STRATEGIC PROGRAMME FOR CLIMATE RESILIENCE (SPCR) UNDER THE PILOT PROGRAMME FOR CLIMATE RESILIENCE (PPCR)




Climate-Resilient & Low-Carbon Sustainable Development Toward Maximizing the Royal Government of Bhutan's Gross National Happiness

GROSS NATIONAL HAPPINESS COMMISSION

THE ROYAL GOVERNMENT OF BHUTAN

FOREWORD

The Royal Government of Bhutan (RGoB) recognizes the devastating impact that climate change is having on Bhutan's economy and our vulnerable communities and biosphere, and we are committed to address these challenges and opportunities through the 12th Five Year Plan (2018-2023). In this context, during the 2009 Conference of the Parties 15 (COP 15) in Copenhagen, RGoB pledged to remain a carbon-neutral country, and has successfully done so. This was reaffirmed at the COP 21 in Paris in 2015.

Despite being a negative-emission Least Developed Country (LDC), Bhutan continues to restrain its socioeconomic development to maintain more than 71% of its geographical area under forest cover,[1] and currently more than 50% of the total land area is formally under protected areas[2], biological corridors and natural reserves. In fact, our constitutional mandate declares that at least 60% of Bhutan's total land areas shall remain under forest cover at all times.

This Strategic Program for Climate Resilience (SPCR) represents a solid framework to build the climate-resilience of vulnerable sectors of the economy and at-risk communities across the country responding to the priorities of NDC. It also offers an integrated story line on Bhutan's national climate-resilience challenges an expectations, with a geo-climatic focus on the highly vulnerable southern belt river basins, mountain ecosystems, and farming communities,

This SPCR includes: innovative eco-system based approaches to Integrated Flood-Based Management (IFBM) of river basins; Climate-Oriented Integrated Watershed Management Plans; Climate SMART Human Settlement planning; building a strong information base for weather and climate services for resilience; a robust and innovative Resource Mobilization Strategy, with non-traditional financing options and sustainability mechanisms; climate-resilient CSMIs, and the promotion of adaptation business services; transformational capacity-building approaches; a strong Gender Equity and Social Development (GESI) component; and "Happiness" developmental performance reporting.

The SPCR preparation and development process has been purposefully country-driven; spearheaded by the Gross National Happiness Commission Secretariat (GNHC-S) with support from the MDB Teams led by the World Bank; with Central and LG officials including Women, Youth, CSOs and private sector representation; and fully vetted by several Government Technical Teams. This SPCR has been formulated through a strategic and participatory process that ensures: (i) strong country buy-in through a highly decentralized development model; and, meaningful programmatic climate-resilient outcomes for vulnerable southern Gewogs (Blocks) and Chiwogs (Sub-blocks).

The institutional mechanism for SPCR Investment implementation, and for monitoring and evaluation, are anchored within GNHC-S to ensure conformity with its mandate as a coordination agency for national level planning, coordination and monitoring of policies, programs and projects. This implementation mechanism will ensure the institutional and governance sustainability of the SPCR by effectively transforming new ideas into tangible and meaningful results on the ground.

Bhutan is submitting its SPCR in a relative position of strength as it was short-listed within a group of 10 eligible countries from a much larger list of expressions of interest of 36 countries. Moreover, Bhutan is not just the first country to officially declare its carbon-neutral commitment to the world - it is the sole nation on earth to actually attain the unique status of carbon-negative state. Notwithstanding this commitment, our national development is being fundamentally hampered by a barrage of climate-induced extreme events wreaking havoc to our local economies, our very precious riparian and highly-mountain ecosystems, and extensive forest cover and protected areas.

[1] Land Use Land Cover 2017 Atlas of Bhutan, Ministry of Agriculture and Forests
[2] Department of Forest and Park Services

Given the profound climate-induced risk that we are facing, and our commitment to climate resilience and negative carbon status, we confidently submit this SPCR proposal to the CIF, with the distinct expectation of categorical endorsement from the CIF PPCR Committee and the International Donor Community to help galvanize the *Kingdom of Bhutan* toward a climate-resilient and low-carbon future in a climate-changing world.

Secretary, Gross National Happiness Commission (GNHC)
November 2017

ACKNOWLEDGEMENT

Bhutan's Strategic Program for Climate Resilience has been carefully crafted with invaluable inputs, and the active participation of multi-sectoral stakeholders from Central Government Line Ministries to Local Government (LG), Multi-lateral Development Banks, Development Partners, and Civil Society Organizations - including the Civil Society Organizations Authority (CSOA) and the Bhutan Chamber of Commerce and Industry (BCCI).

The Gross National Happiness Commission Secretariat (GNHC-S) of the Royal Government of Bhutan gratefully acknowledges the pivotal role played by our SPCR stakeholders. In particular, we thank the Technical Working Groups (TWG); the National Centre for Hydrology and Meteorology; Department of Forest and Park Services (Watershed Management Division) Ministry of Agriculture and Forests; the Department of Engineering Services (FEMD), Department of Human Settlement, Ministry of Works and Human Settlements; and, the National Environment Commission Secretariat - for their painstaking efforts and cooperation in the preparation of this highly innovative SPCR.

GNHC-S on behalf of the Royal Government of Bhutan deeply appreciates the financial support from the Climate Investment Fund (CIF), the tremendous inter-institutional coordination and CIF administrative support, guidance and technical review contribution from the World Bank (WB) as the lead MDB. The GNHC-S further extends its gratitude to the International Finance Corporation (IFC) and the Asian Development Bank for their support during the preparation of this SPCR.

During the various Stakeholder Consultative Workshops (Scoping Mission, Joint Missions, Technical Working Group Meetings, and National Stakeholders Round Table), LG and civil society stakeholders and partner agencies provided quality inputs that demonstrate their unwavering commitment to making this SPCR a country-driven and country-owned document. It strategically addresses Bhutan's critical climate change challenges and priorities, in alignment with Bhutan's developmental priorities [12th Five Year Plan; National Adaptation Plan (NAP); Sustainable Development Goals (SDGs); *Vision 2020: A Vision For Peace, Prosperity, & Happiness*; and our Nationally Determined Contribution (NDC)]. In essence, this SPCR is wholly designed to strategically position Bhutan toward a robust climate-resilient and low-carbon future.

GNHC also offers special thanks to Mr. Peter J. Hayes, SPCR International Consultant; Dr. Mani Ram Moktan, SPCR National Consultant and Maarten van Alst, CIF Expert Reviewer, for helping Bhutan design a truly transformational SPCR that: affords Bhutan a more climate-resilient future; and that confidently positions the RGoB to engage climate-financing donors cognizant of Bhutan's critical development needs and its substantive contribution to global cooling as the sole Carbon-Negative Nation on the planet.

Tashi Delek!

Plan, Monitoring and Coordination Division
Gross National Happiness Commission
November, 2017

EXECUTIVE SUMMARY

SPCR Rationale

1. Located between China in the north and India in the south, west and east, the Kingdom of Bhutan occupies a total geographical area of 38, 394 km^2 (LCMP, 2010) with a projected population of 768,577 persons (48% women) in 2016 (NSB, 2016). Out of the total geographical area, forest covers 70.46%, agriculture 2.75%, barren areas 3.2%, degraded lands 0.54%, meadows 4.10%, shrubs 10.43%, snow cover 7.43%, water bodies 0.72%, human settlements 0.16%, and marshy and non-built up areas each 0.01% (NSB, 2016).

2. Bhutan is highly vulnerable to hydro-meteorological hazards and weather extremes. Some of the major hazards facing Bhutan include flash floods, riverine floods, landslides, landslide dam outburst floods, cloudbursts, glacial lake outburst floods (GLOFs), forest fires, and windstorms. Recognizing its vulnerability to a number of natural hazards and the importance to enhance its resilience capacity to these disasters and to sustain and build on the economic progress that the country has made, Bhutan prioritizes enhancement of climate resilience and disaster risk management in its development agenda. Bhutan is also a member to a number of international parties working towards enhancing climate resilience.

3. In July 2011, the UN General-Assembly unanimously adopted the Bhutan-led resolution on "Hapiness towards a holistic approach to development." As a constitutional mandate, the Gross National Happiness (GNH) Philosophy is used as a development paradigm that inspires and guides the formulation of socio-economic development plans and policies aimed at maximizing the wellbeing and happiness of the Bhutanese people and society.

4. The primary goal of our upcoming 12^{th} Five Year Plan (2013-2018) is the "Maximization of Gross National Happiness." This "Happiness" goal is key pillar of this SPCR which seeks to contribute to our National Key Result Areas (NKRA) 6: Carbon Neutral Climate and Disaster Resilient Development; NKRA 8: Water, Food and Nutrition Security; and NKRA 18: Livability, Safety and Sustainability of Human Settlements.

5. During the United Nations Conference of Parties (COP) 15 in Copenhagen, Bhutan voluntarily pledged to remain carbon-neutral. Bhutan emits approximately 1.6 million tonnes of carbon annually, while its forests serve as a carbon sink absorbing approximately 6.3 million tonnes, distinguishing Bhutan as the sole country in the world with negative carbon emissions. Bhutan's Nationally Determined Contribution (NDC) builds on this commitment to remain carbon-neutral in the Paris Agreement, with 10 adaptation and 9 mitigation priorities. Bhutan's SPCR Investments directly contribute to the implementation of 7 of these adaptation priorities and 6 mitigation priorities.

6. Ironically, Bhutan's net sequestration status does not make it immune to global anthropogenic climate change directly threatening our fragile mountain ecosystems and river basins, and our vulnerable communities. For example, an expected increase in mean annual temperature by 3.5ºC (1980-2069) will lead to an accelerated melting of Bhutan's high mountain glaciers, triggering Glacial Lake Outburst Floods (GLOFs) impacting downstream rural and urban infrastructure and energy supplies, drinking and irrigation water, farmlands, transportation and communications, and loss of human life.

7. As well, climate-induced extreme precipitation during the monsoon causes flashfloods, damaging its scare 2.75% of cultivable farm land, farm roads and national highways cutting-off vital transport routes between the highlands, inner central valleys, and southern townships. This adversely impacts food supplies, and the population's access to vital health and energy services.

8. Natural resource-dependent Cottage, Small and Medium Industries (CSMIs) are also vulnerable to climate impacts. Business communities are painfully aware that their value-chains are frequently subject to climate risks, due to climate-induced water shortages for production processes and farm-based enterprise, and from downstream flash floods and debris flows. This is especially so in the agriculture and

power sectors, particularly in the southern region of Bhutan where violent climate impacts are more frequent.

9. Bhutan is also endowed with vast water supplies, yet paradoxically suffers from increasing water scarcity and drought to localized ground and spring water from climate-induced erratic and scanty rainfall patterns. The acute water shortages across the inner dry valleys and cities of Wangdi Phodrang, Trashigang and Lhuntse Dzongkhag have many farmers frustrated with rain-fed irrigated paddy lands turning fallow, and ensuing food insecurity in their home communities.

10. Although Bhutan has made great strides in its SDG and national development goals, as an aspiring Low-Middle Income Country, it is subject to several developmental contradictions. More than 58%[3] of its total labour force is engaged in agriculture activities, yet agriculture is practiced on barely 2.75% of existing cultivated land,[4] with most food items being imported from India. Limited access to quality and timely hydro-meterologica data easily understandable by the farmers is a major gap in making this sector climate resilience.

11. Thus, with Bhutan's extremely high food insecurity/low food self-sufficiency, and its low-rated Economic Vulnerability Index (EVI) due to its topography and hydrologically unstable climate, the country's LDC status may actually remain static. It is also plausible that anticipated climate shocks may actually reverse Bhutan's positive development trends by precipitating a sizable economic shock, resulting in an unanticipated drop in Bhutan's Gross National Income (GNI), and a downward trend in socio-economic development.

12. In this context, most Gewogs (Blocks) and Chiwogs (Sub-Blocks) across Bhutan have a very low "reactive" adaptation capacity attributed to their limited resource base, precarious socio-economic status, labour shortages; and increased risk and exposure to drought, unseasonal precipitation, and extreme wind events. Bhutan's SPCR must therefore prioritize the incorporation of eco-system-based climate-resilient measures to protect human settlements and critical infrastructure, especially in our Southern Dzongkhags (Districts) where vulnerability and exposure to climate impacts are at their greatest.

13. Within Central Government, the current knowledge base and operational capabilities of Bhutan's Central Agencies and SPCR Line Ministry Implementing Agencies are very modestly equipped to respond to risk management needs in the field. With extensive dialogue to date on SPCR, these expert teams are excited at the prospect of assuming greater institutional roles in the innovative design and implementation of climate risk management initiatives.

14. For example, the National Centre for Hydrology and Meteorology (NCHM) is the key Agency mandated to provide data and science-based assessment, which underpins analysis and Investments related to flood management, watershed management and water scarcity management, Climate-SMART human settlement. However, it has very limited capacity to conduct basic climate projections and climate change impact assessments. While risks posed by climate change to critical environments, infrastructure and vulnerable populations are well perceived by Government and civil society, limited scientific knowledge and technical capacity in-country on anticipating climate impacts hinders the Government's and other agencies' ability to adequately understand, let alone strategically respond to climate hazards.

15. Regarding water resources, many of the critical Watershed Management Plans developed by the Watershed Management Division (WMD), report the drying-up of water sources in seven major and minor river basins across the country. WMD is one of the key Agencies mandated to sustainably manage watersheds and be equipped with multidisciplinary technical professionals. However, it currently lacks adequate technical capacity to address climate-induced drinking and irrigation water shortages.

[3] Labour Force Survey Report 2015. Ministry of Labour and Human Resources.
[4] Atlas of Bhutan, Land Use Land Cover 2017. Ministry of Agriculture and Forests.

16. Although flooding occurs in most parts of the country, it is most recurrent in the southern region (Samdrup Jongkhar, Sarpang, Dagana, Chukkha and Samtse). This extreme and repeated flooding generates hazardous debri-flows downstream, and deposits in the southern plains making human settlements and the scarce arable lands along the river banks considerably vulnerable and exposed. Here, the Flood Engineering Management Division (FEMD) requires training and resources to develop an eco-system-based and proactive adaptation approach to mitigate flood damages by green infrastructure to respond to these repeated flood events.

17. With rapid urbanization, it is the priority of the Government to implement Climate-SMART measures to make municipal infrastructure and services climate-resilient for its inhabitants. Samdrup JongkharThromde in the south-eastern part of the country is one of the rapidly growing municipalities, playing a strategic role as a trading hub, an administrative centre, and a key transit point leading to accelerated urbanization. The Thromde lacks climate-resilient municipal infrastructure and services, and the most basic and hazard-free leisure and green spaces. The DHS is equipped with urban planning capacity but requires further support in planning climate-SMART human settlements.

18. Environment, Climate Change and Poverty (ECP) are cross-cutting issues that government policy-makers and planners have prioritized in the 12th FYP. It is therefore imperative that ECP concerns be mainstreamed systematically in Bhutan's Tertiary Education system through the University and College Networks and in the LGs planning process.

19. With the private sector partners desperately seeking climate-proofing skills to protect Industry's bottom-line against climate extremes, tailor-made adaptation measures and risk management products for industry are essential – especially given that there are more than 27,000 licensed businesses across the country, of which about 85% are micro/cottage and small enterprise (20,143), and of those an estimated 65% are women-led.

Strategic Approach

20. With a view to addressing these climate risks and institutional adaptation gaps, GNHC-S of the Royal Government of Bhutan sought support from the Climate Investment Fund (CIF) to develop a Strategic Programme for Climate Resilience (SPCR). Consequently, Bhutan became one of 10 countries eligible for funding under the CIF Pilot Program for Climate Resilience (PPCR).

21. The SPCR development process was country-driven, spearheaded by the Gross National Happiness Commission Secretariat (GNHC-S) with participation of MDBs, Central and Local Government officials, Development Partners, CSOs and Private sector; and, technically vetted by Line Ministry Technical Agencies, gradually evolving into a genuine country-owned initiative.

22. On the strategic planning side, Bhutan's SPCR reflects a climate-resilience vision that: (i) complements the overarching developmental policy framework of *Gross National Happiness* (GNH) and poverty reduction; (ii) prioritizes adaptation mainstreaming and risk management institutional strengthening and capacity-building; and, (iii) articulates a program of climate risk management (and low-carbon development) Investments and activities to contribute to Bhutan's 12th Five Year Plan (FYP), and to complement NAP, NDC, and SDG priorities.

23. The policy and development framework of Bhutan (GNH, FYP) underscore the need for strategic engagement to achieve transformative resilience at scale. In this context, the SPCR emphasis a focus on the national landscape, with a geographical progression starting in the glacier-melting northern highlands, through the eco-system stressed central valleys, to the highly vulnerable southern lowlands; coupled with a bottom-up approach to climate-resilience for human settlements, ecosystems, and critical infrastructure; including a focus on strengthening and enabling information and knowledge base. A disproportionate share of SPCR Investments will strategically focus on vulnerable communities in the Southern belt, with significant institutional strengthening in the Central Government and capacity-building in Local Governments and high-risk/low adaptive capacity target communities.

24. Recognizing the aforementioned developmental and institutional challenges, and the barrage of climate hazards and longer term climate change impacts that Bhutan faces, the SPCR set out a set of programme of high priority Investments that will be instrumental in orienting Bhutan towards a stronger and sustainable pathway of climate resilient development. To this end, the SPCR seeks to develop the following programmatic Investments:

25. **Investment 1 (**US $6.5 million from PPCR): Building Climate Resilience Through Enhancement *of Hydro-Meteorological and Cryosphere Information* - led by NCHM to strengthen hydro-meterologica information and services to the climate sensitive sectors and enhanced early warning systems through improved climate impact modeling projections to anticipate climate impacts at the Investment/community levels and better inform the communities on climate hazard.

26. Through extensive staff, Line Ministry and community-based training and strengthening the infrastructure and capacity for the development of impact scenarios and Vulnerability & Adaptation Assessments, NCHM will formulate risk profiles and provide customized service delivery for priority sectors and SPCR target regions. Trainings will also create a critical mass of government and grassroots community experts, fully equipped with climate science, hydrology and cryosphere risk management knowledge and capability.

27. **Investment 2** (US $10 million from PPCR): *Strengthening Climate-Resilient in the Management of targeted Watersheds and Water Sources*- led by WMD, DoFPS to sustainably manage watershed and water resources in the context of climate induced water shortages, identify water scarcity hot-spots, and formulate and introduce Climate-adaptive Integrated Watershed Management Plans, Climate-adaptive Wetland Management Guidelines and carry out Pan-National Adaptive Wetland Inventory.

28. These instruments will help strengthen Government's and southern target communities' capacity to develop and implement adaptive watershed management plans, and conduct more accurate climate-related ground-truthing of water resources.

29. **Investment 3** (US$ 28 million from PPCR): *Strengthening Resilience to Flood Hazards* - led by FEMD, MoWHS to develop Adaptive Integrated Flood Management (IFM) Plan, implement IFM infrastructure solutions, and build community resilience, especially in the flood hazard-prone southern region.

30. Flood Hazard, Risk and Vulnerability Maps and Profiles will be prepared for high-risk settlements and farmlands; and geotechnical/geo-climatic Projects will be conducted in target river basins, including the detailed Project and analysis of target catchment and downstream flooding in southern regions. Adaptive eco-system-based (green engineering) flood mitigation infrastructure will be introduced. Overall, the national adaptive capacity to respond to climate-induced floods will be solidified through climate impact science and climate adaptive measures in high-risk river basins and vulnerable downstream settlements, small industry, and critical infrastructure.

31. **Investment 4 (**US $7 million from PPCR): *Supporting Climate-SMART Human Settlement Planning and Development for Samdrup Jongkhar Thromde* - led by DHS under the MoWHS to introduce Climate-SMART and low-carbon human settlement planning and developmental practices at the Thromde level.

32. A replicable Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) Land Use Plan will be validated for Samdrup Jongkhar Thromde, and for use in other vulnerable southern areas. This will enable DHS and the Local Governments and industry partners to plan, design and implement Climate-SMART municipal services and infrastructure.

33. Strengthened governance, institutional coordination, and human resource capacity with Thromde, private sector, women's groups, and youth CBOs will be assured via participatory approach. The livability of peri-urban/rural residents will also be enhanced through climate-SMART planning, design and implementation.

34. **Investment 5** (Inter-woven across SPCR Program): *Strengthening Climate Resilience in Private Sector Intervention* - led by GNHC in collaboration with the Bhutan Chamber of Industry and Commerce to (i) vulnerable CSMIs trained in climate-proofing, to protect property and value-chains and ii) adaptation–related products and services developed and marketed to support diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.

35. Within the current scope of private sector activities, Investments in making energy infrastructure more resilient, ensuring transportation networks (roads) cope with climate variability, increasing resilience of agriculture, tourism and other supply chains are some areas where private sector Investments could play a role to address Bhutan's climate vulnerabilities.

36. **Investment 6 (**US $1.5 million from PPCR): *Strengthening Capacity for the Development of a Sound Climate Education Programme in Bhutan* - led by NEC in collaboration with the Royal University of Bhutan (RUB**)** to mainstream Environment, Climate Change & Poverty (ECP) curriculum throughout the tertiary education system and at LG levels.

37. This intervention will help identify gaps in the professional capacity of institutions in Bhutan, Such as meteorologists, hydrologists and hydro-geologists, and how such expertise can be further developed within the existing curriculum of university level colleges to improve Central and LGs governance on climate change policy, and enhance their HR adaption capacity. It will also support the establishment of climate research labs, develop university level climate education programmes and built capacity at the district levels.

38. Throughout these aforementioned SPCR Investments, Gender Equity and Social Integration (GESI) is systematically interwoven through the entire SPCR Program life-cycle. GESI will be programmatically supported by the National Network of Line Ministry and LG Gender Focals, with the explicit involvement of the National Commission for Women & Children (NCWC), women led CSOs and CSMIs.

39. For sustainability, SPCR Investments and where possible broadly within the national budget, will incorporate: (i) an incremental adaptation co-efficient that calculates requisite funding to cover the cost of climate-proofing current and future Investments; and (ii) investigate the validity of a Bhutanese Adaptation/Green Bond for future financing of climate change programs. In addition, since these priorities are fully integrated with the 12th FYP, they will reflect RGoB's priorities over the next five years.

40. In essence, Bhutan's SPCR presents a fully integrated, multi-sectoral, programmatic, and cross-cutting Investment package. With Contract Agreements now signed between the GNHC-S and Lead Technical Agencies, SPCR Phase I Preparatory Technical Projects have now commenced, and are being implemented over a ten to fifteen month period, with expected completion between June to December, 2018. With SPCR being strongly aligned with the RGoB 12th FYP which commences in July 2018, it is vital that PPCR financing coincide with these SPCR Investment timelines.

41. Recognizing this SPCR's overall positive impact on reducing Bhutan's vulnerability to climate shocks, and helping it to strengthen the information base for climate resilience by improving and delivering hydromet and climate services; introduce climate-resilient water resource management; protect lives and livelihood with eco-system-based Integrated Flood Risk Management (IFRM); bolster food security and food sufficiency; apply Climate-SMART urban planning; engage women-led CSMIs in climate-resilient value chains and risk management business activities; and promote climate-

mainstreaming across tertiary educational institutes, the RGoB invites development partners to collaborate on this SPCR Developmental Happiness adventure.

42. The total SPCR funding envelope amounts to US $154.941 million , of which US $55.65 million represents requested PPCR Investment funding; and, US $99.291 million represents the combined RGoB and development partners co-financing contribution. Bhutan, therefore submits to the CIF this innovative SPCR, with the distinct expectation that the entire PPCR Investment envelope of US $55.65 million will be funded - recognizing that Bhutan has categorically earned its stripes as a PPCR eligible country with high-risk vulnerability from climate extremes, and an unbending commitment to maintain its carbon-negative status, both deserving of international financing support.

Contents

List of Figures

List of Tables

List of Annexes

10. List of Key Reference Documents For Inception Report & SPCR Formulation

ABBREVIATIONS AND ACRONYMS

ABI	Association of Bhutanese Industries
ACCF	Africa Climate Change Fund
ADA	Austrian Development Agency
ADB	Asian Development Bank
ADB BRM	Asian Development Bank Bhutan Resident Mission
ADF	Asian Development Fund
AF	Adaptation Fund
AKRA	Agency Key Results Area
AM	Aide Memoire
APA	Annul Performance Agreement
ASAP	Adaptation for Smallholder Agriculture Program
BAOWE	Bhutanese Association of Women Entrepreneurs
BCCI	Bhutan Chamber of Commerce and Industry
BFL	Bhutan for Life
BHU	Basic Health Unit
BLSS	Bhutan Living Standards Survey
BNEW	Bhutanese Network for Empowering Women
BOB	Bank of Bhutan
BRM	Bhutan Resident Mission
BTFEC	Bhutan Trust Fund for Environmental Conservation
BTO	Back to Office Report
CCCC	Climate Change Coordinating Committee
CBDRM	Community Based Disaster Risk Management
CBD	Convention on Biological Diversity
CBFF	Congo Basin Forest Fund
CBO	Community-Based Organization
CBS	Center for Bhutan Projects
CCA	Climate Change Adaptation
CCM	Country Coordination Mechanism
CDKN	Climate Development Knowledge Network
CDM	Clean Development Mechanism
CGE	Computational General Equilibrium
CGIS	Center for Geographic Information System
CIF	Climate Investment Fund
CNC	Carbon Negative Country
COBP	Country Operations Business Plan
CPS	Country Partnership Strategy
CR	Climate-Resilient
CRM	Climate Risk Management
CSDRMS	Commonwealth Secretariat Department Reporting Management System
CSMI	Cottage, Small, & Medium Industry
CSO	Civil Society Organizations
CTF	Clean Technology Fund
DA	Designated Account
DANIDA	Danish International Development Agency
DCSI	Department of Cottage and Small Industry
DDM	Department of Disaster Management
DEM	Digital Elevation Model
DGM	Department of Geology and Mines
DHS	Department of Human Settlements

DMD	Debt Management Division
DMEA	Department of Macroeconomic Affairs
DMIS	Disaster Management Information System
DoA	Department of Agriculture
DoFPS	Department of Forest and Park Services
DoHS	Department of Hydromet Services
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ECP	Environment, Climate Change and Poverty
EIA	Environmental Impact Assessment
ENGO	Environmental Non-Governmental Organization
EOI	Expression of Interest
EPOS	European Public Offering of Securities
EU	European Union
EVI	Economic Vulnerability Index
EWS	Early Warning System
FCPF	Forest Carbon Partnership Facility
FEMD	Flood Engineering Management Division
FIP	Forest Investment Program
FAO	Food and Agriculture Organization
FREL	Forest Reference Emission Level
FYP	Five Year Plan
GAFSP	Global Agriculture and Food Security Program
GBFA	Government Budget Fund Account
GCCA	Global Climate Change Alliance
GCCI	Global Climate Change Initiative
GCF	Green Climate Fund
GCM	General Circulation Models
GCPF	Global Climate Partnership Fund
GDP	Gross Domestic Product
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GEF	Global Environment Facility
GEMS	Gender Equality Monitoring System
GESI	Gender Equity & Social Integration
GHG	Green House Gas
GIS	Geographic Information System
GLOF	Glacial Lake Outburst Flood
GLS	Gray Leaf Spot
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GNHC-S	Gross National Happiness Commission Secretariat
GNHI	Gross National Happiness Indices
GNI	Gross National Income
GPMS	Government Performance Management System
GPPB	Green Public Procurement in Bhutan
GRS	Grievance Redress System
HAI	Human Asset Index
HANAS	High Altitude Northern Areas
HoID	Hydromet Operations & Infrastructure Division
HRVA	Hazard Risk Vulnerability Assessment
HWSD	Hydrology & Water Services Division
IBRD	International Bank for Reconstruction and Development

ICF	International Climate Fund
ICFI	International Climate Forest Initiative
ICI	International Climate Initiative
ICIMOD	International Center for Integrated Mountain Development
IDA	International Development Assistance
IFC	International Finance Corporation
IFFIm	International Finance Facility for Immunization Company
INDC	Indicative Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
ISP	Implementation Support Plan
IUCN	International Union for Conservation of Nature
IUFR	Interim Unaudited Financial Report
IWRM	Integrated Water Resource Management
JI	Joint Implementation
JICA	Japan International Cooperation Agency
KPIs	Key Performance Indicators
LCMP	Land Use and Cover Mapping Project
LDC	Least Developed Country
LDCF	Least Developed Countries Funds
LG	Local Government
LGKRA	Local Government Key Result Areas
LMRG	Local Mainstreaming Reference Group
LUP	Land Use Planning
M&E	Monitoring and Evaluation
MDB	Multilateral Development Bank
MDG	Millennium Development Goal
MIC	Middle Income Country
MIS	Management Information System
MLRWR	Ministry of Land Reclamation & Water Resources
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
MoF	Ministry of Finance
MoHCA	Ministry of Home & Cultural Affairs
MoIC	Ministry of Information and Communications
MoLHR	Ministry of Labor & Human Resources
MoWHS	Ministry of Work & Human Settlement
MSTCCC	Multi-Sectoral Technical Committee on Climate Change
MW	Mega Watt
MRG	Mainstreaming Reference Group
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NAPA	National Adaptation Plan of Action
NBC	National Biodiversity Center
NC	National Communication
NCHM	National Center for Hydrology and Meteorology
NCWC	National Commission for Women and Children
NDC	Nationally Determined Contributions
NEC	National Environment Commission
NES	National Environment Strategy
NGO	Non-Governmental Organization
NIE	National Implementing Entity
NIWRM	National Integrated Water Resource Management

NKRA	National Key Result Area
NPF	New Procurement Framework
NRP	National Rehabilitation Program
NSB	National Statistics Bureau
OAS	Organization of American States
OECD	Organization for Economic Cooperation & Development
ORC	Outreach Clinic
PCR	Project Compliance Request
PDO	Project Development Objective
PEMS	Public Expenditure Management System
PES	Payments for Environmental Services
PFC	Project Finance Component
PIU	Project Implementation Unit
PMCD	Plan, Monitoring and Coordination Division
PMR	Partnership for Market Readiness
PMU	Program Management Unit
PNG	Papua New Guinea
PPCR	Pilot Program for Climate Resilience
PPP	Public Private Sector Partnership
PPSD	Project Procurement Strategy for Development
PRECIS	Providing Regional Climates for Impacts Projects
PLAMs	Planning and Monitoring System
RAA	Royal Auditing Authority
RCSC	Royal Civil Service Commission
REAP	Rural Economy Advancement Program
REM	REDD Early Mover
RENEW	Respect, Educate, Nurture and Empower Women
RGoB	Royal Government of Bhutan
RMA	Royal Monetary Authority
RMR	Reliability-Must-Run
RNR	Renewable Natural Resources
RUB	Royal University of Bhutan
RSPN	Royal Society for Protection of Nature
SCCF	Special Climate Change Fund
SCF	Strategic Climate Fund
SDG	Sustainable Development Goal
SDM	Statistical Downscaled Model
SIDS	Small Island Developing States
SLMP	Sustainable Land Management Plans
SMART	Sustainable Mitigation Adaptation Risk Toolkit
SNV	Stichting Nederlandse Vrijwilligers (Netherlands Development Organization)
SPCR	Strategic Program for Climate Resilience
SREP	Scaling-Up Renewable Energy Program
STEP	Systemic Tracking of Exchange in Procurement
THPP	Targeted Household Poverty Program
TOR	Terms of Reference
TOT	Training of Trainers
TRAH	Tajikistan National Agency for Hydrometeorology
TWG	Technical Working Group
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization

UNFCCC	United Nations Framework Convention on Climate Change
UN ESC	United Nations Economic & Social Council
UNPA	United Nations Population Fund
UNREDD	United Nations Collaborative Program on Reducing Emissions for Deforestation and Forest Degradation
UWICE	Ugyen Wangchuck Institute for Conservation and Environment
VRA	Vulnerability & Risk Assessments
VFM	Value for Money
WARF	Weather Research and Forecasting
WB	World Bank
WBG	World Bank Group
WCP	Wangchuck Centennial Park
WCSD	Weather & Climate Services Division
WEAP	Water Evaluation and Planning
WHO	World Health Organization
WMD	Watershed Management Division
WWF	World Wide Fund for Nature
YDC	Youth Development Center
YDF	Youth Development Fund

GLOSSARY OF BHUTANESE TERMS

Nu	Ngultrum (Bhutanese currency)
Chhu	River
Chiwog	1044 basic electoral precincts of Bhutan (Sub-block)
Dzongkhag	District
Drungkhag	Sub-District
Dzongkhag Tshogdu	District Committee
Druk Gyalpo	King of Bhutan
Gups	Head of the Gewog
Thromde	Municipality
Yenlag Thromdes	Satellite towns
Gewog	Blocks
Gewog Tshogde	Block Committee

TEMPLATE FOR SUMMARY OF SPCR[5]

PILOT PROGRAM FOR CLIMATE RESILIENCE Summary of Strategic Program for Climate Resilience		
1. **Country/Region**:	Royal Government of Bhutan/South Asia	
2. **PPCR Funding Request (in USD million)**	Grant: **US $55.65 million**	Loan:
3. **National PPCR Focal Point**:	Dasho Thinley Namgyel, Secretary, Gross National Happiness Commission Secretariat, Royal Government of Bhutan, P.O. Box 127, Tashichho Dzong, Thimphu, Bhutan Tel.; +975 2 325192/325850; Fax.; +975 02 322928 E-mail: tnamgyel@gnhc.gov.bt	
4. **National Implementing Agency** (Coordination of Strategic Program)**:**	**Coordination & Executing Agency & Fund Manager:** Gross National Happiness Commission Secretariat **Program Management Unit (PMU):** GNHC-S **Implementing Agency(ies):** **Investment 1**: National Centre for Hydrology and Meteorology **Investment 2**:Watershed Management Division, Department of Forest and Park Services, Ministry of Agriculture and Forests **Investment 3:** Department of Engineering Services, Ministry of Works and Human Settlement **Investment 4:** Department of Human Settlement, Ministry of Works and Human Settlement **Investment 5:** Gross National Happiness Commission Secretariat in collaboration with the Bhutan Chamber of Commerce and Industry **Investment 6:** National Environment Commission in collaboration with Royal University of Bhutan	
5. **Involved MDB**	World Bank (WB)	
6. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	Headquarters-PPCR Focal Point: **World Bank**: Kanta Kumari Rigaud **IFC**: Joyita Mukherjee **ADB**:	Task Team Leader: **World Bank**: Dechen Tshering **IFC**: Om Bhandari **ADB**:

[5] To be submitted together with the full strategy document for endorsement by the PPCR Sub-Committee.

Description of SPCR:

(a) Key challenges related to vulnerability to climate change/variability:

Bhutan has entered the 21st century with its natural environment largely intact. It is also one of the first countries that have pledged to remain carbon neutral with actually carbon negative emission. Ironically, Bhutan's net negative carbon emission status does not make it immune to global anthropogenic climate change directly threatening our fragile mountain ecosystems and river basins, and its vulnerable communities. For example, an expected increase in the mean annual temperature by 3.5ºC (1980-2069) will lead to an accelerated melting of Bhutan's high mountain glaciers, triggering Glacial Lake Outburst Floods (GLOFs) impacting downstream rural and urban infrastructure and energy supplies, drinking and irrigation water, farmlands, transportation and communications, and loss of human lives.

As well, extreme hydro-meteorological events in the form of cyclone-induced heavy rains and flash-floods, windstorms and hailstorms are becoming much more frequent, and negatively impacting food security/food self-sufficiency, damaging scarce 2.75% of cultivable farm land, and threatening downstream critical infrastructure, human settlements, and destabilizing bio-diverse ecosystems. Damaged farm roads and national highways repeatedly cut-off vital transport routes between the highlands, inner central valleys, and southern townships adversely impacting food supplies, access to vital health and energy services and economic development.

Although Bhutan is endowed with vast water supplies, paradoxically Bhutan also suffers from increasing water scarcity and drought to localized ground and spring water sources from climate-induced erratic and scanty rainfall patterns. The acute water shortages across the inner dry valleys (Wangdue, Trashigang, Mongar, and Lhuntse) and southern valleys have many farmers frustrated with rain-fed irrigated paddy lands turning fallow, and ensuing food insecurity in their communities.

Tambe et al (2012) claims: "Due to the impacts of climate change on precipitation patterns such as rise in rainfall intensity, reduction in its temporal spread, and a marked decline in winter rain, coupled with other anthropogenic causes, the problem of drying springs is being increasingly felt across the region."

The electricity and water sectors account for 14.34%, agriculture and forestry account for 16.67%, and, construction infrastructure accounts for 15.61% of Bhutan's GDP growth in 2016. However, climate change variability and extremes are wreaking havoc on the productivity and performance of these and other socio-economic development sectors.

Natural resource-dependent CSMI's are also vulnerable to climate impacts. Business communities are painfully aware that their value-chains are frequently subject to climate risks, due to climate-induced water shortages for production processes and farm-based enterprise, and from downstream flash floods and debris flows.

Thus, with Bhutan's extremely high food insecurity/low food self-sufficiency, and its low-rated Economic Vulnerability Index (EVI) due to its topography and hydrologically unstable climate, the country's LDC status may actually remain static. It is also plausible that anticipated climate shocks may actually reverse Bhutan's positive development trends by precipitating an economic shock that results in an unanticipated drop in Bhutan's Gross National Income (GNI) and downward trend in socio-economic development.

If climate change issues and challenges are not urgently addressed, the productivity of these key development sectors will continue to decline from water resource and eco-system destabilization, making the people, economy and ecosystems increasingly vulnerable. While the cost of climate resilience may be expensive, the cost of inaction will be incalculable.

(b) Areas of Intervention – sectors and themes

a) Develop Hydromet, Early Warning and Climate Information Services for Climate-Resilient Development and Disaster Risk Management
b) Promote Climate-Resilient Food and Water Security, and Sustainable Management of Natural Resources (Wetland Ecosystems and Watersheds)
c) Strengthen Climate-Resilient Integrated Flood Management & Practices; Introduce Adaptive Eco-System based mitigation measures;
d) Promote Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) Human Settlement Planning and Development.
e) Engage CSMIs in Climate-Proofing Measures; and Adaptation-Related Business Products & Services
f) Build Institutional Capacity to Mainstream Environment, Climate Change & Poverty (ECP) in Tertiary Education System and at the LG.

Themes: Climate Change Adaptation Mainstreaming; Food and Water Security; Risk Management Institutional Strengthening (Capacity-Building); Climate-SMART Land Use Planning; Hydro-meterologica Data and Services, Gender Equity & Social Inclusion Mainstreaming; Climate-Resilient Cottage, Small and Medium Industry (CSMI); Private Sector Integration; Climate Risk Management & Disaster Risk Management (DRM) Synergies; and Adaptation Co-efficient.

(c) Strategic Pillars

Pillar 1: Enhancing Information Base for Hydromet Services & Climate-Resilience
Pillar 2: Preparedness, Food & Water Security
Pillar 3: Sustainable Growth & Resilient Infrastructure
Pillar 4 (Cross-Cutting): Strengthening Institutional Coordination and Human Resource Capacity Through Curriculum Development

(d) Expected Outcomes from the Implementation of the SPCR

Investment 1: Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information
Outcome 1: NCHM trained to deliver reliable hydromet and cryosphere information services to Central & LGs and the public to inform policy decisions
Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water Sources
Outcome 2: Improved water availability and accessibility through Climate-Resilient Integrated Watershed Management Program Implementation
Investment 3: Strengthening Resilience to Flood Hazards
Outcome 3: Reduced flood risks to flood prone vulnerable communities in Southern Bhutan
Investment 4: Supporting Climate-SMART Human Settlement Planning & Development for Samdrup Jongkhar Thromde
Outcome 4: Climate-SMART human settlement plans to climate-proof Thromde (municipal/township) infrastructure and services.
Investment 5: Strengthening Climate Resilience in Private Sector Interventions (Inter-Woven)
Outcome 5: Climate proofing value-chains of CSMIs with climate-resilient measures, and development and marketing of climate risk management products and service delivery.
Investment 6: Strengthening Capacity for Development of a Sound Climate Education Program in Bhutan
Outcome 6: Institutional and human resource capacity of Academia, Central Government (Civil Service and Line Ministries), and LGs on climate- resilience strengthened

7. **Expected Key results from the Implementation of the Investment Strategy (consistent with PPCR Results Framework):**	
Results	**Success Indicator (s)**
Investment 1: Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information	
Output 1.1: Hydro-meteorology and cryosphere research and climate risk management capacity enhanced	Percentage of NCHM staff trained on hydrometeorology and cryosphere research and data management(gender disaggregated); CSO and public access to climate information
Output 1.2: Downscaled climate model (Dynamical) 5-10 km resolution functional	Downscaling facilities (high-end computers with software modelling to utilize 6 different GCMs with 4 different scenarios; RCP2, 2.6, 4.5 & 8.5) installed and functional
Output 1.3: Climate projections and impact scenarios developed for priority sectors and SPCR target regions, in consultation with and involvement of relevant stakeholders at National, Dzongkhag, and Gewog/CSO levels	Climate change impact projections available for pilot project areas, and at national level for Government Line Ministries; GLOF data updated, published and accessible to public
Output 1.4: Hydro-meteorological data bolstered through localized hydromet stations	Number of functional hydromet stations reporting data remotely
Output 1.5: Pool of experts (NCHM, Line Ministries/Civil society) established in climate science, hydrology and cryosphere	Number of staff trained on medium & extended range on climate extremes, risk assessment, instrumentation, hazard mapping, melt modelling, observation, calibration and validation of hydro-meteorological and weather model (HBV, Mike 11, WRF) instrumentation (gender disaggregated); and number of climate knowledge products developed and disseminated to inform climate risk management planning and policy decisions at the National, Dzongkhag and Gewog level
Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water Sources	
Output 2.1: Develop and implement Adaptive Integrated Watershed Management Plans in critical watersheds with beneficiary groups including women, and target drying water sources rehabilitated.	Number of critical watersheds for drinking and irrigation in SPCR pilot sites in southern Bhutan with management plans in place
Output 2.2: Nationwide wetlands inventory mapped in consultation with key stakeholders, and Climate-Resilient Wetland Management Guidelines developed.	Inventory of wetlands in the SPCR project areas; and Management Plans/Guidelines in place
Output 2.3: Valuation of wetlands carried out, and Climate-Oriented Payment for Ecosystem Services (PES) schemes toward for conservation explored.	Quantification and valuation of critical wetlands in SPCR pilot areas; and feasibility of PES schemes carried out. Upon favorable result, establishment of the PES schemes
Output 2.4: Enhanced climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in	DoFPS, number of Line Ministries, and number of

Central & Southern target communities) on wetlands and watershed management.	communities (including women groups, youth and CSMIs) trained in adaptive watershed and water conservation concepts, policies, climate-oriented water resource inventory and mapping hydrogeology (gender disaggregated).
Investment 3: Strengthening Resilience to Flood Hazards **Output 3.1:** Flood risk and vulnerability assessed, climate hazards mapped and geotechnical/geoclimatic Projects completed in southern Bhutan (Phase 1- Moa River Basin, under Sarpang District). **Output 3.2**: Hazard, risk and vulnerability maps prepared, detailed Project and analysis of target catchment & downstream flooding conducted in other southern regions (eg. Samdrup Jongkhar, Phuntsholing, Samtse, Dagana, Sarpang). **Output 3.3:** Climate-resilient measures implemented in vulnerable target river basins against extreme climate events causing flood hazards, in collaboration with at-risk communities including: women, youth and private sector. **Output 3.4:** Strengthened national capacity (MoWHS, LGs, and vulnerable communities) to respond to climate-induced floods through structured ability to assess, analyse, prepare and apply climate impact science and integrate climate adaptive measures.	Number of reports on flood vulnerability; climate hazards maps; geotechnical feasibilities conducted and reported on Maochu, Shetikheri and Aiepoly (big and small) river Increased number of households adopting climate-resilient measures in Sarpang, Phuntsholing, Samdrup Jongkhar and Samtse Number of climate-resilient activities implemented in collaboration with vulnerable communities/groups Number of long-term/ short-term training events/workshops; community sensitization; learning by doing on climate, flood & environment-related fields (gender disaggregated).
Investment 4: **Supporting Climate-SMART Human Settlement Planning & Development for Samdrup Jongkhar Thromde** **Output 4.1:** Revised climate-oriented Samdrup JongkharUrban Development Plan, and replicable Climate-SMART Land Use Plan for use in vulnerable southern Thromdes (Phase II). **Output 4.2:** Enhanced effectiveness and efficiency of municipal services (eg. climate-resilient urban roads; climate adaptive WaSH infrastructure), through planning, design and implementation of Climate-SMART municipal services and infrastructure. **Output 4.3:** Improved urban resilience through Climate-SMART planning that incorporates hydromet-related hazard risk management approaches to flooding and landslides; and to green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands). **Output 4.4:** Sustainably managed land resources in the target Thromde through climate-proofing of human settlement areas.	Climate-SMART LUP Standards and Guidelines for Samdrup JongkharThromde Inventory and stocking of drinking water, road, electricity, waste water and solid waste, land use in the Thromde (gender disaggregated); percentage of hazard incidents, & comparative % invested to rehabilitate damaged municipal Investments Percentage of urban residents (visitation) using Climate-SMART urban infrastructure and hazard-fee green and recreational spaces facilities(gender disaggregated) Percentage of Thromde land resources at low-risk/adaptive to climate hazards.

Output 4.5: Strengthened governance, institutional coordination, and human resource capacity with private sector stakeholders, women's groups, and youth CBOs via Climate-SMART training workshops and inclusive participatory approach. **Output 4.6:** DHS and Samdrup JongkharThromde land use planners and urban designers trained in Climate-SMART planning, along with women-led CSMIs and CSOs.	Number of Thromde inhabitants and civil society organization stakeholders engaged (gender disaggregated). Number of training workshops on Climate-SMART human settlement planning and benefits (Gender disaggregated).
Investment 5: Strengthening Climate Resilience in Private Sector Interventions (Inter-Woven) **Output 5.1:** Vulnerable CSMIs trained in climate-proofing, to protect property and value-chains **Output 5.2:** Adaptation–related products and services developed and marketed to support diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.	No. of CSMIs using climate information and services produced by NCHM (gender disaggregated). No. of CSMIs vulnerable to climate change identified and reported (gender disaggregated).
Investment 6: Strengthening Capacity for Development of a Sound Climate Education Program in Bhutan **Output 6.1:** Enhanced and revised curriculum on environment, climate change, and poverty (ECP) within tertiary education sector, with specific focus on Sherubtse College (Trashigang) and College of Science and Technology (Phuntsholing). **Output 6.2:** Establishment of ECP teaching and research institute/units. **Output 6.3:** Capacity-building of Faculties, civil service professionals and students on ECP, and climate change projections and impact modeling. **Output 6.4:** Institutional capacity to mainstream climate change in development planning across multiple-sectors and agencies.	Climate change history, theory and praxis curriculum in place in RUB and participating colleges. Climate change teaching & research facilities upgraded with ECP; number of ECP Academic Scholarships. Number of Faculties and LG Representatives benefitting from/participating in ECP training (gender disaggregated). ECP mainstreaming capacity of faculties and students developed in participating colleges and in target Dzongkhags (gender disaggregated).

8. **Project and Program Concepts under the SPCR:**

Project/Program Concept Title	MDB	Requested potential PPCR Amount (US$[6] million)			RGoB/others co-financing (US$)	Preparation grant request (US$ million)	Total request for resilience building[7]	Potential MDB Fee[8]
		Total	**Grant**	**Loan**				
1. Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information		6.5	6.5		11,597,332	0.385		

[6] Includes preparation grant and project/program amount. This section to be filled out should PPCR funding be available only.
[7] Other than PPCR resources
[8] To be filled by MDB submitting the project. This section to be filled out should PPCR funding be available only.

2. Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources		10	10		17,842,049	0.385		
3. Strengthening to Resilience to Flood Hazards		28	28		49,957,736	0.495		
4. Strengthening Climate-SMART Human Settlement Planning & Development in Samdrup Jongkhar Thromde		7	7		12,489,434	0.440		
5. Strengthening Climate-Resilience for Private Sector Intervention (Inter-Woven)								
6. Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan		1.5			2,676,307			
Program Management Unit		2.65			4,728,143	0.297		
TOTAL		**55.65**			**99.29**[9]	**2.02**		

9. **Timeframe** (tentative)

- Submission to CIF: November 9, 2017
- Submission to other donors: December 2017 & onwards
- Start of Implementation (Phase I Preparatory): September 2017 - December 2018
- Start of Implementation (Phase II Investments): July 2018 - June 2023 (in line with RGoB 12th FYP)

[9] Rounded

10. **Key National Stakeholder Groups involved in SPCR design**[10]:

- Gross National Happiness Commission Secretariat (GNHC-S)
- National Environment Commission (NEC)
- Ministry of Finance (MoF)
- Ministry of Home and Cultural Affairs (MoHCA)
- Ministry of Works and Human Settlements (MoWHS)
- Ministry of Economic Affairs (MoEA)
- National Center for Hydrology and Meteorology (NCHM)
- Ministry of Agriculture and Forests (MoAF)
- Ministry of Information & Communications (MoIC)
- National Land Commission Secretariat
- Dzongkhag Administration, Punakha
- Dzongkhag Administration, Wangdi Phodrang
- Dzongkhag Administration, Paro
- Dzongkhag Administration, Pemagatshel
- Thimphu Thromde
- Gelephu Thromde
- Phuentsholing Thromde
- Samtse Dzongkhag
- Samdrup Jongkhar Thromde
- Centre for Bhutan Projects (CBS)
- Royal University of Bhutan (RUB)
- National Commission on Women and Children (NCWC)
- Youth Development Centre (YDC)
- Dzongkhag Tshogdu, Paro
- Gewog Tshogde, Sarpang
- National Statistics Bureau
- Tourism Council of Bhutan

11. **Development Partners**

- World Bank
- International Finance Corporation
- United Nations Development Program (UNDP) and other UN Agencies
- Japan International Cooperation Agency (JICA)
- World Wildlife Fund (WWF)
- Bhutan Trust Fund for Environmental Conservation (BTFEC)

12. **Civil Society Organizations and Private Sector**

- Bhutan Chamber of Commerce and Industry (BCCI)
- Tarayana Foundation
- Respect, Educate, Nurture and Empower Women (RENEW)
- Bhutanese Association of Women Entrepreneur (BAOWE)
- The Association of Bhutanese Industry (ABI)
- Royal Society for Protection of Nature (RSPN)
- Bhutanese Network to Empowering Women (BNEW)
- Clean Bhutan

[10] Other local, national and international partners expected to be involved in design and implementation of the strategy.

CHAPTER 1 – INTRODUCTION

1.1 Country Background and Context

1. Bhutan is a landlocked country nestled in the eastern Himalayas between China towards its north and India in its south and occupies a total geographical area of 38, 394 km^2 (LCMP, 2010). It has a projected population of 768,577 persons (48% women) in 2016 (NSB, 2016). It is classified as one of 10 global biodiversity hotspots[11] and has successfully preserved much of its national biodiversity heritage, with 72 percent of the country's land area under forest cover.

2. Bhutan is highly vulnerable to hydro-meteorological hazards and weather extremes. Some of the major hazards facing Bhutan include flash floods, riverine floods, landslides, landslide dam outburst floods, cloud bursts, and glacial lake outburst floods (GLOFs), forest fires, and windstorms. Between 1994 and 2011, approximately 87,369 people were affected and 304 deaths occurred because of natural disasters in the country. With climate change, the frequency and intensity of extreme events is expected to increase. The 1994 GLOF event in the Punakha-Wangdue valley was one of the most devastating, resulting in enormous downstream damages.

3. Mid-mountainous areas, including the Thimphu valley, are frequently exposed to landslides triggered by cloudbursts. Most of Bhutan's productive infrastructure (hydropower plants, roads, airports, and so on), fertile agricultural land, and over 70 percent of the settlements are located along the main drainage basins, which puts them at high risk of flooding. Flash flood charged rivers wash away vital infrastructure, such as roads connecting places, buildings, water tanks, and electricity and communication facilities. Flash floods in 2013 caused extensive damage to infrastructure in Gasa Dzongkhag (district) and downstream in Punakha and Wangdue Dzongkhags. Acute windstorms are destroying rural business and critical (urban) infrastructure. Bhutan is also prone to transboundary risks such as tropical cyclones as witnessed during cyclone Aila in 2009, which brought unprecedented rain inducing severe flooding in seventeen of Bhutan's 20 Districts. The single event resulted in damages of approximately US$17 million (roughly 1.7 percent of Bhutan's GDP in 2009).

4. Bhutan has demonstrated steady and pro-poor economic growth and a strong commitment to peace and democratic governance. It is a lower-middle-income country and one of the fastest growing economies in South Asia, with a per capita income of US$2,532 and annual GDP growth rate 6.49% in 2015. The 2012 Poverty Assessment shows that the percentage of people living below the national poverty line was effectively reduced by 50 percent, from 23.2 percent in 2007 to 12 percent in 2012. Extreme poverty has been almost eradicated in the country, while multidimensional poverty indices that also include parameters such as education and health declined from 30 percent in 2007 to 12.7 percent in 2012.

5. Bhutan's development framework is uniquely embedded in the concept of "Gross National Happiness (GNH)", which was put forward by His Majesty the Fourth King of Bhutan in the 1970s. Since then, its socio-economic development visioning and planning has been inspired and guided by GNH, which aims to maximize the well-being and happiness of the Bhutanese people. It was a significant achievement for the country when, in July 2011, the UN General-Assembly unanimously adopted the Bhutan-lead resolution on "Happiness towards a holistic approach to development."

6. Bhutan is known for its commitment to environmental sustainability and conservation. Environmental conservation is at the core of Bhutan's Development Strategy, "the middle path." The constitution of the Kingdom of Bhutan requires state to maintain at least 60% of its land area under forest cover for all times to come. Currently, more than 50% of the total land area is under protected area system and network of biological corridors. All of Bhutan's protected land is inter-connected through a

[11] WWF assessment

vast network of biological corridors, allowing animals to migrate freely throughout the countryside (see Figure 1).

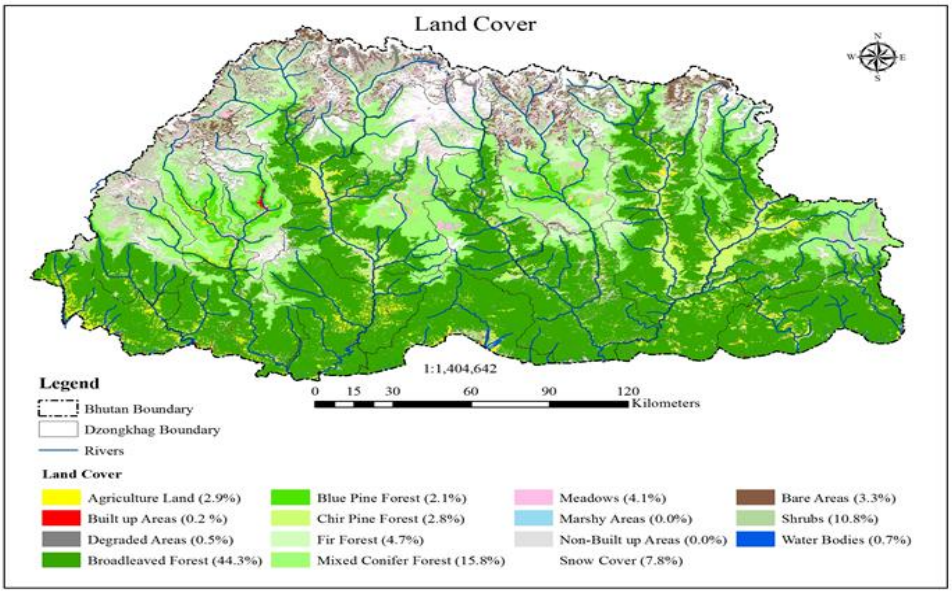

Figure 1. Land cover map of Bhutan (Source: LCMP, 2010)

7. Bhutan has been lauded for proactivity in environmental conservation and is viewed as a model in this regard. Bhutan was also bestowed with: the first-ever UNEP Champion of The Earth Award in 2005. His Majesty, The Fourth King of Bhutan, Jigme Singye Wangchuck was conferred with the J. Paul Getty Award for Conservation Leadership, administered by the WWF, for His Majesty's three decades of work to conserve the environment of the Himalayan Kingdom. His Majesty, The Fourth King was also inducted into the Kyoto Earth Hall of Fame for outstanding contribution to the protection of the global environment in 2001.

8. Bhutan is the world's only carbon-negative nation. It currently has net sink greenhouse gas emissions status because the small amount of pollution it emits is entirely absorbed by the vast forests that cover most of the countryside. So, while the entire country collectively produces 1.6 million tons of carbon dioxide a year (Ref. NDC), the immense forest covering more than 71% of the country acts as a carbon sink, absorbing more than 6.3 million tons of carbon dioxide every year.

1.2 Climate-Resilient & Low-Carbon Development Promotes Developmental Happiness[12]

9. For Bhutan, Happiness is a constitutional mandate, as per the Article 9 of Constitution of the Kingdom of Bhutan. Bhutan's Happiness Index forms a fundamental part of its measurement of socio-economic progress. Arguably, this country's' socio-economic progress will falter unless climate resilience is woven into this conceptual framework in line with Bhutan's 12th Five Year Plan (FYP) and other national strategies such as the National Adaptation Program of Action (NAPA), the National Adaptation Plan (NAP), the Nationally Determined Contribution (NDC), and the SPCR must also be directly and comprehensively aligned with this constitutional Happiness mandate.

[12]Further insights on Happiness conceptual and operational gaps, garnered from consultative meetings, in Annex 10: Impressions on Happiness Index.

10. The level of happiness is measured through the GNH Index which includes nine domains[13] and 33 indicators. The GNH Index contains both traditional areas of socio-economic concern such as living standards, health, education, good governance and ecological diversity and resilience; and less traditional aspects of culture, time use, community vitality and psychological well-being. It is a holistic reflection of the general wellbeing of the Bhutanese population, rather than a subjective psychological ranking of 'happiness' alone. The last GNH Survey was conducted in 2015 and measured a marginal increase in the Happiness of Bhutanese society - from 0.743 in 2010 to 0.756 in 2015, due to Bhutan's overall development progress.

11. Bhutan fully recognizes that in order to maintain and build on its development gains and economic reforms, Bhutan must strengthen its resilience to weather and climate risk. The economy is dependent on climate-sensitive sectors such as: agriculture, livestock, forestry, water and energy to ensure basic necessities and sustainable livelihoods. Agriculture, livestock and forestry account for 16.67% of Bhutan's GDP; construction accounts for 15.61%, and electricity and water account for 14.34% (NSB, 2016).

12. About 69% of the total population resides in rural, largely agricultural areas. Agrarian practices consist largely of subsistence farming and animal husbandry. Although Bhutan's agriculture and forestry sectors provide 58% of employment to rural men and women (MoLHR, 2015 Survey), Bhutan's level of food self-sufficiency is alarmingly low with only 2.75% of land being arable, and its heavy reliance on food imports from India.

13. Food Security encompasses food self-sufficiency and food safety. The Renewable Natural Resources (RNR) sector, comprised of agriculture, livestock and forestry administered by the Ministry of Agriculture and Forests, is mandated to address rural poverty and attain food security. Bhutan is only modestly food secure.[14]

14. Food self-sufficiency encompasses food availability, access and nutrition. According to the 11th FYP report of the MoAF, about 60% of cereals, vegetables and animal products are domestically produced and 90% of fruits and nuts are domestically available with apples and oranges enough to be exported. However, 97% of fish, 80% beef, 77% pork demand, and 90% oil and fat demand are still met from imports (2015).

15. Regarding access to food, about 3% of the population spends less than the food poverty line of Nu. 1,154.74 per month. The nutritional status measured in terms of stunting prevalence reduced to 33.5% in 2010 from 56% in 1998 which is still very high. According to the 11th FYP Mid-Term Review, good progress has been achieved in vegetable self-sufficiency with 83%[15] domestically met.

16. The Renewable Natural Resource (RNR) sector's full potential is challenged by low agricultural productivity and production due to acute shortage of farm labour driven by rural to urban migration, human-wildlife conflicts, loss of agricultural land to urbanization, difficult terrain, fragmented land holdings, and lack of access to markets and credits aggravated by climate change and disasters. Consequently, the import of food and food grains remains high, with marginal returns to small farmers resulting from higher costs of production and low economies of scale.

17. Moreover, the agriculture sector has been the hardest hit by erratic and scanty rains during winter, resulting in a decline in crop productivity and production. Bhutanese farmers practice subsistence and mixed farming, raising livestock animals and growing trees for wood, food and fodder on their farms. The challenges of farming are low productivity due to small land holding, shortage of irrigation water, poor

[13] Psychological wellbeing; Health; Education; Time use; Cultural diversity and resilience; Good governance; Community vitality; Ecological diversity and resilience; Living standards.

[14] GNHC, 11th Five Year Plan Main Document Volume I

[15] GNHC, 11th Five Year Plan Mid-Term Review Document, November 2016.

agricultural practices, and lack of access to markets, credit and technology. Farmers do not get access to systematic agro-weather advisories or bulletins or seasonal forecasts to support them in making decisions at the farm level.

18. According to a Project, the total area under irrigated paddy fallow land has increased to 3394 ha in 2008 from 1693 ha in 2000 primarily due to shortage of irrigation water plausibly due to climate change-induced drought.[16] Lamentably, there is a significant shortage of applied research Projects to assess and respond to the severe food security and food insufficiency challenges Bhutan faces. In this regard, the World Bank is supporting an $8 million GAFSP- Food Security and Agricultural Productivity Project (FSAPP) to collect field data, and pragmatically support Bhutan's efforts to reduce rural poverty, food insecurity, and malnutrition (see Annex 3).

1.3 Genesis of SPCR

19. The Gross National Happiness Commission (GNHC) of the Royal Government of Bhutan (RGoB) sought support from the Climate Investment Fund (CIF) to develop a Strategic Program for Climate Resilience (SPCR) to address climate risks and vulnerability and build climate resilience.

20. The SPCR preparation process was country-driven, and spearheaded by the GNHC involving extensive consultations with multi-sectoral stakeholders comprised of: national to local Governmental agencies; communities at the grassroots level; donors/development partners; and, Civil Society Organizations (CSOs) including the private sector (more on SPCR process.

21. As mentioned earlier, even though Bhutan is currently the sole country on the planet that behaves as a net carbon sink (Constitutional mandate to maintain 60% forest cover), and contributes negatively to GHG emissions,[17] nevertheless, the net effects of anthropogenic climate change are becoming increasingly visible throughout Bhutan. The socio-economic development sacrifices that Bhutan endures to sustain its forests and biodiverse corridors as fallow lands for conservation and sequestration purposes belies the stark reality of its food insecurity challenges.[18] The SPCR will directly address some of these challenges with tangible positive outcomes.

22. It is therefore expected that Bhutan is most deserving of proportionately greater climate financing assistance based on its planetary contribution to a low-carbon future, and its level of vulnerability to extreme hydrological hazards.

23. In rural areas, Happiness margins vary greatly depending on the socio-economic status and adverse environmental impacts of the rural inhabitants livelihoods. At the local level, the consequences of Bhutan's strong conservation policy are often felt by the rural populace with persistent human versus wildlife conflict and their forgoing significant revenue opportunity and socioeconomic development to protect land and animals. This precipitates lower levels of happiness. It is through building ecological climate-resilience of forest, agricultural landscapes and livelihoods that will enhance the overall happiness of rural inhabitants**.**

24. All SPCR Investment activities seek to promote and enhance ecological diversity and resilience, living standards, education and good governance. Like other FYP development progress, it is understood that the attainment of climate-resilient development will actually promote Happiness.

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[16] Lungten and Moktan 2016. Assessment on the roles of trees and forests in building community resilience against climate induced drought: In Forests and Drought: Roles of Trees and Forests in Building Resilience against Drought, FAO Bangkok.

[17] According to the 'carbon comparator' tool developed by the Energy and Climate Intelligence Unit (ECIU), the country is now an unparalleled carbon sink, absorbing three times more CO2 emissions than its 700,000 population produces, mostly through hydropower. https://www.theguardian.com/environment/2015/dec/03/bhutan-has-most-ambitious-pledge-at-paris-climate-summit

[18] Food security is defined as "the access for all people at all times to enough food for a healthy, active life" (FAO, 1996). In contrast, food self-sufficiency is defined as being able to meet consumption needs (particularly for staple food crops) from own production rather than by buying or importing. http://www.ifpri.org/publication/food-security-and-food-self-sufficiency-bhutan

25. In supporting the GNH domains, the SPCR will: (i) support "psychological wellbeing" by reducing vulnerability and risks to climate impacts; (ii) improve "public health" by minimizing downstream impacts to public utilities and services; (iii) improve "education" through ECP curriculum development within tertiary education institutions and in the Local Governments; (iv) reduce the burden on water collection ("Time use") through improvement in water conservation in drought-stricken springs; (v) protect "cultural diversity and resilience" through the reduction of climate vulnerability and risk in peri-urban Thromdes and marginalized populations subject to constant brain-drain to urban centres; (vi) introduce climate-resilient "good governance" in Local and Central Governments; (vii) bolster "community vitality' via climate-resilient training of CSMIs; (viii) Introduce adaptive eco-system-based flood management to promote "ecological diversity and resilience"; and, (ix) Improve "living standards" through risk reduction and climate-resilient enterprise development practices.

26. This is likely the first and only proposed SPCR to organically link the PPCR goals of strategic climate-resilient development with the developmental notion of "Happiness." Bhutan's Gross National Happiness (GNH) Index is a national performance indicator that is intrinsically linked with Bhutan's national development goals to ensure the livelihood security, decentralized service access, and health and well-being of our populace.

27. To ensure alignment with the Royal Government of Bhutan's developmental priorities, it is paramount that the SPCR Program effectively blend the Gross National Happiness Indices (GNHI) with programmatic climate-resilience indicators in the national planning process. The proposed SPCR Results Framework and Monitoring and Evaluation (M&E) Framework will also need to capture this data.

1.4 Gender Equity & Happiness

28. Without specific attention to gender issues and initiatives, project Investments and added resources can actually reinforce inequalities between women and men, and even increase gender disparities and systemic discontent. Many initiatives are thought to be 'gender neutral,' but this is rarely the case. Although gender mainstreaming guidelines and Gender Focals have been recently put in place within the various Line Ministries both at the Central and LG levels, there are still numerous obstacles to implement Gender Equity and Social Inclusion (GESI) policies in practice, and limited gender-related performance indicators to assess the attainment of gender equity and real Happiness.

29. The SPCR seeks to further strengthen the institutionalization of gender mainstreaming at the central and local levels, including within the private sector. The SPCR also envisions the establishment of a gender-sensitive data collection tool and reporting format; and to advocate and plan together with the Line Ministry Gender Focals the practical incorporation of GESI and Happiness priorities in SPCR program activities, especially at the operational and community levels.

1.5 SPCR Themes arising from Consultations

30. During the consultations at the beginning of the SPCR consultative process[19] several themes were raised repeatedly, including: (i) the importance of mid and long-term climate risk information relevant to major economic sectors; (2) the need for climate related agricultural information services; (iii) the decline in water availability and accessibility due to drying up of water resources and lack of infrastructure; and the need for technical capacity building; (iv) strengthening weather and water-related information and services; (v) governance and communication between the national and sub-national government agencies; (vi) improving disaster preparedness and emergency services; (vii) mainstreaming climate-resilience; and, (viii) the need for a Resource Mobilization Strategy for Climate Finance.

31. Although the Energy, Tourism (and Mining) sectors were also deemed to be priorities for the national economy, and subject to high risk from climate impacts (Figure 2), it was nonetheless agreed that the cost of making these sectors climate-resilient would be prohibitive, and would fall well beyond the

[19] Scoping Mission of 26-30 October 2015

purview of PPCR funding parameters. Moreover, large resource envelopes are already being provided to these sectors through other traditional financing sources.

32. Further, it is noted that significant climate-related activities are being proposed under LDCF and GCF, in addition to some being undertaken in priority sectors such as: hydropower, tourism, agriculture, integrated water resources management, and disaster risk management;[20] and that the SPCR should build on some of these – which it does.

1.6 Climate-Resilient Strategic National Landscape to Southern Focus

33. The SPCR shall consider a national landscape approach, and zoom in on the southern districts to address impact projection modeling needs, water scarcity/security, ecosystem-based adaptive flood management, municipal Climate-SMART planning, private sector climate-proofing, and capacity-building via an Environment, Climate & Poverty (ECP) curriculum.

34. Recognizing the limitations of funding and human resources, Bhutan cannot possibly expect to address the multitude of risks in all vulnerable regions and sectors across our country – no matter how important. RGoB are also cognizant of the need to focus on realistically achievable results, toward transformational developmental outcomes versus trying unrealistically to do everything for everyone everywhere.

35. Thus, GNHC-S and the Lead Technical Agencies from the Line Ministries have already conducted a preliminary prioritization of high-risk Dzongkhags and thematic focii, to be further justified during the Preparatory Phase I stage. GNHC-S has decided to strategically focus on target communities and ecosystems across the southern belt, as this region is far-and-away at greatest risk from climate hazards, particularly from flash foods.

36. That said, some Investment Components are actually designed as pan-national. They include: (i) Investment1, which seeks to mainstream hydromet downscaled climate impact projection modeling across Government and communities; and (ii) Investment 2, which intends to formulate climate impact-oriented Wetland and Watershed Management Plans to address water scarcity issues across the Central Midlands and Southern Belt.

37. Other SPCR Investments are designed to replicate results and lessons learned in the South to other vulnerable regions across Bhutan. These include: (i) Investment 4, which will introduce Climate-SMART human settlement planning and development in the South, followed by mainstreaming this replicable climate risk management planning and development instrument in other Thromdes (Municipalities) in Bhutan; and (ii) Investment 6, which will mainstream the Environment, Climate Change, and Poverty education program (ECP) across Bhutan's College Network, and at the Local Government level.

1.7 Building on Existing Processes & Value-Added of SPCR

38. The 2015 Scoping Mission noted that Bhutan had already undertaken a number of consultative and strategic processes such as: preparation of the NAPA document; and, the INDC - which present an extensive list of priority areas for both adaptation and mitigation. Bhutan is also in the process of preparing the NAP. Moreover, the 12th FYP which is currently under formulation has a dedicated National Key Result area on climate change, carbon neutrality and disaster resilience.

39. Thus, the value-addition of the SPCR process is that it builds on these previous and on-going strategic planning and development initiatives; while contributing to the 12th Five Year Plan (FYP) preparation and its expected progress towards the Sustainable Development Goals (SDGs).

[20] The Tourism & Energy sectors fall outside the gambit of SPCR support due to the prohibitive of climate-proofing these sectors; and limited PPCR financing. Other Investment strategies and programs are attending to these sector's needs.

40. Several other key Environmental Plans and Climate Change Strategies reinforce Bhutan's commitment to climate change; and are in some way supported or reinforced by the proposed SPCR. They include: the National Biodiversity Action Plan of Bhutan (2014); the Biodiversity Policy and Institutional Review Report; the Climate Policy and Institutional Review Report; Less Developing Country (LDC) Position Paper; Carbon National Strategy; National Communication Report to the UNFCCC and the recently ratified NDC of Bhutan.

41. Another value-added of the SPCR is its programmatic intent to follow the 12th FYP development process of significant decentralization of Central Government resources (50%+) and management of country Investments toward LG management, thereby ensuring significant buy-in and ownership at the grassroots from participating Dzongkhags and Gewogs. The value-added of the RGoB intending to commit disproportionate national resources to this SPCR must not be understated.

42. The proposed Bhutan Adaptation Bond, and integration of an adaptation co-efficient at the National policy level in country Investments both represent additional and creative (non-traditional) sources of SPCR revenue that deserve attention and recognition as viable new Investment financing mechanisms for SPCR. These highly innovative funding mechanisms would add substantive value to the SPCR resource envelope, and overall program experience.

43. Far and away, the most cost-effective/value-added contributions of Bhutan is its contribution to national net-negative carbon sequestration to minimize anthropogenic climate change impacts on Annex I and Non-Annex 1 signatory countries. The selfless act by Bhutan's citizenry to maintain biodiverse land conservation, and surrender their forests and farmable lands to avoid disruption of wild animal migrations, both in honor of the Paris Agreement, represents the ultimate value-added sacrifice.

Figure 2. Amochu River bank in Phuentsholing inundated by flash floods, damaging local industry (Source: Sonam Phuntsho)

1.8 Funding Analysis

44. Any justification of climate financing in Bhutan must be tempered with a clear understanding of Bhutan's current developmental and economic status. For example, as per World Bank (WB) financing standards, because Bhutan is currently categorized as a Least Developed Country (LDC), it is eligible for Official Development Assistance (ODA),[21] in the form of favorable grants and concessional loans.

45. Under ADB fund categorization, Bhutan is currently an Asian Development Fund (ADF) "Category A" country. It is expected that ADF grant support to recipient countries is expected to increase by 70% over the period 2017-2020. Therefore, currently 50% of ADB's allocation to Bhutan is in the form of grant financing; and the other 50% is concessional loan financing.

[21] DAC List of ODA Recipients Effective for reporting on 2014, 2015 and 2016 flows

46. The RGoB has set a limit of 35% of Gross Domestic Product (GDP) on non-hydro borrowing, including climate change Investment. According to ADB, the country will therefore arrive at full loan status by 2019. GNHC-S' dialogue with the United Nations Economic & Social Council (UN ECOSOC) may extend this ADF status to 2023. This presents a Catch-22 Dilemma for Bhutan's developmental progress, because on the one hand Bhutan is evolving into middle income status with reduced support from the international cooperation community, while conversely, Bhutan continues to suffer from extreme food insecurity and a seemingly unhealthy and disproportionate reliance on food imports for our national food security.

47. The World Bank in 2006 categorized Bhutan as a highly indebted and economically distressed country, therefore eligible for full grant financing. ADB in 2007 followed suit. In 2011, ADB's debt analysis on Bhutan concluded that its national economy was moderately debt-distressed, with its current debt to GPD ratio at 120%.

48. With MDBs expecting Bhutan to cross most GDP and Gross National Income (GNH) socio-economic thresholds, and with the expectation that Bhutan may graduate to moderate-debt status, international funding agencies have continued to operate in-country but may re-consider their presence here down the road, depending on future UN ECOSOC results and Bhutan's future adaptive capacity to resist climate-induced economic hardship. Yet, this emergent economy, heavily dependent on food imports, and profoundly climate-vulnerable, still faces a multitude of challenges.

1.9 Premature Donor Assessment

49. Although per capita income increased to US $2,719, Bhutan's economy is restricted to hydropower & subsistence agriculture. The UN ECOSOC rated Bhutan's Economic Vulnerability Index (EVI) at 40.2, which fails the graduation level of 32 points. In fact, Bhutan may not pass the EVI, or pass the GNI financial litmus test any time soon due to anticipated climate shocks adversely impacting its economy.

50. Recently, several bilateral donors have diminished their presence in Bhutan, with the expectation that Bhutan will transition from an LDC to a Low-Middle Income Country (LMIC) by 2020 or so. However, this seems to be a premature assessment by the MDBs and bilateral, as Bhutan is heavily dependent on hydropower export receipts, which may be significantly offset by initial capital outlay, adversely impacting Bhutan's GNI and IDA status. It is estimated that Bhutan's LDC status may in fact remain static until 2023-2024 – that is six years and a full Five Year Plan away! The RGoB is also reluctant to draw on IDA loans as it is still categorized as a Low-Income Country, and fully eligible for grant-financing.

11. A handful of Bilateral Partners continue to provide in-country support through diplomatic presence, or remotely through fund disbursements. They include: (i) the Government of India, (ii) Government of Japan (JICA); (iii) Austrian Development Agency (ADA); (iii) Government of Finland (FINNIDA); and, (v) Government of Netherlands (SNV Domestic).[22] For more detail on bilateral support, see Annex 3: Stocktaking of Past & Current Climate-Related Investments and Activities

1.10 Developmental Progress against Climate Hazard Back-Drop

51. With Bhutan's extremely high food insecurity, and its low-rated Economic Vulnerability Index (EVI) due to its topography and hydrologically unstable climate, the country's LDC status may very well remain static until 2023-2024, thereby justifying continued international cooperation support, and essential SPCR financing resources. It is also highly plausible that anticipated climate shocks may actually reverse Bhutan's positive development trends by precipitating a severe downward economic

[22] Bilaterals that have departed to date include: SIDA (Swiss); DANIDA; FINNIDA; NEDA (Netherlands); SNV International (not domestic); and Helvetas (downsized).

trend and an unanticipated drop in Bhutan's Gross National Income (GNI). For this reason alone, Bhutan's eligibility for climate financing must continue to rate high.

52. Bhutan is also endowed with vast water supplies, yet paradoxically suffers from increasing water scarcity and drought across the Central Midlands and Southern Belt, exacerbated by wide spread climate extremes. Moreover, emergent industry is struggling to diversify its products and services nationally, with a desire to strengthen export markets. This desire for economic growth and diversification is tempered by repeat climate hazards that continue to disrupt business value chains, and hamper CSMI success. Again, the country needs a climate-resilient business model to contend with these climate threats to their bottom line.

53. As the Stern Review states: Climatic shocks cause setbacks to economic and social development in developing countries today even with temperature increases of less than 1°C. The impacts of unabated climate change, - that is, increases of 3 or 4°C and upwards - will be to increase the risks and costs of these events very powerfully.[23] This plausible scenario must not be overlooked or underestimated by IFIs and SPCR donors. Thus, for all the aforementioned reasons, Bhutan invites the international community to support this vital and innovative SPCR.

1.11 Objective of Bhutan's SPCR

54. The SPCR represents a strategic risk management framework that builds on national climate strategies to strategically incorporate climate-resilient measures in Bhutan's development process, through a decentralized development model. It provides a long-term vision that addresses climate-resilience, outlines country priorities, and articulates a Program of SPCR Investments to achieve its climate-resilient goals and objectives over the five year period.

55. As developmental outcomes, Bhutan's SPCR seeks to achieve the following:

1. Create a strategic framework to mainstream climate-resilience into development planning in Bhutan, to complement the NDC, NAP and SDG process, and especially align with 12th FYP.
2. Put in place a coordinated mechanism and process of engagement on climate issues, building on existing institutional arrangements, and ensuring climate-resilient institutional capacity over the short, medium and long-term.
3. Identify climate Investment opportunities while supporting a diverse number of vulnerable groups (including CSMIs, women's groups, and CSOs) to build climate-resilience at the grassroots; and,
4. Build Climate-SMART planning capacity for at-risk Thromdes.
5. Be wholly transformative, especially through decentralized fund transfers and aggressive stakeholder engagement, including CSO and CSMI participation.
6. Incorporate purposeful and participatory capacity-building measures for both Central and LG planners and developers, leading to strong climate-resilient outcomes for adaptive watershed management and adaptive flood protection.

1.12 Alignment with Global Commitments

56. Bhutan is also amongst the first few priority countries rolling forward the implementation of the SDGs since its adoption in 2015. While all 17 Goals are important, Bhutan has prioritized three SDGs (Goal 1 – No Poverty; Goal 13 - Climate Action; and Goal 15 – Life on Land) for immediate implementation in the current 11th FYP.

57. These goals were prioritized on the basis of urgency to address the following issues: to eliminate poverty in Bhutan (No Poverty); to ensure Bhutan's commitment to the global community to remain carbon neutral at all times (Climate Action); and, to be a champion and world leader by show-casing Bhutan's success in terms of biodiversity (Life on Land). The RGoB general national development efforts

[23] Stern Review: The Economics of Climate Change (pp. vii)

and SPCR activities specifically, will focus on implementing policies and programs that will have multiple impacts on a number of SDGs (more on Chapter 4).

1.13 Main Challenges & Priorities addressed by SPCR - General

58. There are a myriad of developmental and climate-related challenges and SPCR priorities addressed in this document. They include inadequate information and data on hydro-meterology, food insecurity from extreme flooding and droughts (see Figure 4) in the south; monsoon-induced landslides damaging roadwork and disrupting industry supply chains; climate threats to Thromde municipal infrastructure, also predominantly in the southern belt; and, climate-induced water shortages across the midlands and southern region adversely impacting CSMIs, involving a disproportionate number of women-led enterprise. The SPCR report touch on some of the key challenges and climate-resilient priorities in this section, and provide much greater detail in Chapters 2 and 4.

1.13.1 Specific Climate Impacts

59. Bhutan is highly exposed to hydro-meteorological hazards such as: chronic flooding and extreme flashfloods damaging rural farm lands; frequent landslides and destabilized slopes in human settlements and roadsides; climate-induced droughts, water scarcity from groundwater depletion, and consequent food insecurity; and, acute windstorms and greater intensity cyclones destroying cottage industries and critical infrastructure.

60. According to the International Disaster Database, the ten most significant "natural" disasters in Bhutan have all occurred in the last twenty years resulting in casualties and number of people affected. This is consistent with global temperature and associated climate impacts as: "The 10 hottest years ever recorded have all occurred since 1998; (with) the hottest year on record is 2006."[24] To respond to these specific climate hazards, SPCR Investments shall focus on the following priorities:

1.13.2 SPCR & Hydromet Impact Projection Modeling and Hydromet Services

61. The performance of Bhutan's key economic sectors also depends upon managing weather and disaster risks. Some of the key economic sectors driving Bhutan's economy, such as agriculture, hydropower, tourism, water resources, and infrastructure, are heavily dependent on weather, water, and climate-related information. However, information products tailored to these sectors are highly limited. Planners have limited information about areas that are flood-prone now and prone to future climate risks. In addition to strengthening community resilience, improved development of hydromet-based information services can make important contributions to the performance of key economic sectors in Bhutan. Recognizing the risk posed by hydrometeorological hazards to the country's development path, the Royal Government of Bhutan (RGOB) is developing an enabling policy environment, and has begun to make Investments in modernizing hydromet observation systems and improving basic service delivery. Development partners have also played a critical role in supporting this process. However, significant improvements are needed in further strengthening hydrological and meteorological forecasting capacity in Bhutan and development and delivery of weather- and water-related information services.

62. Further, National Centre for Hydrology and Meteorology (NCHM) has very limited capacity to conduct basic climate projections and climate change impact assessments. While risks posed by climate change to critical environments, infrastructure and vulnerable populations is well perceived by Government and civil society, limited scientific knowledge and technical capacity in the country hinders the Government's and other agencies' ability to adequately understand and strategically respond to the expected risks of climate change.

[24] Climate Central: http://www.climatecentral.org/gallery/graphics/10-hottest-years-on-record

63. Thus, the inability to produce national climate impact scenarios and hydromet risk assessments and other risk management services severely compromises NCHM's capacity to provide timely weather, water and climate information to various sectors in vulnerability assessment and adaptation planning.

64. The SPCR intends to strengthen NCHM's institutional capacity in climate change impact modeling and climate-oriented hydromet services to: conduct hydro-meteorological, and cryosphere research; identify climate-induced risks associated with GLOFs, using high-resolution impact projection data; and interpret and disseminate climate impact models and risk assessments to policy makers, sectoral planning experts, and civil society agencies (especially CSMI Associations and CSOs focusing on women-led enterprise) to build their overall capacity for climate-resilience (CR).

65. The capacity-building component of this project will ensure that technical experts (NCHM, Line Ministries, community leaders, and key CSOs involved in complementing Bhutan's development efforts) are well-trained in climate science, cryosphere interpretation, climate modeling and impact projections, and additional early warning approaches, for integration of climate risk management practices in SPCR Investment activities. Specialized and targeted training modules will be introduced to ensure the optimum and long-term program involvement of woman leaders, with the support of NHCM's Gender Focal and technical team.

1.13.3 SPCR & Climate-Induced Water Scarcity

66. In Bhutan, there are persistent reports from many parts of the country, especially in the mid-altitude inner valleys and southern rural areas that water sources (particularly springs) are drying up and causing problems for local people to obtain water for domestic consumption, and for irrigation. Many of the critical Watershed Management Plans developed by the Watershed Management Division (WMD) report the drying of water sources in multiple locations in seven major and minor river basins across the country.

67. Tambe et al (2012) claims "Due to the impacts of climate change on precipitation patterns such as rise in rainfall intensity, reduction in its temporal spread, and a marked decline in winter rain, coupled with other anthropogenic causes, the problem of dying springs is being increasingly felt across this region."

68. This SPCR seeks to analyze climate impacts on water scarcity across the country and particularly in the vulnerable mid-altitude inner valleys and southern districts; and develop an implementation plan for climate-resilient critical watersheds. This will help both Central and LG policy-makers and practitioners, and Civil Society Organizations (CSOs) [including grassroots CSOs, women-led CSMIs, and Community-Based Organizations (CBOs) particularly in the Central Midlands and Rural South] to make informed decisions on how to safeguard Investments made in the food and water nexus through climate-resilient practices.

1.13.4 SPCR & Flash Floods, Food Security, and Human Settlements

69. Bhutanese rivers are generally characterized by very steep slopes in the upper catchment areas, which are subject to intense seasonal rainfall and high rates of erosion. As the rivers flow towards the southern foothills, the transition from mountainous areas to flat plains typically occurs, and is accompanied by extensive and repeated flooding.

70. Although flooding occurs in most parts of the country, it is very recurrent in the southern region affecting people and property nearby, especially in the Dzongkhags of Sarpang, Chukka, Danaga, Samtse, and Samdrup Jongkhar. This extreme and repeat flooding generates hazardous debris flows upstream, and deposits these debris flows in the southern plains downstream making human settlements and the scarce arable lands along the river banks considerably vulnerable and exposed (see Figure 3). These results in:

destroyed crops and food scarcity; damaged critical infrastructure causing a disruption in public services; and consequent disruption of local enterprise value chains.

Figure 3: Flash floods occurrence in Shawa village in Gangzur, Lhuentse

71. On climate-induced hazards from recurrent floods, the SPCR proposes, inter-alia that: (i) Flood hazard assessments be conducted across the southern districts affecting local populations, farm livestock, agricultural lands, and public infrastructure and property; (ii) building increased climate-resilience measures for food security and critical infrastructure, by identifying core factors contributing to upstream catastrophic flooding hazards; (iii) introducing adaptive eco-system based river basin measures to minimize those impacts; and, (iv) offering climate adaptation approaches downstream benefitting vulnerable human settlements, at-risk communities and CSMIs, and target agricultural lands.

1.13.5 SPCR & Peri-Urban Hazards

72. Samdrup Jongkhar in the south-eastern part of the country plays a strategic role as a trading hub, an administrative centre, and a key transit point, thereby leading to its accelerated urbanization. The Dungsam Chhu River, which flows through the heart of the, floods during monsoon season because of a shallow river bed. The level of the river bed continues to rise from gradual siltation and flood debris. The flood control embankments constructed along the river continue to suffer from repeated flood damage (see Figure 4). Other hazards include severe embankment erosion, landslides and earthquakes, and the drying up of water sources.

73. Added to these frequent hazards, these small peri-urban township is lacking for the most basic & hazard-free green spaces for basic leisure activities. The steep topographical terrain is subject to high levels of risk from slope deterioration and concomitant landslides, and flash flooding attributed to extreme weather events. As most land surrounding these peri-urban centres is highly unstable, there is a scarcity of livable, safe, low-risk green spaces.

74. This SPCR shall develop and introduce a replicable National Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) human settlement Plan, comprised of low-carbon and climate-resilient policies and practices for Bhutanese policy-makers and practitioners, to successfully mainstream Climate-SMART Land Use Planning nationally, with a focus on the southern of Samdrup Jongkhar . This will ensure the future climate-resilient design and development of municipal services and critical infrastructure.

Figure 4: Human settlements damages by flash floods

75. A concerted effort will be made to fully engage women planners at the LG level to acquire climate-SMART land use planning skills. In addition, women-led CSMIs will be targeted to ensure that climate-resilient planning designs and practices directly benefit their local businesses.

1.13.6 SPCR & CSMI Development

76. Environment-dependent CSMI's are vulnerable to climate impacts. The apex business body – Bhutan Chamber of Commerce and Industry (BCCI) is painfully aware that their value-chains are frequently subject to climate risks, which adversely impact business operations and revenue. This is especially so in the agriculture and power sectors where climate impacts are more frequent.

77. This SPCR will strive to fully engage CSMIs at every level in the SPC program life-cycle, including the integral involvement of the Bhutan Chamber of Commerce and Industry (BCCI) and its member firms to:

a. Identify realistic and lasting climate-resilient training and solutions to defend CSMI corporate value chains against repeated disruptions from climate hazards; and,

b. Bolster CSMI direct involvement in the development of uniquely competitive climate adaptation products and services for domestic consumption, and external markets.

1.13.7 SPCR & Enhancement Of Climate Change Education

78. Environment, Climate Change and Poverty (ECP) are cross-cutting issues that government policy-makers and planners have prioritized through the 11th FYP and now 12th FYP, and recently within the education sector. Environmental degradation - brought about by rapid economic development and urban population growth in Bhutan, and concomitant consumption of natural resources causing eco-system stress - is being exacerbated by an increase in repeat extreme events. This continues to impede Bhutan's socio-economic development, and further aggravate existing poverty. Thus, "it is imperative that environmental and climate change concerns be addressed systematically with the reduction of poverty and enhancement of people's livelihoods."[25]

79. Recognising the importance of environment, climate change and poverty, through this SPCR, the Royal Government of Bhutan is committed to enhance college level curriculum to incorporate environment, climate change, and poverty in target educational institutions across the country. This

[25] Framework to Mainstream Environment, Climate Change and Poverty (ECP) concerns into the Eleventh Five Year Plan (2013-2018)

curriculum enhancement squarely contributes to the SDG Goal #13 on climate change. Equipping faculty, civil servants and students with the requisite knowledge and skills on adaptation and mitigation to climate change and will enable these future leaders to take urgent and long-term strategic action to combat the ravages of climate change in their communities, LG and industry. This SPCR Investment will in the long run help to mainstream climate change in the decision-making process, and thereby help sustain climate change Investments.

1.13.8 SPCR & Gender Equity and Social Inclusion

80. Information from Ministry of Home & Cultural Affairs (MoHCA) Reports indicate that only 11% of LG positions are filled by women representatives; with only 2 women Gups amongst 205 this year (1%); and a relatively low 24 female deputies in those same 205 Gewogs (12%). Although there has been a moderate increase in participation by women at the LG election level, there is nonetheless very little representation of women officials at the national electoral and managerial level.

81. Interestingly, it is recognized that most Bhutanese families are matrilineal in nature, with wife or mother as family head, and with property traditionally passed on to wives and daughters. In spite of these inheritance advantages, as women and children are largely responsible for domestic water collection in rural areas, water scarcity demands more frequent collection of water, and greater domestic burden when cooking and washing. The shortage of irrigation water, aggravated by human-wildlife conflict and rural-urban migration has left agricultural land fallow in many rural areas, where women (and children) farmers are the predominant seed sowers and paddy transplanters.

82. Moreover, with the adverse effects of climate impacts on rural farming populations and home-based micro-enterprise - largely attributed to flash floods and ground water depletion - women and girls are increasingly burdened in the field, in their homes, and with their cottage-based livelihood activities.

83. Gender Equity and Social Inclusion (GESI) mainstreaming is a core component in the design, development and execution of this SPCR. Women-led cooperative groups and user groups are expected to play an essential role in this innovative program: as Central and LG leads; through their direct involvement as Gender Focal to mainstream adaptation and GESI; as direct SPCR advisors to LG committees involved in SPCR Investment activities; during dialogue with CSMIs on climate risk management business practices; and through purposeful dialogue with their male counterparts on the importance of gender mainstreaming and SPCR performance reporting.

1.13.9 Economics of Climate Change

84. According to the Asian Development Bank's (ADB) 2014 Report, Assessing the Costs of Climate Change and Adaptation in South Asia, melting glaciers and other climate change-linked extremes pose a serious threat to Bhutan's economy, and could cause annual losses of over 6% of gross domestic product (GDP) by the end of this century.[26]

85. The Report predicts that six countries—Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka - will see an average annual economic loss of 1.8% of their collective GDP by 2050, rising sharply to 8.8% by 2100, if the world continues on its current fossil fuel-intensive path. The Report goes on to say that, without changes to current global behavior, Bhutan would see an average economic loss equivalent to 1.4% of GDP by 2050, widening sharply to 6.6% by the end of the century. However, if mitigation and adaptation steps are taken, the damage could be limited to around 1.7% by 2100.

[26] (2014) Assessing the Costs of Climate Change and Adaptation in South Asia: https://www.adb.org/news/melting-glaciers-climate-extremes-threaten-bhutans-future-report

1.13.10 Climate Change Risks to Development

86. Climate change is mostly about adverse changes to hydrological resources, and associated impacts on water towers and water-dependent ecosystems and human settlements downstream. In this regard, Bhutan is increasingly experiencing prolonged and extreme droughts, which in turn increases the risk of loss of biodiversity, crop yield, and productivity, as well as forest fires. Unseasonal and intense rainfall and hailstorms are destroying critical infrastructure (see Figure 5), precious food crops and devastating farmer's livelihoods that have no safety net.

87. During the monsoon, landslides are a major problem for the road sector, which is a lifeline for a landlocked country like Bhutan. With most rivers flowing through narrow gorges towards the South, the blockage of rivers by landslides leads to the unnatural formation of precarious water reservoirs posing great risk to downstream hydro power stations and human settlements. Flash floods, accompanied by huge quantities of sand and coarse stone, cause siltation of hydropower dams and cause extensive damage to infrastructure that result in energy supply disruptions and financial loss to the hydropower industry – and by extension, Bhutan's national reserves.

Figure 5. Dokumlung bridge damage by landslide

1.13.11 Climate Change & GLOFs

88. There is substantive evidence of glacial retreat in the Eastern and Western Himalayas, and expansion of glacial lakes is predicted to be the highest in Nepal and Bhutan. With significant glacial deterioration along Bhutan's northern frontier, an integral part of the Tibetan Plateau, there are 677 recorded glaciers with 2,674 glacial lakes and 7 major glacier-fed rivers (Mangdechu, Manas, Punatsangchu, Wangchu, Chamkharchu, Drangmechu, Kholong-chu, Kurichu) all subject to climate variability and extremes.[27] All of these rivers lead to the southern region of Bhutan, where climate impacts are at their greatest.

89. Bhutan's unique geographical location is at the intersection of the Indo-Malayan Realm and the Palearctic Realm. Combined with the altitudinal and micro climatic variation, this endows a rich diversity of ecosystems, landscapes and species in the eastern Himalayas. Concomitantly, its geological complexities also make it extremely vulnerable to climate-induced hazards and risks such as Glacial Lake Outburst Floods (GLOFs, see Figure 6);[28] erratic and extreme rainfall pattern inducing soil erosion; flash

[27] Bhutan Second National Communication to the UNFCCC (NEC, 2011).
[28] Ref: Improving adaptive capacity and resilience in Bhutan: Harsha Meenawat & Benjamin K. Sovacool

floods and landslides; seasonal droughts; and wind and hail storms, all adversely affecting property, human lives, and livelihood security.

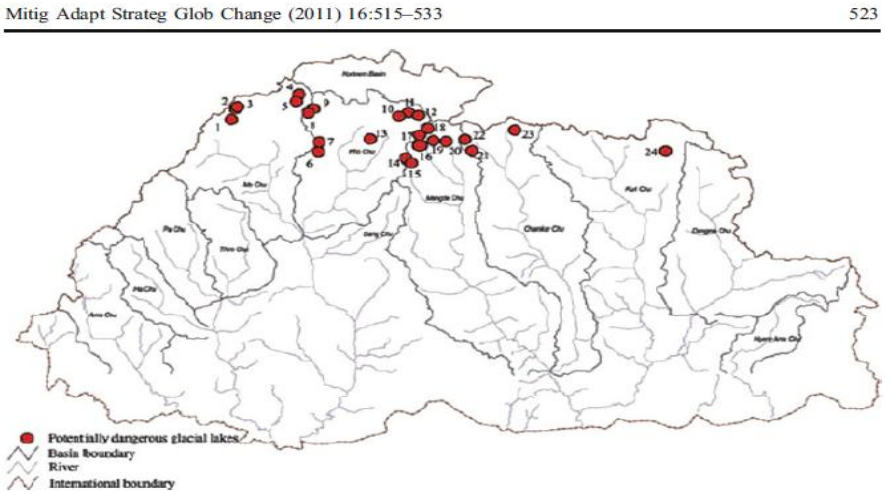


Fig. 5 Twenty-four "dangerous" glacial lakes identified by ICIMOD. Source Ives et al. 2010: 9

Figure 6. 24 Dangerous Glacial Lakes

90. GLOFs are of particular concern for Bhutan, as glaciers are reportedly melting at the rate of 30-40 m per year for debris covered glaciers; and 8-10m per year for debris-free glaciers. This directly impacts drinking and irrigation water, and hydro electricity generation (NEC, 2011).

1.14 SPCR Preparation Grant

91. The SPCR process and timeline for the preparation of Bhutan's SPCR was discussed during the Scoping Mission of 26-30 October, 2015. It was agreed that GNHC, as the National Focal Agency for PPCR, would follow the procedures and modalities of the World Bank (as lead MDB) while accessing the grant.

92. Following the submission of a total of 36 SPCR proposals to the CIF, Bhutan became one of only 10 countries to become eligible for funding during this current Phase II of the CIF's Pilot Program for Climate Resilience (PPCR). This was based on the merits of Bhutan's SPCR proposal, and the overall climate change risks challenges facing the country.

93. GNHC prepared the SPCR proposal based on a CIF template, and the SPCR CIF Proposal went through the lead MDB's approval modality. In March of 2015, the RGoB submitted an Expression of Interest (EOI) to the Pilot Program for Climate Resilience (PPCR), under the Climate Investment Funds (CIF). The SPCR proposal was finalized by January 30, 2016, and approved.

1.14.1 CIF Granting Process

94. The SPCR Preparatory Grant was approved, and the Grant Agreement signed on March 02, 2017 between the World Bank and the RGoB. The RGoB successfully received a preparatory grant of US $1.5 million to: (i) carry out the SPCR consultative process; (ii) prepare the SPCR document; to conduct readiness activities; (iii) conduct feasibility Projects; (iv) provide capacity-building, and sector-based assessments; (v) implement the Phase I Preparatory Technical Projects to generate targeted data and knowledge supporting Phase II Investments; (vi) the hiring of National and International Consultants; and, (vii) readiness activities. Submission of the final SPCR Report to the CIF is planned on November 10, 2017.

Component A. Development of SPCR (US $1.5 million)

95. Implementation of the five Preparatory Projects, financed by Component A of the CIF Grant, has commence from September 2017, and are expected to be completed by December of 2018. The outcomes and outputs from the Preparatory Projects (Projects) will create the requisite enabling environment for the six Investment Components planned under Phase II, which are scheduled to commence from July 2018-June 2023, coinciding with the RGoB's 12th Five Year Plan (FYP).

96. The Planned Technical Projects (as a Part of SPCR Preparation) are listed in Table 1 below (see Annex 6: Phase I Preparatory Technical Project Descriptions):

Table 1: Planned Technical Projects

Preparation of SPCR and Technical (Preparatory) Projects	**Lead Agency**
Preparation of the SPCR – Review of existing literature, gap analysis, consultations, institutional analysis, framework development, development of roadmap and Investment strategy.	Gross National Happiness Commission
Pillar 1: Enhancing Information Base for Hydromet Services and Climate Resilience	
Climate Vulnerability Mapping and Risk Identification and Services	National Center for Hydrology and Meteorology (NCHM)
Pillar 2: Preparedness, Food and Water Security	
Analysis of climate impact on water scarcity and development implementation plan for critical watersheds	Watershed Management Division, Department of Forests and Park Services, Ministry of Agriculture and Forests
Assessment of Flooding Hazards, DEM & Flood Mitigation options for Flood vulnerable districts (Southern belt)	Flood Engineering Management Division, Department of Engineering Services, Ministry of Works and Human Settlements
Pillar 3: Sustainable Growth and Resilient Infrastructure	
Climate-SMART Urban Planning and Development	Department of Human Settlements, Ministry of Works and Human Settlements
Private Sector for Climate Resilience	Gross National Happiness Commission
Cross-Cutting Pillar: Strengthening Governance, Institutional Coordination and Human Resource Capacity	
Human resource capacity analysis and curricula development for climate, meteorology and hydrology	NCHM and NEC

Component B. Program Management & SPCR Preparation (US $0.450 million)

97. This portion of the grant financing is being used by the GNHC for: (i) Government (Central, Line Ministry & Local), and civil society engagement; (ii) institutional capacity-building in preparation for SPCR Phase II Investments; (iii) the contract hiring of a Consultant Team to coordinate SPCR formulation; (iv) institutional coordination; (v) SPCR Program management; and, (vi) the design of SPCR components through extensive agency stakeholder and technical consultations.

1.15 SPCR Participatory Consultative Process and Coordination Mechanism

98. Throughout the entire process of SPCR formulation, an impressive number of stakeholders have been consistently consulted during purposeful Scoping and Joint Missions, stakeholder agency consultations, and Technical Workshops (see Figure 7/Annex 7). In total, 199 Bhutanese and international agency engagements occurred between October 2015 and July 2017; involving an accumulated 401 Central & LG representatives and technical specialists, leads from multiple CSOs and industry, several in-country bilateral agencies and international NGOs/ENGOs; MDB Representatives, and UN Agencies. For more details on the extensive consultation process (see Annex7: Stakeholder organizations consulted during SPCR Preparation process).

Figure 7. SPCR Technical Stakeholder Workshop

99. The Consultation milestones and number of agency and stakeholder participants are detailed in Annex 7.

100. SPCR Scoping Mission: Of particular note was the Scoping Mission, which was led by the GNHC between 26-30 October, 2015. The MDBs were represented by the World Bank as the lead MDB, the Asian Development Bank (ADB) and International Finance Corporation (IFC). NEC and several Line Ministries participated during this 4-day event, as did several NGOs and UN Agencies. The main purpose of this Scoping Mission was to discuss preparation of the SPCR.

101. SPCR First Joint Mission: Core issues raised and agreed to in principle during the 4-day first Joint Mission Workshops included:

a. Private Sector Engagement**:** That although uncharted in Bhutan, the SPCR will explore opportunities to engage private sector, with IFC supporting GNHS's Phase I Scoping Project of private sector integration. This Project would mainly focus on mapping-out opportunities for private sector participation in climate-resilient actions in sectors including: water, waste and flood mitigation, and capacity building of Government to support private sector engagement.
b. Gender and CSO Integration**:** That the integration of gender in technical Projects be of high priority.
c. Carbon Neutral Development**:** That the outcomes from the World Bank supported technical Project with NEC on dynamic interaction between the economy and green-house gas emissions provide inputs to the SPCR Program, especially to the 12th FYP NKRA number 6: Carbon Neutral, Climate and Disaster Resilient Development Enhanced.
d. Implementation Arrangements and Collaboration**:** That the GNHC remain the lead agency for SPCR, with strong collaboration between GNHC and the NEC; that NEC's preparation of the

NAP is closely aligned with the SPCR document; and that GNHC promote the mainstreaming of the climate change agenda in the National Development Planning and Implementation Process.

e. Climate Financing**:** That the SPCR affords Bhutan an opportunity to lay out its strategic vision for climate-resilience with a diverse range of financing sources including: the PPCR, MDBs, the Green Climate Fund, The Global Environment Facility, International Development Association, and other development partners.
f. Strengthening Climate-Resilience Through Satellite Earth Observation Systems**:** That training on the use of earth observation data from satellites and remote sensing technology supplement and enhance Bhutan's information base on climate and hazards, through institution strengthening and capacity-building strategies.
g. Strategic Information needs**:** That these include strengthening glacial lake outburst, flood monitoring, landslide risk monitoring, cryosphere monitoring for improved water security, hydrological modeling and, flood forecasting; and,
h. Low-Carbon Synergies**:** The idea of integrating low carbon growth options into climate-resilient development as part of the SPCR preparation process was suggested by the WB Team; and the outcome of technical assistance to evaluate low-carbon development scenarios is expected to be completed and incorporated in parallel with the preparatory Projects.

Stakeholder Consultative Meetings & Feedback

102. A total of 28 consultative agency meetings were conducted during the July preparation period of the SPCR Working draft. Agencies included: most of the Central Government Line Ministries; almost all in-country national and international donor agencies, and UN Agencies; all three participating MDBs; and leading CSOs, along with several private sector leads, including: BCCI and Industry Association representatives. Along with the significant input garnered from the various Missions and Technical Workshops, a major portion of this SPCR Proposal is reflective of the ideas and expectations espoused during the consultative meetings with these stakeholders.

CHAPTER 2 – CLIMATE RISK & VULNERABILITY

2.1 Historical Trends & Climate Scenarios[29]

103. This Chapter provides detail on official historical and impact data and climate change trends; describes key vulnerabilities; and geo-climatic zones, communities, and ecosystems vulnerable to climate hazards; identifies risks and potential impacts to assets in critical sectors (e.g. water resources, agriculture, food security); and delivers a brief description of climate impacts on Ecosystems and CSMIs.

2.1.1 General

104. Bhutan's climate is varied by monsoon winds and elevations. The climate varies from humid and subtropical in the southern plains and foothills, cool temperate in the mid-altitudes and hot, humid and dry in the inner valleys of the central regions, and cold in the north. Temperatures vary by elevations. The southern foothills and plains experience a hot and humid climate with fairly even temperature ranging between 15°C and 30°C annually, though temperatures at times exceed 35°C in the valleys during summer. Most central valleys experience cool temperate climates throughout the year. In the north above 4000 m (above sea level) elevation, the climate is cold with some of the highest mountain peaks under snow cover most of the year.

2.1.2 Upward Temperature Trend

105. The ECHAM5 and HadCM3 climate simulation model shows a steady increase in the mean annual temperature from 1980 to 2069 (NEC, 2011). The former model indicates an increase by 3.5°C (15.5°C by 2069 from 12°C in 1980) and the latter model indicates an increase to 17°C by 2069 from 13.5°C in 1980 (Figure 8 below). The seasonal (summer) temperatures are projected to increase by approximately 0.8 °C from 2010-2039 and 2.1°C from 2040-2069, respectively. Similarly, winter temperature are expected to increase by 1.2°C by 2010-2039, and increase by 2.8°C from 2040-2069 (NEC, 2011).

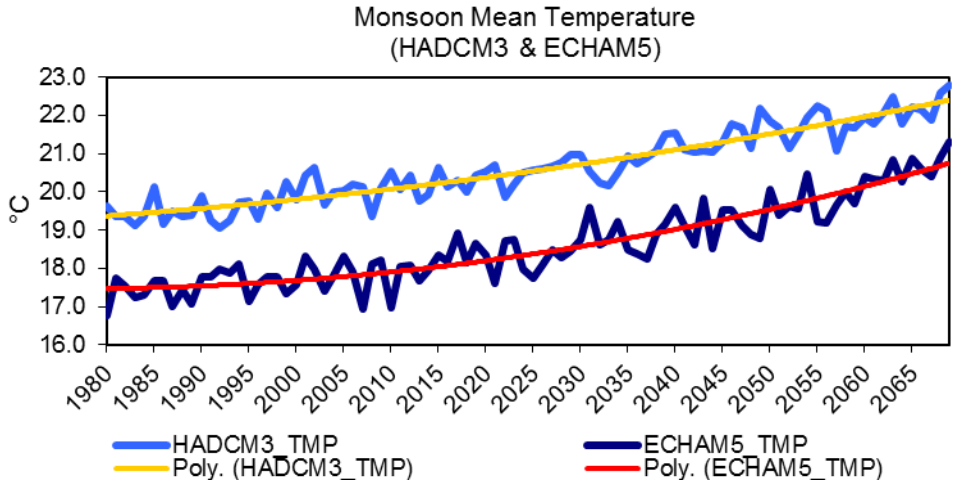


Figure 8. Mean annual temperature from 1980-2069 (Source: NEC, 2011)

106. The surface warming is projected to be more pronounced during pre-monsoon than during the actual monsoon period. The temperature increase will be higher in the inner valleys than in the northern and southern parts of the country (NEC 2011). The model's prediction of 3.5°C warming by the next century will result in melting of more than half the glacier reserves in the high mountains of Bhutan. Several Business As Usual (BAU) scenarios actually coincide to predict higher temperature trends.

[29] Annex 3; Stocktaking of Past and Current Climate-Related Investment and Activities

2.1.3 Increased but Variable Precipitation Trend

107. Both models (below) show an increase in the annual precipitation from 1980 to 2069 (Figure 9). The ECHAM5 model indicates an increase of 600mm/year (2600 mm/year by 2069 from 2000mm/year in 1980), while the HadCM3 indicate an increase of 500mm/year (2400mm/year by 2069 from 1900mm/year in 1980).

108. In general, Bhutan is expected to experience a significant overall increase in precipitation, but with an appreciable change in the spatial pattern of winter and summer monsoon precipitation including 20 to 30% decrease in winter precipitation over the north-east and south-western parts of Bhutan by 2050s (Tse-ring et al., 2010). Summers will be wetter, while winters will be drier in 2010-2039, and becoming drier by 2040-2069 (NEC 2011).

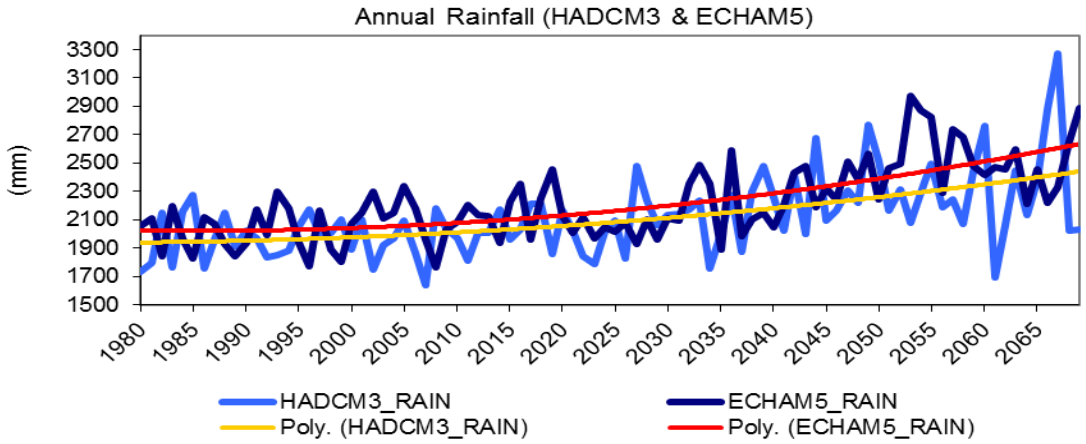


Figure 9. Annual precipitation 1980-2069

2.1.4 Snow Cover, Snow Fall Patterns & Frost

109. By extension, with an upward trend in temperature the extent of snow cover has decreased by about 10% on average in the Northern Hemisphere since the late 1960s (Gitay et al, 2002). Analysis of snow cover from Landsat MSS images taken from 1973 to 1979, and Landsat ETM+ images from 1999 to 2000 indicate a decrease in snow cover in the eastern Himalayas by 24.6 percent (Chettri et al, 2010).[30] This is a most significant melting trend.

2.1.5 Glacial Retreat

110. Several Projects have found that glacial lakes were growing as glaciers shrank. They counted 82 new lakes that have formed over the past 40 years, and estimated that some of the existing glacial lakes have grown by 250 to 750%. The average rate of glacial retreat in Bhutan from 1963 to 1993 is estimated to be about 2 m/year vertically and about 7 m/year horizontally, with 8.1 percent area shrinkage in 66 selected glaciers in 30 years (Karma et al, 2003).[31] Nayar (2009)[32] noted that glaciers are melting so quickly in Bhutan they can actually be heard as "deafening" cracks and booms every few minutes as blocks of ice rip off, crash into lakes, and stir up trails of dust and snow. The potential for GLOFs, therefore, pose an imminent threat to lives, livelihoods and the pace of development in Bhutan.

[30] Chettri, N, Sharma, E., Shakya, B., Thapa, R., Bajracharya, B., Uddin, K., Oli, K.P., & Choudhury, D. 2010: Biodiversity in the Eastern Himalayas; Status, Trends and Vulnerability to Climate Change: Climate Change Impact and Vulnerability in the Eastern Himalayas- Technical Report 2, ICIMOD.

[31] Karma, Ageta, Y., Naito, N., Iwata, S., and Yabuki, H., 2003, Glacier distribution in the Himalayas and glacier shrinkage from 1963 to 1993 in the Bhutan Himalayas: Bulletin of Glaciological Research v. 20, p. 29–40.

[32] Nayar A (2009) When the ice melts. Nature 461:1042–1046

2.1.6 Climate Change

111. Bhutan's unique geographical location is at the intersection of the Indo-Malayan Realm and the Palearctic Realm. Combined with the altitudinal and micro climatic variation, this endows a rich diversity of ecosystems, landscapes and species in the eastern Himalayas. Concomitantly, its geological complexities also make it extremely vulnerable to climate-induced hazards and risks such as: Glacial Lake Outburst Floods (GLOFs, see Figure 10);[33] erratic and extreme rainfall patterns inducing soil erosion; flash floods and landslides; seasonal droughts; and wind and hail storms, all adversely affecting property, human lives, and livelihood security.

2.2 Climate Change Extreme/ Hazards

Extreme weather events like heavy rains during summer triggering flashfloods and landslides, and little or no rain during winter, along with seasonal drought and occasional hailstorms, are increasingly damaging Bhutan's crops and livelihoods. We highlight some of these extreme events as follows:

2.2.1 GLOF

112. GLOFs are of particular concern for Bhutan, as glaciers are reportedly melting at the rate of 30-40m per year for debris-covered glaciers; and 8-10m per year for debris-free glaciers. This directly impacts drinking and irrigation water, and hydro electricity generation as short to medium-term socio-economic development priorities for the Government (NEC, 2011).

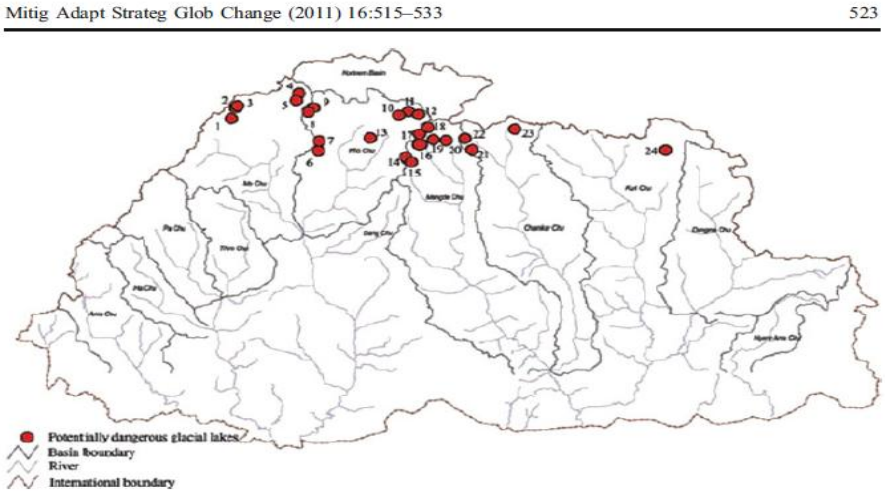


Fig. 5 Twenty-four "dangerous" glacial lakes identified by ICIMOD. Source Ives et al. 2010: 9

Figure 10. 24 Glacial lakes

There is substantive evidence of glacial retreat in the Eastern and Western Himalayas, and expansion of glacial lakes is predicted to be the highest in Nepal and Bhutan. With significant glacial deterioration along Bhutan's Northern frontier, an integral part of the Tibetan Plateau, there are 677 recorded glaciers with 2,674 glacial lakes and 7 major glacier-fed rivers (Mangdechu, manas, Punatsangchu, Wangchu, Chamkharchu, Drangmechu, Kholong chu, Kurichu) all subject to climate variability and extremes.[34] All of these rivers lead to the southern region of Bhutan, where climate impacts are at their greatest.

113. Out of the 2,674 glacial lakes, 24 were classified as potentially dangerous (NEC, 2012). In 1994, a major glacial lake outburst flood from Luggye Tsho in Lunana (Figure 11) north-west of Bhutan caused extensive damage to agricultural land and pastures, and loss of human lives and livestock along *Pho Chu* (river) in Punakha.

[33] Ref: Improving adaptive capacity and resilience in Bhutan: Harsha Meenawat & Benjamin K. Sovacool

[34] Bhutan Second National Communication to the UNFCCC (NEC, 2011).

Figure 11. Bhutan Experiences with the NAPA

114. The threat is imminent from the Raphstreng and Thor Thormi lakes in the headwaters of Puna Tsang Chhu. These lakes are adjacent to each other, separated by a temporary and geologically unstable moraine wall. The combined outbursts discharge from these lakes is estimated at 53 million cubic meters three times more than the 1994 Luggye Tsho Glacial Lake Outburst Flood (see Figure 12). A list of major GLOF occurrences and impacts on infrastructure and human lives are provided in Table 2.

Table 2: GLOF and flash floods and impact on infrastructure and human Lives
(Source: DDM, Ministry of Home and Cultural Affairs, 2014)

Year	GLOF	Areas Affected	Impact
1994	GLOF from Luggye Tsho, eastern Lunana	Punakha and Wangdi Phodrang Valley	21 lives lost; 91 households affected; 12 houses damaged; 5 water mills washed away; 965 acres agricultural land affected by sand and silt; damage to livestock; stored grains and materials; 5 bridges washed away; 3 monasteries in Tsojug badly damaged.
2015	Lemthang Tho lake outburst due to supraglacial breach	Laya	Destroying an acre of arable farm land, with 4 bridges damaged in along with large tracks of destroyed timber and numerous livestock's lost

115. The current trends in glacier melt and erratic rainfall indicate that water levels in rivers and streams will be reduced, with consequences to hydropower generation, food production, and industrial and domestic water use. Enhancing water availability and accessibility through climate-oriented integrated water resource management, natural ecosystem and adaptive wetland conservation, and efficient use of water resources are adaptation priorities.

2.2.2 Flash floods and landslides

116. The flash flood charged rivers wash away vital infrastructure, such as roads connecting places, buildings, water tanks, and electricity and communication facilities. For example, on May 25th and 26th, Cyclone Aila brought unprecedented rain inducing severe flooding in seventeen of Bhutan's 20 districts with estimated damage worth US $17 million (DDM, 2016).

117. The result of these flood events is paralyzed southern towns: e.g., Phuentsholing and Pasakha in 2000; and Gelephu and Sarpang towns in 2016. Heavy rain and flash floods continue to trigger frequent landslides and landslips, common features of Bhutan's geologically unstable, fractured and weathered rocks (of parent material of phyllites, slates and schist). These unstable rock formations are concentrated in the southern part of the lesser Himalayas.

118. Table 3 below shows a list of torrential rain-induced flash floods and landslides events across

Bhutan attributed to global warming and climate change.

Table 3: List of climate-induced flash floods and landslides damage; Department of Disaster Management Ministry of Home and Cultural Affairs, 2016

Date	Flash floods and Landslides	Damaged Impact
2000	Extensive flooding and landslides in the southern region due to extreme rainfall	Loss of life, wide spread damage to residential homes and industry, and leading to the closure of the Thimphu-Phuentsholing highway for almost a month
2003	Landslides threatening the Kurichu Hydropower Station, and the national economy	Extensive road damage; dam siltation build-up
2004	Heavy rainfall causing floods in the six eastern Dzongkhags (Mongar, Trashigang, Trashi Yangtse, Pemagatshel, Lhuntse, and Samdrup jongkhar)	9 lives lost; 29 houses washed away completely; 26 houses collapsed and 107 houses partially; 161 acres of paddy land damaged and 503 acres of dry land washed away; 39 irrigation channels damaged.
2009	On May 25/26th, Cyclone Aila brought unprecedented rain	Severe flooding in seventeen of Bhutan's 20 Districts; and estimated damage worth US $17 million
2010	Flash floods caused by monsoon cyclones in all Districts	Caused 12 deaths with Nu. 719 million damage loss
2011	Landslides due to monsoon rains in western Bhutan and windstorm disasters in 80% of the districts	Caused 15 casualties, 700 houses destroyed; and that same year, windstorm disasters damaged 2400 houses and schools
2013	Flash flood caused by Jichuronchu due to heavy rain fall 5 villages in Kabisa Gewog in Punakha Dzongkhag	More than 14 acres of agricultural land filled with debris and damaged.
2016	Flash floods in southern Bhutan caused by monsoon rains	Multiple landslides and the resulting death of 4 inhabitants, with 125 households damaged, and many roads and farms destroyed beyond repair.

2.2.3 Drought

119. Although the data on drought is limited, parts of the mid-altitude inner valleys in Bhutan suffer from seasonal drought during low rainfall. The winter of 2005/6 experienced an unusually dry winter with virtually no rain and snow (NEC, 2012). Erratic and low rainfall combined with an increase in temperatures make the inner valleys hot and dry (e.g. Wangdi Phodrang in Western Bhutan, Trashigang and Lhuntse in eastern Bhutan, and Sarpang in southern Bhutan). The De Martonne's aridity index decreases annually from 1996-2009, indicating drought in the mid-altitude inner dry valleys, possibly due to less annual precipitation and rising temperatures (see Figure 12).

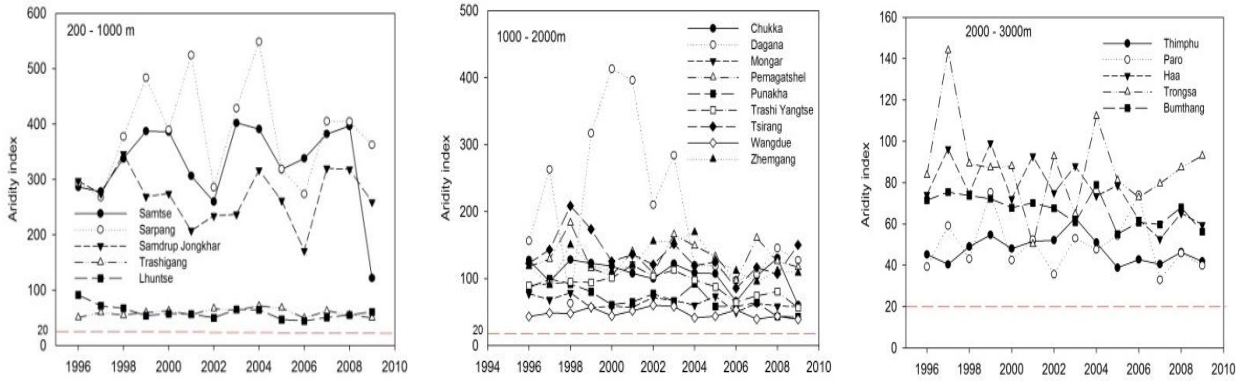


Figure 12. De Martonne's aridity index change (Source; Lungten and Moktan 2015)

120. For example, in Sarpang, rainfall has decreased and droughts have become more common with the most recent drought experienced in 2013 (Lungten and Moktan, 2015). The consequences of drought are reduced water availability for drinking and irrigation for agricultural crops. Drought also induces a higher incidence of forest fires. During the 2013-2014 period, there were 64 forest fire incidences burning approximately 45,095 acres of forests an increase from 34 incidences burning 12,175 acres in 2012-2013 (MoAF, 2016). The incidence of drought is correlated with the frequency of forest fires which pose an imminent threat to forest and biodiversity (Figure 13).

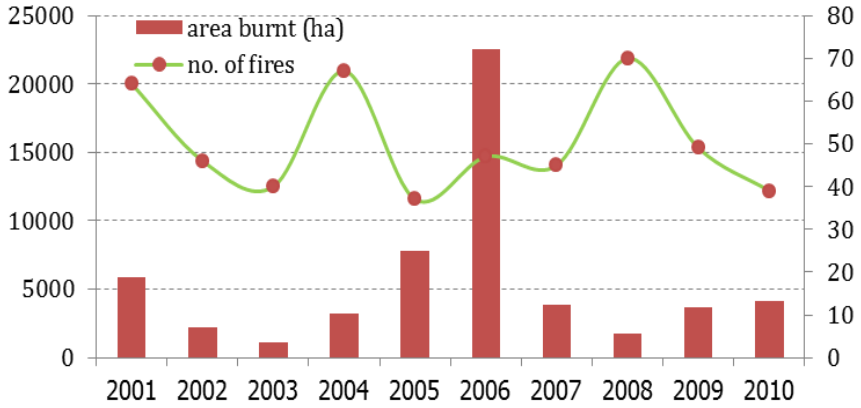


Figure 13. Occurrence of forest fires and forest burnt

2.2.4 Windstorms

121. Windstorms occurrences are more frequent, widespread, and of increasingly greater intensity. The roofs of traditional mud and stone built houses across the country continue to be broken or completely blown away, damaging homes and threatening occupant's lives. The State of Climate Change Report for Renewable Natural Resources (RNR) documents windstorm occurrences in Bhutan (Table 4).

Table 4: List of climate-Induced windstorm and damages
(Source: Department of Disaster Management Ministry of Home and Cultural Affairs, 2016)

Year	Windstorm	Damages
2008	Immense windstorm in Eastern Bhutan	Causing severe damage to houses and crops in Eastern Region; along with roadblocks on the national highways; and fatalities from boulder debris.
2012	A powerful windstorm in central Bhutan	Destroyed 230 houses
2013	Windstorm of similar potency impacted 70% of the districts	Windstorm destroyed 1080 houses
2014	A destructive windstorm in central Bhutan	Destroyed 200 houses destroyed from a massive landslide

2.2.5 Hailstones

122. The recent hailstone event (6-11 April, 2016) damaged 177 households, and affected 89 acres of potato and wheat farms (DDM, 2016).

2.2.6 Invasive Plant Species

123. There has been a significant increase in the diversity of invasive agricultural weeds such as Parthenium, Opuntia, Eupatorium, and *Lantana camera* - particularly along the dry valleys of subtropical zones in Bhutan. For example, paddy weeds are reportedly increasing due to insufficient irrigation water and untimely weeding, which are exacerbated by water scarcity due to climate change-induced aridity. Such invasions by noxious species may result in the decline of native species diversity, and may lower productivity of agricultural crops with high input costs for weed removal.

What is also not apparent immediately is the erosion of cultural practices, beliefs and traditional knowledge that will occur through the disappearance of local plant species or what is termed as loss of "Bioculture" (Maffi, 2007; Singh et al, 2011).[35] It is apparent that climate change will accelerate the loss of traditional knowledge related to the use of medicinal plants, wild and domesticated animals, and cultural elements associated with this biodiversity reflected in song and dance, resulting in the loss of a traditional heritage, an era, a way of life (Gitay et al, 2002, Singh et al, 2011).[36]

2.3 Data Scarcity

124. Considering the aforementioned impacts associated with climate extremes, it is imperative that the RGoB embark on an aggressive path toward a climate-resilient society. This must include a systematic assessment of localized climate vulnerability and adaptive capacity of ecosystems – dependent human settlements and critical infrastructure. However, the field of climate vulnerability assessment has only recently emerged to attempt to quantify how communities will best adapt to changing environmental conditions.

125. In Bhutan, scientific literature on climate vulnerability assessments is virtually non-existent. Recognizing that Bhutan is comprised of multiple fragile ecosystems (riparian biomes, high mountain ecosystems, sub-tropical riverine flora and fauna), it is highly vulnerable to multiple climate-induced hazards. The increasing incidence and intensity of floods, droughts, biodiversity degradation, and subsequent economic destabilization and poverty seriously challenge Bhutan's developmental progress.

126. This field of climate vulnerability and adaptive capacity assessment has only recently emerged to try to quantify how communities will adapt to changing climate-induced environmental conditions. It is therefore essential to implement climate adaptation (and mitigation) measures at local, national, and trans-border levels to reduce vulnerability and risk to climate-induced hazards, especially through ecosystem-based adaptation(see Figure 14). The impact of climate extremes and variability on several key sectors and ecosystems in Bhutan is provided in the following Section 2.4.

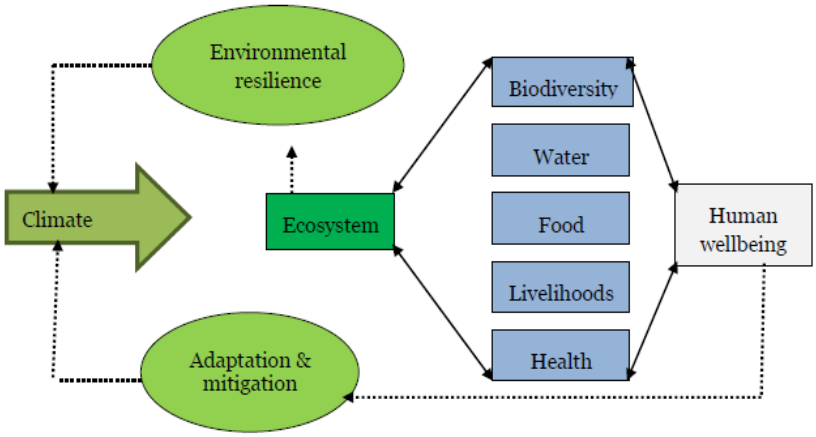
127. As stated (see below) in the Assessment of Climate Change Vulnerabilities in Kangpara Gewog, Trashigang (2012): "Various researchers have tried to bridge the gap between the social, natural, and physical sciences, and (have) contributed new methodologies that confront this challenge. However, almost all such methodologies depend very heavily on the availability of long-term and quality data and observation to make good assessments."[37]

128. Projects relying on climate scenario projections from General Circulation Models (GCMs) suffer from the uncertainty associated with these (low-resolution) models, and how results are mapped (Thornton et al., 2006). Pertinent near-term and medium-range forward-casting impact projection modeling data is not readily available for Bhutan, especially Statistical Downscaled Models (SDMs) or Dynamical Downscaled Models (DDMs) at high-resolution (3-10 km scale) for water basin level impact assessments. This SPCR seeks, inter-alia, to identify data gaps and develop Bhutan's national impact projection modeling capacity within the NCHM to better assess and prepare for the inevitable climate hazards that may further undermine the country's developmental progress.

[35] Maffi, L. 2007. Biocultural diversity and sustainability *in* The SAGE Handbook of Environment & Society, Pretty, J., Ball, A.S., Benton, T., Guivant, J.S., Lee, D.R., Orr, D., Preffer, M.J.,and Ward, H. (eds), SAGE Publications Ltd. California

[36] Gitay, H., Suarez A., Watson, R.T., Dokken, D.J., (eds.), 2002. Intergovernmental Panel on Climate Change, Technical paper V.

[37] Assessment of Climate Change Vulnerabilities In Kangpara Gewog, Trashigang; Royal Society for Protection of Nature, Thimphu; 2012



Source: Adapted and modified from Metzger and Schröter 2006.

Figure 14. Role of ecosystems in assessment of climate change effects on human wellbeing

2.4 Geo-Climatic Zones; Communities & Sectors Vulnerable to Climate-Induced Hazards

2.4.1 Geo-Climatic Zones

129. Geo-climatic zones are defined as unique ecological regions across Asia, where geography, ecosystems, and localized climate coincide to produce increased vulnerability and exposure to climate hazards from climate change variability and extremes.[38]

130. Geo-Climatic Zones across Asia include: (i) fragile mountain ecosystems; (ii) river basins and deltas in low-lying areas; (iii) arid/semi-arid & dry sub-humid; and, (iv) small islands. Low-Income Developing Countries and the Fragile State face additional vulnerability to climate impacts because of their weaker capacity to adapt. Consequently, the integrity of Investments within these higher-risk geo-climatic zones are prone to adverse climate impacts, and demand strategic climate-resilience interventions and financial support to minimize climate-induced damage and maximize Investment outcomes.

131. In this regard, Bhutan faces a "triple-whammy" in that most of the country falls under the geo-climatic zone of: "fragile mountain ecosystems" in the northern and central highlands; and under the geo-climatic zone of "river basins in low-lying areas" in the Southern Belt. In addition, river deltas, such as the Punakha, Sarpang, Phuntsholing, and Mao river in Gelephu are subject to repeated erosion, and riparian destabilization from large debris flows and landslides attributed to climate extremes.

132. Furthermore, Bhutan it is currently under Least Developed Country (LDC) status, with poor adaptive capacity, and therefore ill-equipped to protect its Investments against the ravages of climate change. This is especially so at the community level, and more so in the southern belt which is highly vulnerable to repeat flash floods and drought, and concomitant food and water insecurity.

2.4.2 Vulnerable Communities

133. The vast majority of Gewogs across this small fledgling Himalayan Constitutional Monarch are highly vulnerable to anticipated anthropogenic extreme weather events and climate variability due to their precarious geo-climatic location, and their resource-dependence on destabilized ecosystems and vulnerable critical infrastructure.

[38] ADB's Portfolio at Risk to Climate Change: A Preliminary Assessment (December 2009; P. Hayes)

134. Most climate scientists rely on the IPCC working definition of vulnerability, as a function of exposure, sensitivity, and adaptive capacity (IPCC, 2001). Exposure, in this case, is the magnitude and duration of the climate-related exposure such as a drought or change in precipitation; Sensitivity is the degree to which the system is affected by the exposure; and, Adaptive Capacity is the system's ability to withstand or recover from the exposure (Ebi et al., 2006).

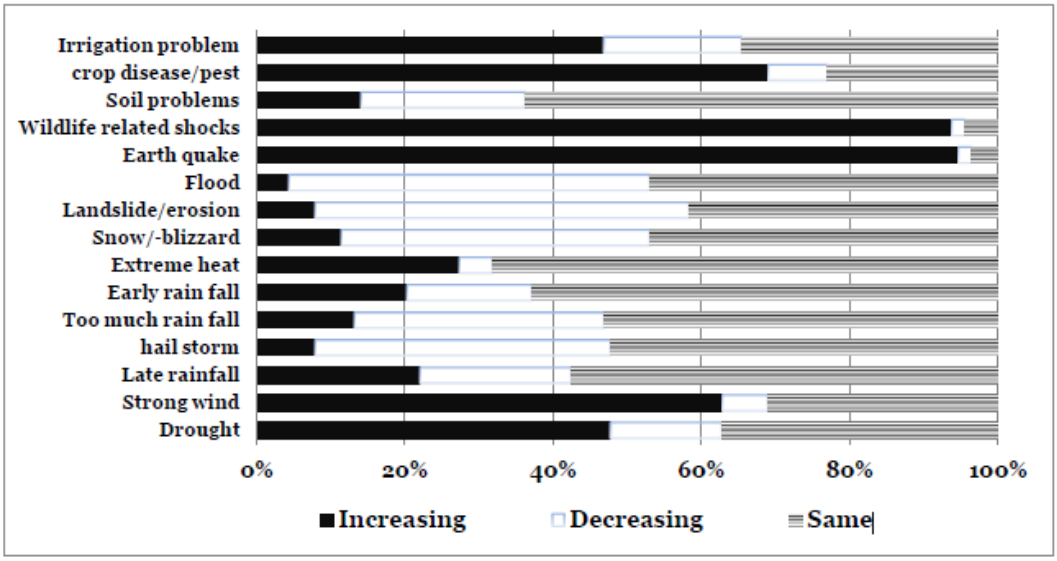


Figure 15. Percentage of households reporting trend in event of high severity

135. Most villages across Bhutan are highly vulnerable to climate impacts, and have low adaptive capacity attributed to their limited resource base and precarious socio-economic status, including: labour shortages; poor grid and road connectivity; unstable dryland agriculture; crop disease and low-yielding seeds; fledgling cottage industry; and, increased risk and exposure to drought, unseasonal precipitation, and wind events (Figure 15).

136. A case in point is the Kanpara Gewog in Trashigang District in Eastern Bhutan. Kangpara's comprehensive 2012 Assessment of Climate Change Vulnerabilities[39] is insightful. It reads:

Kangpara Gewog has about 300 households in 13 villages that have been connected with grid electricity and the remaining households in four villages of Threphu, Merdha, Kheri and Drowanchema are yet to be connected with grid power. Currently, some better off households have bought solar equipment for lighting.

Road connectivity is the main concern of Kangpara Gewog at the moment. There are only two farm roads in the Gewog, one connecting Thrimshing and Bedangphu and the other connecting Bedangphu and Peldung. All other villages are connected by narrow mule tracks.

The Gewog has 10 sets of fixed solar telephone, which keep the Gewog connected to rest of the places. However, existing phones are not reliable as the efficiency is directly dependent on good weather condition with sufficient sunlight. However mobile phone network service is available in several villages.

Kamzhing or dry land based cultivation is the most dominant farming system in all the villages. Cultivation ranges from gentle to steep slopes. Horticulture is not developed in these villages. Most of households have one to two trees of peach or pear. Almost all households have kitchen gardens but very few types of vegetables are grown and commonly include onion, garlic and peas,

[39] Assessment of Climate Change Vulnerabilities In Kangpara Gewog, Trashigang; Royal Society for Protection of Nature, Thimphu; 2012

In general crop production is lower than the national average. The low yield of maize, in particular, could be attributed to the use of poor quality seeds, traditional crop varieties, incidences of pest and diseases and inadequate soil fertility management. Many farmers reported that their maize crops were severely affected by diseases such as Gray Leaf Spot and Turcicum Leaf Blight and these diseases usually occurred in epidemic scale in high altitude maize growing areas around the country. Besides, farmers are battling with noxious weed species such as Gangchimin (*Persecaria runcinata* and *Persecaria nepalensis*), Themnang (*Fagopyrum dibotrys*) and in the non-farm land, Amartala (Eupatorium sp.) seems to be vary invasive.

Most of the villagers are subsistence farmers and agriculture is based on dry land cultivation combined with livestock, and small kitchen garden. Major crops are potato, maize, wheat, millet, and chilly. Livestock includes horse, goat, cow, pig and poultry. The villagers significantly depend on forest resources especially cane and bamboo. Cane and bamboo are commonly used for building house, fencing, roofing and weaving handicrafts. The area is known for one of the finest bamboo crafts in Bhutan. The Bamboo product is a main source of cash income for the local people in this Gewog.

Over the years, bamboo production has drastically depleted, particularly Rinshoo (*Neomicrocalamus andropogonifolius*) commonly used for basket weaving. Most of the Rinshoo is now collected from the neighbouring district–Samdrup Jongkhar that takes a minimum of seven days of combined walk and vehicle (to & from) from these villages. Because of the long travel distance, villagers can do only about one to two trips per year to collect bamboo. Therefore the craft and business is at risk of dwindling.

Most of the villages in Kangpara are scattered amidst forest areas and lack modern infrastructural facilities. The increasing aspirations of the inhabitants of Kangpara for economic development and expanding access to market will potentially lead to degradation of the natural resources. There is, however, opportunity for interventions that will open prospects for enhancing both conservation and socio-economic welfare of the local communities.

Natural climate related disaster that are reported to occur in the Gewog include, drought (59.29%), strong wind (58.41%), late rainfall (47.79%), extreme cold (38.94%), hailstorm (35.4%), too much and early rain fall (30.09%), frost (27.43%), extreme heat (26.55%), snow/blizzard and land slide/erosion (20.35 % each) and flood (14.16%).

2.4.3 Impacts on Climate Change on Climate Sensitive Sectors

137. The following provides a sector-wide analysis of climate impacts on water resources, agriculture and food security/sufficiency, hydropower, infrastructure, human health, biodiversity and forestry, and the private sector (CSMIs).

i) Water Resources

138. There are several rivers which flow into the four major river basins of Bhutan namely: Amo Chhu (Toorsa), Wang Chhu, Puna Tsangchhu (Sunkosh) and Drangme Chu (Manas). Several small river basins occupy the southern part of the country. In some way, all of these rivers are being negatively impacted by hydro-meteorological variations attributed to climate variability and extreme events.

139. The most recent inventory of high altitude wetlands in the country carried out by the Ugyen Wangchuck Institute for Conservation and Environment (UWICE) and WWF - Bhutan Program recorded a total of 3,027 wetlands inclusive of lakes and marshes. The continuous flow of water from these reservoirs is of paramount importance as "water towers" for the region.[40]

140. Bhutan's economy is dependent on climate-sensitive sectors such as hydropower, water for

[40] Biodiversity Persistence and Climate Change in Bhutan, 2011 (Author Unknown)

drinking and irrigation for agriculture, food and nutrition security. With water demand on the rise, and an alarming increase in water springs drying up, water shortages for critical sectors needs to be urgently addressed. The following Project: Water Assessment Using the Water Evaluation and Planning (WEAP) Software Package (NEC, 2011) highlights this point with the following findings:

- There is increased water demand in the future for municipal, rural and irrigation use.
- Agriculture continues to demand more water than Municipal areas and Industry.
- Water demand for all 3 sites (Thimphu, Paro and Haa) will be supplied, but projections (2010-2039; and 2040-2069) show an increase in water demand as a majority of the population depends on water from springs and smaller streams for drinking and irrigation.

141. Lamentably, there are widespread incidences of water sources drying-up in villages and communities across several Dzongkhags, even for basic drinking water. As per the Kuensel editorial on the 9 February 2015, it reads: Acute water shortages in Phangyul Gewog, Wangdi Phodrang Dzongkhag has left many villagers frustrated with more than 1,000 acres of land turned fallow without a possible solution. As a result, water use conflicts are not uncommon among rural communities. The National Integrated Water Resource Management Plan (NIWRM) documents 7 water-related disputes (3 drinking water and 4 irrigation water) in 2012-2015 (NEC, 2016).

142. An estimation of water availability and demand was calculated in target areas, to establish monthly water balances at the level of basins, sub-basins and Dzongkhag (NEC, 2016). The results were ranked in decreasing order of potential water scarcity as given in Table 5 below:

Table 5: Summary of Dzongkhags with potential water shortage by 2030
(Source: NEC, 2016)

Method	Basin	Dzongkhag	January	May	June
Falken mark	Punatsangchu	Thimphu	Scarcity	-	-
Water Balance	Wangchu	Haa	Stress	-	-
	Punatsangchu	Thimphu	Absolute scarcity	Scarcity	Stress
Demand Ratio	Aiechu	Zhemgang	Scarcity	Stress	
	Amochu	Samtse	OK	-	

143. In addition, according to the Bhutan State of the Environment Report (NEC, 2016) there is an increasing demand for drinking, irrigation and industrial water use as given in Table 6:

Table 6: Water demand - current and projection
(Source: NEC, 2016)

Use/Demand	2015 (mcm/year)	2030 (mcm/year)
Drinking water	36.09	77.68
Industrial and other use	74.39	218.35
Irrigation	666.9	911.8

144. It is widely appreciated that Bhutan's glaciers form a "perpetual" and crucial source of water recharge and flow for our river systems, and drinking and irrigation water requirements. Those majestic glacier peaks are the essential water towers for Bhutan's downstream ecosystem-based socio-economic development, and for neighbouring countries like India and Bangladesh. However, they are under climate attack.

ii) Agriculture & Food Security/Food Sufficiency

145. More than 58% of the total labour force of Bhutan is engaged in agriculture activities (MoHLR, 2015), practised on barely 2.75% of existing cultivated land. Generally, women's roles are confined to agricultural activities within the household, while men do off-farm non-agricultural work. Mostly, women market cereals, vegetables, fruits, and livestock products, indicating an increasing feminization of agriculture (Moktan, 2015).

146. Farming is predominantly subsistence level, and a majority of Bhutanese farmers continue to grow traditional crops and crop varieties. Rice and maize are the major staple crops and other commonly grown crops are wheat, barley, buckwheat, millets, oil seeds, grain legumes, orange, apple and cardamom. Bhutan has over 350 traditional rice varieties grown in different agro-ecological zones.

147. This makes agriculture one of the most important economic sectors, though highly vulnerable to impacts from climate change. The impact is elevated due to the dependence of Bhutan's agriculture on largely rain-fed crops. A Project on food vulnerability and mapping (MoA, 2005) concludes that while Bhutan is not self-sufficient in all food grain production, food imports have prevented it from suffering acute food shortage. Generally, food insecurity is confined to remote rural area farmers with limited land and livestock holdings and poor access to markets. Some farmers face seasonal food insecurity coinciding with intensive pre-harvest agricultural operations.

148. A national Project on biodiversity persistence and climate change at the Climate Summit (MoAF, 2011) reported several food insecurity episodes. For example, rice blast in 1995 caused by the fungus *Pyriculari grisea* occurred on an epidemic scale in the high altitude warm temperate rice growing areas - causing as high as 71% yield loss and loss of several traditional rice varieties.

149. A new maize disease - Gray Leaf Spot (GLS) caused by the fungus *Cercospora zeae maydis* – devastated the entire maize growing area in the east, affecting about 3,835 households covering 4,711.76 acres of the maize crop. This threatened the household food sufficiency and existence of about 38 traditional maize varieties.

iii) Hydropower

150. Bhutan's largest export is renewable hydroelectricity. By 2014, hydropower development and export comprised a 5th (approx. 25%) of Bhutan's whole economy. Taxes and dividends from Hydropower companies constitute approximately 40% of national revenue[41], making this the single biggest source of revenue in Bhutan's economy. Sales of hydroelectricity are also a significant source of foreign exchange, accounting for nearly 45% of all of Bhutan's exports by 2014.

151. As of 2015, it is estimated that the sector generates 1,588 MW[42] of hydropower installed capacity. By 2022, it is expected to produce 5,000 MW (EDP 2017) from Himalayan river valleys. The country has the potential to generate upwards of 30,000 MW of hydropower energy. Much of this power can be exported to states across India. Future projects are also being planned with Bangladesh.

152. The three-new hydro-electricity projects (770MW Chamkharchhu, 180WM Bunakha, and 570 MW Wangchhu), besides contributing to domestic revenue, will also enhance our installed hydroelectricity generation capacity from about 1600 MW to about 3120 MW in the 12th FYP.[43] This would help in increasing the current Reliability-Must-Run (RMR) power estimated at 300 MW to close to 900 MW, thereby facilitating establishment of new clean green industries, FDI inflows, employment generation, and economic diversification in the 12th FYP.

153. Based on current and projected energy revenue, hydropower has been the primary focus for the country's 11th and 12th FYP Five-Year Plans. As of 2015, the Tala Hydroelectric Power Station is our largest power plant, with an installed capacity of 1,020 MW. Substantial financing has been received, particularly from the Government of India in the form of both grants and loans to develop Bhutan's hydroelectric projects.[44]

[41] Bhutan Power Annul Report 2016.
[42] Bhutan Power Annul Report 2016
[43] https://www.pressreader.com/bhutan/business-bhutan/20170121/281582355338299
[44] Economic Development Policy (EDP) 2017. Ministry of Economic Affairs.

154. However, the hydropower sector - Bhutan's economic growth engine – is becoming increasingly susceptible to climate impacts. With strengthening monsoons, Bhutan is expected to see more incidents of extreme rainfall, and a greater variance in total river volume between one year and another, jeopardizing Bhutan's ability to generate constant electricity supply for domestic consumption as well as for revenue generation. Moreover, climate-induced upstream siltation and downstream sedimentation are posing serious engineering challenges to the energy sector.

155. The total dependence on hydropower for Bhutan's energy needs and national economy renders it most vulnerable to climate change. While the country has abundant water resources, any change in the flow regime due to climate change will have a direct impact on ensuring our energy security. The issues of concern in the hydropower sector are: (i) predicting future flows; (ii) managing hydropower systems owing to predicted flows; (iii) reservoir sedimentation; (iv) flash floods and GLOFs; (v) increasing glacier retreat and less snow cover; and, (vi) erratic rainfall, patterns due to a prolonged dry season (NEC, 2011).

156. Projects on historical flow patterns of the Chukka Dam indicate that the average annual discharge for the period 1987-2009 shows a decreasing trend, with an average annual decrease of 2,468 m^3/s per year (NEC, 2011). In general, it is projected that river basin flows will decrease moderately in the dry winter months (November to April), but would increase substantially during the monsoon months (May to October).

157. These changes would impact basin flows and hydropower generation which necessitates adaptation and mitigation measures, such as:

- Creation of retention reservoirs within Wangchu and Punatsangchu drainage basins to capture excess flow during the monsoon months, and use in the dry winter months, to regulate winter flows and electricity generation.
- Management of GLOFs, so that glacial lakes may be drained during the winter months to regulate river flows and avoid flooding.
- Greater use of renewable energy in potential remote areas to lessen the burden on hydropower, and
- Adoption of energy-efficient measures to reduce consumption and mitigation of GHGs.

iv) Infrastructure: Urban & Rural Development and Transport/Roads

158. Bhutan's urban settlements (cities and satellite towns) are located in valleys and uphill slopes within fragile mountain ecosystems. Glaciers are the source of Bhutan's major rivers flowing from north to south through deeply incised valleys. In the event of GLOF occurrences, and heavy monsoon rains triggering flash floods, these events are strongly felt by downstream settlements concentrated along the river banks and plains, with lasting impacts.

159. The flash flood charged rivers wash away vital infrastructure, such as roads connecting places, buildings, water tanks, and electricity and communication facilities. For example, on May 25th and 26th, Cyclone Aila brought unprecedented rain inducing severe flooding in seventeen of Bhutan's 20 Districts with estimated damage worth US $17 million (DDM, 2016).

160. The result of these flood events is paralyzed southern towns: e.g., Phuentsholing and Pasakha in 2000; and Gelephu and Sarpang towns in 2016. Heavy rain and flash floods continue to trigger frequent landslides and landslips, common features of Bhutan's geologically unstable, fractured and weathered rocks (of parent material of phyllites, slates and schist). These unstable rock formations are concentrated in the southern part of the lesser Himalayas.

161. To minimize the impact of climate change in these highly vulnerable Thromdes and Gewogs, peri-urban planners and developers need to integrate climate-resilient re-design protocols and formulate Climate-SMART Land Use Plans (LUPs) for housing, public works, critical municipal infrastructure (including roadworks and drainage culverts), and green spaces.

v) Human Health

162. The increase in temperature complicates the control of vector-borne diseases in Bhutan. High temperature, rainfall, humidity and improper sanitation create a breeding environment for malaria parasites and enhance vector–borne transmission. Dengue fever is a climate-induced viral disease which commonly occurs in the southern Dzongkhags of Samtse, Samdrup Jongkhar, and Sarpang. In 2004 and 2006, an estimated 2,616 and 2,546 incidences of Dengue fever were reported (NEC, 2012).

163. The ECHAM5 model projects a moderate increase of Dengue by 2010-2039 and significantly by 2040-2069 for the whole of Bhutan (NEC, 2011). Building climate-resilience requires an ecosystem-based approach to human health; along with water and vector-borne diseases prevention and control measures in vulnerable human settlements.

vi) Biodiversity & Forestry

164. Bhutan straddles two major bio-geographic realms, the Indo-Malayan and Palearctic and is part of the Himalayan biodiversity hotspot with a diverse array of flora and fauna including more than 5600 species of vascular plants, out of which 94% are native species and currently about 105 species are endemic to Bhutan[45] (NBC, 2014). Further, 411 species of pteridophytes, 282 species of mosses, 350 species of fungus (out of which 53 are edible mushrooms), 100 species of insect fungi, 287 species of lichens, 200 mammals with 27 globally threatened and about 700 birds with 18 globally threatened ones are recorded (NBC, 2014).

165. Bhutan also has an extensive network of rivers due to the high (but increasingly unpredictable) level of precipitation, numerous glaciers and glacial lakes and well-preserved forests, resulting in upstream and downstream benefits such as water and other ecosystem services (BAP, 2009).[46] However, these hydrological benefits to ecosystem biodiversity are frequently disrupted due to climate variable and increased extreme weather events, further destabilizing these ecosystems.

166. The total area under forest coverage is 72.5% and 51.32% of the country is secured as protected areas and biological corridors. These are not only rich reservoirs of biodiversity, but have indirectly served as long-term stores of carbon which mitigate the adverse impacts of climate change. The Protected Areas system of Bhutan is regarded as one of the most comprehensive in the world. It encompasses a continuum of representational samples of all major ecosystems found in the country, ranging from the tropical/sub-tropical grasslands and forests in the southern foothills, through temperate forests in the central mountains and valleys, to alpine meadows in the northern mountains (NEC, 2009).

167. Recent moderate warming has been linked to improved forest productivity, but these temporary gains are expected to be offset by the effects of increasing drought, fire and insect outbreak as a result of further warming (Campbell et al, 2009).[47]

168. Simulated spatial distribution of major forest types, according to the Holdridge Forest Classification Systems using HadM3 for 2010-2039, show northward movement and a net decrease in area of subtropical rain forests (-55%), Montane rain forest (-100%), Montane Dry (-29%) and Alpine (-26%) (NEC, 2011). Similarly, the montane cloud forests occurring at 2500 masl in the valley slopes of Dochula-Bajo and at 2000 masl along the mid-hills of Gedu-Darla appear vulnerable (Wangda and Ohsawa, 2006), resulting in habitat loss and fragmentation and disappearance of relic plants e.g., *Taxus*, *Magnolia*, *Tetracentron* and the endangered iconic bird (hornbills).

169. Water or moisture stress due to low winter rainfall affects tree mortality particularly in the mid-altitude inner dry valleys of Bhutan. Dendrochronological Projects showed a significant correlation (65%)

[45] National Biodiversity Strategies and Action Plan (NBSAP) Bhutan 2014.
[46] Biodiversity Action Plan (BAP), 2009. Ministry of Agriculture, Royal Government of Bhutan.
[47] Campbell, A., Kapos, V., Scharlemann, J.P.W., Bubb, P., Chenery, A., Coad,L., Dickson, B., Doswald, N., Khan, M.S.I., Kershaw, F., and Rashid, M., 2009. Review of literature on the Links between Biodiversity and Climate Change: Impacts, Adaptation and Mitigation. Secretariat of the Convention on Biological Diviersity, Montreal. Technical Series No.42.

between the tree growth and the climate factors, particularly the monthly mean rainfall from November to December of the previous year in the die-back affected sites along the Pachu-Wangchu Valley (Wangda et al., 2012).

170. Beyond forest cover, the proportion of other land uses are much smaller, with agriculture (including horticulture) at 2.75%; pasture at 2.51%; settlements at 0.19%; and others mainly consisting of uninhabitable and inaccessible terrain, including glaciers.[48]

171. It is important to understand that changes in biodiversity and ecosystem functioning could lead to changes in critical goods and services upon which human societies rely. These are provisioning services, such as food, water, timber, fibre, genetic resources, and medicines; regulating services such as regulation of climate and, water and soil quality, and pollination; cultural services such as recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation and nutrient cycling. As well, intact ecosystems are more resilient and better able to buffer the impacts of climate change in comparison to ecosystems which are already weakened due to other stressors such as pollution or overuse (Amend & Eibing, 2010).[49]

172. For example, a Project on Climate Change Vulnerability Assessment of Wangchuck Centennial Park (WCP) in central Bhutan (WWF, 2011) deduced a warming trend in the annual temperature and high levels of variability and uncertainty in annual precipitation, which will lead to shifts in seasonal stream flow, ecosystems, and distributions of species depending on habitat shifts. The deterioration of ecosystem connectivity and the increase of habitat fragmentation were identified as major sources of vulnerability for terrestrial and aquatic ecosystems. Loss of biodiversity, shifts in habitats, the occurrence of pests and diseases and decline in ecosystem services are challenges that the forests and biodiversity sector confront.

vii) CSMIs

173. Cottage and small industry (CSI), which constitutes over 96% of all licensed industry in Bhutan, continues to grow from 17,364 establishments to 20,143 over the last year (June 2016-May 2017).[50] A cottage industry is defined as a business with a capital Investment of less than Nu 1 million, employing 1-4 people. In 2015, it is estimated that CSIs employed 92,322 people.

174. The Department of Cottage and Small Industry (DCSI) Report[51]on CSIs[52] indicated that the country's small-scale manufacturing industry is low-tech, and heavily dependent on natural resources, especially forest-related products. These environment-dependent CSI's are therefore more vulnerable to climate impacts, and the climate adaptation needs of these diverse rural-based beneficiaries must be met.

[48] Atlas of Bhutan, Land Use Land Cover 2017, Department of Forest and Park Services, Ministry of Agriculture and Forests
[49] Amend, T. & Eibing, S, (eds.) 2010, Sustainability has many faces. Nature and Mankind facing climate change, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) Gmbh.
[50] Kuensel Daily, 14 July 2017; Tshering Dorji
[51] Cottage and Small Industry Policy (2012)
[52] Medium enterprise not represented in this Report

CHAPTER 3 – STOCK-TAKING & ANALYSIS OF RELEVANT CLIMATE CHANGE DEVELOPMENT PLANS, ADAPTATION PROGRAMS, AND ORGANIZATIONAL MANDATE/ROLES

3.1 General

175. This Chapter provides an assessment of relevant development plans and how the SPCR strategically supports them; provides a brief inventory of adaptation programs and Investments; describes institutional mandates and roles in relation to SPCR engagement and offers an institutional assessment of government and civil society (CSOs and CSMIs) toward SPCR engagement. It discusses the adaptive capacity and resources at the Central & LG, and civil society levels and helps to explain the potential for social integration and civil society engagement into the SPCR.

3.2 International Commitments

176. Bhutan became a party to UNFCCC in 1992, and to the Kyoto Protocol in 1997, ratifying the former in August 1995 and the latter in 2002. It instituted its National Environment Protection Act in 2007. In 2008, Environment was incorporated into its Constitution (Article 5). Bhutan submitted its Intended Nationally Determined Contribution (INDC) at the Conference of Parties (COP21) in Paris. France in September 2015 and later ratified by the parliament of Bhutan. Together with the global community, adopted "The 2030 Agenda for Sustainable Development Goal (SDGs)" at UN Headquarters in New York.

177. Bhutan is also a party to several environmental conventions: (i) Convention on Biological Diversity; (ii) Cartagena Protocol of Bio-Safety (Secretariat of the Convention on Biological Diversity or CBD); (iii) International Trade in Endangered Species of Wild Fauna and Flora; (iv) Basel Convention on the Trans-Boundary Movement of Hazardous Waste and Their Disposal; (v) the Vienna Convention for Protection of Ozone Layer; and (vi) the Montreal Protocol on Substance Depleting Ozone Layer. In 2015, Bhutan outlined its constitutional commitment to maintain a minimum of 60% of land under forest cover in perpetuity, and to remain carbon-neutral.

3.3 Summary of Development Plans

178. Bhutan follows a five year socio-economic development planning cycle, which started with the 1st FYP in 1961. Preparation of these Five Year Plan (FYP) are done based on a bottom-up consultative approach. Based on the national goal and priorities, LGs and central agencies prepare their respective plans and submit them to Central Government for approval. The Gross National Happiness Commission Secretariat is mandated to spearhead the formulation of the country's socio-economic development plans, and mobilize requisite resources. It also coordinates the implementation and monitoring of these socio-economic development plans.

179. The FYP is composed of re-current cost and capital expenditure. As required by Bhutan's Constitution, the recurrent cost is met through domestic revenue mainly generated from hydropower projects, while capital expenditure is largely met through donor assistance.

3.3.1 12th FYP Guidelines

180. The implementation of the 12th FYP will begin from July 2018. It is set to bring about even more, well-being and Happiness for the people of Bhutan through the achievement of the overall Plan, including the adoption of greater operationalization of Bhutan's timeless vision of Gross National Happiness (GNH). Several features of this 12th FYP are significant:

- It takes decentralization further by doubling the share of resources to LG from the planned allocation (current planned share of 30% of capital allocation to 50% of capital share to

ensure that strategic development plans and programs will have greater positive outcomes at the grassroots community level.

- It takes a step further in adopting the Nine Domain approach as the Planning Framework.
- It provides 16 National Key Result Areas, supported by 5 cross-cutting development themes.
- It promotes Environment, Climate Change and Poverty (ECP) into all policies and plans at both sector and LG levels, to secure ecologically balanced sustainable development, while promoting justifiable economic and social development.

181. On this last point, SPCR has dedicated an entire Investment (I5) to incorporate and mainstream the ECP into tertiary education institutions and the Civil Service, and target Dzongkhags, Thromdes and Gewogs to mainstream climate risk management at the grassroots level.

3.3.2 Nationally Determined Contribution

182. The National Environment Commission (NEC) submitted to COP21 the RGoB's *Intended Nationally Determined Contribution (INDC).* The INDC was prepared through a sector-wide consultative process, and had identified priorities in both mitigation and adaptation. It was passed by the current Government in the second Parliament session of 2016. The RGoB has identified 10 key priorities under Adaptation and 10 key priorities under Mitigation. Key priorities for Adaptation and Mitigation:

Summary of Key Priorities Under Adaptation

1. Increase resilience to the impact of climate change on water security through Integrated Water Resource Management (IWRM) approaches
2. Promote climate resilient agriculture to contribute towards achieving food and nutrition security
3. Sustainable forest management and conservation of biodiversity to ensure sustained environmental services
4. Strengthen resilience to climate change induced hazards
5. Minimize climate-related health risks
6. Climate-proof transport infrastructure against landslides and flash floods, particularly for critical roads, bridges, tunnel and trails
7. Promote climate resilient livestock farming practices to contribute towards poverty reduction and self-sufficiency
8. Enhancing climate information services for vulnerability and adaptation assessment and planning
9. Promote clean renewable and climate resilient energy generation
10. Integrate climate resilient and low emission strategies in urban and rural settlements

Summary of Key Priorities Under Mitigation

1. Sustainable Forest Management and Conservation of Biodiversity to ensure sustained environmental services
2. Promotion of low carbon transport system
3. Minimize GHG emission through application of zero waste concept and sustainable waste management practices
4. Promote green and self-reliant economy towards carbon neutral and sustainable development
5. Promote clean renewable energy generation
6. Promote climate-smart livestock farming practices to contribute towards poverty reduction and self-sufficiency
7. Promote climate smart agriculture to contribute towards achieving food and nutrition security
8. Energy demand side management by promoting energy efficiency in appliances, building and industrial processes and technologies
9. Integrate climate resilient and low emission strategies in urban and rural settlements

183. This SPCR prioritizes 7 of Bhutan's 10 key NDC priorities under adaptation; and 6 of Bhutan's 9 NDC mitigation priorities (see highlighted priorities above).

3.3.3 Disaster Risk Management (DRM) Planning

184. Integration of DRM in all developmental activities is a key in sustaining and further promoting the country's economic development. Recognizing the direct link between enhancing disaster resilience to succeed in poverty reduction, it is essential to integrate disaster risk management in all development plans and programs, wherever possible.

3.3.4 Addressing the needs of Vulnerable Groups

185. All agencies including LGs are mandated to consider addressing emerging issues related to youth, child rights/orphans, single parents, senior citizens, and differently-abled people in their programs and projects, while formulating their Development Plans.

3.3.5 Integrating Relevant Sustainable Development Goals (SDGs)

186. Given the similarities between Bhutan's development philosophy of Gross National Happiness (GNH) and SDGs, both aspiring to pursue a sustainable socio-economic development path, alignment of SDGs in our Five Year Plans is highly compatible.

187. Bhutan is also amongst the first few priority countries rolling forward the implementation of the SDGs since its adoption in 2015. While all 17 Goals are important, Bhutan has prioritized three SDGs in particular for immediate implementation: Goal 1 – No Poverty; Goal 13 - Climate Action; and Goal 15 – Life on Land. These goals were prioritized on the basis of urgency to address the issue (No Poverty); Bhutan's commitment to the global community to remain carbon neutral at all times (Climate Action) and be a champion and world leader by show-casing Bhutan's success in terms of biodiversity (Life on Land). Our efforts will focus on implementing policies and programs that would have multiple impacts on a number of SDGs.

188. Preliminary assessment/mapping of the 12th Five Year Plan National Key Results Areas (FYP NKRAs) and Key Performance Indicators (KPIs) with the SDGs show very high correlation. The 16 NKRAs are closely related with 16 of the 17 SDGs and close to 100 Targets and indicators of SDGs are integrated into Bhutan's NKRAs and KPIs. There will be further integration of the SDGs as we formulate the Sector and LG Key Result Areas and corresponding KPIs.

189. The development challenge that Bhutan's SPCR seeks to address involves the adverse impacts of climate change on: rural livelihood security (SDG 13); poverty (SDG 1); the effects of sector-led development practices on the climate-resilience and ecological integrity of biodiversity-rich forested landscapes (SDG 15); food and nutrition security (SDG 2); and gender equality and women's empowerment (SDG 5). In all, Bhutan's SPCR Program explicitly supports ten SDG Goals. Central Agencies and LGs shall identify SDGs which are relevant to their sectors; and the lead Agencies for sectors and LGs shall integrate relevant SDGs into their KRAs.

3.3.6 NAPA (National Adaptation Program of Action)

190. Bhutan became one of the first LDC parties to prepare and submit its NAPA to the UNFCCC in 2006 to address urgent and immediate adaptation needs. The adaptation priority projects under the NAPA were identified as follows:

a. Disaster Management Strategic Planning for Food Security and Emergency Medicine to Vulnerable Communities
b. Artificial Lowering of Thorthormi Lake
c. Weather Forecasting System to Serve Farmers and Agriculture
d. Landslide Management and Flood Prevention in Critical Areas
e. Flood Protection of Downstream Industrial and Agricultural Areas
f. Rain Water Harvesting
g. GLOF Hazard Zoning (Pilot-scheme for Chamkhar Chu Basin)
h. Installation of Early Warning System in Po Chu Basin, and
i. Promoting Community-Based Forest Fire Management and Prevention.

191. Because of funding limitations, Bhutan was able to implement only three (3) out of these nine (9) proposed NAPA projects under the LDCF-funded Project on Reducing Climate Change Induced Risks and Vulnerabilities from GLOFs in the Punakha, Wangdi Phodrang and Chamkhar Valleys.

192. Since 2006, other climate risks and vulnerabilities (windstorms, cyclones and floods) emerged and necessitated revisiting those priority activities that were originally identified in the NAPA 2006, including a review of estimated costs. The updated NAPA 2012 was developed by a Multi-Sectoral Task Force, through a series of stakeholder consultations and analysis of the proposed options.

193. Based on these consultations, eight (8) priority projects were updated:

a. Landslide Management and Flood Prevention
b. Disaster Risk Reduction and Disaster Management Planning Interventions; and providing emergency medical services to vulnerable communities
c. Enhancing National Capacity in Weather Stations and Seasonal Forecasting in Bhutan
d. Application of Climate-Resilient and Environment-Friendly Road Construction Nationwide
e. Community-Based Food Security and Climate-Resilience
f. Flood Protection of Downstream Industrial Areas
g. Rainwater Harvesting and Drought Adaptation, and
h. Community-Based Forest Fire Management and Prevention.

194. Six of these are being directly or indirectly addressed through the SPCR, until the NAPA receives additional financing. These include:

a. Landslide Management and Flood Prevention (FEMD Investment 3)
b. Disaster Risk Reduction and Disaster Management Planning Interventions (FEMD Investment 3, DHS Investment 4, NEC Investment 6)
c. Enhancing National Capacity in Weather Stations and Seasonal Forecasting in Bhutan (NCHM Investment 1)
d. Community-Based Food Security and Climate-Resilience (WMD Investment 2, FEMD Investment 3)
e. Flood Protection of Downstream Industrial Areas (FEMD Investment 3)
f. Drought Adaptation (WMD Investment 2)

3.3.7 NAP (National Adaptation Plan)

195. Bhutan's SPCR is aligned with the NAP process, which is currently being formulated by the NEC. Though similar in some ways to the NAP in addressing medium to long-term climate-resilience priorities, the SPCR will not substitute the NAP process. Rather, it seeks to complement the overall NAP objective and process with complementary Investments (see Chapter 4, Table 7: Synergies Between SPCR & National and International Development Plans) that effectively address Bhutan's medium and long-term adaptation needs.

3.4 Inventory of Climate Adaptation Programs & Investments/Activities

196. There are several key adaptation initiatives that have been completed, or are underway in Bhutan. Examples include, inter-alia:

3.4.1 IFI and UN Supported Climate Adaptation Projects

a. Second National Communication Project completed in 2009.
b. National Adaptation Program of Action (NAPA) of 2006 and 2012: with 8 identified priority adaptation projects.
c. Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar Valleys: supported by the GEF, UNDP, Austrian Government, and WWF.

d. EU GCCA: to enhance the resilience of Bhutan's rural households to the impacts of climate change and natural variability.
e. High Altitude Northern Areas (HANAS): supported by the GEF, to enhance conservation management of the High Altitude Northern Areas (HANAS) landscapes.
f. REDD+ Readiness Program: with support from the UN-REDD Program, World Bank FCPF window, and UNDP, UNEP, and FAO: to identify drivers of deforestation and forest degradation; determine forest reference emission level (FREL); quantify and valuate ecosystem services; monitor, report and verify (MRV); and fund mobilization.
g. GEF-SGP under UNDP: with 55 on-going SGP projects spread across the country.
h. UNEP (through the United Nations Development Assistance Framework): to support MDG 7 & UNDAF Outcome 5 to strengthen national capacity for environmental sustainability and disaster management.
i. GEF TRUST Fund (GEF 6): to primarily focus on alternate modes of transport, including electric vehicles, reducing threats to biodiversity, and making rural livelihoods resilient to climate risks.
j. LDCF: Addressing the Risk of Climate-Induced Disasters Through Enhanced National and Local Capacity for Effective Actions (NAPA II Project).

197. A more comprehensive and detailed inventory of past and current adaptation interventions can be found in Annex 3: Stocktaking of Past & Current Climate-Related Investments and Activities.

3.5 Analysis of Organizational Mandates/Roles, Risk Management Gaps, and Involvement in the SPCR

3.5.1 Central and Local Government

i) Gross National Happiness Commission

198. The Gross National Happiness Commission Secretariat (GNHC-S) is the nodal agency charged with the planning, coordination, monitoring and mainstreaming of GNH philosophy in national development plans and policies. GNHC-S is also the National Designated Authority (NDA) for the GCF in Bhutan, and PPCR Focal.

199. The GNHC is the lead implementing agency mandated for inter-agency coordination, planning, and monitoring of SPCR activities in collaboration with the lead technical agencies (NCHM, WMD, FEMD, DHS, NEC). The SPCR Program Management Unit (PMU) will be housed within GNHC-S.

ii) National Environment Commission

200. The NEC Secretariat is the National Regulatory Agency and Policy lead for climate change; and is responsible for fulfilling climate change obligations, including national level coordination and facilitation, and NAP formulation and implementation. The NEC Climate Change Team was the lead author of the INDC, in addition to leading the formulation and publication of the NAPA, NAP, TNA, NAMA, and upcoming NDC. As well, NEC recently received approval from Cabinet for the development of the National Climate Change Policy (May 28th 2017).

iii) National Centre for Hydrology and Meteorology

201. NCHM is an autonomous technical agency under the RGoB mandated to generate and disseminate climate and hydro-meteorological information and services to the end users of weather and water related sectors and general public, provide glacier water balance data for downstream impact and hazards assessment and conduct projection modeling to facilitate flood management.

202. This agency is equipped with fairly sophisticated data management networks connected to NOAA, NASA, and several other international weather portals and hydro-meteorological networks to help report on local weather, and contribute to Bhutan's Early Warning forecasting system. However, NCHM is currently unable to formulate high-resolution climate impact projection models to scientifically inform Government Departments or civil society organizations on expected impacts for planning and risk management purposes.

203. NCHM is involved with the SPCR as lead Implementing Agency for Pillar 1: Enhancement of Information for Hydromet Services and Climate-Resilience, which is expected to: produce high-resolution downscaled impact projection scenarios; climate-oriented forecasting; customized impact modeling product generation and risk management service delivery to a variety of key sectors such as agriculture, water, and urban planning.

204. To enhance its institutional risk management capacity, NCHM will also receive extensive training in these areas to deliver risk management products and services to multiple stakeholders: in Central and LG (including SPCR Implementing Agencies); to the College Network for Faculty capacity-building; and to organizations directly involved with CSMIs.

iv) Watershed Management Division

205. In 2009, the Government established the Watershed Management Division (WMD) under the Department of Forests and Park Services (DoFPs). The WMD was designated as the national focal agency to operationalize a watershed management program and to enable the Government to meet its watershed management policy commitments. A document "Guideline for Classification of Watersheds" was prepared in 2010 (and revised in 2016) to provide guidance on the assessment of watersheds and their classification according to the level of degradation.

206. While highly committed, WMD is only recently embarking on works related to climate risk management and requires enhanced technical capacity-building to understand the complexities of climate-induced water shortages. Under this SPCR, extensive training will be provided to the WMD Technical Team to fill these capacity gaps, with the expectation that a Climate-Oriented Framework for a Wetlands Inventory (water ecosystems) will be developed to contribute to the Phase II Investment. WMD will also rely on NCHM dynamical downscaled impact projection models for further work.

v) Flood Engineering Management Division

207. The Flood Engineering and Management Division under the Department of Engineering Services, MoWHS was designated as a national focal agency to plan and implement short-term and long-term flood management plans for all the 20 districts of Bhutan. Short-term measures include flood assessment which involves modeling and mapping after which the mitigation measures are prioritized for acquiring funds. It is then followed by survey, design and estimate of short-term measure which is forwarded to the implementing agencies. Long-term measures include conducting a detailed technical Project of critical rivers identified and implement flood risk management plan accordingly.

208. With the Government's strong decentralization approach of service provision, Dzongkhags and Gewog engineers are left to design and propose short-term climate-resilient measures in their respective districts, for which there are currently significant technical and capacity gaps. These technical gaps can be bridged through enhanced technical backstopping and capacity building of local government engineers by trained experts from FEMD.

209. As such, this SPCR seeks to assess the complex geo-climatic, geomorphic, and socio-economic conditions and causes of downstream flooding and adaptive incapacity of southern regions - in the context of climate-induced changes in river-basin hydrology and also build technical capacity of the FEMD Staff. In doing so, the role of the FEMD in reinforcing its integrated flood management (IFM) practices with climate-resilient measures represents a critical contribution to Bhutan's environmental and socio-economic sustainability.

vi) Department of Human Settlement

210. The Department of Human Settlement (DHS) under the Ministry of Works and Human Settlement (MoWHS) is the lead agency mandated to prepare human settlement plans along with development control guidelines across Bhutan. The Department also provides technical backstopping to LGs. However, the Department has very limited labour power, and the technical capacity of its planners

and designers to plan Climate-SMART cities toward municipal climate-resilience is at present non-existent.

211. As such, SPCR aims to enhance the technical capacity of DHS and participating Thromdes through capacity-building in planning Climate-SMART cities. In doing so, the role of the Department of Human Settlement in reinforcing its climate-resilient urban planning practices will be a critical contribution to Bhutan's environmental and socio-economic sustainability, especially in the context of Bhutan's National Climate Change Strategies and Gross National Happiness (GNH) Index.

vii) Department for Disaster Management

212. The DDM is the lead agency for all disaster risk management, preparedness and response activities and policies. It has good experience in the management of disasters attributed to Bhutan's high-incidence of extreme hazardous events, and has a strong mandate to mainstream DRM at the Dzongkhag and Gewog and village level.

213. However, DDM has yet to include non-licensed civil society entities in their DRM operations, such as: volunteers group, religious group, and village associations or Farmers' Cooperative Societies. This under-representation of grassroots organizations is likely attributed to the lack of an institutional business model to engage them; and, the limited mandate of DDM, and limited resources within its three Divisions.

214. DDM admittedly does not have an explicit mandate for or capacity in climate risk management, and any Department practices and activities conducted by DDM on climate risk management would be governed by their current disaster hazard management protocols. However, the DDM has expressed significant interest in being integrally involved throughout the SPCR Program. Thus, the SPCR seeks to fully integrate the DDM into SPCR to ensure their acquisition of CRM capability, to enhance CRM and DRM synergies at the Central and LG levels, and to avoid duplication of field effort.

215. While the DDM is not a lead technical agency in Phase I, it is one of the main contributing technical agencies for the ongoing technical Projects as well as the proposed Investments.

viii) National Commission on Women and Children

216. The NCWC is an autonomous agency whose Chair is the Minister for Works and Human Settlement. It plays a key role as Program Management Unit for the ADB's project on Economic Empowerment of Women through gender-based planning and budgetary task force and tool comprised of CSOs and private sector members.

217. The NCWC was involved in the SPCR's Consultative meetings. NCWC's Task Force will play a key role in helping to mainstream gender in SPCR climate adaptation measures through relevant Gender focal in the line ministries including CSOs and private sector through capacity building and training programme.

ix) Local Government

218. Local Government in Bhutan refers to Dzongkhags (20), Class A Thromdes (4) and Gewogs (205). The LG assumes responsibility for its own socio-economic development under the auspicious of the Plan Guidelines. Under the upcoming 12th FYP, the RGoB has instituted a systematic devolution of responsibilities, along with requisite financing to the tune of 50% untied aid going directly to LGs.

219. With greater resource access at the community level, management and administrative burdens will likely escalate, and initial program implementation may be temporarily hampered until a proper administrative and operational rhythm is established.

220. While the SPCR will effectively be implemented, administered, and reported on through the well-established Implementing Agencies (NCHM, WMD, FEMD, DHS, NEC), the actual implementation of SPCR activities will require close engagement and cooperation with LG counterparts. Moreover, civil society partners such as the BCCI for CSMIs engagement and the CSOA for CSOs engagement shall provide an additional layer of support, training and oversight to local and community officials centrally involved in SPCR activities.

x) Centre for Bhutan Projects

221. The Center for Bhutan Projects (CBS) is an autonomous government research institute. The CBS conducts analysis and workshops on Bhutan's official Developmental Happiness priorities, toward the development of indicators for Gross National Happiness which is the development framework for five years.

222. CBS's strength is its commitment to conduct research on the developmental philosophy of GNH. However, it does not have any operational capacity directly with beneficiaries of the "Happiness Index." The CBS has expressed its eagerness to further work on integrating climate change indicators as a part of happiness reporting instruments.

223. As SPCR develops further, CBS's contribution will be vital especially in helping to formulate climate resilience and CR promoting happiness indicators which do not exists within the GNH Framework.

3.5.2 Development Partners

224. The GNHC-S coordinates the engagement of development partners in various developmental areas to synchronize the priorities of the development partners with that of the RGoB. Adequate coordination and collaboration mechanism are in place to ensure maximization of the available resources from the development partners and effective implementation and monitoring. For details on development partner (MDBs, Bilateral) institutional mandates and roles, and SPCR involvement, see Annex 9. Development Partners Mandates/Roles, Risk Management Gaps, and SPCR Involvement.

3.5.3 Civil Society Mandate

225. Before Bhutan's first constitutional elections in 2008, civil society organizations (CSOs) were not legal entities, and traditional village-based CBOs were not very visible. Today, there is a relative 'movement' of CSOs that have gained confidence, partly through support from the RGoB. There are an estimated 41 registered CSOs and international NGOs in Bhutan. Not surprisingly, there is a higher concentration of CSOs in urban centers, such as Thimphu, Gelephu, Samdrup Jongkhar, and Phuentsholing. However, some of the prominent CSO such as Tarayana, Renew, Read Bhutan, Bhutan Association of Women Entrepreneurs (BAOWE), the Royal Society for the Protection of Nature (RSPN), and Loden Foundation have outreach programs in rural communities. Most of these CSOs have been consulted during the SPCR process, and have varying capacity to deliver on climate adaptation measures.

226. The RGoB considers CSOs as critical partner in Bhutan's development, and a core partner in the SPCR. For example, the 12th FYP clearly reflects the engagement of CSOs in the Plan's implementation. In addition, with the RGoB's strident efforts of decentralized development, CSO's are expected to play a considerably greater role in helping to operationalize LG's increased share of resources from Central Government, including resources for climate risk management programming. As witnessed during the SPCR Round Table, civil society stakeholders view the SPCR process and approach as positive, inclusive and transparent.

3.5.4 Private Sector

227. The existence of a visible private sector in Bhutan is a relatively recent phenomenon, over the last 30-40 years. Historically, the private sector only evolved from the early 1970s, and quickly developed due to rapid economic growth nationally and favorable export rates. Before that, economic subsistence was generally the order of the day. Bhutan's private sector is still developing, as the economy is aid-driven. More recently, Bhutan's economy entered into a negative trade balance, and it is expected that this trade balance will continue to remain negative for some years to come.

228. CSMIs are painfully aware of disruptions to their supply and production chains from flash floods, washed-out roads, water scarcity for production lines, and wind storms causing black-outs. However, there are no targeted Government provisions to manage these climate hazards and risks to their bottom line. Moreover, with vital market linkages and industry networking between industry producers and consumers (e.g. CBOs, Cooperatives and tourism), any disruption in business chains also inevitably disrupts consumer access to products and services.

229. Nonetheless, Central Government has prioritized improving ease of doing business, and has endorsed a dedicated NKRA on economic diversification. In the 12th. FYP, the Government plans to promote economic diversification for local economic development, employment generation and export diversification through engagement of CSMIs. As part of Central Government's commitment to building climate-resilience in the private sector, a Public Private Partnership (PPP) modality will be established within the NAP in roughly two year's time.

230. Moreover, with an estimated 65% of micro/small enterprise being women-led, any adaptation development programming that focuses on industry is duty-bound to incorporate a gender lens to ensure that the needs of this large segment of the private sector is adequately attended to.

231. To wholly support private sector, the SPCR seeks to:

- Introduce pertinent risk-reduction measures to protect industry's bottom-line. A sector-based geo-climatic hazard mapping of private sector business (large and small) will be developed; along with community-based vulnerability and adaptation mapping to ensure that climate-resilience becomes part of the private sector's Investment agenda. Risk management planning will be also provided by the DHS to support the integration of Climate-SMART planning into local business practices at the Thromde level.

- Incorporate training in climate risk management service-delivery and product development. Target community workshops on 'Building Industry Resilience to Climate Hazards' will be provided to cottage and small industry to defend their local enterprise value chains. It is also proposed that a second workshop on 'Climate Risk Management Business Opportunities' will be offered to help these same participating at-risk companies to generate new climate-oriented revenue streams.

232. For more detail on these leading private sector agencies in Bhutan, please see Annex 9: Development Partners Mandates/Roles, Risk Management Gaps, and SPCR Involvement.

3.6 Capacity To Mainstream Adaptation

3.6.1 National & Local Government

233. Despite progress made in decentralizing authority and resources to LG, there is continued need to support the professional development of government officials working at the national and local levels, particularly in understanding issues related to climate change impacts and adaptation, and climate risk management (CRM) and disaster risk management (DRM).

3.6.2 Adaptive Capacity of Communities Vulnerable to Climate Hazards

234. As a Least Developed Country (LDC), Bhutan is ill-equipped to protect its Investments against climate hazards. This challenge is especially evident in the rural Southern belt which has more recently come under the adaptation spotlight to respond to constant climate-induced flash floods, landslides, and drought, and associated damage to farmlands, water supplies, and critical infrastructure.

235. To maximize SPCR Investments within these higher-risk geo-climatic zones, there is a need for strategic risk management capacity-building interventions at the grassroots to minimize climate-induced damage, and optimize Bhutan's Investment outcomes.

CHAPTER 4 – SPCR PREPERATION AND PROPOSED INVESTMENT PROGRAM

236. This Chapter presents an overview of SPCR Investment approach; describing alignment with national development priorities, including Happiness. It also elaborates on the four SPCR Pillars covered during the Preparatory Phase I projects and highlights the Phase II Investment Plan. The SPCR inter-agency coordination mechanism (e.g. Steering Committee and Program Management Unit), and implementation arrangements; highlight the process for SPCR Investment prioritization; feature several knowledge-sharing measures; and present some Theory of Change examples; and Risks and Solutions by Investment.

4.1 Overview

237. Climate change is mostly about water and adverse impacts to socio-economic development: unpredictable hydro-meteorological events, adverse impacts on water towers, destabilization of water-dependent ecosystems, severe drought events, and downstream risks to human settlements, farmland, and critical infrastructure.

238. The storyline for this SPCR is one of focusing on a national landscape, with a geographical progression starting in the glacier-ridden northern highlands, through the central midland valleys, to the highly vulnerable southern lowlands; whereby a bottom-up approach of climate-resilience to human settlements, ecosystems, and critical infrastructure will be applied. Consequently, a disproportionate share of SPCR Investment will strategically focus on southern region community vulnerability.

4.2 SPCR Investment Prioritization[53]

4.2.1 Investment Prioritization by Consultation

239. Bhutan continues to institutionally strengthen its diverse national climate resilience agenda. Through the GNHC-S, the RGoB has coordinated and co-hosted with participating MDBs numerous SPCR stakeholder consultations involving: all Line Ministries, several LGs, and diverse civil society representation.

240. Over the last 22 months (between October 2015 and August 2017), this consultative process has allowed engagement with an accumulated total of 201 Bhutanese and international agencies, involving an accumulated 423 Central & LG Representatives (from Dzonkhags, Gewogs & Chiwogs), Technical Specialists, leads from multiple CSOs and CSMIs, several in-country Bilateral and International NGOs/ENGOs, MDB Representatives, and UN Agencies.

241. This in-depth consultative process has successfully propelled the SPCR forward to prioritize and consolidate its Preparatory projects and Investment portfolio. This prioritization and consolidation was based on a number of programmatic, risk-based, and financial criteria, as follows:

1. Investments selected and agreed upon during the Scoping Mission and First Joint Missions, based largely on: an assessment of 11th FYP developmental outcomes and SPCR synergies; and a review of current climate programming and significant program gaps needing attention.
2. Alignment with national development Strategies and Plans [the 11th FYP, 12th FYP Guidelines, Happiness Index priorities (including Combining GNHI With CCA Resilience), the SDG, and NDC]; and PPCR objectives.
3. Regional and sectoral vulnerability to climate hazards, based on geo-climatic assessments (especially in the south).
4. Dialogue and recommendations with Ministry Senior Technical Teams extensively involved in risk management and field operations (i.e., NCHM, WMD, FEMD, DHS & NEC).
5. Opportunity for community-based adaptation capacity-building, especially supporting the gender equity-enterprise development nexus toward climate-resilience.

[53] See also Section 1.17: SPCR Participatory Consultative Process and Coordination Mechanism

6. Opportunity to support the food-water-ecosystem nexus & climate adaptation.
7. Distinct potential for bottom-up transformational change and CCA mainstreaming at the Central/LG Levels.
8. Sectoral Investment recommendations made during agency stakeholder consultations.
9. Solid opportunity for innovative/alternative financing options to develop the Resource Mobilization Strategy toward creative fund leveraging and co-financing: e.g. Adaptation Bonds; incremental adaptation co-efficient, and co-financing from national decentralized transfer payments.
10. Identification of creative sustainability practices, including: CSMI adaptation products & services; and Payments for Environmental Services (PES) schemes.
11. Innovations such as: Climate-SMART Land Use Planning; bottom-up civil society partnerships; ecosystem-based approaches to adaptation, and low-cost soft infrastructure solutions; river-basin adaptation for downstream hazard risk-reduction to human settlements, critical infrastructure, and ecosystems; and, gender-focused climate science curriculum (with field practicums).
12. Understanding and application of the Precautionary Principle in Investment activities.
13. Upscaling potential, both programmatically and financially with Central & LG and integration into long-term development plans.

4.2.2 Investment Prioritization by Technical Agencies

242. Added to the aforementioned programmatic, risk-based, and financial criteria for SPCR prioritization, Guiding Notes were also presented to SPCR Line Ministry Technical Teams during SPCR Workshops to ensure that: certain minimum international adaptation standards were met; and, Bhutan's SPCR Program contain thematic, technical, and operational uniformity. These Guiding Notes were thoroughly discussed, and duly incorporated into the Project Descriptions for Preparatory Phase I actions, and in all Investments.

243. A summary of the Guiding Notes are as follows:

1. Bhutan's SPCR represents a national landscape of climate-resilient priority actions, where Investment activities support the overall adaptation mainstreaming and Institutional strengthening of the implementing agencies, toward specific climate adaptation actions and outcomes in Southern Bhutan.
2. Articulate the climate-resilient objectives, outcomes & activities. Outcomes must be measurable: quantified & qualified.
3. Reference and incorporate National Happiness Indices, with programmatic climate change adaptation (CCA) resilience indicators.
4. Reference an SPCR MIS component.
5. Incorporate gender equity and social integration considerations in Investment Concepts. Also reference and integrate Marginalized and Indigenous Peoples.
6. Reference direct & indirect beneficiaries. Cite the specific beneficiary Dzongkhags & Gewogs. The SPCR must have strong civil society engagement (youth, women, CSMIs, CSOs, marginalized communities, communities at risk).
7. Describe value-added of the Program: risk reduction; adaptation mainstreaming; socio-economic development; climate-resilient capacity-building and Institution-strengthening; CSMI and gender engagement.
8. Explain value-for-money (VFM): strong implementing capacity and high programmatic efficiencies; pool funding; solid technology innovations; technical pooling between implementing agencies; cost savings; significant climate adaptation mainstreaming.
9. HRVAs at the community level.
10. Describe inter-agency synergies between SPCR implementing agencies, and field partners and beneficiaries.
11. Where feasible, describe/reference trans-boundary opportunities & benefits; and cross-pollination with other SPCRs.

12. Other Thematic content: Combine GNHI with CRM; transformational CRM mainstreaming; Civil Society Technical Working Groups; Precautionary Principle; incremental adaptation; ecosystem-based approach to adaptation.

4.2.3 Investment Prioritization by Economic Status

244. The United Nations Economic & Social Council's (UNECOSOC) last Economic Survey, including Bhutan, was conducted in 2015 (conducted every 3 years).[54] The next one is expected in 2018. Despite multiple development challenges, Bhutan has made progress towards LDC graduation eligibility by meeting two of the three criteria (Gross National Income or GNI per capita; and Human Asset Index or HAI) at the 2015 triennial review. However, meeting the Economic Vulnerability Index (EVI) in the near future is a major challenge, which still stood at a poor composite index of 40.02 in 2015 against the graduation threshold of 32. In this context, the issue of reducing vulnerability and enhancing climate-resilience merits special attention.

4.2.4 Investment Prioritization by Budget

245. To rationalize SPCR's proposed funding portfolio of: Total US$154.941 million (US$55.65 million PPCR/$99.291 Bhutan contribution), several working sessions were conducted with the senior Technical Teams from the identified Implementing Line Ministries and partner agencies to prioritize adaptation actions, and establish realistic and corresponding budget amounts for SPCR inputs by Investment.

246. Although indicative and not exhaustive, these proposed budgets are deemed to be reasonable estimates required for SPCR Investments. Costing estimates considered several key SPCR ingredients, inter-alia:

a. Implementing Agencies institutional/operational costs (adaptation capacity-building, impact modeling, international Joint Technical Missions & in-country field missions, river-based ecosystem resilience measures)
b. LG operations and SPCR workshop costs
c. PMU partner expenses
d. International Technical Exchange Missions
e. SPCR integration into the National Happiness performance rating system
f. GESI & Climate-SMART Knowledge Products
g. Southern belt HRVAs
h. Use of ICT for improved data and knowledge sharing
i. Climate-Resilient Water Security Index
j. Field workshops to build climate-proofing measures in CSMI business practices; and assist with creation of adaptation product and service lines for domestic and export markets.
k. Software procurement for high-resolution downscaled impact modeling scenarios.

247. Thus, Bhutan's proposed SPCR resource envelope was rationalized based on Bhutan's urgent developmental needs and priorities in terms of climate resilience and its capacity to implement and deliver both quantitatively and qualitatively within the 12th FYP period. In line with the aforementioned, we calculate Bhutan's PPCR requirements at: $154.941 Mn (**PPCR $55.65 million**/ with combined RGoB/Donor contribution of $99.291 million).

[54] https://www.un.org/ecosoc/en/

4.3 SPCR Approach

4.3.1 Alignment with National & International Development Priorities

Alignment with 12th FYP

248. The objective of Bhutan's 12th FYP is: "Just, Harmonious and Sustainable Society through Enhanced Decentralization." The SPCR is linked to the 12th FYP's National Key Result Areas (NKRAs), which are designed to achieve the plans objectives. We highlight just a few of those priorities as follows (for more detailed descriptions, see Annex 1: SPCR Phase II Investments):

Integrated Water Security

249. The 12th FYP Guideline reads as follows: "water is one of the most important natural resources for livelihood, developing the economy and sustaining the natural environment. There is increasing pressure on the quantity and quality of our water resources because of rapid socio-economic development, the effects of which are further exacerbated by climate change. There is now growing concern about water availability for drinking supply and for agriculture as many springs water sources are drying up, and there is minimal flow in winter for hydropower generation."

250. SPCR Investment "Investment 2" focuses on addressing water scarcity and climate-resilient critical watersheds. This Investment seeks to restore critical watersheds and at-risk wetlands with Climate-Oriented Watershed and Wetlands Management Plans; and to make responsible agencies and communities (especially women's groups/farming women/women-led CSMIs and youth) knowledgeable in climate-resilient practices through adaptive watershed and water conservation concepts, policies and application of good practices.

Economic Diversification

251. Equally important, the 12th FYP focuses on economic diversification. The 12th FYP states: a) "a concerted effort shall be made to explore and develop industries other than hydropower including cottage and small industries."

252. SPCR Investment "Investment 4" focuses on climate-SMART LUPs, and climate-resilient planning for CSMIs. The private sector Investment 5 (inter-woven throughout the other 5 SPCR Investments) seeks to engage CSMIs in risk management practices to protect their value-chains against climate hazards; and to build capacity to develop and sell climate adaptation products and services. This Investment will also identify with aspiring youth, including aspiring female entrepreneurs in the Faculty of Business Administration to verse them in ECP (environmental business practices, climate change mitigation & adaptation, and poverty education) and include field practicums to apply their theory in praxis directly with women-led CSMIs and farming communities.

Livelihood Security of Vulnerable Groups

253. The 12th FYP also emphasizes the importance of livelihood security of vulnerable groups, stating the following: "livelihood opportunities of vulnerable groups including people living under poverty, youth and senior citizens will be undertaken to address their needs."

254. SPCR Investment 2 focuses on climate-resilient water security (and potable water) to protect the integrity of farmlands and rural enterprise to improve overall livelihoods of rural agricultural settlements in mid-altitude inner valleys and in the south; SPCR Investment I3 seeks to apply an eco-system-based approach to river basin integrated flood management to minimize climate-induced hazards impacting local communities, their farm lands, and critical infrastructure.

255. Investment 4 looks at Thromde planning practices to design and climate-proof Thromde (municipal) infrastructure and municipal services through climate-SMART LUPs, towards livelihood security, including for identified CSMIs at risk.

SPCR Alignment with NAP

256. The National Adaptation Plan (NAP) of Bhutan is also expected to commence implementation within the 12th FYP. Complementary inputs from SPCR Preparatory projects will be aligned to support NAP adaptation activities. SPCR support activities will include, inter-alia:

- A strategic multi-sector focus on water security issues, through Investments 1, 2, 3, and 4.
- A PPP modality that helps to create an enabling environment for the NAP PPP modality. All six SPCR Investments have CSMI incorporated into their program activities and outcomes. For example: Investment "I4" on Climate-SMART planning; the inter-woven I5 private sector activities on private sector integration; and, Investment "I6" on climate curriculum development all prioritize industry engagement. These private sector related Investments will all rely on the support of the BCCI, the Bhutanese Association of Women's Enterprises, and the Association of Bhutanese Industry.

Alignment of the proposed SPCR Investment with NDC

257. Complementary inputs from SPCR Preparatory Projects and Investments will coincide with, and support NDC adaptation activities which have already been integrated into the 12th FYP. Therefore, SPCR will complement the implementation of NDC activities and the National Strategy and Action Plan for Low Carbon Development.

258. Examples of how the SPCR will strategically reinforce several NDC priorities, include:

- Formulation of a pioneering Climate-SMART Land-Use Plan, whereby we will conduct a stocktaking of climate vulnerable open green spaces; and formulate a climate-resilient planning tool to identify and develop desperately needed climate-safe recreational green spaces in peri-urban and peri-rural areas of Bhutan. The creation of climate-friendly and ecosystem stable green spaces will further contribute to land conservation and serve as carbon sequestration zones. I4 will be managed by the Department of Human Settlement (DHS).

- Conducting a multi-sectoral analysis using a Computational General Equilibrium (CGE) model to understand the dynamic interaction between the local economy and GHG emissions. The NEC climate change team is leading this. Outcomes from this analysis will provide inputs to help identify and prioritize low-carbon options as part of NDC implementation. Inputs will equally support the preparation of the 12thFive Year Plan, especially relating to the National Key Result Area (NKRA) 6: "Carbon Neutral, Climate and Disaster Resilient Development Enhanced."

259. SPCR Investment 1 will complement NDC Priority 8: Enhancing climate information services for vulnerability and adaptation assessment and planning, as follows: (i) strengthening of hydrometeorological stations and networks for weather and flood forecasting to adequate levels of temporal and spatial scales and; (ii) development of climate change scenarios with appropriate resolutions for Bhutan's mountainous terrains.

260. SPCR Investment 1 will also complement NDC Priority 4: Resilience to climate-induced hazards, as follows: (i) improved monitoring and detection of climate extremes, using satellite-based and remote sensing technologies; and, (ii) monitoring of potentially dangerous glacial lakes, and improvement of GLOF early warning systems.

261. SPCR Investment 2 complements NDC Priority 3: Increased resilience to the impact of climate change on water security, through Integrated Water Resource Management (IWRM) approaches, as follows: (i) climate-adaptive water resource monitoring, assessment and mapping; (ii) climate-proofing water distribution systems; (iii) Climate-Oriented Integrated Watershed and Wetland Management; and, (iv) promotion of climate-resilient agriculture to contribute towards achieving food and nutrition security.

262. SPCR Investment 3 complements NDC Priority 4: Developing assessment, monitoring and warning systems for flash floods and landslide hazards and risks; and NDC priority 6: Climate-SMART transport infrastructure against landslides and flash floods, particularly for critical municipal roads, bridges, tunnel and trails.

263. SPCR Investment 4 directly contributes to NDC priority 10: Integrating climate-resilient and low-carbon emission strategies in urban and rural settlements, as follows: promotion of Climate–SMART cities through adaptive improvement of storm water management and sewerage systems.

264. SPCR Investment 6 contributes to the overall capacity development of the country for enhancing its climate resilience.

NDC Implementation Period

265. The (to be-completed) NDC will follow the Paris Agreement cycle, commencing in 2020 till 2025, about two years into the 12th FYP. With SPCR Preparatory projects completed in time (mid-2018), inputs from SPCR Preparatory projects and partial results from SPCR Investments will align with and support NDC mitigation and adaptation activities.

266. Although PPCR funding for low-carbon activities is not a high priority for PPCR -as it is an adaptation-focused program - nevertheless, Bhutan's SPCR will look at NDC-supported co-benefits to strengthen national mitigation and adaptation activities. This will include the NEC's Computational General Equilibrium Initiative, supported by the World Bank, which looks at economic and GEC emissions inter-activity (US $250,000 TA to be completed August 2017). This mitigation initiative is integrated into the Investment on Climate-SMART planning, including emissions planning. SPCR may also support Bhutan's Low Emissions Development Strategy.

SPCR Alignment with SDGs

267. The SPCR will also align its activities and measurable outcomes with the RGoB's Sustainable Development Goals, specifically focusing on the following:

a. Goal #1: No poverty – through CSMI livelihood security activities, via Investments I2, I3, and I4, and the I5 inter-woven private sector Investment.
b. Goal #2: Zero hunger – through climate-resilient farm-based CSMI initiatives, via Investment I2, and I3; and the inter-woven private sector Investment.
c. Goal #4: Quality education – through the I4 climate-oriented curriculum development initiative to mainstream ECP (Environment, Climate Change, and Poverty) through Climate-SMART peri-rural/urban.
d. Goal #7: Decent work and economic growth – through the building of climate-resilient cottage and small enterprise in rural areas via Investment I2, I3, I4, and I5 private sector Investment.
e. Goal #9: Industry, innovation and infrastructure – through the development and introduction of climate adaptive micro-enterprise and critical infrastructure in the vulnerable area in southern Bhutan, via Investments I1, I2, I3, I4, and I5 private sector Investment.
f. Goal #10: Reduced inequalities – through identification and engagement of women leaders in LG and CSOs in vulnerable southern human settlements, via all Investments.
g. Goal #11: Sustainable cities and communities – especially through the development and incorporation of I4 Climate-SMART urban planning in vulnerable Thromdes, and via Investment I4, as well as contributing to climate-resilience in target communities through the ECP curriculum development Investment I4.
h. Goal #13: Climate action – through scalable SPCR Investments targeting multiple regions and sections especially in the south, via Investment I2, I3, and I4.
i. Goal #15: Life on land – through ecosystem-based approaches to river basins and flood management of resource dependent downstream human settlements and farming communities at risk, via Investment I2; supported by Investments I3 and I4.

j. Goal #17: Partnerships for the goals through collaborative inter-agency partnerships to strengthen SPCR Investments in alignment with the aforementioned SDG goals, via all Investments: whereby strong inter-agency alliances are being galvanized for targeted cross-collaboration between the 6 SPCR Implementing Agencies through strategic knowledge-sharing of replicable Knowledge Products for operationalization in target communities.

268. Recognizing the strategic importance of aligning SPCR Investment outcomes and programmatic synergies with Bhutan's National Development Strategies in presented in Table 7:

Table 7. Synergies between SPCR & National and International Development Plans

SPCR Investments	Sub-Component	GNH Domain	12th FYP Components	NAP Components	NDC Components	SDG Components
Investment 1: Building Climate Resilience Through *Enhancement of Hydro-Meteorological and Cryosphere Information Services* (US $6.5 million from PPCR)	• Hydro-meteorology and cryosphere research capacity enhanced • Downscaled climate model (Dynamical) 5-10 km resolution functional • Climate projections and impacts scenarios developed at national and Dzongkhag level • Capacity of NCHM experts & civil society (CSOs/CSMIs), especially women, enhanced on climate science, hydrology and cryosphere.	Ecological Diversity Resilience Education	NKRA# 6 Carbon neutral, climate, disaster resilient development enhanced.	Output 2: Preparatory elements in place to support an iterative and continuous NAP process.	• Enhancing climate information services for vulnerability and adaptation assessment and planning • Same as above	• Make urgent actions to combat climate change and its impacts (SDG 13)

SPCR Investments	Sub-Component	GNH Domain	12th FYP Components	NAP Components	NDC Components	SDG Components
Investment 2: Climate-Resilient Watershed Management Program (US $10 million from PPCR)	• Nationwide wetlands inventory conducted and mapped in consultation with key stakeholders, including women groups and climate-resilient wetland management guidelines developed; • Valuation of wetlands and institute PES mechanism/schemes for conservation benefits implemented • Enhance climate-adaptive knowledge & capacity of DoFPS and project beneficiaries, including women groups on wetlands and watershed management • Develop and implement National Climate-Oriented Integrated Watershed Management Plans in collaboration with critical watershed beneficiary groups, including women and youth.	Living Standards/ Ecological Diversity Resilience Good governance	NKRA#5 Healthy ecosystem Services; & NKRA #6& #8 (Food, Water and Nutrition Security enhanced)	Output 3:Enhance adaptation planning process to support medium and long term adaptation planning, with particular thematic focus on multi-sectoral water related adaptation actions Output 1: National mandate, strategy & mechanisms in place & gaps addressed	• Increase resilience to the impacts of climate change on water security through Integrated Water Resource Management (IWRM) approaches (reliant on NCHM impact projection models); • Promote climate resilient agriculture to contribute towards achieving food and nutrition security; • Sustainable forest management and conservation of biodiversity to ensure sustained environmental services; • Promote climate-resilient livestock farming practices to contribute towards poverty alleviation and self-sufficiency	• Make urgent actions to combat climate change and its impacts (SDG 13) • Ensure availability and sustainable management of water & sanitation for all (SDG 6) • Ensure gender equality and empower women & girls (SDG 5)

SPCR Investments	Sub-Component	GNH Domain	12th FYP Components	NAP Components	NDC Components	SDG Components
Investment 3: Flood Hazard Assessment &Climate-Resilient Measures (US $28 million from PPCR)	• Flood risk and vulnerability assessed, climate hazards mapped and geotechnical Projects conducted in consultation with southern Bhutan communities including women groups (Phase 1- Moa River Basin under Sarpang District) • Catchment level Projects and downstream flooding conducted and hazards, risk and vulnerability mapped in other parts of southern Bhutan (Samdrup Jongkhar, Phuntsholing, Samtse, Dagana and Sarpang) • Climate-resilient measures along the vulnerable zones against flood and extreme climate hazards implemented in collaboration with vulnerable communities including women groups, youth and private sector • Built adaptive capacity of relevant ministries, LGs, and vulnerable communities including men and women.	Health Ecological diversity and resilience Living standard	NKRA#15 (Livability, Safety and Sustainability of Human Settlements Improved	Output 1: National mandate, strategy & mechanisms in place & gaps addressed	• Strengthen resilience to climate change induced hazards • Strengthen resilience to climate change induced hazards • Integrate climate resilient and low emission strategies in urban and rural settlements	• Make urgent actions to combat climate change and its impacts (SDG 13) • Ensure gender equality and empower women & girls (SDG 5)

SPCR Investments	Sub-Component	GNH Domain	12th FYP Components	NAP Components	NDC Components	SDG Components
Investment 4: Climate-SMART Human Settlement Planning in Samdrup Jongkhar(& Samptse, Gelephu, & Phensoling) (US $7 million)	• Sustainable land resource management through Climate-SMART land use planning • Effective and efficient climate adaptive municipal services (including roads, transport, drinking water and waste management principles) delivered in collaboration with youth, women's groups and private sector participation. • Climate-SMART Human Settlements, with provision for climate hazard-free recreational spots, eco-friendly walking footpaths and hazard-free bicycle lanes for human health in place.	Living Standard/ Ecological Diversity Resilience Good Governance	NKRA#15 (Livability, Safety and Sustainability of Human Settlements Improved)		• Integrate climate resilient and low emission strategies in urban and rural settlements • Integrate climate resilient and low emission strategies in urban and rural settlements • Climate-proof transport infrastructure against landslides and flash floods, particularly for critical roads, bridges, tunnel and trails	• Make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11) • Ensure gender equality and empower women & girls (SDG 5)

SPCR Investments	Sub-Component	GNH Domain	12th FYP Components	NAP Components	NDC Components	SDG Components
Investment 5: Private Sector for Climate Resilience	• Evidence of use of NCHM downscaled impact projection models by CSMIs. • Reduced risk from a clearer understanding of vulnerability, exposure, and risk to CSMIs assets and value chains. • Adaptation-related products and services developed and marketed to support the diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.	Improved climate-resilient living standards,	NKRA # 1: Macroeconomic Stability Ensured. NKRA # 2: Economic Diversity and Productivity Ensured.	Output 1: National mandate, strategy & mechanisms in place & gaps addressed.	• Integrate Climate-Resilient, Low Emission Strategy in Urban and Rural Settlements (Adaptation) • Promote green & self-reliant economy towards carbon neutral and sustainable development (Mitigation)	• Sustained, Inclusive and Sustainable Economic Growth; Full & Productive Employment (SDG 8) • Industry, Innovation and Infrastructure (SDG9)
Investment 6: Strengthening capacity for the development of a sound climate education program in Bhutan (US $1.5 million from PPCR)	• Climate change science and policy curriculum developed and instituted in degree courses in the RUB and its colleges. • Climate change research centre/units instituted in selected colleges with increased capacity and research on climate change modelling and down-scaling, especially for women. • Capacity developed to mainstream climate-resilient measures into policies, plans and programs.	Education	NKRA#7 Quality of Education & Skills improved	Output 1: National mandate, strategy & mechanisms in place & gaps addressed Same as above Same as above	• Climate change theory and praxis • Climate change research • Mainstreaming climate, poverty, gender, environment , private sector into development planning	• Ensure inclusive and equitable quality education & promote lifelong opportunities (SDG 4) • Ensure gender equality and empower women & girls (SDG 5)

4.4 Four SPCR Thematic Pillars & Six Preparatory Projects

4.4.1 Preparatory Projects (Phase I)

269. Both the Preparatory projects and corresponding Investments are strongly aligned with Bhutan's key development strategies (see section 4.3.1, Alignment with National & International Development Priorities) which has been fully vetted, through several missions and workshops, and are based on a multiplicity of program and financing criteria (see Sections 4.2: SPCR Investment Prioritization). Both SPCR phases incorporate creative gender equity and CSMI components throughout the program life-cycle.

270. The Table 8 gives the four Thematic Pillars governing the six Preparatory Projects (Phase I) that will be implemented commencing in November 2017; and the six follow-on Investments (Phase II) for which $55.65 million is proposed from PPCR funding.

Table 8. Thematic pillars for preparatory Projects (Phase I) & Investments (Phase II)

Pillar	Preparatory Projects	Investment	Budget (US$ million)
Pillar 1: Enhancing Information Base for Hydro-met Services and Climate Resilience	Project I1: Hydro-Meteorological Extreme Analysis, Climate and Glacier Mapping, Risk Identification and Services	Investment 1: Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information Lead agency: NCHM	6.5
Pillar 2: Preparedness, Food and Water Security	Project I2: Analysis of Climate Impact on Water Scarcity	Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources Lead agency: WMD, DoFPS	10
	Project I3: Assessment of Flooding Hazards & Development of Climate-Resilient Flood Mitigation Measures in Southern Bhutan	Investment 3: Strengthening Resilience to Flood Hazard Lead agency: FEMD, MoWHS	28
Pillar 3: Sustainable Growth and Resilient Infrastructure	Project I4: Climate-SMART Human Settlement Planning and Development in Samdrup Jongkhar Thromde	Investment 4: Supporting Climate Smart Human Settlement Planning in Samdrup Jongkhar Lead agency: DHS, MoWHS	7
Pillar 4 (Cross-Cutting): Strengthening Governance, Institutional Coordination, and Human Resource Capacity	Project I6: Human Resource Capacity Analysis and Curricula Development for Climate Change, Meteorology, Hydrology, and Hydro-Geology	Investment 6: Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan Lead agency: NEC	1.5
	Project Management Unit	PMU (5 %)	2.65
		TOTAL	**55.65**

Note: Private Sector for Climate Resilience under Pillar 3 and Gender Equity are inter-woven

271. Below is the summary description of the six Phase I Preparatory Projects (detailed descriptions are contained in Annex 6: Preparatory Projects Descriptions)*:*

SPCR Pillar 1: Enhancing Information Base for Hydro-met Services and Climate Resilience
Preparatory Phase I Project for Investment 1: Hydro-Meteorological Extreme Analysis, Climate and Glacier Mapping, Risk Identification and Services

Goal

272. To protect the socio-economic development priorities and developmental happiness of Bhutanese society through the proper integration of weather, climate, water and climate change information into national and sectoral policy and planning; using science-based and climate-informed decision-making processes. This will strengthen NCHM's overall institutional capacity to promote, introduce and facilitate the mainstreaming of impact projections data and climate-resilient measures across all developmental sectors.

Description

273. This Phase I Preparatory projects will focus on analysing the historical climate and hydro-meteorological data available with NCHM to assess the trends and occurrences of extreme events, reassess and remap the potentially dangerous glacial lakes for future water resource assessment, and conduct water budget Projects and develop capacity of the NCHM and partner staff towards devising a climate impact modelling framework during implementation of the Phase II Investment.

274. The primary aim of this Preparatory projects (Phase I) is to support the formulation of the Investment plan and implementation of SPCR Phase II, in alignment with the 12th FYP Guidelines; NDC; NAP; Second National Communication (SNC); and developmental priorities set out in the GNH Index.

275. Accordingly, during Phase I the NCHM will undertake an assessment of existing baseline hydro-meteorological and cryosphere data. This Project will include an analysis of historical data, generate climate maps and update the glacier and glacial lake inventory. The Project will also assess the current institutional capacity of NCHM, identify gaps, and formulate Institutional Development Plans and activities for Phase II.

276. In addition, a user need assessment will be carried out through various levels of consultation, including with vulnerable populations. Through this project, a designated Gender Focal will be appointed at NCHM to mainstream gender issues during Phase I and Phase II, and also for future projects and plans of NCHM.

Expected Outputs

277. The Project is expected to contribute to the proper integration of hydro-met factors and climate change into national and sectoral policy and planning for climate-resilient Investments. It is also expected to strengthen NCHM capacity to facilitate the mainstreaming of climate-resilience in national, sub-national and sector-based planning and decision-making.

SPCR Pillar 2: Preparedness, Food and Water Security
Preparatory Phase I Project for Investment 2: Analysis of Climate Impact on Water Scarcity

Goal

278. The goal of the project is to identify the causes of the phenomenon – water sources drying up – and to help provide evidence to make informed decisions in applying climate adaptive interventions in southern and central Bhutan. The end goal of the project is to access and provide water for drinking and irrigation toward food security and food self-sufficiency in Bhutan.

Description

279. This SPCR Preparatory project will carry out a scoping Project on water sources drying up in Bhutan. The extent of this Project will be nationwide, with a particular focus on southern and central

watersheds including mid altitudinal zones. Water-dependent ecosystems and human settlements shall be assessed to identify the causes of the problem, and to design appropriate solutions.

Expected Outputs

280. The results of this project will inform appropriate science-based interventions in the wise use of water ecosystems. The project will help identify the cause of water deficits, and integrated water management solutions will be designed through community-based Climate-Oriented Integrated Watershed Management Plans during Phase II.

281. Information garnered from this Phase I project will contribute to a more comprehensive climate-resilient strategy for integrated water resource management in Phase II. Phase II will help to develop and implement a climate-adaptive watershed management plan in Bhutan, particularly in the vulnerable southern and central regions. A Climate-Oriented Wetlands Inventory shall also be formulated. Moreover, Payment for Ecosystem Services (PES), as a sustainable financial tool will be explored and established according to feasibility.

282. Information derived from this Preparatory phase will particularly enhance the knowledge and increase awareness on climate resilience among women and youth, through the sharing of evidence on why water sources are drying up. Moreover, this information will directly benefit farming cooperatives and private sector entities in the south, through climate-resilient planning and community-based workshops.

SPCR Pillar 2: Preparedness, Food & Water Security
Preparatory Phase I Project for Investment 3: Assessment of Flooding Hazards & Development of Climate-Resilient Flood Mitigation Measures in Southern Bhutan

Goal

283. To make Bhutan safe from climate-induced hazards (beyond flood management) through an eco-system based approach to river basins and Climate Risk Management Plans. The country also has its National Key Result Area (NKRA) focused on enhancing carbon neutral, climate and disaster resilience development; and its Agency Key Result Area (AKRA) set on reducing vulnerability to flooding though Integrated Flood Risk Management (IFRM).

Description

284. This SPCR Preparatory project will enable FEMD to conduct a comprehensive Project on factors contributing to flooding and debris flow in the target areas. The Project will focus on catchment analysis and hydro-meteorological modelling for the three Project areas (one river and two streams).

285. Hazard Assessments and Hazard risk maps are expected from the Project, along with Vulnerability and Adaptation Assessments to ascertain the number of houses, families, infrastructure, CSMIs and agricultural lands affected. The Shetekheri Project area will include geotechnical and landslide Projects to determine the major factors contributing to debris flow/flooding. Eco-system based climate-resilient measures will be proposed.

286. This Preparatory project supports Pillar II of the SPCR: Preparedness, Food and Water Security. It seeks to provide an "assessment of flooding hazards and flood mitigation options for flood vulnerable districts (southern belt)." Experience, outputs, and lessons learned from this preparatory Phase I will provide the requisite information required to design the Phase II SPCR Investment, and help formulate a Decision-Making Framework & Action Plan for long-term climate-resilient flood measures in the south, particularly benefitting vulnerable farm land, marginalized and indigenous populations, and CSMIs.

Expected Outputs

287. Key Outputs of this preparatory Project include the following:

- Production of Hazard maps for the Shetikheri and Mao rivers
- Identification of factors contributing to the flooding, geological instabilities and catchment disruption upstream (including the long term consequences of GLOF on the hydrological cycle, and therefore on downstream water resources)
- An assessment of flooding impacts on households, critical infrastructure, CSMIs, agricultural land and properties along the Project area
- The consequent formulation of climate adaptation programs and plans along the affected areas
- Eco-system based structural/non-structural measures at the affected areas; and,
- A Climate Risk Management Cost-Benefit Analysis.

SPCR Pillar 3: Sustainable Growth and Resilient Infrastructure
Preparatory Phase I Project for Investment 4: Climate-SMART Human Settlement Planning and Development in Samdrup jongkhar Thromde (Municipality)

Goal

288. To mainstream climate-resilience planning policies and practices in Bhutan's human settlement land use planning, policies and Investments.

289. The purpose of this Preparatory Project is to make Samdrup Jongkhar Thromde climate-resilient by increasing the adaptive capacity and livelihood resilience of the city through mainstreaming Climate-SMART land use planning in the Samdrup Jongkhar Urban Development Plan and promoting climate-resilient urban services and critical infrastructure. This project also provides capacity-building to Project Team members, DHS, and LG officials; and women-led CSMI training and knowledge transfer.

Description

290. This SPCR Preparatory Project will be carried out in-house by a Technical Team comprised of officials from the Department of Human Settlement, and Samdrup Jongkhar Thromde. Phase I of the will assess the existing and anticipated climate risk issues in Samdrup Jongkhar, and prescribe adaptation measures to address risk management planning issues through the revision of Samdrup Jongkhar's Urban Development Plan. Phase 2 will be informed by Phase I scoping, data collection, and design activities.

Expected Outputs

291. Key Outputs of this Preparatory Project include the following:

- Sustainably managed land resources in the target Thromdes through creation of climate-resilient human settlement areas, and the introduction of Climate SMART LUPs;
- Enhanced effectiveness and efficiency of municipal services (climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate-SMART approaches;
- Increased adaptive capacity of Line Ministries, LGs and local communities to manage urban resources;
- Improved urban resilience with Climate-SMART planning that incorporates hydromet related hazard risk management from flooding and landslides, and green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands);
- Strengthened rural resilience, including livelihoods and basic services, to minimize migration pressure to urban centers;
- Identify and develop low-carbon & climate-resilient planning and development synergies, relying in part upon the World Bank's multi-sectoral analysis using a Computational General Equilibrium (CGE) Model to understand the dynamic interaction between the local economy and GHG emissions;
- Replicable Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) validated for Samdrup Jongkhar Thromde, and for use in vulnerable southern region;

- Strengthened governance, institutional coordination, and human resource capacity with Thromde private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach;
- The climate risk management planning needs of Thromde private sector stakeholders, women's groups, and youth CBOs fully integrated into Climate-SMART LUPs.

Pillar 3: Sustainable Growth and Resilient Infrastructure
Preparatory Phase I Project for Investment 5: (Inter-Woven Investment) Private Sector for Climate-Resilience

Goal

292. To climate-proof CSMIs and a cluster of mid-sized companies involved in exotic fruit culture and legumes in the southern belt of Bhutan.

Description

293. This SPCR will strive to fully engage CSMIs at every level in the SPCR program life-cycle, including the integral involvement of the Bhutan Chamber of Commerce and Industry (BCCI) and its member firms to:

- Identify realistic and lasting climate-resilient training and solutions to defend CSMI corporate value chains against repeated disruptions from climate hazards; and,

- Bolster CSMI direct involvement in the development of uniquely competitive climate adaptation products and services for domestic consumption, and external markets. We propose the following examples of business-related adaptation services to help formulate the private sector component of the Preparatory & Investment Projects.

294. There is a need for the promotion of enterprise development and self-sustaining business locally within SPCR's activities. Adaptation–related products and services must be developed and marketed to support the diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.

295. These products and services can be marketed domestically, and exported abroad through a clustered network of local area businesses offering more competitive packaged products and services. As well, we need to integrate private sector into Bhutan's national development performance rating system, whereby CSMIs accomplishments need to be incorporated into the 9 GNH themes as a pass or fail measurement.

296. The following themes are areas where business-oriented training workshops may focus: (i) Conducting climate-oriented EIAs, and designing climate-oriented LUPs; (ii) Offering value-added engineering services that incorporate climate-resilient infrastructure-redesign protocols; (iii) Conducting Portfolio at Risk Assessments for host governments and the private sector; (iv) Developing sector-based and site-specific hazard-maps and risk assessments for LG and CSMI's; (v) providing adaptive cultivars to rural farming enterprise; and others.

Expected Outputs

297. Complete a climate-hazard mapping, and develop the Phase II Investment in concert with GNHC and BCCI. The Private Sector will lead this SPCR Investment, as the government is perhaps not in the best position to reflect Private Sector needs. GNHC would allocate the requisite SPCR funding for these activities. It is important that the SPCR program focus primarily on rural enterprise, and consider the tourism sector and energy efficiency issues which speak to NDC priorities.

Pillar 4 (Cross-Cutting): Strengthening Governance, Institutional Coordination, and Human Resource Capacity

Preparatory Phase I Project for Investment 6: Human Resource Capacity Analysis and Curricula Development For Climate Change, Meteorology, Hydrology, and Hydro-Geology

Goal

298. To enhance and revise the curriculum on climate change, environment and poverty education (ECP) within the education sector, with a specific focus on the Royal University of Bhutan; the Sherubtse College; College of Science and Technology; and Jigme Namgyel Polytechnic.

Description

299. Recognising the importance of Environment, Climate Change Poverty Reduction (ECP), the Royal Government of Bhutan is committed to address these concerns in an integrated manner via policy and planning processes, both at the Central and LG levels and with civil society agencies.

300. There is a need to develop pan-institutional curriculum on ECP in colleges and schools, and within the public sector. Preliminary climate change and mainstreaming curriculum has been developed in Shertubtse College, and the College of Science and Technology, starting in 2016.

301. However, since this subject is new, it has been very challenging to both Faculty Lecturers and students, and has been left as an optional subject. This is of concern, as students may not opt for this subject if there is no proper teaching and guidance from Faculty Members and Lecturers. Therefore, SPCR support will enhance the capacity of Lecturers and The Faculty to ensure widespread mainstreaming of the ECP program across the country, and in the target southern belt.

302. SPCR will also help identify gaps in the professional capacity of climate change related institutions in Bhutan, such as meteorologists, hydrologists and hydro-geologists, and how such expertise can be further developed within the existing curriculum of university-level colleges to improve Central and LGs governance on climate change policy, and enhance their human resource adaptation capacity. Moreover, it will help the Royal Civil Service Commission (RCSC) to prioritize the specialization and application of climate-related disciplines.

Expected Output

303. Through this SPCR, the Local level Mainstreaming Reference Group (LMRG) has an ECP mandate, and will help the RUB to facilitate: stakeholder engagement and institutional coordination between stakeholders; human resource capacity-building activities for the civil service and College Faculties; and CSOs/CSMIs engagement in target communities for the student field practicums.

304. Lessons learned from this Investment will be disseminated to lead Universities in SPCR recipient countries, including Nepal, India, Tajikistan, and Bangladesh for their consideration. This may be broadened to include participation from Australian Universities where Bhutan's civil servants frequent for degree accreditation (e.g. the Australian National University, the University of Melbourne, and the University of Sydney). Australian Universities may provide ongoing financial and curriculum support to I4 to provide RCSC scholarships, and sustain Investment activities beyond the life of the SPCR.

4.4.2 Transition from Preparatory to Investment Phases

305. The SPCR Preparatory (Phase I) project are designed to create a strong knowledge-based and evidentiary-based enabling environment toward designing the six SPCR Investments. A multiplicity of adaptation knowledge products will be developed, and field pilots completed, to effectively inform SPCR implementing partners on further Phase II Investment design, approach, field needs, and best practices.

306. With contract agreement now signed between the GNHC and lead technical agencies, these Phase I initiatives are in the process of initialization in September of 2017, and will be implemented over a ten-to-twelve month period, with an expected completion on or around June through December, 2018.

With SPCR being fully aligned with the 12th FYP, which commences in July 2018, it is important that SPCR Investment activities commence simultaneously (see implementation arrangement below).

307. GNHC and partners will ensure the smooth transition from Phase I Preparatory Projects to Phase II Investment activities to ensure there is no programmatic disruption. Any unexpected delays would: (i) compromise SPCR program momentum gained from Phase I Preparatory work; (ii) potentially create adverse impacts on beneficiary communities and agencies; (iii) disrupt SPCR program synergies with scheduled 12th FYP, SDG, and NDC activities; and, (iv) generate dampened spirits and expectations on SPCR progress and outcomes.

4.3 Phase II Proposed Investment Plan

4.3.1 Priority Investments Areas

308. The four Thematic Pillars and six Investments have been prioritized based on the primary climate risk management and developmental needs of Bhutan.

309. Early on in the SPCR process, all SPCR Technical Agencies were invited by GNHC to partake in a Scoping Mission and Stakeholder Consultations in July 2016, whereby they provided their first SPCR Concept Papers. These Concepts have evolved considerably to the ambitious but realistic Investments they are today.

310. To appreciate the programmatic landscape (North to South) of this innovative SPCR Program, we provide the following graphic, describing the six (6) Investments, and their target regions:

311. Figure 16 illustrate describing the six (6) Investments, and their target regions:

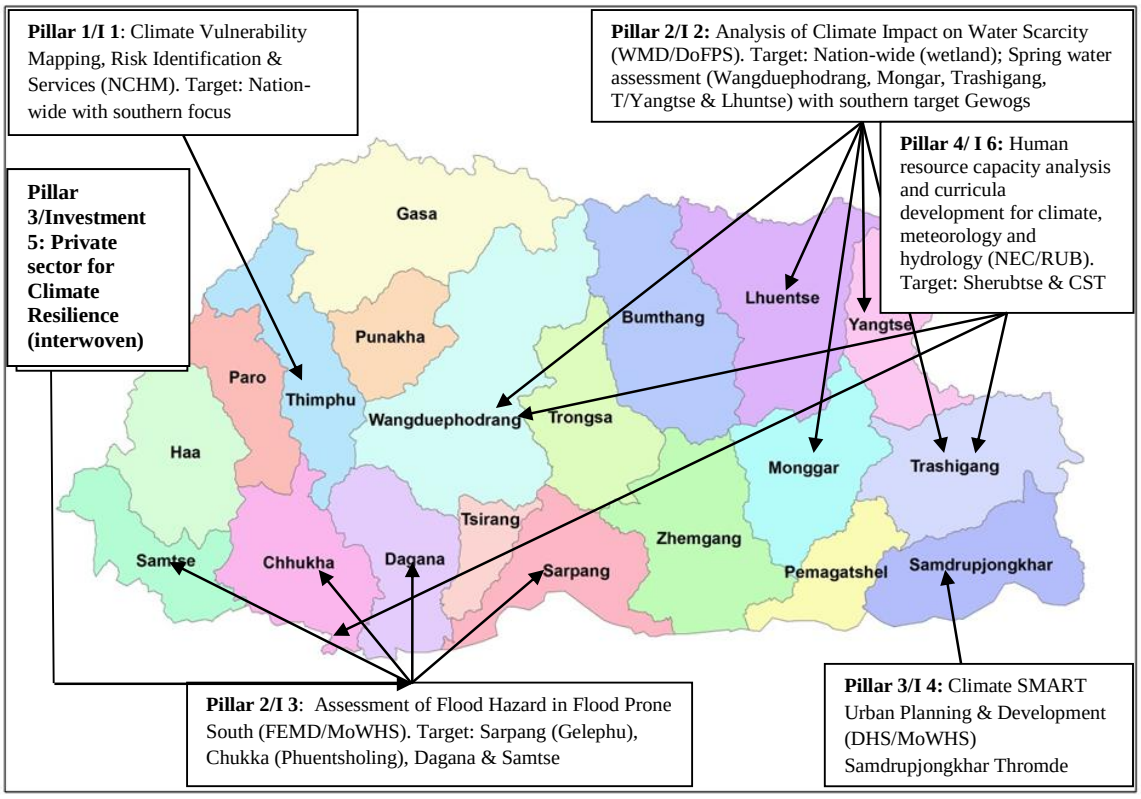


Figure 16. Programmatic Landscape of SPCR

312. A brief description of these six Proposed Investments (Phase II) are provided below, with detailed explanations for each Investment contained in Annex 1: SPCR Phase II Investments, in the form of concept notes.

Pillar 1: Enhancing Information Base for Hydromet Services and Climate Resilience

Investment 1	Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information
Principal Implementing Agency	National Center for Hydrology and Meteorology (NCHM)
Objective of Proposed Investment Plan	Strengthening and enhancing national capacity of the National Center for Hydrology and Meteorology, Stakeholders, Users and Public to use and apply climate science and downscaled climate impact projections toward the formulation of sector-based climate science for Investment resilience.
Proposed Outputs	1. Hydro-meteorology and cryosphere research capacity enhanced 2. Downscaled climate model (Dynamical) 5-10 km resolution functional 3. Climate projections & Impact scenarios and specific V&As developed for priority sectors and SPCR target regions in consultation with and involvement of relevant stakeholders 4. Hydro-meteorological data bolstered through localized hydromet stations 5. Pool of experts (NCHM, Line Ministries/Civil society) established in climate science, hydrology and cryosphere The above outputs will be achieved through Investments in the establishment of a climate research lab with adequate facilities, capacity enhancement for modeling and data analysis, strengthening ICT infrastructure, installation of hydro-met stations in data scarcity areas, development of SOPs with end users and strengthening of service delivery.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	**US $6.5 million**

313. The southern belt of Bhutan is highly vulnerable to climate extremes, especially: the agricultural sector, localized river basins and watersheds, and village infrastructure. Currently, these at-risk communities have no practical high-resolution predictive models to help them anticipate and prepare for hydro-meteorological climate impacts over the medium or long-term. There are no projected flood plans, no climate-oriented water flow data, nor temperature impact projections upon which to estimate their harvesting practices, farm and domestic water consumption, seasonal business inventories, or LG budgets.

314. What is needed is high-resolution impact scenarios to carry-out sector-based vulnerability and adaption impact assessments. However, the NCHM has no capacity to formulate dynamical downscaled impact projections. Therefore, government institutions, local businesses, and CSOs do not currently have access to science to inform their risk management practices and Investment priorities.

315. The NCHM has been fully engaged in the SPCR process. NCHM formulates plans and policies that are channeled through GNHC, recognizing the critical importance of NCHM's role vis-à-vis climate change prioritization. However, NCHM's current capacity to assist in flood management early warning and climate risk management data and guidance is virtually non-existent. As NCHM lacks significant field data on snow and glacial conditions to determine melt data and downstream impacts. There is also a

desperate need to build professional and institutional capacity to collect cryosphere and hydro-meteorological data for downstream impact modeling and field predictions. Flash-flood guidance, and formulation of climate data sets for predictive modeling services, forecasting, and early warning is imperative for Line Ministries reliant on NCHM.

316. NCHM currently relies on WARF end-running 4 (at 3x3 KM resolution), and our modeling capacity is reliant on global-sourced downloads.[55] This is entirely inadequate for downscaled river-basin (vs. basin-wide) level predictive capability, which demands 3-10km model grid resolution.

317. This SPCR Project seeks to bolster NCHM's predictive science and develop a suite of downscaled modeling scenarios and generation of high-resolution climate impact projections data to be operationalized at the LG (Dzongkhag, Thromde, Gewog) and river-basin levels, benefitting government, farmers, and industry. The risk management needs of DDM, LG, and CSMI's will all be considered in the formulation of these impact models, and for NCHM capacity-building. This Investment will be led by the National Centre for Hydrology and Meteorology (NCHM).

Precautionary Principle

318. Recognizing the trend uncertainty and difficulty in relying upon existing GCM and RCM climate impact modeling for Bhutan, and in the absence of higher-resolution (downscaled) climate modelling, the GNHC Steering Committee and SPCR Implementing Agency Technical Teams will ensure that precautionary climate risk management practices (e.g. *Precautionary Principle*) will be duly incorporated into SPCR policy, design, and actions. This will help improve the coping capacity of participating institutions and vulnerable communities in the south to effectively respond to existing and expected climate-induced extreme events, whilst anticipating and developing future climate impact scenarios.

Pillar 2: Preparedness, Food and Water Security

Investment 2	Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources
Principal Implementing Agency	Department of Forests and Park Services.
Objective of Proposed Investment Plan	To sustainably manage watersheds and manage water resources, in the context of climate-induced water shortages.
Proposed Outputs	1. Develop and implement Adaptive Integrated Watershed Management Plans in critical watersheds with beneficiary groups including women, and target drying water sources rehabilitated. 2. Nationwide wetlands inventory mapped in consultation with key stakeholders, and Climate-Resilient Wetland Management Guidelines developed. 3. Valuation of wetlands carried out, and PES schemes climate-oriented Payment for Ecosystem Services (PES) schemes Instituted toward for conservation. 4. Enhanced climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed management. The above outputs will be achieved through Investments in strengthening the monitoring systems for wetland and water resource, capacity development for

[55] NCHM received some PRECIS training & relied upon PRECIS remote GCM modeling for SNC data, & for Global Forecasting System (GFS) from NOAA.

Investment 2	Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources
	implementation of watershed management plans, capacity enhancement for hydro-meteorological data analysis and modelling, strengthening information base such as GIS and satellite monitoring, identifying open source data relevant for Bhutan and ground truthing of regionally and globally available date.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	**US $10 million**

319. In Bhutan, there are persistent reports across the country, especially in the mid-altitude inner valleys and southern rural areas, that water sources, particularly springs, are drying-up and causing serious water shortages for domestic consumption and irrigation. Applied research on water-related approaches to food security and food sufficiency is only just emerging in Bhutan. The Chiwogs of central and southern Bhutan are particularly adversely affected by these droughts, especially regarding agricultural irrigation issues and public drinking water.

320. Livelihoods of the communities, farmers and businesses are subject to the vagaries of climate change, resulting in business being shutdown and land being left fallow. In turn, many inhabitants are moving to the larger more populated Chiwogs and Gewogs. In some regions, this dilemma is precipitating a serious brain-drain of farming expertise in an already food-insecure country, and wreaking havoc on available local traditional environmental knowledge.

321. Thus, this WMD Investment was precipitated by a national interest in water resource management, especially in target regions where there have been recurrent water scarcity events. This issue was raised in Bhutan's National Management Plans as a nationwide concern.

322. In an effort to maintain healthy ecosystems, and ensure water and food security/sufficiency for water-dependent ecosystems and human settlements, the SPCR will identify the causes of water sources drying up, and identify appropriate adaptive technology and climate-resilient water conservation measures for southern and mid-altitude inner valleys in Bhutan.

323. We will also operationalize the Climate-Resilient Watershed Management Plans and conduct appropriate adaptive water rehabilitation measures and protection of water-related ecosystems of target water sources at the Gewog/Chiwog levels, in concert with LG. Ecosystem-based financial management services will be introduced to sustain Investment activities beyond the life of the Investment. These actions intend to benefit water-starved farm communities and water-dependent cottage and mid-sized industry - nationally and with Project areas in Lhuentse & Trashiyangtse in the northen highlands; Wangduephodrang in the midlands; and Mongar and Trashigang in Eastern Bhutan. NCHM's downscaled impact models will partially inform development of these outputs.

324. The water–based needs of women-led CSMI's will be fully considered. We will also consider the development of income-earning activities for women within the water sector, suited to the local context. This should include, inter-alia, employment positions to incorporate climate-resilient measures within water Investments. This Investment will provide extensive community-based adaptation capacity-building, supporting both the gender equity-enterprise development nexus; and food-water-ecosystem nexus.

Investment 3	Strengthening Resilience to Flood Hazards
Principal Implementing Agency	Department of Engineering Services, Ministry of Works and Human Settlement
Objective of Proposed Investment Plan	Increase resilience from extreme climate change events by identifying the factors contributing to catastrophic flooding hazards affecting vulnerable human settlements, public & private sector infrastructure & resources, and agricultural land and properties, through ecosystem-based adaptation measures.
Proposed Outputs	1. Flood risk and vulnerability assessment and geotechnical/geoclimatic Projects completed in southern Bhutan (Phase 1- Moa River Basin, under Sarpang District). 2. Hazard, risk and vulnerability maps prepared, detailed Project and analysis of target catchment & downstream flooding conducted in other southern regions (e.g. Samdrup Jongkhar, Phuntsholing, Samtse, Dagana, Sarpang). 3. Implementation of climate-resilient measures along the target river-basins against extreme climate events causing flood hazards - in collaboration with at-risk communities including: women, youth and private sector (Phase II). 4. Strengthened national capacity to respond to climate-induced floods through structured ability to assess, analyse, prepare and apply climate impact science and integrate climate adaptive measures. The above outputs will be achieved through Investments in carrying out detailed feasibility Projects for mitigation measures, financing of flood mitigation infrastructure including green engineering, capacity building for planning, designing and technical diagnostics, mapping and development of flood risk profiles for critical settlements and strengthening coordination with NCHM and local government.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	**US $28 million**

325. Bhutanese rivers are generally characterized by steep slopes in the upper catchment, subject to intense seasonal rainfall and high rates of erosion. As the rivers flow towards the southern foothills, the transition from mountainous areas to flat plains typically occurs, and is accompanied by an extensive flash flooding. Consequently, floods are very recurrent in the southern region affecting vulnerable settlements, public infrastructure, agricultural land, and business property and their value-chains.

326. The towns of Sarpang, Gelephu, Phuntsholing, Samtse, Dagana and Samdrup Jongkhar are largely river-based due to hill sloping. They suffer from severe and frequent flooding, along with immense volumes of eroded sediment and debris, making settlement along the river bank highly dangerous. The adaptive capacity of these high-risk communities to these mass flood and debris events is limited. These southern settlements receive heavy rainfall each summer, and any short-term risk management measures are literally "washed-away" during the monsoon season, making government rehabilitation obsolete.

327. Current flood protection measures, implemented by the FEMD are no match for these extreme climate events, as any natural or hard infrastructure embankments are either washed away or buried by massive debris deposits. FEMD's limited technical capacity in understanding these impacts to critical natural and engineered infrastructure and vulnerable settlements poses a direct threat to Bhutan's national poverty reduction objectives, and the realization of developmental philosophy of Gross National Happiness.

328. FEMD's current Flood Hazard Assessment Maps are solely based on historical data from lack of predictive impact data. Thus, FEMD requires in-house impact modeling capacity beyond available NCHM data, as NCHM data is GCM or RCM basin-wide (vs. downscaled river basin). Consequently, FEMD requires hazard mapping capacity with increased modeling resolution at the downscaled river-basin level, reliant on future data from NCHM. This will enable FEMD and its field partners to conduct ecosystem-based adaptation measures to reduce climate hazards in vulnerable human settlements and critical infrastructure, and especially high-risk women-led CSMIs.

329. This SPCR Investment seeks to address these challenges by identifying those geomorphic and climatic factors contributing to catastrophic flooding hazards and damage to human settlements, basic infrastructure, and farmland and their local enterprise, through eco-system based adaptation measures and Integrated Climate-Oriented Flood Management Plans; and will introduce climate-resilient practices to protect both upstream and downstream human settlements, agriculture, and critical infrastructure (Fig. 17).

330. The highly vulnerable towns of Sarpang, Gelephu, Phuntsholing, Samtse, Dagana and Samdrup Jongkhar will be focused on. Moreover, this Investment will provide extensive community-based adaptation capacity-building, supporting both the gender equity-enterprise development nexus; and food-water-ecosystem nexus.

Figure 17. Flash flood at border gate Gelephu

331. The Association of Bhutanese Industries will lend its expertise to the FEMD, based on knowledge acquired during its Flood Risk Reduction Project that prioritized industry needs. As well, DDM will play a pivotal role in supporting FEMD's work, particularly in the South. FEMD will be lead technical and implementing agency, with secondary support from the DDM, MoHCA, especially regarding advocacy, promotion of CRM practices, and policy formulation. NCHM's downscaled impact models will partially inform the development of these outputs.

Pillar 3: Sustainable Growth and Resilient Infrastructure

Investment 4	Supporting Climate-SMART Human Settlement Planning and Development for Samdrup Jongkhar
Principal Implementing Agency	Department of Human Settlement, Ministry of Works and Human Settlement
Objective of Proposed Investment Plan	To make Samdrup Jongkhar more climate-resilient, by increasing their adaptive capacity through Climate-SMART Land Use Planning; and the promotion of climate-resilient urban services and installation of climate-resilient infrastructure, and hazard-free green leisure spaces.
Proposed Outputs	1. Revised climate-oriented Samdrup Jongkhar Urban Development Plan, and replicable Climate-SMART Land Use Plan for use in vulnerable southern

Investment 4	Supporting Climate-SMART Human Settlement Planning and Development for Samdrup Jongkhar
	Thromdes (Phase I). 2. Enhanced effectiveness and efficiency of municipal services (e.g. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate-SMART municipal services and infrastructure. 3. Improved urban resilience with Climate-SMART planning that incorporates hydromet-related hazard risk management approaches to flooding and landslides; and to green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands). 4. Sustainably managed land resources in the target Thromde through climate-proofing of human settlement areas. 5. Strengthened governance, institutional coordination, and human resource capacity with private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach. 6. DHS and Samdrup Jongkhar Thromde land use planners and urban designers trained in Climate-SMART planning, along with women-led CSMIs and CSOs. The above outputs will be achieved through Investments in upgrading, rehabilitating or installing climate smart green infrastructure, development of green spaces, strengthening database including mapping and inventory, international consulting services & green infrastructure, feasibility Projects, enhancing service delivery to public users and enhancement of capacity for development and implementation of climate smart urban plans.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	**US $7 million**

332. The Dungsam Chhu River flowing through the heart of the Samdrup Jongkhar Thromde floods during monsoon season because of a shallow river bed. The level of the river bed is rising gradually due to siltation and sedimentation. The flood control embankments constructed along the river suffer repeated damage during floods. In addition, increasing amounts of rainfall also cause flash floods. Other disasters that the town often experiences are erosion, landslides and earthquakes.

333. In addition, the poor quality of roads, drains and footpaths; declining green areas and improper solid waste disposal; and climate-related disruptions to waste water and water services are serious issues that the Samdrup Jongkhar Thromde have been facing for many years. Moreover, the town faces acute water shortages in spite of government Investments to improve urban services each year.

334. Further, urban inhabitants across Bhutan are crying out for the most basic green spaces for leisure activities, but the topographical terrain in most small urban center is subject to high levels of risks from slope deterioration and concomitant landslides and flooding attributed to extreme weather events. Similarly, the scarce open and recreational areas in townships are not designed with climate-resilience against repeated extreme impacts.

335. It is painfully evident that the Samdrup Jongkhar Thromde is currently incapable of adapting to these repeated climate assaults, with very limited resources, no climate-resilient planning models to follow, and very limited adaptation capacity to climate-proof municipal infrastructure and public services.

336. The DHS is the lead agency mandated to prepare human settlement plans along with development control guidelines across the country. Owing to this mandate, the DHS was identified as the lead agency to implement Pillar 3: Sustainable Growth and Resilient Infrastructure.

337. Through DHS (Planning Division, MoWHS) in concert with relevant agencies, this SPCR will support the formulation of Climate-SMART Land Use Plans to provide Thromdes across the country, and Samdrup Jongkhar Thromde in particular, with the requisite planning and development tools to ensure climate-resilient municipal infrastructure and services for at-risk local residents and CSMIs, and provide basic hazard-free leisure areas and green spaces.

338. This Investment will provide extensive community-based adaptation capacity-building, supporting the gender equity-enterprise development nexus. Thus, women-led CSMIs will be integrally involved in an inventory exercise to identify enterprise-related risks from climate impacts, and help strengthen the value of the climate-oriented LUPs to foster adaptive business measures.

339. The DHS will formulate climate-resilient re-design protocols for urban developers. In addition, employment positions will be identified within this Investment whereby women Urban Planners within DHS will incorporate climate-resilient measures within the WaSH sector, and in other urban Investment planning. NCHMS impact projection scenarios will help inform some of these inputs.

340. Finally, this Investment project will implement a strategy to incorporate an incremental adaptation co-efficient into all development planning processes and municipal Investments within municipal jurisdiction, formulated during the preparatory phase.

Pillar 3: Sustainable Growth and Resilient Infrastructure

Investment 5 (Inter-Woven)	Strengthening Climate-Resilience in Private Sector Interventions
Principal Implementing Agency	GNHC
Objective of Proposed Activity	To identify realistic and lasting climate-resilient training and solutions to defend CSMI corporate value chains against repeated disruptions from climate hazards; and, bolster CSMI direct involvement in the development of uniquely competitive climate adaptation products and services for domestic consumption, and external markets.
Proposed Outputs	1. Vulnerable CSMIs trained in climate-proofing, to protect property and value-chains. 2. Adaptation–related products and services developed and marketed to support diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit. The above outputs will be achieved through an inventory of climate vulnerable CSMIs, including V&A in the southern belt; engaging BCCI member firms (especially women-led) in participatory risk management workshops relating to impact projections, climate-proofing value chains, and development and marketing of adaptation services; and, certifications/accreditation programs for climate adaptation products and services are expected to be implemented by respective business associations based on participating member company sector needs.

Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	N/A (Inter-Woven throughout SPCR Program Investments)

341. According to the Asian Development Bank's (ADB) 2014 Report: Assessing the Costs of Climate Change and Adaptation in South Asia, melting glaciers and other climate change-linked extremes pose a serious threat to Bhutan's economy, and could cause annual losses of over 6% of gross domestic product (GDP) by the end of this century.[56]

342. Cottage, small and medium industry (CSMI),[57] which constitutes over 96% of all licensed industry in Bhutan, continued to grow from 17,364 establishments to 20,143 over the last year (June 2016-May 2017).[58] In 2015, it was estimated that CSMIs employed 92,322 people. Of the 27,000 licensed businesses across the country, 85% are micro/cottage and small enterprise (20,000+), with an estimated 65% of micro/small enterprise being women-led.

343. The Department of Cottage and Small Industry (DCSI) Report[59] on CSIs indicated that the country's small-scale manufacturing industry is low-tech, and heavily dependent on natural resources, especially water for manufacturing processes/irrigation and forest-related products. These environment-dependent CSI's are therefore more vulnerable to climate impacts because of hydrological instability and ecosystem deterioration. Members of the apex business body BCCI are fully aware that their value and supply chains are frequently subject to climate risks from washed-out roads, landslides, and flash floods - which adversely impact business operations and revenue. The agriculture and power sectors, especially in the southern region of Bhutan, are generally at higher risk of climate hazards.

344. From the get-go, the idea of integrating Bhutanese enterprise in the SPCR has been a prime consideration. Participating MDBs have expressed a keen desire to see businesses explicitly benefit from SPCR climate-resilient measures to protect their bottom-line and to potentially acquire climate-related skills to create climate risk management products and services.

345. Although originally envisioned as a stand-alone Investment, it was soon realized that the incorporation of industry interests would be better served by "weaving' their needs throughout the SPCR Program to maximize program impact on a larger number of sectors and companies, especially CSMIs, and more particularly women-led enterprises in the Southern belt that are more exposed to climate hazards.

346. Thus, the SPCR has consciously integrated CSMI considerations into all six preparatory Phase I and Phase II Investments Projects, with dedicated resources and targeted outcomes, including for example: Field training workshops to build climate-proofing measures in southern-based CSMI business practices, and assist with the creation of adaptation product and service lines for domestic and export markets; and a Climate-SMART LUP that includes a sector-based scoping mechanism to identify environmental risks to local area industry.

347. First, through this SPCR CSMIs identified as moderate-to-high-risk to climate hazards will be supported through tailored training to inform owners and workers/staff on how best to make their Investments and business infrastructure more climate-resilient to expected climate hazards. Second, participating CSMIs will learn to produce adaptation–related products, and market and deliver climate-resilient services. This will help to support the diversification of their business lines, and strengthen their

[56] (2014) Assessing the Costs of Climate Change and Adaptation in South Asia: https://www.adb.org/news/melting-glaciers-climate-extremes-threaten-bhutans-future-report
[57] Defined as a business with a capital Investment of less than Nu 1 million , employing 1-4 people.
[58] Kuensel Daily, 14 July 2017; Tshering Dorji
[59] Cottage, Small and Medium Industry Policy of Kingdom of Bhutan 2012. Royal Government of Bhutan.

revenue base as an adaptive capacity method. These products and services can be marketed domestically, and exported abroad through a clustered network of local area businesses that would offer these adaptation products and services.

348. This private sector initiative will be conducted in alliance with the BCCI, Bhutanese Association of Women Entrepreneurs; and, the CSOA for CSO engagement. It will provide extensive community-based adaptation capacity-building supporting the gender equity-enterprise development nexus with the local women-led enterprise in target Thromdes. In addition, new certifications/accreditation programs for climate adaptation products and services are expected to be implemented by respective business associations based on participating member company sector needs.

Pillar 4 (Cross Cutting Pillar): Strengthening Governance, Institutional Coordination and Human Resource Capacity [led by the National Environment Commission Secretariat (NEC)]

Investment 6	Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan
Principal Implementing Agency	National Environment Commission
Objective of Proposed Activity	To mainstream environment, climate change, and poverty (ECP) knowledge nationally, through institutionalized education curricula
Proposed Outputs	1. Enhanced and revised curriculum on the environment, climate change, and poverty (ECP) within tertiary education sector, with a specific focus on Sherubtse College (Trashigang), the College of Science and Technology (Phuntsholing), and Jigme Namgyel Engineering College of Science and Technology. 2. Capacity-Needs Report of participating Colleges Faculties, relevant Civil Service Departments, and LG MRGs. 3. Establishment of ECP teaching and research institute/units. 4. Revised training agenda for Faculty; and revised curriculum of the environment, climate change and poverty. 5. Capacity-building of Faculties, Civil Service Professionals and students on ECP, and climate change projections and impact modeling. 6. Curriculum on environment, climate-resilient & low-carbon development, & poverty reduction institutionalized across faculty & colleges; in Government Departments; and extended through student practicums in southern region
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated PPCR Funding Required	**US $1.5 million**

349. There is a sense of urgency in Bhutan in tackling the repeated threats of climate extremes, as they adversely affect Bhutan's long-term development priorities. With a scarcity of established curriculum content on anthropogenic climate change and ecosystem degradation, hydrometeorology and carbon sequestration issues, the institutional capacity of post-secondary education institutions in Bhutan to generate academic discourse on climate change topics is marginal.

350. Moreover, public institutions and civil society agencies lack the basic knowledge products to advance the climate adaptation agenda within Bhutanese society. This deficiency of knowledge products restricts the overall capacity of the populace to: (i) understand the basic principles of climate impacts and

climate risk management in their daily lives; and, (ii) to begin to respond to those challenges in simple ways that may have a positive cumulative effect on building climate-resilience within the public domain.

351. Environment, climate change and poverty reduction are cross-cutting issues that demand attention by government policy-makers and planners, and especially within the education sector. Environmental degradation brought about by rapid economic development and population growth, and exacerbated by climate hazards, continue to impede socio-economic development, and further aggravate existing poverty.

352. Recognizing the 12th FYP emphasis on mainstreaming the ECP, the Royal Government of Bhutan is committed to enhance post-secondary curriculum to incorporate these development themes in target educational institutions in the east and south, where climate impacts are most felt. This faculty training and curriculum enhancement squarely contributes to the SDG Goal #13 on climate change.

353. The SPCR seeks to develop a robust curriculum plan to mainstream ECP in the 12th FYP through the College Network, under the auspices of the Royal University of Bhutan and led by the NEC-S. This ECP curriculum is expected to increase the critical mass of professionals amongst faculty and the Civil Service to help address climate change issues in the medium-to-long run. It will reinforce the faculty & college of Natural Resources; Sherubtse College; & Jigme Namgyel Engineering College of Science and Technology with ECP knowledge. Moreover, RCSC employees will benefits from direct ECP training to strengthen capacity-building, while the NAP will later focus on the climate adaptation research component.

354. It is also expected that gender equity and private sector engagement will be centrally addressed in this Investment, especially through student practicums to be conducted in the south whereby students apply their theoretical knowledge of climate change risk management to real-life risks of climate change on vulnerable communities and local women-led enterprise. As well, the civil service will benefit from tailored ECP and CRM training in Meteorology, Hydrology, and Hydro-Geology; and in downscaled impact projection modeling, to strengthen its overall HR and adaptation capacity in support of country Investments.

355. It is important to build the capacity of Local Mainstreaming Reference Groups (LMRGs), and to establish them as fully functional entities in their respective Dzongkhags. Through this Investment, SPCR will facilitate the operationalization of the LMRG Strategic Work Plans though ECP Curriculum development activities, both in the target educational institutions, and through field work practicums directly with target Dzongkhags. As well, the Environment, Climate Change and Poverty Mainstreaming (ECPM) Reference Group - comprised of members from GNHC, NEC, MoAF, UNDP and DLG (MoHCA) – will continue to work with target sectors and LGs (including Class "A" Thromdes) to identify ECP concerns and mainstreaming opportunities for the 12th FYP towards smarter development.

356. While the Local Level Mainstreaming Reference Group (see chapter 3) has been formed in all twenty Dzongkhags, no capacity-building has yet taken place. The MRGs have shown great interest to undertake work, but because of a lack of expertise, they have not been able to operationalize their mandate.

4.5 Inter-Agency Investment Coordination & Implementation Arrangements

4.5.1 Investment Coordination

357. The GNHC holds the planning and mandate to mainstreaming the climate change agenda in the national development process. GNHC is the PPCR Focal, and the main agency to lead the SPCR. It is also mandated to coordinate the implementation and monitoring of the five year plans (including the integration of cross-cutting issues such as gender, environment, disaster, poverty and climate). Further, it is also responsible for mobilizing resources to finance the Five Year Plans in collaboration with the Ministry of Foreign Affairs and Ministry of Finance.

4.5.2 Program Steering Committee (PSC)

358. An SPCR multidisciplinary Program Steering Committee (PSC) consisting of RGoB senior officers from NCHM, DoFPS, DHS, DES, NEC-S and GNHC-S is formed to: provide policy coherence and coordination advice to the program; ensure that program interventions are technically sound in keeping with RGoB and MDBs standards including social and environmental standards; and, ensure a coordinated and integrated approach to program implementation. The PSC will also be complemented with a representative from the CSOA representing CSOs, the BCCI representing private sector (CSMIs); and a representative from the MDBs.

359. The PSC will be supported by the SPCR Program Management Unit (PMU), which is housed within GNHC. Responsibility for donor engagement for climate financing, and overall climate mainstreaming within the national agenda is also under the domain of the GNHC-S.

360. To ensure full participation and meaningful input from regional stakeholders and communities vulnerable to climate change (especially at the Gewog & Chiwog), participating SPCR agencies are mandated by the GNHC (PPCR focal) to identity significant entry points for purposeful involvement by women, youth, and industry leaders, within the SPCR Program and throughout its life-cycle.

361. The PMU will be supported by the Technical Working Group (TWG). The TWG will consist of representatives from Lead Technical Agencies – NCHM, WMD, DES, DHS, NEC-S, GNHC-S and representatives from DDM, MoF and BBCI. The six Investment Work Streams will be managed by this Technical Working Group. The TWG will be responsible for overall coordination of the program at the technical level.

362. The NEC representative will ensure the consistency and complementarity of SPCR activities and outcomes in line with other key Climate Change Strategies under its jurisdiction, such as the NAP, NAPA and NDC, while recognizing GNHC's overriding responsibility as SPCR authority.

363. LG (Dzongkhags, Thromdes, and Gewogs) will be fully involved throughout the SPCR life-cycle in providing support and decision-making on Investment inputs and outcomes. They will also be tasked with managing the SPCR MIS and Climate-Resilient Happiness Performance Reporting. Additional inputs and feedback are provided from participating CSOs and CSMIs at the operational level, to ensure civil society buy-in and positive community impact. Finally, the mainstreaming of gender equity and the integration of CSMIs and youth is effectively realized through targeted actions under this SPCR, and reported upward to LG.

Composition of PSC

364. The proposed composition of the PSC, affirmed at the Program Inception Workshop in October 2017, is given below:

1. Secretary, GNHC-S (Chair)
2. Country Representative, World Bank (member)
3. Director, NCHM (member)
4. Director, DES, MoWHS (member)
5. Director, DHS, MoWHS (member)
6. Director, DoFPS, MoAF (member)
7. Chief, Climate Change Division, NECS (member)
8. Director, DDM, MoHCA (member)
9. Director, DMA, MoF (member)
10. Representative from the Private Sector
11. Representative from the CSOA

Roles & Responsibilities for Program Steering Committee (PSC)

1. Provide policy coherence and coordination advice to the project
2. Ensure a coordinated and integrated approach to project implementation
3. Ensuring timely implementation of Phase I Preparatory Projects, and Phase II Investments, and smooth transition between the two phases
4. Ensure programmatic synergies are capitalized on, while avoiding duplication of effort or resources between Investments and partner program activities; and with other climate change initiatives
5. Provide overall guidance and direction to the PMU, ensuring it the planned activities are implemented in line with the project objectives and timeframe
6. Address project issues raised by the PMU for the PSC's attention and endorsement
7. Review and approve annual work plans and budgets
8. Review project progress reports submitted by the PMU and intervene, or provide guidance to the PMU for corrective measures
9. Monitor overall implementation progress with a special focus on delays, problems, bottlenecks, lessons, and recommendations
10. Ensure that all project deliverables are produced satisfactorily
11. Review Terminal Evaluation of the project and provide recommendations for follow-up actions
12. Review and approve proposals concerning budget re-appropriation and project extension

Working Procedures

- The PSC will meet at least twice a year during which timing for the next PSC will be decided
- Extraordinary meetings may be called at the request of any member or by the Program Management Unit
- All members should be present (or represented through other members) at the Program Steering Committee Meetings so that decisions can be made by consensus
- The Secretary, GNHC-S will chair the meetings. The Director, GNHC-S will assume the role of chair in absence of the Secretary
- Decisions will be reached by consensus
- The PMU will announce the meetings with at least one weeks' notice
- All documentation for the meetings (plan/budget, reports, proposals for adjustments, etc.) shall be distributed to the members at least three days in advance together with a draft agenda
- The PMU shall draft the minutes of the PSC meetings and shall distribute the draft minutes to all participants within a week after the meeting
- The PSC will review and provide comments by e-mail
- The draft minutes shall be ratified in the subsequent PSC meetings

(i) At SPCR Inception (Phase I & II)

- Review and endorse the staff positions (and their ToR) for the Program Management Unit
- Appraise the overall project Action Plan
- Review and approve the annual work plan and budget
- Delegate any project assurance functions as appropriate

(ii) After Program Initiation

- Provide overall guidance and direction to the PMU, ensuring that planned activities are implemented in line with the project objectives and timeframe
- Address project issues raised by the PMU for the PSC's attention and endorsement
- Review and approve annual work plans and budgets
- Formulate annual work plans to address recommendations
- Review Program Progress Reports submitted by the PMU and intervene, or provide guidance to the PMU for corrective measures

(iii) At Program Close

- Assure that all Program deliverables have been produced satisfactorily

- Review Terminal Evaluation of the Program, and endorse the TE Report
- Provide recommendations for follow-up actions
- Notify operational completion of the project

4.5.3 Technical Working Group (TWG)

365. The multi-sectoral TWG will be chaired by the Program Manager, Chief of the Plan, Monitoring and Coordination Division (PMCD), GNHC-S. It will meet quarterly and have the following specific functions:

a. Review planned activities, and ensure that the Program's key results, outcomes and objectives are in line with Program documents
b. Ensure that project interventions are planned and implemented in a coordinated and holistic manner at central, Thromde and LG levels
c. Promote technical coordination between government and civil society implementing partners, where such coordination is necessary and feasible
d. Provide guidance, and/or clarifications, where technical issues are confronted
e. Share good and bad lessons learned through SPCR knowledge product dissemination, and best practice for improvement and scalability to outside project areas.

366. The TWG members are comprised of SPCR Project Implementing partners (to be affirmed at the Program Inception Workshop) as follows:

1. Mr Norbu Wangchuk, Chief Planning Officer, PMCD, GNHC-S (Chair)
2. Ms Tashi Wangmo, DHS, MoWHS (Member)
3. Ms Bhawana Chettri, DHS, MoWHS (Member)
4. Mr Karma Tshering, NEC (Member)
5. Ms Dago Zangmo, DHS, MoWHS (Member)
6. Mr Kinley Dorji, DHS, MoWHS (Member)
7. Mr Tashi Phuntsho DHS, MoWHS (Member)
8. Mr Gyembo Dorji, PMCD, GNHC-S (Member)
9. Mr Pem Bazar, LDD, GNHC-S (Member)
10. Mr Phuntsho Tshering, NCHM (Member)
11. Mr Tshencho Dorji, NCHM (Member)
12. Mr Pema Wangdi, NCHM (Member)
13. Ms Sonam Choden, WCD, DoFPS (Member)
14. Mr Sangay Choedar, PMCD, GNHC-S (Member Secretary).

367. Furthermore, the SPCR Program will fully engage representatives from CSOs, YDF, and BCCI during TWG meetings to discuss Program technical needs, and inter-agency arrangements.

4.5.4 Program Management Unit

368. A PMU will be established to run the project on a day-to-day basis on behalf of the implementing agencies and SPCR partners. Under the oversight and guidance of the Chief, PMCD, the PMU will be responsible for: overall day to day project management monitoring and evaluation; inter-institutional coordination with implementing partners and other stakeholder agencies for planning and implementation of SPCR activities; and, delivery of project results in a timely and effective manner.

Terms of Reference for PMU Staff

369. Other PMU staff include: (i) Program Manager; (ii) Program Officer; and, (iii) Program Accountant.

Program Manager

370. The Chief, PMCD will assume the role of the Program Manager (PM). The PM will have the responsibility for overall operational direction, supervision and management of the SPCR Program - in close consultation with the Program Officer. Specific responsibilities will include:

a. Supervise and guide the functioning of PMU;
b. Ensure that inputs from the implementing partners are forthcoming in a timely and effective manner;
c. Ensure strong inter-agency coordination within Government, and with key SPCR stakeholders;
d. Review annual work plans and budgets for review and approval by the PSC;
e. Review annual and program performance reports (M&E) and financial progress reports in accordance with the requirements specified in the SPCR Document;
f. Ensure that the minutes of PSC meetings are produced and circulated within a week after such meetings are held;
g. Chair the Technical Working Group Meetings;
h. Represent the Program as the national focal point to RGoB.

Program Officer

371. An Officer of the PMCD, GNHC-S will assume the role of Program Officer (PO). Under the overall supervision and guidance of the PM, the PO will have responsibility for the day-to-day management and administering of the SPCR Program. Specific responsibilities will include:

a. Manage and coordinate the implementation of the SPCR project activities in accordance with the approved SPCR Program Document, annual work plans and budgets
b. Prepare annual work plans and budgets for onward submission to the PSC for perusal and approval
c. Monitor project progress and prepare physical and financial progress reports
d. Organize PSC and TWG meetings, including the preparation and notification of agenda and circulation of documents necessary for these meetings at least a week in advance
e. Ensure that the minutes of PSC and TWG meetings are produced and circulated within a week after such meetings are held
f. Manage staff and consultants assigned to the project
g. Network with other relevant agencies and projects and establish linkages for learning and sharing experiences and developing synergies
h. Facilitate mid-term and terminal evaluations of the Program
i. Liaise with Development partners.
j. Visit project sites as and when necessary to appraise project implementation and related issues in interaction with local project stakeholders.

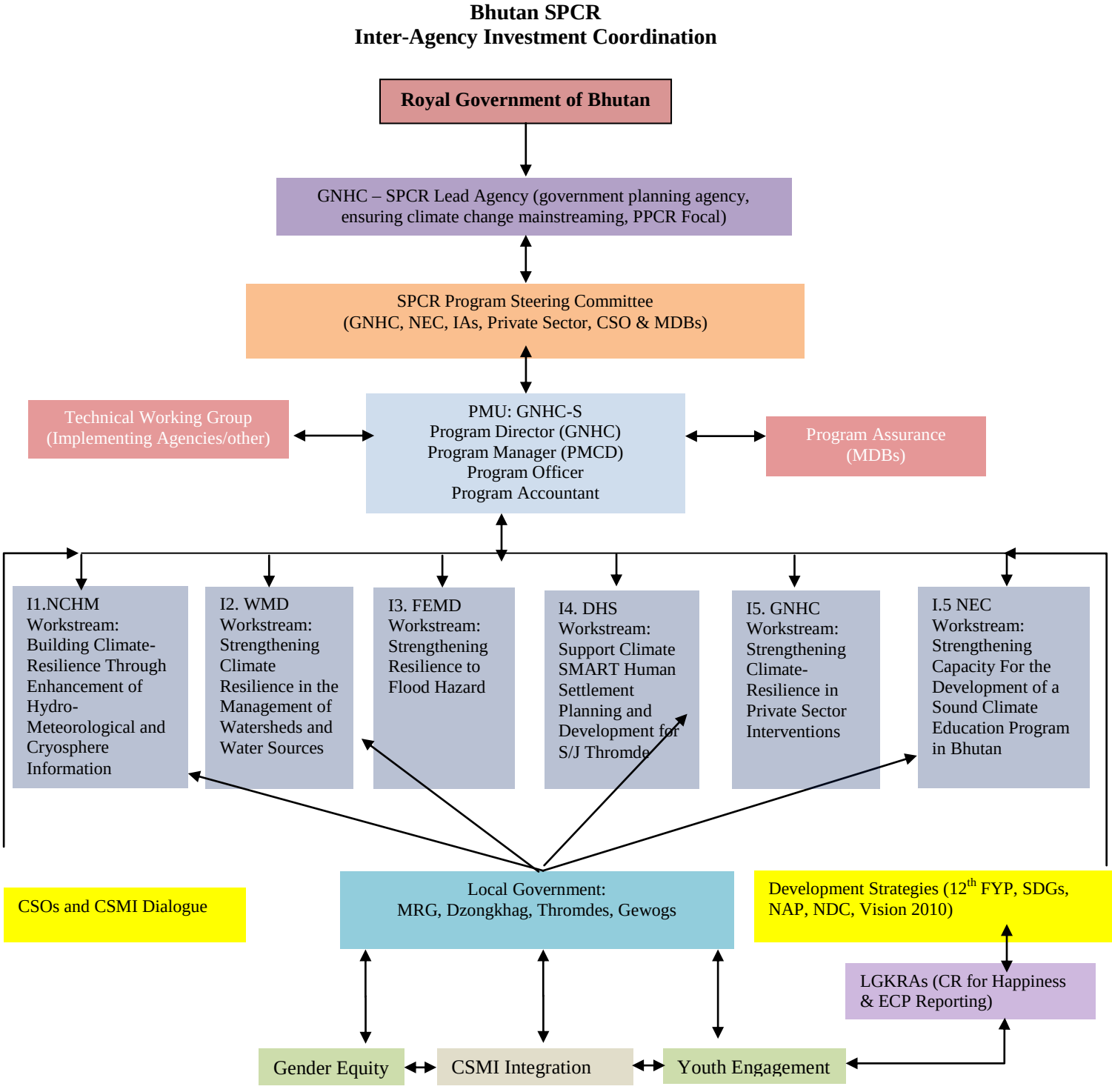
Program Accountant

372. An accountant from the GNHC-S Administration & Finance Division will assume the role of the Program Accountant. Under the guidance and supervision of the PM and PO, the Program Accountant will have the following specific responsibilities:

a. Keep records of Program funds and expenditures, and ensure all project-related financial documentation are well maintained and readily available
b. Review project expenditures and ensure that Program funds are used in compliance with the Program Document and RGoB financial rules and procedures
c. Provide necessary financial information as and when required for program management decisions
d. Provide necessary financial information during Program audit(s)
e. Review annual budgets and Program expenditure reports, and notify the PM/PO if there are any discrepancies or issues
f. Consolidate financial progress reports submitted by the responsible parties for implementation of Program activities
g. Liaise and follow up with the implementing partners on any financial related matters.

4.5.5. SPCR Organogram

373. The following SPCR organogram reflects the aforementioned inter-institutional arrangements proposed for SPCR:



4.5.6 Implementation Arrangements

374. During the technical workshops, it was agreed that the Phase I SPCR Preparatory Projects would commence in November of 2017, and continue roughly over a one year period, with completion somewhere between July and December of 2018, depending on the complexity of Phase I activities. SPCR Investments will commence from July through December of 2018, in alignment with commencement of the RGoB's 12th FYP in July, 2018, through to June of 2023.

375. The respective roles of the GNHC and NEC will be further defined prior to the commencement of Phase II implementation and financing. In addition, the SPCR needs to dove-tail with the $2 million NAP Readiness Program, commencing from 2018 to 2022. Bhutan's SPCR will also look at NDC-supported co-benefits to strengthen SPCR adaptation (and mitigation) synergies.

4.5.7 SPCR and Fund Process

376. The SPCR financing shall follow the RGoB financial mechanism once the Project Agreement is signed between the GNHC, Development Partner and a concerned budgetary agency.

377. Following the signing of a project, the Financing Item Code (FIC) will be assigned by the GNHC-S to track the expenditure of project fund.

378. Once the FIC is assigned, a budgetary agency shall as per the project agreement and work plan, requests the GNHC-S to facilitate the release of fund from Development Partner to the RGoB budget fund account.

4.6.1 Climate-Resilience Promotes Happiness Screening Tool

379. GNH Survey, administered by Center for Bhutan Studies is the main source of happiness data. With support from the Centre for Bhutan Studies, an indicator will be created to incorporate Climate-Resilience Promotes Happiness data inputs into the 12th FYP NKRA #6: Carbon Neutral, Climate and Disaster Resilient Development Enhanced. The NAP is expected to do the same. Indicator data will be aligned with the GNHC's standard NKRA reporting protocols and NEC's proposed Environmental Management Information System (E-MIS).

4.6.2 SPCR Environmental Management Information System (MIS)

380. An Agency Key Result Area (AKRA) could be formulated by decomposing an NKRA into distinct Agency results corresponding to the constituent Agency that the NKRA covers. For example, NKRA 6: Carbon Neutral, Climate and Disaster Resilient Development Enhanced could be decomposed into two AKRAs - one each for Environment and for Disaster. In this case, the AKRAs are distinct results corresponding to the Agency's mandate or domain of expertise.

381. As well, SPCR's Program Monitoring and Evaluation System will operate in concert with and feed into the M&E system. SPCR Program activities, results and outcomes, will be included in the Annual Performance Agreement of the GNHC and Implementing Partners, and their progress monitored through established government performance systems. As such, the implementing agencies for SPCR, with their LG and Civil Society partners and stakeholders, will jointly contribute upward to their respective Key Result Areas toward the NKRA.

382. Other NKRAs that the SPCR will contribute directly to are:

a. Healthy ecosystem, enhanced by MoAF
b. Water food and nutrition security ensured, by NEC and MoAF
c. Economic diversity and capacity, enhanced by MoEA
d. Water, food, and nutrition security, enhanced by NEC and MoAF
e. Infrastructure, improved by MoWHS
f. Gender equality improved and women in power, enhanced by NSWC

g. Productive and gainful employment, created by MoLHR
b. Livability, safety and sustainability of human settlements, improved by MoWHS[6]

4.6.3 MIS and Gender

383. An SPCR Environmental Management Information System (MIS) will capture climate-relevant socio-economic and health indicators, including disaggregated data on gender equity, climate change food-security, water-availability, and CSMI integration (e.g. disaggregated data based on age, gender, poverty level, water use, infrastructure risk).

384. NCWC manages the Gender Equality Monitoring System (GEMS), which provides reporting guidance to all government Gender Focals. Currently, no climate-resilience references or indicators are contained in the NCWC's Governance Gender Monitoring Handbook, nor by the GNHC. Data disaggregated gender data collected in NCWC's GEMS may be incorporated into the central NKRA system, with climate-resilience and gender indicators.

4.6.4 Knowledge Sharing

385. The transformational success of this SPCR depends on the strategic dissemination of adaptation measures and policies, the transfer of adaptation technology and expertise acquired, and the effective sharing of knowledge products and lessons learned (see Dissemination of Knowledge Products/Lessons Learned sections in each Investment, Annex 12). We highlight here some knowledge-sharing approaches, as follows:

4.6.5 Dissemination of Knowledge Products

386. Through the PSC TWG (mentioned above), key knowledge products (eg. Hydromet Impact Projection Models, Flood Vulnerability & Hazard Maps, Climate-Oriented Watershed Management Plans, Climate-SMART LUPs, & ECP Learning Tools) will be widely disseminated to all participating LGs and stakeholders. In addition, key lessons learned generated from the SPCR MIS and annual Happiness Index performance reviews for SPCR will be documented by participating Line Ministries and MDBs/DPs, and shared and discussed in SPCR Learning Workshops.

4.6.6 Dissemination of findings from Preparatory Projects

387. Summary results from the six Preparatory Projects will be distributed to SPCR stakeholders involved in the investment design stage to: facilitate further knowledge acquisition to finalize design parameters for the SPCR Investments; and for application in future climate adaptation efforts, including contributing knowledge to the NAP, NDC, and other climate change strategies.

4.7 SPCR Program Results Framework

388. The following table 9 highlights, by Investment, the expected outcomes & outputs and measurable indicators; baseline; program targets; and reporting responsibility of Bhutan's SPCR.

[6] Reference Table 12: lead agencies and contributors for NKRAs; Page 59, 12th FYP Guidelines.

Table 9. Bhutan SPCR Program Results Framework

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
Pillar 1: Enhancing Information Base for Hydromet Services & Climate-Resilience Investment 1: Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information				
Outcome 1. NCHM trained and equipped to deliver reliable hydromet and cryosphere information and services to central & local Governments, and civil society to inform policy decisions.	Percentage of NCHM's staff trained on; downscaling facilities (computers, software) available; downscaled climate impact projection models(gender disaggregated); number of hydromet stations reporting data remotely	Limited technical capacity on hydromet & cryosphere; no high-resolution maps; limited time-series data; GLOF early warning and rainstorm floods in Punatsangchhu, Mangdechu & Chamkharchhu; 72-hours weather forecast.	NCHM's technical capacity (especially women) enhanced on hydromet and cryosphere data collection & impact modeling; provision of weather & tailored climate impact information provided to end-users (Line Ministries, LG, CSMIS) by 2023	NCHM/GNHC-S/LGs
1.1 Hydro-meteorology and cryosphere research capacity enhanced	Percentage of NCHM staff trained on hydrometeorology and cryosphere research and data management(gender disaggregated);; CSO and public access to climate information	Limited capacity in hydrometeorology and cryosphere research and data management in 2017	NCHM staff's (especially women) capability on hydrometeorology & cryosphere research and data management improved by 2023	
1.2 Downscaled climate model (Dynamical) 5-10 km resolution functional	Downscaling facilities (high-end computers with software modelling to utilize 6 different GCMs with 4 different scenarios; RCP2, 2.6, 4.5 & 8.5) installed and functional	No high-resolution maps available to inform climate change risks in 2017	Downscaled high-resolution maps to inform sector-wide climate change impacts, at varying time scales/scenarios available by 2023	
1.3 Climate projections & impact scenarios and specific V&As developed for priority sectors and SPCR target regions, in consultation with and involvement of relevant stakeholders	Climate change impact projections available for pilot project areas, and at national level for Government Line Ministries; GLOF data updated, published and accessible to public	Limited climate change impact projections data available in 2017	Climate change impact projections data available by 2023 for multiple end-users (Line Ministries, LG, Civil Society, with focus on women and CSMI end-users). Also provision of downscaled climate risk projections data provided to at-risk sectors to formulate individualized Sectoral Impact & Risk Profiles.	

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
1.4 Institutional capacity of NCHM on hydrolomet and cryosphere enhanced.	Number of staff trained on medium & extended range on climate extremes, risk assessment, instrumentation, hazard mapping, melt modelling, observation, calibration and validation of hydro-meteorological and weather model (HBV, Mike 11, WRF) instrumentation(gender disaggregated); and number of climate knowledge products developed and disseminated to inform climate risk management planning and policy decisions at the National, Dzongkhag and Gewog level (including by women's groups/CSMIs with leadership role).	Limited GLOF early warning and rainstorm flood data for Punatsangchhu, Mangdechu & Chamkharchhu; 72-hours weather forecast; & seasonal climate information (2017)	Increased number of climate knowledge products developed and disseminated to agricultural women through state-of-the-art technologies; climate mainstreamed in policies and programs at national, Dzongkhags and Gewogs by 2023	
1.5 Hydro-meteorological data bolstered through localized hydromet stations.	Number of functional hydromet stations reporting data remotely	Limited scoping of climate impacts in critical river basin locations and destabilized eco-systems, using limited number of hydromet stations.	A number of Hydromet stations installed in high-risk target river basins; and number of critical river basin and target eco-system locations assessed through number of installed hydromet stations.	
1.6 Pool of experts (NCHM, Line Ministries/Civil Society) established in climate science, hydrology and cryosphere science.	Percentage of professionals specialized in climate science, hydrology and cryosphere (gender disaggregated).	Staff capacity in hydrology and cryosphere science limited.	Number of NCHM staff & Civil Servants, and CSMI/CSO representatives trained in related science and impact projections.	
Pillar 2: Preparedness, Food & Water Security **Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources**				
Outcome 2. Improved water availability and accessibility through Climate-Resilient Integrated Watershed Management Program Implementation	No. of critical watersheds with management plans; no. of wetlands inventoried and valuations; no. of beneficiaries (DoFPs, CSMIs, youth, private sector by gender)	186 watersheds; 7 Watershed Management Plans with 9 plans under process; 3 International Wetlands Plans; 3 PES sites/schemes.	Critical watersheds benefitting from *Climate-Resilient Integrated Watershed Management Plans*; wetlands inventoried and valuated/monetized; number of beneficiaries (DoFPs, CSMIs, youth, private sector with gender focus) trained	WMD/GNHC-S/LGs
2.1: Develop and implement Adaptive Integrated Watershed Management Plans in critical watersheds with beneficiary groups including women, and target drying water sources rehabilitated.	Number of critical watersheds for drinking and irrigation in SPCR pilot sites in southern Bhutan with management plans already in place	186 watersheds identified; 7 watershed management plans in place & 9 watershed management plans under process	Climate-Related Integrated Watershed Management Plans for critical watersheds and wetlands in the SPCR pilot sites developed to restore sites to normal condition	

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
2.2: Nationwide wetlands mapped in consultation with key stakeholders; and Climate-Resilient Wetland Management Guidelines developed (Phase II).	Inventory of wetlands in the SPCR project areas; and Management Plans/Guidelines already in place	Wetland degradation; no systematic inventory records; 3 internationally declared wetland sites; no climate data on vulnerable target wetlands; UWICE high altitude inventory	Nationwide wetlands inventoried to manage the available water resources, with upstream adaptive protective measures and downstream conservation benefits; Protection of eco-system stressed target wetlands for water resources (drinking and irrigation).	
2.3: Valuation of wetlands carried out, and institute PES schemes climate-oriented Payment for Ecosystem Services (PES) schemes instituted toward adaptive water conservation.	Quantification and valuation of critical wetlands in SPCR pilot areas; and feasibility of PES schemes carried out. Upon favorable result, establishment of the PES schemes	3 pilot PES sites in Bhutan	Valuation of critical wetlands; Feasibility Project of PES schemes in SPCR pilot areas completed; Establishment of PES schemes employing women, depending on favourable results of PES feasibility Project.	
2.4: Enhance Climate-Resilient Enhanced climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed management.	DoFPS, number of Line Ministries, and number of communities (including women groups, youth and CSMIs) trained in adaptive watershed and water conservation concepts, policies, climate-oriented water resource inventory and mapping hydrogeology(gender disaggregated).	Limited DoFPS staff trained on hydrogeology mapping (esp. climate-oriented); Training of Trainers (TOT) on socioeconomic data collection (incl. GESI & GNH)	MoAF, other Line Ministries, LG, and number of vulnerable communities (including women's groups/farming women/women-led CSMIs, youth) knowledgeable in climate-oriented watershed, wetlands and water conservation concepts, policies, and application of adaptive good practices; climate-oriented water management modules targeted to vulnerable communities	
Pillar 2: Preparedness, Food & Water Security **Investment 3: Strengthening Climate Resilience to Flood Hazards**				
3. Reduced flood risks to flood prone vulnerable communities in Southern Bhutan, via eco-system-based adaptation measures	Number of households & vulnerable communities with reduced flood risks	Flood protection infrastructure, Impact Projects of past floods with flood risks households; Limited technical capacity of engineers and planners on river basin flood control	Households & vulnerable communities with reduced flood risks reaches 70-80% from baseline by 2023	FEMD/GNHC-S/LGs

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
3.1: Flood risk and vulnerability assessment and geotechnical/geoclimatic Projects completed in southern Bhutan (Phase 1- Moa River Basin, under Sarpang District).	Number of reports on flood vulnerability; climate hazards maps; geotechnical Projects conducted and reported on Maochu, Shetikheri and Aiepoly (big and small) rivers	Flood protection infrastructure along the Maochu, Shetikari, Aiepoly streams; Impact Projects of past floods	Causes and effects of flood risks and vulnerability Projects generated by 2018; Eco-system-based geotechnical & slope stability analysis of soil and rock slopes report for Shetikheri stream.	
3.2: Hazard, risk and vulnerability maps prepared, detailed Project and analysis of target catchment & downstream flooding conducted in other southern regions (eg. Samdrup Jongkhar, Phuntsholing, Samtse, Dagana, Sarpang).	Increased number of households adopting climate-resilient measures in Sarpang, Phuntsholing, Samdrup Jongkharand Samtse	Preliminary Projects on flood risks assessments and hazard maps available for Samdrup Jongkhar, Phuntsholing & Samtse, Sarpang, Dagana	Number of integrated adaptive soft and hard ecosystem & engineering-based climate-resilient measures in place and functional, with emphasis on target household women and girls.	
3.3: Implementation of climate-resilient measures along the target river-basins against extreme climate events causing flood hazards - in collaboration with at-risk communities including: women, youth and private sector.	Number of climate-resilient activities implemented in collaboration with vulnerable communities/groups	Findings from output 1.1 during Phase I implementation	Number of integrated ecosystem-based and engineering-based climate-resilient measures in place and functional in affected areas	
3.4: Strengthened national capacity to respond to climate-induced floods through structured ability to assess, analyse, prepare and apply climate impact science and integrate climate adaptive measures.	Number of long-term/ short-term training events/workshops; community sensitization; learning by doing on climate, flood & environment-related fields(gender disaggregated)	Limited technical capacity of Line Ministry & LG engineers and planners, and participating target community groups on floods, climate and environment in 2017	Enhancement of climate-resilient capacity by 50% from the baseline for FEMD, LGs, and vulnerable communities by 2023; number of trained women and girls, where appropriate	
Pillar 3: Sustainable Growth & Resilient Infrastructure **Investment 4: Strengthening Climate-SMART Human Settlement Planning For Samdrup Jongkhar Thromde**				
4. Climate-SMART human settlement plans for climate-proofing of infrastructure and services to Thromde beneficiaries.	No. of Climate-SMART LUPs with climate-proofing infrastructure & services used by residents & Climate-SMART training of beneficiaries (with gender lens)	No Climate-SMART LUPs; poor climate-resilient infrastructure & services; limited knowledge on Climate-SMART land-use planning	Climate-SMART LUPs with climate-proofing infrastructure & services; & climate knowledgeable beneficiaries (with gender lens)	DHS/GNHC-S/LGs
4.1: Revised climate-oriented Samdrup JongkharUrban Development Plan, and replicable Climate-SMART Land Use Plan for use in vulnerable southern Thromdes (Phase I).	Climate-SMART LUP Standards and Guidelines for Samdrup JongkharThromde	No proper climate-SMART LUPs for zonation within the S/jongkhar Thromde	Climate-SMART planning Standards, Guidelines, and Policies developed for S/J Thromde Plan, with gender focus where possible.	

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
4.2: Enhanced effectiveness and efficiency of municipal services (eg. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through policy, planning, design and implementation of Climate-SMART municipal services and infrastructure.	Inventory and stocking of drinking water, road, electricity, waste water and solid waste, land use in the Thromde; percentage of hazard incidents, & comparative % invested to rehabilitate damaged municipal Investments(gender disaggregated)	Poor quality roads, drains and green spaces, solid waste, waste water and drinking water management void of climate impact planning and adaptive development considerations; rehabilitation budget	Sector-based client– responsive Thromde risk management services improved by 50% from the baseline scenario; reduced percentage of hazard incidents, & % reduction in rehabilitation costs to municipal Investments	
4.3: Improved urban resilience with Climate-SMART planning that incorporates hydromet-related hazard risk management approaches to flooding and landslides; and to green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands).	Percentage of urban residents (visitation) using Climate-SMART urban infrastructure and hazard-fee green and recreational spaces facilities(gender disaggregated)	Virtually no hazard-free green and/or basic leisure areas & facilities in S/J Thromde	Climate-SMART LUP planning guidelines implemented; good lessons and practice shared for scaling-up in other Thromdes by 2023; Increased % (visitation) of municipal users to hazard-free green and recreational spaces facilities	
4.4 Sustainably managed land resources in the target Thromde through climate-proofing of human settlement areas.	Percentage of Thromde land resources at low-risk/adaptive to climate hazards.	Current level of land resource vulnerability (historical inventory of land damage).	Number of hectares of land resources covered under Climate-SMART LUP.	
4.5 Strengthened governance, institutional coordination, and human resource capacity with private sector stakeholders, women's groups, and youth CBOs via Climate-SMART training workshops and inclusive participatory approach.	Number of Thromde inhabitants and civil society organization stakeholders engaged.	Assessment of level of awareness of Thromde inhabitants and civil society groups re climate adaptation/risk management measures.	Number of Thromde inhabitants and civil society organization stakeholders fully trained in Climate-SMART planning; and engaged in Climate-SMART activities.	
4.5: DHS and Samdrup JongkharThromde land use planners and urban designers trained in Climate-SMART policy-formulation, planning and land-use practices, along with women-led CSMIs and CSOs.	Number of training workshops on Climate-SMART human settlement planning (with gender focus, and by benefits).	Limited knowledge and skills on Climate-Smart Planning by Land Use Planners, Urban Designers and environment officers in MoWHS & S/Jongkhar	MoWHS and S/J Thromde land use planners, urban designers and environment officers (prioritizing women professionals) specially trained in Climate-SMART land use policy-formulation, planning & practices.	
Pillar 3: Sustainable Growth & Resilient Infrastructure **Investment 5. Strengthening Climate-Resilience for Private Sector Interventions**				

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
5. Climate proofing value-chains of CSMIs with climate-resilient measures, and incorporation of adaptive product and service delivery	No. of CSMIs vulnerable to CC impacts identified, and uptake climate information and services available	Large and CSMIs unaware of climate-proofing business opportunities; lack of climate-proofing knowledge transfer from BCCI to private businesses	No. CSMIs and medium enterprise use climate information and services to climate-proof their businesses.	BCCI/GNHC-S
5.1 Evidence of use of NCHM downscaled impact projection models by CSMIs and BCCI.	No. of CSMIs using climate information and services produced by NCHM	Limited or virtually no use of climate information by CSMIs; NCHM lack technical capacity to transfer climate-oriented knowledge to private sector	CSMIs (especially women-led) use climate information and services to safeguard business value-chains; improved BCCI capacity on impact projection modelling and knowledge transfer to business members	
5.2 Levels of vulnerability, exposure and risk to CSMIs identified via hazard mapping; and vulnerability reduced risk from clearer understanding of vulnerability, exposure, and risk to CSMIs assets and value chains.	No. of CSMIs vulnerable to climate change identified and reported (gender disaggregated)	Climate vulnerability and risks CSMIs little/or unknown; lack climate adaptation knowledge by businesses.	Vulnerable CSMIs build climate risk management capacity.	
5.3 Non-GMO climate-resilient cultivars (fruiticulture and exotic produce) introduced, along with adaptive water management and flood protection practices in high-risk CSMI locations.	No. of CSMIs actively using adaptive cultivars, water management and flood protection practices (gender disaggregated)	Inventory of CSMI cultivar practices; inability to respond to hazards.	25% increase in usage of non-GMO adaptive cultivars, and risk management practices against water hazards; No. of women-led CSMIs using climate adaptive safeguards on their Investments/value-chains in the food-water-energy nexus.	
5.3 Adaptation–related products and services developed and marketed to support diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.	No. of CSMIs trained and providing climate adaptation products and services.	CSMIs knowledge and capacity to produce and deliver climate risk management products and service non-existent.	No. of CSMIs fully trained and providing climate adaptation products and services domestically, and internationally; No. of certification/ accreditations issued by GNHC for CSMI training in CRM product development and service delivery.	
Pillar 4 (Cross-Cutting): Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan				
6. Institutional and human resource	Revised climate change theory and praxis	ECP a regular subject,	ECP teaching and research as regular	NEC/RUB/GNHC-

Outcome & Output	Indicator	Baseline	Target	Reporting Responsibility
capacity of Academia, Central and Local Governments on Climate-Resilience strengthened	curriculum; teaching & research units; ECP mainstreaming capacity of College Faculties, RCSC & students (especially women Faculty and students)	with modest facility in Sherubtse and CNR; none in CST; limited lecturers on ECP; RCSC & MRG have limited ECP capacity	program; College faculties and facilities ECP capacity enhanced; RCSC & MRG (especially women representatives) trained to mainstream ECP in Central and LGs.	S/MRG
6.1: Enhanced and revised curriculum on Environment, Climate Change, and Poverty (ECP) within tertiary education sector; & in Government Departments; Extended through student practicums in Southern Region with specific focus on Sherubtse College (Trashigang), the College of Science and Technology (Phuntsholing), and Jigme Namgyel Polytechnic; college of Natural Resources	Climate change history, theory and praxis curriculum in place in RUB and participating Colleges.	Climate change a regular subject in Sherubtse College; College of Natural Resources, Wangdue; none in CST.	Environment, climate change (mitigation & adaptation), and poverty reduction taught as regular subjects, with fully developed curriculum in the Royal University of Bhutan, & participating colleges.	
6.2: Capacity-Needs Report of participating Colleges Faculties, relevant Civil Service Departments, and LG MRGs.	Number of Faculty, Civil Servants, and LG Reps benefitting from/ participating in ECP training (gender disaggregated).	ECP capacity needs of beneficiaries determined.	20% of Faculty, Civil Servants, and LG Reps benefitting from/participating in ECP training.	
6.3: Establishment of ECP teaching and research institute/units (Phase II); and ECP Academic Scholarships.	Climate change teaching instituted in number of colleges and RCSC Departments; research facilities upgraded with ECP; number of ECP Academic Scholarships.	Sherutse; Science and Technology and CNR College have a small CC unit; RSCC has absence of ECP professional capacity.	ECP program instituted at participating Colleges and RCSC Departments; Faculty, with ECP facilities in respective Colleges.	
6.4: Capacity-building of Faculties, civil service professionals and students on ECP, and climate change projections and impact modeling.	ECP capacity built in number of Faculties, Government Departments; and with (especially female) students in respective colleges.	Limited qualified lecturers & civil servants on ECP.	Number of Faculty members teaching ECP, civil servant professionals applying ECP, and student's enrollment and participation (esp. women) increased by at least 30% from baseline (2017). At least 1,000 students participate in field practicums in southern communities.	
6.4: Institutional capacity to mainstream ECP in development planning across multi-sectors (Phase II).	ECP mainstreaming capacity of Faculties and students developed in participating Colleges and in target Dzongkhags(gender disaggregated).	National level Climate Change Mainstreaming Reference Group has limited ECP capacity, as do Dzongkhags.	Mainstreaming of evidence-based ECP policy into national, sectoral and LG plans, programs and projects.	

4.8 Theory of Change (Higher Level Impacts)

389. Below highlight how each SPCR Investment contributes to higher impacts to change the baseline situation in Bhutan.

Investment 1: Building Climate Resilience through Enhancement of Hydro-Meteorological and Cryosphere Information

390. **Baseline.** NCHM currently has very limited capacity to formulate high-resolution maps that reflect climate impact projections on precipitation (hydromet), glacial melt (cryosphere), or temperature change and heat events, especially for hazard-prone regions in the midlands and Southern Bhutan.

391. **Change to baseline from SPCR Support.** The SPCR will adequately train and equip NCHM with strategically located hydromet stations reporting data remotely; and state-of-the-art super computer data management and software systems to formulate high-resolution statistical and dynamical downscaled impact models to deliver reliable hydromet and cryosphere information and services to Central & LGs to inform policy decisions.

392. **Higher Impact.** This vital information will dramatically upscale Central and LG's ability to anticipate climate impacts in target sectors at risk, and allow for the timely response to anticipated extreme events with adaptive measures in some of Bhutan's most vulnerable communities and river basins. College Faculty, NCHM female staff, WMD water resource managers, FEMD flood specialists, DHS Municipal Planners, Department of Disaster Management staff, and women-led CSMIs in the south will finally have useful impact projection science to improve their adaptive capacity in Government, and at the community-level.

Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water Sources

393. **Baseline.** Currently, Bhutan faces systemic climate-induced water shortages and extensive wetland degradation in a myriad of watersheds; and a Watershed Management Plan void of any climate-impact data to anticipate future water availability or water scarcity, especially in the agricultural south.

394. **Change to Baseline from SPCR Support.** Through this SPCR, an Integrated Climate-Resilient Watershed Management Program will be implemented nation-wide to identify stressed wetland ecosystems and assess current and projected water resource availability (climate-related water resource inventory) for downstream use, especially for rural farmlands and cottage industry reliant on water for production.

395. **Higher Impact.** This pan-national Integrated Climate-Resilient Watershed Management Program will allow DoFPS staff and other front-line Ministries (Agriculture, Forests, Industry) for the first time to develop and implement Climate-Oriented Watershed Management Plans and Climate-Adaptation Wetland Maps in critical watersheds, to allow vulnerable farmers and women-led CSMIs (especially in the hazard-prone midland and southern districts) to institute climate-resilient watershed and water conservation good practices and sustainable PES schemes to protect and maximize the use of limited drinking and irrigation water.

Investment 3: Strengthening Climate Resilience to Flood Hazards

396. **Baseline.** In spite of the FEMD being instituted in 2012, there is very limited technical capacity of flood engineers, Dzongkhags, and DDM disaster specialists to respond in any meaningful way with flood protection measures against the increased incidence and intensity of extreme flood events across the country, and especially in the flash flood-prone south where Chiwog farm lands and critical infrastructure are most vulnerable.

397. **Change to Baseline from SPCR Support.** This SPCR envisions reducing the overall risk of flood-prone southern communities to climate-induced repeat flash floods through: formulation of geo-climatic hazard mapping; conducting climate impact risk assessments of human settlements near target river basins; and, introducing innovative upstream eco-system-based approaches to climate-resilient flood risk management, benefitting downstream Thromdes, communities, and businesses at risk.

398. **Higher Impact.** These climate risk management tools and eco-system-based adaptation approaches to Integrated Flood Management (IFM) will enable FEMD flood engineers and LG to confidently reduce the risks of flooding in the highly vulnerable southern Dzongkhags of Samdrupjonghar, Phuntsholing, Samtse, Sarpang, and Dagana; and qualitatively and quantitatively minimize flood risk damage to community households, farm lands, and local industry across the region.

Investment 4: Strengthening Climate-SMART Human Settlement Planning and Development in Samdrup Jongkhar Thromde

399. **Baseline.** Without climate-oriented Land Use Planning (LUPs) to ensure municipal infrastructure and services are resilient to repeat climate hazards; and almost no knowledge or capacity amongst municipal planners, environmental specialists, or urban designers on municipal or community adaptation planning anywhere in-country; municipal works and urban settlements continue to be highly exposed to climate-induced hazards – with repeated damage and service disruption to municipal infrastructure; and no access to safe hazard-free green and leisure spaces.

400. With the constant barrage of climate extreme events, municipal roads remain degraded, city wastewater systems are rudimentary, drinking water is not entirely reliable, and eco-friendly walking footpaths and hazard-free bicycle lanes are virtually non-existent because of the dangers of landslides and culvert flooding. Moreover, the supply chains of city-based small businesses are constantly being disrupted from interrupted municipal services.

401. **Change to Baseline from SPCR Support.** SPCR will enable DHS's land use planners and urban designers to be highly trained in, and introduce a replicable municipal Climate-S.M.A.R.T. (Sustainable Mitigation & Adaptation Tools) Land Use Plan (LUP) in Samdrup Jongkhar Thromde to climate-proof critical municipal infrastructure and services providing a more stable and safe environment for the general public and small enterprises.

402. **Higher Impact.** The DHS will pioneer the institutionalization of this Climate-SMART urban planning tool, readily replicated in other vulnerable Thromdes, to effectively climate-proof urban infrastructure Investments against climate risks; and provide Bhutan urban human settlements with desperately needed hazard-free green and leisure spaces.

Investment 5: Strengthening Climate-Resilience for Private Sector for Intervention

403. **Baseline.** Recurrent flooding in the southern region generates hazardous debris flows upstream, and deposits these debris flows in the southern plains downstream, making human settlements and the precious little arable lands along the river banks considerably vulnerable and exposed. These results in: destroyed crops and food scarcity; damaged critical infrastructure causing a disruption in public services; and consequent disruption of local enterprise value chains and the local economy. The Chamber business membership is painfully aware that their value-chains are frequently subject to these climate risks, which adversely impact business operations and revenue.

404. **Change to Baseline from SPCR Support.** Through this SPCR, CSMIs identified as moderate-to-high-risk to climate hazards will be supported through training to make their Investments, business infrastructure, and exotic fruit and vegetable cultivars more resilient to expected climate impacts. Second,

adaptation–related products and services will be developed and marketed to support diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit.

405. **Higher Impact.** This SPCR intervention will help CSMIs for the first time to: receive climate-resilient training and implement realistic and lasting solutions to defend their corporate value chains against chronic disruptions from climate hazards; and, bolster their direct involvement in the development, marketing, and sale of uniquely competitive climate risk management products and services for domestic consumption, and external markets. It will potentially galvanize companies involved in exotic fruit and vegetable production to upscale their productive capacity, to strengthen their adaptive capacity through more resistant and robust cultivars.

Investment 6: Strengthening Capacity for the Development of Sound Climate Education Programme in Bhutan

406. **Baseline.** Bhutan's College Network has very limited capacity to deliver on its commitment to teach the National Environment, Climate Change, and Poverty Program (ECP), mandated by Central Government. Lecturers are untrained, the National-Level Climate Change Mainstreaming Group has poor institutional and technical capacity, and there is little incentive for students or lecturers to teach about climate change without a full appreciation of the pronounced impacts climate change is having on the environment, at-risk rural communities, and the national economy.

407. **Change to Baseline from SPCR Support.** SPCR shall institutionally mainstream ECP and climate-resilient science and adaptation policy and practices in degree courses in the Royal University of Bhutan and its network of colleges; with mass student participation in ECP learning and region-wide field practicums in southern vulnerable communities focusing on women-led industry and vulnerable communities.

408. **Higher Impact.** The large-scale institutionalized mainstreaming of evidence-based ECP and climate-adaptation science, policy and climate-resilient good practices through tertiary education centers into LG plans and programs is a significant adaptation milestone. Moreover, the establishment of a National Academic Centre of Excellence on Climate Change Actions (with degree scholarships); and the high-level participation of several Colleges' Faculty Members and Civil Service professionals represents a quantum leap in Bhutan's climate change knowledge acquisition.

409. With these higher level impacts in mind, we highlight in the Table 10 below some SPCR's contributions toward transformational impacts:

Table 10. SPCR Theory of Change for transformational Impact

Global-CIF Final Outcomes **Bhutan-Contribution of SPCR to Transformational Impact** 1. A strategic framework to mainstream climate-resilience into LG and vulnerable community development planning, complementing the 12th FYP, NAP, NDC, and SDGs; 2. Support RGoB in achieving its National Key Results Areas (NKRAs), and Gross National Happiness developmental Index; and measuring progress towards Sustainable Development Goals (SDGs): particularly SDG 6 and 13 through its Key Performance Indicators (KPIs) - including tracking on climate-resilience indicators related to its GKRAs & NKRAs; 3. Develop decentralized climate adaptation projects at the Gewog levels, especially in the highly vulnerable Southern regions; and build institutional capacity of SPCR Implementing Agencies on adaptation for long-term development progress; 4. Identify climate Investment opportunities with significant private sector, gender and youth participation to build climate-resilience of Bhutan's human settlements, critical infrastructure, and fragile eco-systems; and strengthen private sector engagement in climate-resilient actions and adaptation-related business activities. 5. Incorporate Climate-SMART planning policies and measures in urban & peri-urban/rural townships to minimize hazard exposure and establish hazard-free green and leisure zones. 6. Mainstream Environment, Climate and Poverty curricula across Bhutan's College Network to strengthen Faculty capacity in climate-related fields of Project; build capacity within the Royal Civil Service Commission; and engage students in field practicums to operationalize their learning in target vulnerable communities and industry at risk.						
SPCR Outcomes	1. NCHM trained to deliver reliable hydromet, agromet and cryosphere information and services to Central & LGs and public to inform policy decisions	2. Improved water availability and accessibility through Integrated Climate-Resilient Watershed Management Program Implementation	3. Reduced flood risks to flood prone vulnerable communities in Southern Bhutan	4. Climate-SMART human settlement plans for climate-proofing of infrastructure and services to Thromde beneficiaries	5. Climate proofing value-chains of CSMIs with climate-resilient measures; and incorporation of adaptive product and service delivery	6. Institutional and human resource capacity of Academia, Central and LGs on climate-resilience strengthened
Project Outputs	1.1 Hydro-meteorolog, and cryosphere research capacity enhanced	2.1: Adaptive watershed management plans developed and implemented, and target drying water sources rehabilitated	3.1: Flood risk and vulnerability assessment and geotechnical/geo-climatic Projects	4.1: Revised climate-oriented Samdrup JongkharThromde Urban Development Plan, and replicable Climate-SMART Land Use Plan	5.1 Evidence of use of NCHM downscaled impact projection models by large and CSMIs.	6.1: Enhanced and revised curriculum (if required) on climate change and environment at Education sectors with specific focus to Sherubtse College (Trashigang) and College of Science and Technology (Phuntsholing)
	1.2 Downscaled climate model (Dynamical) 5-10 km resolution functional	2.2: Nationwide wetlands inventory carried out; and Climate Adaptive Wetland Management Guidelines developed.	3.2: Hazard, risk and vulnerability maps prepared, detailed Project and analysis of target catchment & downstream flooding conducted in other southern regions (Samdrup Jongkhar, Phuntsholing, Samtse, Dagana, Sarpang).	4.2: Enhanced effectiveness and efficiency of municipal services (e.g. climate-resilient urban roads and storm water drains; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate-SMART municipal services and infrastructure.	5.2 Reduced risk from clearer understanding of vulnerability, exposure, and risk to CSMIs assets and value chains	6.2: **:** Climate change research centres instituted
	1.3 Climate projections and impacts scenarios developed at National and Dzongkhag level	2.3: Valuation of wetlands carried out; and climate-related Payment for Ecosystem Services (PES) schemes for implementation explored	3.3: Implementation of climate-resilient measures along target river-basins against extreme climate events causing flood hazards.	4.3: Enhanced livability of peri-urban/rural residents through planning, design and implementation of Climate-SMART dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands.	5.4 Ability to formulate and deliver climate adaptation products and services domestically and internationally	6.3: Technical capacity enhanced for climate change projections and modeling
	1.4 Institutional	2.4: Enhanced climate-	3.4: Strengthened national	4.4: Sustainably managed land resources		6.4: Capacity of faculty

Global-CIF Final Outcomes Bhutan-Contribution of SPCR to Transformational Impact						
	capacity of NCHM on hydromet, agromet and cryosphere enhanced	adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed	capacity to respond to climate-induced floods through structured ability to assess, analyze, prepare and apply climate impact science and integrate climate adaptive measures.	in the target Thromde through identification of potential human settlement areas, and Climate-SMART LUPs.		members and relevant sectors engaged in climate change (advance levels and specialized) enhanced
	1.5 Hydrological data bolstered through localized hydromet stations			4.5. Strengthened governance, institutional coordination, and human resource capacity with private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach.		
				4.6. DHS and Samdrup Jongkhar Thromde land use planners and urban designers trained in Climate-SMART planning, along with women-led CSMIs and CSOs.		

4.9. Program Risks and Solutions

410. The following Table 11 lists some of the general and Investment-related risks facing this SPCR, and corresponding solutions proposed (specific Risks and Solutions for each Investment are contained in the Concept Notes in Annex 1: Project Concept for Phase II Investments).

Table 11: SPCR Program Risks and Solutions (General)

Risks	Solutions
1. With a time constraint of one year to complete Phase I, this may restrict the level of field engagements and stakeholder participation, and the quality of outputs for SPCR Investment preparation.	1. The existence of the GNHC as a SPCR coordinating agency affords this SPCR the advantage of mainstreaming climate change at a higher level within the country. Moreover, the recent establishment of the C4 as a regulatory, policy, and coordinating body for climate change projects with LG has given rise within Government to an increased awareness and inter-agency coordination vis-a-vis climate change. In addition, most Government lead agencies are already on board with SPCR progress; and their technical teams are committed to the process, and are already strongly engaged in project design and preparation. We will capitalize on this relatively well-greased climate change network to build upon already completed work, and advance Phase I contract hiring to commence Phase I work by October. The SPCR Steering Committee and Technical Working Group will convene and coordinate SPCR activities to ensure a high level of stakeholder representation and prioritization of country adaptation needs in a shorter timeframe, likely on or around commencement of proposed Phase II Investment activities for July 2018, aligned with Bhutan's 12th FYP.
2. As SPCR Phase I Preparatory Projects are expected to be completed by July-December of 2018, they may not be completed within the prescribed 10-12 month timeline, in time for Phase II Investment activities in July-September, 2018.	2. The SPCR will put forward an aggressive implementation schedule of preparatory activities, with front-end loaded institutional capacity development measures, and robust implementation procedures to ensure that significant phase I outputs and knowledge products are completed, toward the timely completion of Preparatory Projects within the prescribed 10-12 month period. Any potential cross-over between Phase I Preparatory & Phase II Investment activities will be planned in advance in budgets, field activities and reporting.
3. The difficult geographic terrain across Bhutan restricts sub-regional representation, and program implementation.	3. To ensure broad representation from key stakeholders at all levels of Government, in the public and private sector, and from community NGOs and CSOs, a critical push will be made by the SPCR Steering Committee, Technical Working Group, and Program Management Unit, and the 5 lead Implementing Agencies, to successfully engage sector stakeholders at the Dzongkhag, Gewog, and Chiwog levels. Extra effort will also be made to ensure a balanced representation and full participation of women and youth leadership during implementation of Phase I Preparatory work and during inter-agency consultations, as done with other SPCR initiatives across the Asia-Pacific region.
4. The diversity of mandates and interests of key national, regional, and community stakeholders may affect the ability to reach a functional consensus, during Phase I, on the design and	4. During the July 2017 SPCR Stakeholder Round Table, the SPCR approach and proposed Investments were objectively presented to participants. No outstanding program, sectoral, or technical concerns were addressed, other than the need to establish a Financing Plan to ensure Phase II SPCR financing.

Risks	Solutions
implementation of SPCR Phase II Investments.	A Working Draft of the SPCR has also been presented to stakeholders, incorporating key suggestions in the draft for submission to the CIF. Key SPCR stakeholder agencies will continue to be consulted to ensure that a range of highly-relevant priority adaptation issues and needs are systematically addressed. To ensure strong civil society representation, the proposed SPCR PMU will include LG women leaders, the CSOA and member CSOs, and the BCCI and member CSMIs.
5. Generally, SPCR capacity-building and technical assistance activities leverage lower funding values than infrastructure Investments, thereby impeding the overall capacity of SPCR participating institutions to deliver on climate-resilient measures.	5. During ongoing SPCR Phase I consultations and implementation; and during the program design stage for SPCR Investments; concerted efforts will be made to identify capacity-building and technical assistance opportunities within Line Ministries, and vulnerable communities/CSOs and CSMIs (especially in the vulnerable South), that merit SPCR Investment financing. Moreover, the program will seek to establish and strengthen inter-agency coordination across multiple sectors with a high level of agency leadership, particularly from LG (Dzongkhags, Gewogs), community women leaders, and private sector industry associations and CSOs. Capacity-building outcomes, especially in target settlements in the South, will be carefully measured through the proposed SPCR GIS-based MIS and *CR* Promotes Happiness Screening Tool, and be aligned with the existing national performance rating system and Happiness Index.
6. The expectation of linked and leveraged funds from the international community may not be fully realized, with inadequate funding to finance an adequate portfolio of SPCR Project Investments. This funding deficiency will hamper country buy-in with the SPCR. In particular, there is a mistaken assumption that the NAPA (short-term priority adaptation) can be financed under SPCR funding, but this is against SPCR funding guidelines, potentially impeding NAPA progress.	6. To ensure country buy-in, SPCR funding and leveraged co-financing, at scale, will be built into national and donor dialogue, and integrated into SPCR Investment financing and overall program design. Moreover, although NAPA activities are not directly eligible for SPCR financing, efforts are being made to align with, support, and complement NAPA near-term adaptation activities with SCPR longer-term strategic Investment activities. In addition, the RGoB through the GNHC Development Cooperation Division is seeking innovative and alternative (non-traditional) financing opportunities through the development of a Financing Plan and Resource Mobilization Strategy which will identify co-financing from private sector and foundation sources, in addition to PPCR and other traditional funding mechanisms. An array of co-financing options are being considered/proposed (see Chapter 5: Section 5.2: Resource Mobilization Strategy) to diversify Bhutan's climate financing base. For example: (i) Designated transfer funds (from specific budget line items compatible with SPCR actions) for LG may be used as significant co-financing to leverage international donor co-financing. (ii) The RGoB is considering a national policy to build-in an incremental adaptation co-efficient on national Investments, to cover the cost of adaptation measures.

	(iii) As well, consideration is being given to development of a National Adaptation (Green) Bond for commercial Investment. (iv) Finally, several revenue generating activities at the Yenlag/Chiwog level are being considered to create sustainable practices through private sector adaptation business ventures.
7. An underdeveloped private sector, with minimal climate change knowledge, may be misaligned with SPCR Investment priorities as they face several challenges due to structural mismatches with Government & MDB private sector operations.	7. Along with CSOs/NGOs, forward-looking CSMI players will be identified and engaged in the SPCR consultative process, and fully integrated as implementing agencies in the Preparatory and Investment Project activities. In addition, participating MDBs and Line Ministries will be requested to review and adjust accordingly their PPP guidelines, in alignment with Bhutan industry stakeholder needs and expectations. The BCCI will provide insights into CSMI needs, through stocktaking and member consultations on climate hazards and climate-resilient needs and business opportunities.
8. The 2018 General Elections may interfere with Central Government workloads and operations, and slow progress of the SPCR.	8. National elections are not expected to hamper the implementation of planned activities. As SPCR lead agencies, GNHC and NEC (C4) senior staff are not political appointees, and are not involved in campaigning. SPCR implementation is largely conducted through the Technical Teams of the 5 Implementing Agencies, not affected by election activities. Moreover, with the 2018 national budget decentralized allocation of 50% to LG, considerable work is being done in the South by LG and at the community level (by CSOs and CSMIs), where Political activity is minimal.
9. With the upcoming 12th FYP in July 2018, the systematic devolution of responsibilities, along with requisite financing to the tune of 50% untied aid to LG will provide considerably greater resource access, with concomitant escalation in management burden, and significant delay in program implementation.	9. Initial delay in LG implementation will be tempered by the newly established administrative guidelines to streamline government disbursements, and expedite procurement of materials and contractors.
10. With SPCR being fully aligned with the 12th FYP which commences in July 2018, SPCR Investment activities may not commence immediately following completion of Phase I Projects.	10. GNHC and partners will ensure the smooth transition from Phase I Preparatory Projects to Phase II Investment activities with a Contingency Plan to ensure there is no programmatic disruption between Phases, and ensure continuity of SPCR Program implementation.

Table 12: of SPCR Program Risk and Solutions (Investment)

Investment 1: Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information	
Risk 1: Limited institutional and human resource capacity of NCHM staff on hydrometeorology and Cryosphere Research.	**Solution 1:** Training of NCHM staff including women climatologists on climate change data analysis, modeling, interpretation & analysis of climate outputs into public and user-friendly knowledge, products and services.
Risk 2: Lack of hydrometeorology and Cryosphere Program sustainability due to recent institutionalization and limited funding of NCHM program and activities.	**Solution 2**: As an autonomous wing of the RGoB, NCHM needs its own institutional policy and strategy and modus operandi to regulate services and leverage co-financing and other support services to sustain program and activities.

Investment 2: Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources	
Risk1: Limited DoFPS capacity and communities' knowledge, and limited lessons learned on watershed and wetland management.	**Solution 1**: Capacity building of DoFPS technical staff and communities on Climate-Oriented Wetland and Watershed Management through: Project tours; hands-on training (learning by doing) and scaling-up; exchange visits between domestic and international experts on technology and knowledge transfer; and leveraging co-financing to sustain its program and activities.
Risk 2: The magnitude of the water scarcity issues across the country, and the consequent need for numerous Watershed Management Plans and climate-resilient measures country-wide demands increased resources (staff's time, funds, facilities), which may not be available within this SPCR intervention, and therefore impede Project completion.	**Solution 2**: Given limited SPCR resources, WMD needs a hierarchical criteria-based prioritization of adaptive watershed management interventionsbased on community need; and must identify critical (high-priority) sites through consultations with LG water specialists, and Project beneficiaries (agricultural womens groups, youth, private sector).
Investment 3: Strengthening Climate Resilience to Flood Hazards	
Risk 1: Inadequate hydro-met data in the areas of interest for hydrological and hydrodynamic modeling by the FEMD.	**Solution 2:** Collaborate with National Centre for Hydrology and Meteorology (NCHM) to obtain required data, analysis, interpretation and access to climate change knowledge on impact, projections and preparedness to build climate-resilient infrastructure design.
Risk 2: Inadequate budget for the engineering-based flood and climate-resilient infrastructure procurement and built-up	**Solution 2**: Leverage funding from MDBs (World Bank, ADB), CIF, PPCR, GCF, and GEF.
Risk 3: Capacity of the FEMD (central flood agency) limited to conduct proper hydrology and geotechnical or climate related Projects.	**Solution 3:** Capacity-building through exposure training and long-term specialization in flood and climate adaptation.
Investment 4: Strengthening Climate-Smart Human Settlement Planning and Development in Samdrup Jongkhar Thromde	
Risk 1: Lack of technical capacity in the Central Government and LG to design and implement Climate-SMART LUP, and activities proposed.	**Solution 1**: Capacity-building through short-term trainings, seminars, workshops, expert exchange visits) to strengthen human resources in DHS, MoWHS; LGs (Dzongkhag/Geogs); and Private Sector
Risk 2: Limited collaboration between DHS, MoWHS and Thromdes.	**Solution 2**: DHS, MoWHS coordinates and collaborates on SPCR activities with active participation of Thromdes, CSMI, youth, gender and private entities.
Investment 5 (Inter-Woven): Strengthening Climate-Resilience for Private Sector Intervention	
Risk 1: CSMI and industries lack adequate guidance and support on climate-resilient SMART business.	**Solution 1:** BCCI as lead coordinates and supports CSMI and industries in scoping of climate-resilient SMART business in private sector RNR, agriculture, water, and tourism.
Risk 2: CSMI and industries lack awareness and incentives on climate-resilient business start-up.	**Solution 2:** BCCI and MoEA in consultation with GNHC-S provide awareness, incentives and mechanisms to start-up business under the EDP framework.
Investment 6: Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan	
Risk 1: Limited collaboration between RUB/colleges, NEC and GNHC due to resource unevenness and varying institutional mandates.	**Solution 1:** GNHC and NEC fully collaborate with RUB/colleges on curriculum development, with adequate SPCR resource allocation and high level of joint information exchange workshops. Also, strong reliance on LMRGs.

4.10 Social & Environmental Risks

4.10.1 Phase I

411. No Environmental and Social Impact Assessments (ESIA) are required for SPCR Phase I Projects as they are all technical Projects, with no actual physical development (ecological or infrastructure); and will therefore, have no expected adverse environmental impacts. This is a Category "C" Projects.

412. As some Phase II Investments will involve a higher level of field activities that involve the development of hard and soft infrastructure, it is necessary that EIAs be conducted in line with RGoB and MDB requirements on the following: I1 (Hydromet Impact Projection Modeling & Hydromet Stations); I2 (Water Scarcity); I3 (Flood Management); and I4 (Climate-SMART planning). As a purely capacity-building initiative, Investment 6 (Climate Change Curriculum) does not likely involve any physical development. The details of the process for preparation, implementation and monitoring of the environment and social management frameworks and plans will be put in place during the project preparation.

4.10.2 Climate-Oriented EIAs

413. To maintain high international EIA and environmental standards under Bhutan's SPCR, it is proposed that for Phase II Investments, where appropriate, a Climate-Oriented Environmental Impact Assessment be conducted to confirm both: the potential adverse impacts of SPCR Investments on the localized environment; and the potential adverse impacts of climate-induced environmental change on SPCR Investments. Because this Climate-Oriented Environmental Impact Assessment capability is currently unavailable in Bhutan, outside expertise will be sought. Training will be provided to relevant experts to ensure that this capability remains in-house for all future EIAs conducted in Bhutan.

CHAPTER 5 – FINANCING

This final Chapter will present the proposed indicative resource envelope, highlighting multiple sources of domestic and international co-financing; while describing several traditional, alternative, & innovative financing sources and mechanisms to finance the SPCR (FYP transfer contributions, Adaptation Bond, adaptation co-efficient). A Resource Mobilization Strategy and Financing Options are provided for funding reference.

5.1 Indicative Resource Envelope

414. The RGoB has estimated a PPCR fund envelope totaling US $55.65 million (35.9%); plus a combined National/Donor contribution amounting to $99.291 million, for a grand total of $154.941 million. The combined country/donor contribution represents a significant 64.08% of the total SPCR resource envelope from RGOB and other partners.

415. The individual SPCR Investment amounts are contained in Table 13, as follows:

Table 13: SPCR Investment amounts

Project/Program Concept Title	MDB	Requested potential PPCR Amount (US $)[60] million			RGoB/others co-financing (US$)	Preparation grant request (US$) million	Total request for resilience building[61]	Potential MDB Fee[62]
		Total	**Grant**	**Loan**				
1. Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information		6.5	6.5		11,597,332	0.385		
2.Strengthening Climate-Resilience in the Management of targeted Watersheds and Water sources		10	10		17,842,049	0.385		
3. Strengthening to Climate-Resilient Flood Hazard		28	28		49,957,736	0.495		
4. Strengthening Climate-SMART Human Settlement Planning in Samdrup Jongkhar		7	7		12,489,434	0.440		
5. Strengthening Climate-Resilience for Private Sector Intervention								
6. Strengthening Capacity for the Development of Sound Climate Education Program in Bhutan		1.5			2,676,307			
Program Management Unit		2.65			4,728,143	0.297		
TOTAL		**55.65**			**99.29**[63]	**2.02**		

[60] Includes preparation grant and project/program amount. This section to be filled out should PPCR funding be available only.
[61] Other than PPCR resources
[62] To be filled by MDB submitting the project. This section to be filled out should PPCR funding be available only.
[63] Rounded

416. The Program Management Unit (PMU) and some non-Investment expenses are featured in the following Table 14:

Table 14: Program Management Unit (PMU) and non-Investment expenses

Item	Amount (US$)	Purpose
1. PMU (5% of $53 million)	2, 650,000	Over 5 years. Includes: Program Management, inter-agency coordination, field visits, staff training, M&E, international missions. Also, for GNHC and the 5 SPCR implementing agencies, training will be provided on: inter-institutional roles & responsibilities & lines of communication; and CR promotes happiness monitoring and performance reporting.
Some Key Non-Investment Expenses Included Within PMU Costing		
2. DDM Information System to include CRM & DRM hazard analysis	80,000	Re-vamp DDM hazard analysis for CRM inclusion.
3. CBS Research on Climate-Resilience & Happiness Index	140,000	Formulation of climate-resilience promotes happiness toolkit; Project to integrate climate-related indicators in GNH Index. Includes field consultations & observations.
4. Enhancement of ICT platform for knowledge-sharing	350,000	Includes core participation of: LGs/MRG; CSMIs; CSOs; MoIC (responsible for Central Government communications); Bhutan Telecom Utility. Includes 5-year licensing & PSAs/texting service.
Sub-Total	**570,000**	

5.2 Resource Mobilization Strategy & Investment Financing Options

5.2.1 Resource Mobilization Strategy

417. This SPCR offers a programmatic and shelf-ready program for potential financiers, with justification for financing based on estimated budgets sourced during technical workshops. Preliminary discussions with prospective funding entities including MDBs, in-country bilateral agencies and large national CSOs are ongoing. However, it is expected that the majority of SPCR funding will be forthcoming from PPCR sources and new donors.

418. This SPCR Investment portfolio has been designed as a fully integrated, multi-sectoral, and cross-cutting Investment package. In fact, this SPCR articulates a highly programmatic approach to Investment activities, with: all 6 Investments supporting one another; I1 (NCHM downscaled impact scenarios) supporting I2 through I6; I2 (WMD adaptive watershed management) informing I3 (food security/sufficiency issues); I4 (Climate-SMART planning) providing planning inputs to I2 (adaptive watershed management), I3 (eco-system-based integrated flood management), the I5 CSMI initiative, and the I6 ECP curriculum initiative; and I5 (private sector) and GESI are inter-woven throughout all program Investments.

419. That being said, the six proposed SPCR Investments can also be financed as stand-alone adaptation actions, capable of producing significant developmental and climate adaptation outcomes on their own merit. A project-based approach to SPCR Investments is however, not the intended or desired approach to build risk management capacity across Bhutan.

420. Recognizing that Bhutan has categorically earned its stripes as a PPCR eligible country with a very high-risk of national vulnerability to climate extremes, and an unbending commitment to carbon negative status deserving of international financing support, we put forward a variety of complementary financing options for consideration to finance the full PPCR Investment envelope of $55.65 million.

421. In formulating a Resource Mobilization Strategy to finance the SPCR, RGoB recognize that within the climate financing architecture, there are a myriad of traditional funding agencies (MDBs, Multilateral Funds, Bilateral Funds, and Regional Initiatives) that have over many years served Non-Annex 1 Countries well in financing their climate change mitigation and adaptation needs.

422. It is estimated that upwards of $27 billion in accumulated contributions has been donated up to COP 21 for adaptation.[64] In laying out strategic vision for climate resilience, Bhutan's SPCR could potentially be financed from a range of climate financing sources, including the PPCR, MDB partners, the Green Climate Fund (GCF), the Global Environment Facility (GEF), and others.

5.2.2 Financing Options

423. In spite of the multitude of traditional funding sources referenced above, the flow of financing continues to be uneven and increasingly competitive. For example, US $13.5 trillion is needed just to meet the globe's NDC pledges,[65] and the availability of PPCR funding is currently in question. With a desire to identify co-financing resources to match the PPCR portfolio of US $55.65 million, we therefore consider a number of traditional, non-traditional and innovative financing approaches, as follows:

Innovative Financing

WMD Payments for Environmental Services (PES)

424. This valuation of ecosystems services is a revenue generating mechanism, with monies going to community forest group members. These funds are independently administered by GCFC through a joint account managed by committee members. There are currently three PES schemes, each generating about US $1000 equivalent per annum. This PES funding mechanism is being considered for WMD's SPCR Investment, and will be assessed during the preparatory phase.

425. SPCR will investigate the viability and benefits of this PES mechanism, through a validation of community water services (e.g. Investment 2 water security); and a validation of flood management benefits (Investment 3 adaptive integrated flood management).

Forest Carbon Partnership Fund (REDD+ Strategy)

426. Under this fund, the REDD+ Strategy is also being developed. The project finance component (PFC) is valued at US $40 million, and is expected to be replenished over the life of this Project (2017-2031) by MoAF and MoF; with an additional US $14 million from national receipts.

427. These fund resources may serve as longer-term SPCR co-financing, assuming that the SPCR has a substantive land conservation component (e.g. I2 wetlands conservation; and I3 adaptive integrated flood management through eco-system based river basin management & flood management).

Bhutan for Life (BFL)

428. The Bhutan for Life (BFL) initiative is a sustainable new financing option for innovative conservation financing, valued at $40 million over a 14 year period from 2017-2013.

429. BFL may be a potential platform for SPCR partnership relating to landscape conservation to address climate-resilience; and resources could be used beyond the SPCR financing term.

Bhutan Adaptation (Green) Bond

430. A Bhutanese Adaptation Bond is a pioneering market-driven financing mechanism that would creatively contribute to Bhutan's existing climate adaptation funding portfolio. This Adaptation Bond

[64] Climatefinancelandscape.org

[65] http://www.climatefinancelandscape.org/?gclid=CjwKCAjw5uTMBRAYEiwA5HxQNioiW8zLCC8J0_YkSfEDs3aFQ4hP0xwtu9mjguIj0vvcfdz1XWxY5BoCozsQAvD_BwE

would: help convert our grant-dependent adaptation sector into a more commercially sustainable endeavour; create a market-driven adaptation enterprise, with downstream benefits to adaptation projects; and, increase our adaptation portfolio to help minimize risks to Bhutan's Investments from climate impacts.

431. Examples of successful alternative bonds include: (i) The Climate Awareness Bond (EIB), combining innovative features focused on climate protection with unique Investment opportunities; and, (ii) The first World Bank Green Bonds valued at Swedish kronor (SEK) 2.325 billion, with a maturity of six years.

432. The idea would be to create a 5-year bond issue in Asian markets/international markets, at a AAA rating (Moody's/Standard & Poor/Fitch), with a minimum guarantee of 5% at maturity. This would help Bhutan (and other partnering developing countries) to leverage needed co-financing to satisfy gaps in adaptation fund co-financing.

433. The RGoB and Ministry of Finance is discussing the idea of launching an Adaptation Bond to generate foreign exchange (Annex 8) Bhutanese Adaptation/Green Bond Market: Preliminary Concept). This would eventually help to transform Bhutan's grant-dependent adaptation sector into a more commercially sustainable endeavour.

Incremental Adaptation Co-Efficient

434. An incremental adaptation co-efficient is a costing mechanism designed to supplement the anticipated cost of climate impacts on a given Investment. A policy of this nature would necessitate that all in-country development projects be required to include a percentage of their Investment dollars to cover the incremental cost of climate-proofing Investments.

435. There have been a number of credible field Projects, cost-benefit analysis, and Investment guidelines developed over the years (WB 2007; ADB 2008; OECD 2009/10) that rationalize incremental adaptation costs to Investments; and ensure the introduction of cost-saving risk resiliency measures against climate extremes and variability. It is important to note that the recommended co-efficient for incremental adaptation Investment needed to adequately "climate-proof" existing or new infrastructure Investments is generally considered to be between 6-21%.[66]

436. This adaptation co-efficient may be aligned with UNDP's Biodiversity Finance Initiative (BIOFIN) in Bhutan – to combine processes to develop an integrated financing strategy to ensure pro-poor sustainable financing of environment, biodiversity and climate change; and establish a Green Investment or Resource Mobilization Plan to provide a valuable entry point to link the new SDG prioritization and Bhutan's National Five Year Plans with financing instruments. As well, Bhutan's National BIOFIN Team would ensure that the adaptation co-efficient is fully vetted through the Climate Finance Policy and Institutional Review (CPIR) process.

437. The RGoB is considering a national policy to build-in an incremental adaptation co-efficient in national Investments that may be considered at higher risk from climate impacts, to cover the cost of "climate-proofing" measures. This would bring added revenue to all proposed development projects, while ensuring the climate-resilience of Bhutan's national assets.

[66]ADB's Portfolio at Risk to Climate Change: A Preliminary Assessment (December 2009; P. Hayes), states that: "... the potential risks (of climate change on projects need) to be considered in future lending,'' and "may warrant further systematic analysis on actions in the current portfolio to lower risk and increase project resilience to anticipated climate change impacts.'' "For ADB, climate-proofing existing and future loans may require unanticipated but necessary incremental financing of between 6-21%, and ADB procedures will need to be adjusted to ensure that climate change impacts are considered in future project designs.''

Decentralized Transfer Payments

438. It should finally be noted that the RGoB has firmly committed to a decentralized development model (12th FYP) to transfer over 50% of national funds as untied development resources directly to LG for their discretionary use. This will ensure a strong bottom-up development approach which will inevitably strengthen the ability of the local agency to sustain its development needs over longer periods.

439. The SPCR seeks to model this bottom-up decentralized approach, in alignment with the RGoB's 12th FYP.

Non-Traditional Donors

440. We are also planning to approach several funding entities, whose administrative requirements may be somewhat less burdensome, to ensure PPCR co-financing is secured in a timely fashion for the Phase II Investments. These include inter-alia: the Global Climate Change Alliance+ Intra ACP (GCCA), and other European Union and Asia Pacific funding entities.[67]

Green Climate Fund Readiness Capacity-Building

441. As an LDC, Bhutan may solicit climate change financing for adaptation in the short to medium term through "direct access" to the Green Climate Funds. As the SPCR's capacity-building component is robust, this will ensure that the management, fiscal, legal, and administrative structures for GCF direct access funding will be in place during the implementation period of the SPCR to ensure strong country-ownership in our adaptation planning.

442. We anticipate that GCF funding will be channeled through the Bhutan Trust Fund for Environmental Conservation (BTFEC). This Trust Fund has been designated by RGoB as a prospective Adaptation Fund (AF) National Implementing Entity (NIE), and is in the final stage of accreditation. It may also potentially serve as Bhutan's GCF NIE, and has commenced GCF accreditation. This direct access to GCF and AF through our NIE will be more responsive to our country needs, and will not result in the longer processing delays associated with other IFI financing mechanisms.

443. In this regard, the RGoB has requested $1million in GCF Readiness financing for Bhutan's NAP, of which $300,000 is approved and available for: (i) Capacity building for the NDA; (ii) Identifying & building the NIE; and, (iii) Country programming Project toward potential GCF Investments. This may be used as co-financing for SPCR.

444. Three proposals have been submitted to the GCF:

1. Bhutan for Life Initiative ($26.5Million of $40 million; with remaining $13.5Million from private donors): to conserve protected areas. This proposal was sent to the Independent Appraisal Committee, and is now with the GCF Board (13 September 2017). WWF would be the GCF IE. Implementation is expected to commence from Nov 2017-2031.
2. Sustainable Agriculture ($35 million): UNDP would serve as the GCF IE. The focus is on climate-proofing irrigation & roads. The proposal was submitted to the GCF Secretariat for review, and for onward submission to the Independent Appraisal Committee.
3. Bhutan Green Transport Program ($26 million): A Concept Note was endorsed by GCF, with a detailed proposal currently under preparation. World Bank is expected to serve as GCF IE.

Host-Government Co-Financing

445. As part of Bhutan's 12th FYP, 50% of the national allocation goes to LGs through transfer payments. The SPCR is being aligned with this decentralized funding modality, and will, therefore provide at least 50% of SPCR financing directly to LGs for SPCR Investment activities.

446. The RGoB's 12th FYP includes a grant allocation of Nu 5 billion to finance common minimum municipality infrastructure for 16 municipalities and 20 Yenlag Thromdes over the 5 year implementation

[67] http://newsroom.unfccc.int/financial-flows/list-of-recent-climate-funding-announcements/

period.[68] Activities include: internal roads, water supply, storm water drainage and sewer system, and foot paths. Therefore, the SPCR proposes that 15% (Nu 750 Million or US $12.5 million) of this annual capital grant be used as country client co-financing for SPCR Investment activities, including the I4 Climate-SMART Investment.

447. Also, 6 Gewogs and 30 Chiwogs are implementing performance-based climate-resilience grants for the completion of Vulnerability and Adaptation Risk assessments through the NAPA. An amount of NU. 5 million is provided to each Gewog as an annual capital grant x 205 Gewogs x 5 years, and will be further supplemented with 15% through climate adaptation incremental funding. This increment has been calculated based on a Portfolio-At-Risk Assessment conducted by the ADB and the World Bank, which estimates the Incremental Adaptation cost of Investments at between 6-21%. For example: 15% of Nu. 5 million x 205 Gewogs = Nu. 153 million or US $2.6 million per year times 5-years implementation.

448. Other climate financing programs include the GEF-financed NAPA Phase III, valued at $13.99 million and implemented through UNDP. These funds will be used to climate-proof irrigation networks & promote food and nutrition security through climate-smart intervention such as sustainable land management, farm mechanization etc. These funds will also serve as co-financing for the SPCR. Several other host government financing contributions to this SPC are highlighted in the Resource Mobilization Strategy (Table 15) below.

449. Based on the aforementioned traditional and innovative funding mechanisms for this SPCR, Table 15 shows an Indicative Resource Mobilization Strategy, outlining these co-financing options.

[68] Section 3.3.1, 12th FYP Guideline,

Table 15: Resource Mobilization Strategy

Possible Funding Source& Implementing Agency/NIE	Programmed or Estimated Co-Financing Amount (US$)	% Contribution	Implementation Period/Timeline	Financing Type	Sector/Region	Comments/Actions
1. 12th FYP RGoB Contribution Research in climate	$12.5 million	Nu. 750 million from RGoB, as per 12 FYP and specific planned activity costing; 15% incremental adaptation co-efficient on Nu. 50 billion for LG.				GNHC discussion with LG Focals to confirm acceptable % allocation commitment; inclusion in current 12th. FYP draft in time for submission & review of 1st. draft (July-October 2017).
2. Bhutan For Life	$7.142	30% client contribution from RGoB US $30 million ; $2.85 million /Yr x 5 yrs = $14.285/mitigation & adaptation =$7.142.	Phase II 2019-2031	Grants	To be implemented for the Bhutan's Protected Area System	SPCR I3 to focus on landscape conservation to address flash flood via eco-system-based climate-resilience. REDD+ (our SPCR I2 & I3 for land conservation)
3. 12th FYP annual grant allocation to Local Government Local Government (Gewog) RGoB performance-based CR Grants for V&A as part of NAPA Local Government	$13 million (estimated)	15% incremental adaptation value on Nu. 5 million x 205 Gewogs = Nu 153,000,000 or US 2,600,000 per year over 5-year implementation period.	12th FYP: 2018-2023	RGoB performance-based CR Capital Grant.	Completion of Vulnerability & Adaptation Risk Assessments	NU. 5,000,000 is provided to each Gewog as annual capital grant. This adaptation 15% increment is based on a Portfolio-At-Risk Assessment conducted by the ADB & World Bank, which estimates the Incremental Adaptation cost of Investments at between 6-21%.
4. MOHCA Local Climate Adaptive Living Facility (part of NAPA III funded by UNDP).	$0.5 million	100%		Tied Grant for LG	NAPA	MOHCA currently implementing its *Local Climate Adaptive Living Facility*, implemented by LG. Part of NAPA (funded by UNDP), channeled through Line Ministry. SPCR may compliment this NAPA LG Facility Program.

Possible Funding Source& Implementing Agency/NIE	Programmed or Estimated Co-Financing Amount (US$)	% Contribution	Implementation Period/Timeline	Financing Type	Sector/Region	Comments/Actions
5. GEF NAPA Phase III, UNDP & NEC (UNDP)	$13.99 million	100%	Over 6 years			GNHC managed: to enhance climate-resilience and food security
6. NAP (climate-resilience of farmers focusing on water)	$3 million	100%				It is expected that NAP III may look at climate-resilience of farmers, focusing on water
7. GEF-5 (NEC)	$4.14(Program)	100%		Co-Financing Grant		GEF 5 focuses on Bhutan highlands; possible contribution to SPCR I2 (Water Scarcity).
8. GCF Readiness Fund GNHC	$5 million (Program)	100%	$1Million /yr over 5 yrs.			GNHC is the Designated Authority for Adaptation Funds and national designated authority for GCF.
9. JICA support to the development of comprehensive national plan 2030. DHS, MoAF, the GNHC Chair, NEC, CBS, the National Land Commission, and the MoEA.	$3.5 million (estimated)	In-kind	2017 – 2020	Leveraging dollars (not co-financing)	Agricultural rural development; infrastructure development (bridges, road connectivity and rural electrification); public service improvement.	Supports Bhutan's comprehensive development planning:
10. World Bank/IBRD Hydromet Services and Disaster Resilience Regional Project	$3.8 million				Hydroment Upgrading; World/IBRD Bank-supported	

Possible Funding Source& Implementing Agency/NIE	Programmed or Estimated Co-Financing Amount (US$)	% Contribution	Implementation Period/Timeline	Financing Type	Sector/Region	Comments/Actions
11. Generating Youth Employment and Community-Based Enterprise Development Project: $1.25 million	$1.25 million $8 million	Parallel grant Parallel grant	2017-2022	Grant Grant	World/IBRD Bank-supported World/IBRD Bank-supported	
12. Food Security and Agriculture Productivity Project: $8 million (GASFP) 13. Remote Rural Communities Development Project: $9 million	$9 million	Parallel grant		Grant	World/IBRD Bank-supported	
14. ADB's National Irrigation Masterplan RGoB & ADB	$3.969	15% incremental adaptation co-efficient on $26.46 million (TA).	Commences 2019	Appraisal TA	Identification of 100 target irrigation streams.	See ADB's 2018 COBP & PCR
15. Bhutan Trust Fund For Environmental Conservation (BTFEC) Bhutan Trust Fund & Partners	$7.5 million for 12FYP	100% $45 million over 14 years; 100% of Nu. 475 million /.60 = $7.916 million 1. Nu. 270 million for climate change programming		3rd Strategic Plan (soon to be implemented)		12 projects related to climate change with various sectors.

Possible Funding Source& Implementing Agency/NIE	Programmed or Estimated Co-Financing Amount (US$)	% Contribution	Implementation Period/Timeline	Financing Type	Sector/Region	Comments/Actions
			2. Nu. 135 million for populations affected by climate vulnerabilities 3. Nu. 70 million for partnership development			
16. Adaptation Fund		$3 million	100%		Over 5 years.	
Total SPCR Co-Financing		**$99.291 million**				

Figure 18. Thimphu Flash Flood, 26 May 2016

5.3 Submission Statement

450. As an LDC, continually subject to the unpredictable ravages of climate change to small but ecologically and culturally diverse nation, RGoB confidently put forth this SPCR Proposal for full PPCR financing.

LIST OF ANNEXES ON BHUTAN SPCR

ANNEX 1: PROJECT CONCEPTS FOR PHASE II INVESTMENTS

Investment 1
NCHM - Strategic Program for Climate Resilience
Pilot Programme for Climate Resilience (PPCR)

Investment 1	Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information Services
Principal Implementing Agency	National Center for Hydrology and Meteorology (NCHM)
Objective of Proposed Investment Plan	Strengthening and enhancing national capacity of the National Center for Hydrology and Meteorology, Stakeholders, Users and Public to use and apply climate science and downscaled climate impact projections toward formulation of sector-based climate science for investment resilience.
Proposed Outputs	1. Hydro-meteorology and cryosphere research capacity enhanced 2. Downscaled climate model (Dynamical) 5-10 km resolution functional 3. Climate projections & Impact scenarios and specific V&As developed for priority sectors and SPCR target regions in consultation with and involvement of relevant stakeholders 4. Hydrological data bolstered through localized hydromet stations 5. Pool of experts (NCHM, Line Ministries/Civil society) established in climate science, hydrology and cryosphere The above outputs will be achieved through investments in establishment of a climate research lab with adequate facilities, capacity enhancement for modelling and data analysis, strengthening ICT infrastructure, installation of hydro-met stations in data sparse areas, development of SOPs with end users and strengthening of service delivery.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Funding Required (Notional)	US $6.5 Million

1.0 Background

National Centre for Hydrology and Meteorology (NCHM) has very limited capacity to conduct basic climate projections and climate change impact assessments. While risks posed by climate change to critical environment, infrastructures and vulnerable populations is well perceived by the Government and the Civil Society, the limited scientific knowledge and technical capacity in the country hinders the Government's and other user agencies' ability to adequately understand and strategically respond to the expected risks of climate change in Bhutan.

Currently the impact projections from global and regional climate models have limited use value for NCHM because of their coarse grid resolutions. Therefore, major river basins feeding the hydropower plants such as Punatsangchhu, Mangdechhu, which are vulnerable to climate induced glacial melt and extreme events are not adequately captured for impact assessment.

Precipitation, snow pack and glaciers are major source of water supply for all water-dependent sectors in Bhutan. For example, hydropower and agriculture sectors comprise the major consumptive use of water. Snow pack and glacial melt are of critical importance to perennial river flows and downstream community livelihoods; and are also essential for the economic livelihood of neighboring countries.

In this context, Bhutan still lacks capacity in monitoring snow and glacial melt, besides limited capacity in climate change assessment. The inability to produce national climate impact scenarios and risk assessments severely compromises NCHM's capacity to provide climate projection information to various sectors in vulnerability assessment and adaptation planning; and prepare for climate hazards.

1.1 The Phase I Preparatory Project Component I "*Enhancing Information Base Hydro-met Services and Climate Resilience*" will produce an assessment and analysis of the historical climate, hydrology and cryosphere data. In addition, Phase I activity will identify opportunities for institutional strengthening and capacity building for climate change projection and impact assessment. It will help in understanding the historical climate of Bhutan, record of extreme events and their return periods and relationship between extreme climate events on hydrology and formulate appropriate framework for generating medium-resolution downscaled impact scenarios. Phase I will basically provide crucial hydro-meteorological information to inform PPCR investments at the national, regional and community level.

1.2 Phase II Investment on "*Building Climate Resilience Through Enhancement of Hydro-Meteorological, and Cryosphere Information"* will build upon Phase I results and recommendations on how to address the NCHM's overall capacity needs to produce dynamical downscaled climate change impact projections, interpret, disseminate to user agencies and CSOs in climate hazard risk management and investment in resilience.

2.0. Project Goal and Specific Objectives

2.1 Project Goal

The fundamental goal of the Phase II is to build NCHM's capacity in climate change modeling, and to conduct hydro-meteorological and cryosphere research; interpret and disseminate the outputs of the climate change models to the policy makers and sectors in planning and implementation towards building climate resilience. It will also identify the climate induced risk on glaciers and glacial lakes using a high-resolution projection data.

Moreover, retrospective analysis of climate and hydrological data and statistically downscaled coarse resolution climate projection across Bhutan during Phase I and dynamical downscaled modelling in Phase II will help to assess impact risks in all PPCR agencies/activities. Availability of high resolution climate change data will assist in assessing climate change induced risks and impacts at micro scale such as the river basin level, enabling downscaled modelling for flow/flood forecasting and water resource planning and management.

2.2 Specific Objectives:

- Establish dynamically downscaled modelling capacity within NCHM to ensure the development of high resolution climate projections and a dedicated computer lab to run the models. It will also serve as a training facility for different user agencies and CSOs to generate impact scenarios and mainstream vulnerability and adaption measures in their development plans and projects.
- Based on the findings of the Phase I assessment on enhancing information base for hydro-met services and climate resilience, this project will strengthen hydro-meteorological and glaciology research in Bhutan to enhance the understanding of glacial melts and downstream impacts of GLOF and water budget studies. This will be done in collaboration with relevant institutions in the country, such as the collage of Science and Technology as well as climate and glaciology centers in the region, including ICIMOD and RIMES.
- Develop capacity to generate, analyze and interpret output from climate models. This will include training of local experts (NCHM, experts from academia, line ministries, CSOs, vulnerable communities) on climate impact modelling and climate induced risk management including study tours, field vulnerability assessment, and exchange of scientists from international centers of excellence.

3.0 Key Indicators and Baseline

3.1 Indicators

1. Downscaled modeling facility established enabling reliable climate information services.
2. Downscaled climate projections and impact scenarios developed to support climate induced hazard management activities.
3. Enhance the capacity of NCHM hydrology and cryosphere research in the use of climate projection data.
4. Successful mainstreaming of climate change information for climate resilience in government strategies, sector-based investments and development plans.

3.2 Baseline

The National Center for Hydrology and Meteorology, Royal Government of Bhutan has hydro-meteorological data archival from 1996 till date. A baseline information is indicated below:

1. Operation and maintenance of 20 Class A and 59 Class C meteorological stations, and 82 Automatic weather stations.
2. Operation and maintenance of 16 principals and 9 secondary hydrological stations, and 59 Automatic water level stations.
3. Operation and maintenance of 14 manual snow stations, and 20 (including NAPA II) automatic snow stations (snow incidence and depth, SWE).
4. Maintaining an inventory of climate data (processing, storing, retrieving and publication), and dissemination of data to end users.
5. Providing 72-hour weather forecast and early warnings.
6. Providing seasonal climate information.
7. Maintaining an inventory of hydrological data (processing, storing, retrieving and publication), and dissemination of data to end users.
8. Providing Early Warning on Glacier Lake Outburst Floods (GLOF) and Rainstorm Floods, based on the principle of a water level detection system in three (03) main river basins in Bhutan. These include:
    a) Punatsangchhu River Basin in 2011, under UNDP GEF (NAPA-I Project)
    b) Mandgechhu Basin in 2015, under JICA supported Project
    c) Chamkharchhu Basin in 2015, under JICA supported Project
9. Maintaining an inventory of glaciers and glacial lakes.
10. Undertaking glacial mass balance studies.

However, NCHM has very limited capacity to formulate downscaled climate and impact projections. Currently, no government institutions/sectors/CSOs can rely upon high resolution impact models to inform risks management practices.

The project will be concentrated in modelling and generation of high resolution climate projection data for whole Bhutan. In the process of project preparation, it is planned to select southern belt of the country to generate impacts scenarios for carrying vulnerability and adaption by different sectors (disaster reduction, agriculture, water resources management, hydro power).

4.0. Anticipated Components and Activities

a. **Capacity in Downscaled Climate Modelling and Interpretation**

- Establish the facility within NCHM to ensure high resolution and reliable impact projections, including installation of high speed computing systems.

- NCHM technical experts will be trained to run the installed local computing center system; interpretation and analysis of model outputs. Modelling software will be installed within the NCHM, and staff will be trained to run the installed system.

- Phase I is expected to inform the need and formulate the development of dynamical downscaling of GCM climate change projections for Bhutan. The modeling will utilize 6 different GCMs with 4 different scenarios (RCP2, RCP2.6, RCP4.5 and RCP8.5) to cover the whole spectrum of emission scenarios and provide a comprehensive picture on the future behavior of climate (2020 – 2100 period) over Bhutan, targeted river basins and other key regions/sectors.

- Phase II will Downscale GCM/RCM projections to 10-5km grid resolution to provide realistic results of climate variables (precipitation, temperature, radiation and wind), which will be used in the modelling of glacial melt and hydrological processes and water resources assessment at finer resolution. For other user sectors to carry out specific vulnerability and adaptation measures, a more integrated impact model will be developed by layering other data (land use and cover, soil, evapotranspiration and population).

b. Enhancing Cryosphere and Hydrological Information for Climate Resilience and Adaptation.

- Through the outcomes of Phase I on re-mapped glaciers (updated inventory on glaciers), Phase II will focus on studying glacier areal/volumetric changes (using downscaled climate data) and melt contributions to the river discharge system by installing Automatic River Discharge System at the outlets of selected benchmark glaciers.

- Acquiring and analyzing high-resolution satellite imageries (2-5m resolution) and DEM/DSM (2-5m resolution)

- Initiate surface water resource assessment by time series analysis of water resources data including flow duration curves, statistical distribution, trend analysis and extreme value analysis (flood and droughts)

- Water accounting using catchment water balance in GIS environment and integrated hydrological and water balance model

c. Institutional Strengthening, Mainstreaming Impact Projections and Raising Awareness for Grassroot (Gewogs and Chiwogs) End-Users

- The capacity building component of this project will have a number of technical experts (NCHM, Line Ministries, community leaders and key CSOs) trained in climate science, cryosphere, climate modelling and impact projections and integration of climate risk management practices in investment activities.

- Capacity-building will also include technical assistance to mainstream and embed climate and disaster risk screening/management into national and subnational planning and budgeting processes.

- Promoting woman participation through specialized and targeted training modules involving gender focal officials from NCHM.

- Strengthening the capability of NCHM through technology transfer and capacity development in hydro-met instrumentation, observation and data collection to support all the sectors that requires developmental planning and implementation of activities.

- Knowledge and products generated and managed including summary of climate projections and impacts scenarios, information on glacier meltwater contribution, GLOF for policy makers, disseminate events on climate vulnerability of fragile mountainous ecosystems in collaboration with different stakeholders.

- Awareness raising activities in climate change and impacts, adaptations at community level.

- Multi-stakeholder training courses, domestic and international study tours, field vulnerability assessment, and visits of scientists from international centers of excellence will be carried out

5.0. Risks and Solutions

Risks	Solutions
Lack of adequate historical hydro-meteorological data	Acquisition and compilation of relevant Hydro-met data (combination of historical, satellite telemetry, GCMs/RCMs, met data)
Limitation of trained NCHM experts to generate downscaled impact scenarios and undertake advanced cryosphere and hydrological studies	Capacity building of NCHM staffs through short/long term trainings/workshops/seminars/ study tours/field visits/ex-change programs

Risks	Solutions
Lack of support and ability of line ministries, policy makers, LGs to implement and mainstream climate projections, cryosphere and hydrological science into their policies and operations	Awareness raising through NCHM's education and outreach program and conduct user oriented trainings/seminars/workshops on climate, cryosphere and hydrology
Program Sustainability	Put in place hydro-met services policy of Bhutan and Leverage co-financing, and other risks management knowledge products

6.0 Investment Costing (Estimated Allocation – PPCR)

Component	PPCR Support (USD million)	IDA (USD Million)	RGoB Contribution (USD Million)	Other International Cooperation Sources	Project total (USD Million)
Capacity in Downscaled Climate Modelling and interpretation	1.00	N/A	TBD		1.00
Enhancing Cryosphere and Hydrological Information for Climate Resilience and Adaptation.	1.50	N/A	TBD		1.50
Hydromet & EWS Station Installation/Enhancement	3.00	N/A	TBD		3.00
Institutional Strengthening, Mainstreaming Impact Projections and Raising Awareness for Grassroot (Gewogs and Chiwogs) End-Users	1.50	N/A	TBD		1.50
Total	**6.5**				**6.5**

7.0 Value-Added/Value For Money Rationale for Investment Component (Phase II)

The estimated budget of $6.5Million has been calculated based on internal budget calculations, and field consultations; and from references to Tajikistan's SPCR, which reflects climate risks and climate-resilient approaches very similar to Bhutan's. This Investment Component is intended to cover the cost of three main outputs/activities planned for Phase II:

(i) Establishment of Climate Modelling Laboratory and purchase of hardware, software, and physical structure in the computer laboratory building. In addition, it includes the cost of International Consultants; and capacity development of NCHM staff, Line Ministries and LG, and civil society organizations and private sector in climate modelling, prediction and projection.

(ii) Enhancing cryosphere and hydrological data and forecasting services based on the outcome of Phase I, and on impact studies reliant on Phase I outputs. The investment requested under this activity will cover the cost of carrying out the studies, procurement of snow and hydrological stations and other investment activities including TA needs.

(iii) Strengthening the institutional capacity of NCHM officials and other relevant SPCR stakeholders in climate, cryosphere and hydrology through long term studies. It will also cover the cost of extensive capacity-building of stakeholders and user agencies (especially the SPCR Implementing Agencies and Department of Disaster Management) in climate downscaling and development of impact scenarios; and enhanced skills in use of cryosphere and hydrological information in their risk planning and development works.

8.0 Results and Performance Framework

Outcome	Baseline	Key Project Results
1. Hydro-meteorology and cryosphere research enhanced.	Production of research reports and findings from Phase I.	Improved capacity of NCHM and Line Ministries to carry out climate science, hydrology and cryosphere research.
2. Downscaled climate model (Dynamical) 5-10 km resolution functional.	Recommendations from the Phase I activity on formulation of downscaled climate modeling.	Climate modeling facilities established with qualified and trained staffs at NCHM.
3. Hydromet & EWS Station Installation/improvement for downstream climate impact preparedness.	Stocktaking of existing network, and viability assessment of Hydromet & EWS enhancement.	Additional stations established, with remote date sensing facility; significant improvement in river-basin data collection. Blending of projection data with historical and field data.
4. Sector-oriented climate and impacts scenarios developed and projected.	Need assessment through stakeholder consultation in Phase I.	Line Government/agencies/sectors better able to mainstream climate change in planning and projects. Climate knowledge products disseminated. and services delivered on time. NCHM experience, good lessons and practice shared with other HKH developing countries.
5. Capacity of NCHM staffs enhanced and stakeholder's knowledge on hydro-meteorology and cryosphere enhanced.	NCHM need assessment and stakeholder consultation from Phase I.	Number of trained participants including women increased. A critical Pool of NCHM experts developed in climate science, hydrology and cryosphere applications

9.0 Dissemination of Knowledge Products/Lessons Learned

To mainstream and embed climate and disaster risk screening/management into national and subnational planning and budgeting processes, tailored training in: climate science; cryosphere changes; climate impact modelling and impact projections; and integration of climate risk management practices in investment activities; will be provided to: NCHM, experts from academia, line ministries, CSOs, and vulnerable communities. This will be accomplished through study tours, field vulnerability assessments, and exchange of scientists from international centers of excellence.

Moreover, lessons learned from NCHM's enhanced capability in: hydro-met instrumentation; downscaled climate model (Dynamical) functional observation; etc, shall be transferred to LG focals for their field application. Additionally, knowledge products generated (including summary climate projections and impacts scenarios; information on glacier meltwater contribution & GLOF risks, and their potential impact on fragile mountainous ecosystems and river basins) will be disseminated to the aforementioned stakeholders. NCHM experience, good lessons and practice will also be shared with other HKH developing countries.

Investment 2
WMD - Strategic Program for Climate Resilience
Pilot Programme for Climate Resilience (PPCR)

Investment 2	*Strengthening Climate-Resilience in the management of targeted watersheds and water sources*
Principal Implementing Agency	Department of Forests and Park Services.
Objective of Proposed Investment Plan	To sustainably manage watersheds and manage water resources, in the context of climate-induced water shortages.
Proposed Outputs	Develop and implement *Adaptive Integrated Watershed Management Plans* in critical watersheds with beneficiary groups including women, and target drying water sources rehabilitated. Nationwide wetlands inventory mapped in consultation with key stakeholders, and *Climate-Resilient Wetland Management Guidelines* developed. Valuation of wetlands carried out, and institute PES schemes climate-oriented Payment for Ecosystem Services (PES) schemes instituted toward adaptive water conservation. Enhanced climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed management. The above outputs will be achieved through investments in strengthening the monitoring systems for wetland and water resource, capacity development for implementation of watershed management plans, capacity enhancement for hydrological data analysis and modelling, strengthening information base such as GIS and satellite monitoring, identifying open source data relevant for Bhutan and ground truthing of regionally and globally available date.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Funding Required (Notional)	US $10 Million

1.0 Background

Today, developing countries like Bhutan face enormous challenges trying to meet the growing demand of water, food and energy, which is further compounded by climate change. Reports of water sources drying have been coming from across the Himalaya (Nepal, Sikkim and Bhutan) for several years. Most reports have been anecdotal, and typical of the claims are that "…almost 70 per cent of the water sources in the Himalayan region are…now half of what they were some years back, while as many as five per cent of the waterfalls that were once a common sight have dried up." Bhatt (2015). There tends to be very little empirical evidence to support the claims.

Climate change, particularly a change in the frequency and intensity of monsoon rain events, is frequently hypothesized as being at the heart of the phenomenon, although this is not universal. Tambe et al (2012) claim "Due to the impacts of climate change on precipitation patterns such as rise in rainfall intensity, reduction in its temporal spread, and a marked decline in winter rain, coupled with other anthropogenic causes, the problem of dying springs is being increasingly felt across this region."

In Bhutan, there are persistent reports from many parts of the country, especially in the southern rural areas, that water sources, particularly springs, are drying, and causing problems for local people to obtain water for domestic consumption, and for irrigation. In Bhutan, water for domestic use and for irrigation is tapped from springs. NEC (2016) also reports, in the State of the Environment Report that drying of water sources is one of the challenges Bhutan grapples with in the water sector. Many of the critical watershed management plans developed by the Watershed Management Division (WMD) also report the drying of water sources. The wetlands program in WMD has also been assessing reported drying springs and lakes that are used as water sources.

Under the provisions of the Water Act of Bhutan 2011, The Water Regulation of Bhutan 2014 and The Forest and Nature Rules and Regulations of Bhutan 2017, the Ministry of Agriculture and Forests (MoAF) has the mandate under these three legal instruments to develop and implement watershed and wetland management plans.

To operationalize watershed management interventions, both the 10th Five Year Plan (FYP) (2008-2013) and the national vision document (Bhutan 2020) indicated that master plans should be developed for all river basins in the country. In 2009, the Government established the Watershed Management Division (WMD) under the Department of Forests and Park Services (DoFPs). The WMD was designated as the national focal agency to operationalize a watershed management program and to enable the Government to meet its watershed management policy commitments.

The 11th FYP (2013-2018) contains a vision that emphasizes self-reliance and inclusive green socio-economic development. The Department of Forests and Park Services (DoFPS) implemented three programs in the 11th FYP, one of which is: Integrated watershed management to ensure sustainable environmental service delivery. This emphasizes the importance that the Government places on watershed management.

1.1 The Phase I Preparatory Project: "Scoping Study on Water Sources Drying Up In The Country" will identify the causes of the phenomenon – water sources drying up – and provide evidences to make informed decisions in applying climate - adaptive interventions in southern and central Bhutan. The end goal of the project is to maintain healthy ecosystem and ensure water and food security in Bhutan. The extent of the study will be nationwide, with particular focus on Southern and Central watersheds – mid altitudinal zones. Water-dependent ecosystems and human settlements shall be assessed to identify the causes of the problem and to design appropriate solutions. Along with the evidences provided, a framework for the inventory of wetlands (water ecosystem) shall also be developed to contribute in the Phase II Investment.

1.2 Phase II Investment: *Strengthening Climate-Resilience in the management of targeted watersheds and water sources* will build upon Phase I's results and recommendations on how to address the ongoing phenomenon of water sources drying up in southern and central Bhutan. Climate-Oriented Watershed Management Plans shall be developed and implemented, with rehabilitation of targeted water sources as a primary focus. The Framework for a climate-oriented wetlands inventory, developed in Phase I, will guide the nationwide wetlands inventory & mapping in Phase II. This will provide the long-term mechanism to execute the existing policies to protect water ecosystems from the unintended consequences of developmental activities.

The valuation of wetlands will in turn help explore climate-related Payment for Ecosystem Services schemes for implementation and sustainability. The climate-adaptive knowledge & capacity of DoFPS and other stakeholders, on wetlands and watershed management shall also be enhanced.

2.0 Project Goal and Specific Objectives

2.1 Project Goal

The fundamental goal of Phase II is to design appropriate adaptation measures to better rehabilitate water sources that are drying up, through strategic climate-resilient watershed management planning; and through the protection of water related ecosystems in the country, by applying sustainable financial mechanisms to sustain these water sources.

2.2 Specific Objectives:

To develop and implement climate adaptive watershed management plans with target drying water sources rehabilitated

The approach will require the development and implementation of Climate-Oriented Watershed Management Plans with a detailed inventory and mapping of water ecosystems (wetlands including marshes, lakes, streams, rivers, ponds and peat bogs). The Management Plan will focus on the rehabilitation of water sources drying up (especially those that have been identified as degraded in the South), as it being the main issue identified in the watershed. The outcome of this Management Plan should be to bring back the critical/degraded watershed to normal or close to conditions.

To carry out nationwide wetlands inventory, and develop Climate Adaptive Wetland Management Guidelines
The inventory and mapping of water sources (wetlands) shall not be limited to the focus areas, but will be a nationwide task to replicate informed decision-making in other Dzongkhags. This Map will provide the required guidance in implementing the existing policies in wetlands conservation in the country. The FNCRR 2017 provides the legal framework to protect wetlands but the map showing the different wetland in the country does not exist today. Thus, posing an implementation challenge in the good wetland conservation policies. The climate adaptive guidelines will help field implementers/managers spread across the country to manage wetlands (especially climate-degraded ones) with climate-resilience in mind.

Carry out valuation of wetlands and explore climate-related Payment for Ecosystem Services schemes for implementation. The valuation of wetlands to explore the feasibility and establishment of PES schemes for long-term sustainability of the watershed shall be integrated in watershed management plan. The PES scheme shall be used as a financial tool to sustain the maintenance of wetlands within the watershed; and the valuation process shall help in building a viable PES scheme, especially for Chiwog level watershed wetlands that have been compromised by climate-induced impacts in the South.

Enhance climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) onclimate-resilient wetlands and watershed management
The knowledge on wetlands and watershed management is very weak among all sectors in the country. Oftentimes, wetlands and watersheds are managed with proposed activities that have a primary focus on livelihood co-benefits in mind. These activities oftentimes do not have an implicit link in sustaining the wetlands within the watershed and oftentimes result to unintended consequences of destroying the very water ecosystem we set foot to protect. Our managers are at the forefront of maintaining the healthy conditions of our wetlands and watershed. Thus, their climate-adaptive knowledge and capacity has to be enhanced through appropriate training, in both assessments and monitoring of specifically water-related ecosystems.

3.0 Key Indicators and Baseline

3.1 Indicators:

1. Climate-Resilient Watershed Management Plans developed and implemented, with a focus in rehabilitating target drying water sources.
2. Nationwide wetlands inventory carried out, and Climate Adaptive Wetland Management Guidelines developed.
3. Valuation of wetlands carried out and climate-related Payment for Ecosystem Services schemes explored for implementation.
4. Climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed management enhanced.

3.2 Baseline and Project Area:

Bhutan is a mountainous country located in the Eastern Himalayas, with rugged topography and a wide variety of ecological conditions. Most of the rivers originate in the Himalayas and flow south to the Brahmaputra River in India. Geographically, Bhutan is divided into five major and two minor river basins (Figure 1 and Table 1).

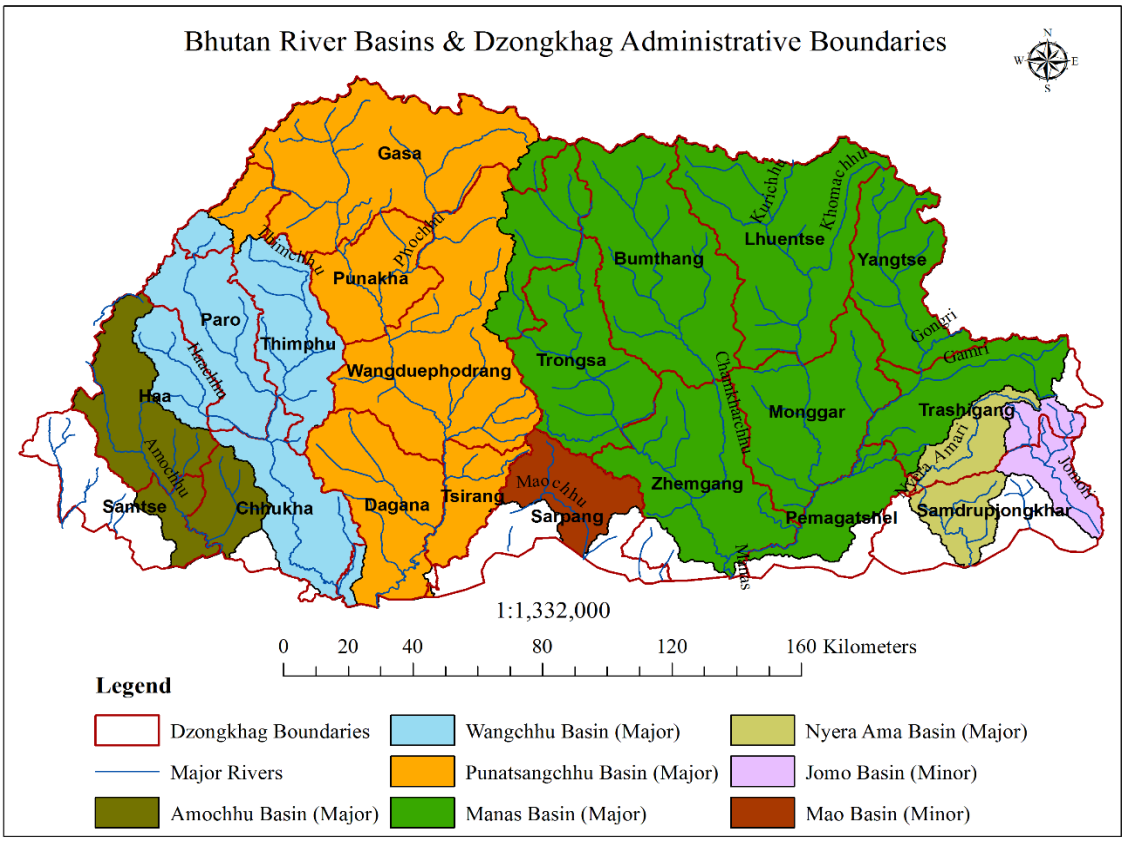


Figure 1. Major and minor river basins in Bhutan

Table 1. River basins and their tributaries in Bhutan

Sl. No	River Basins	Area (ha)	Basin category	Tributaries
1	Wangchhu	4,60,176	Major	Haachhu Pachhu Thimchhu
2	Punatsangchhu	9,73,270	Major	Mochhu Phochhu Dangchhu Dagachhu
3	Manas	15,95,521	Major	Mangdechhu Chamkharchhu Kurichhu Drangmechhu Kholongchhu
4	Amochhu	2,21,156	Major	-
5	Nyera-Amachhu	1,13,970	Major	-
6	Maochhu	85,783	Minor	Kharchhu Gongchhu Gulechhu Ruthalgongchhu
7	Jomochhu	75,247	Minor	

Natural erosion is extremely high in most of the Himalayan region due to the steep rugged mountains, the regular monsoon rains and the active mountain building processes that are on going. Mass wastage occurs across the country and the major rivers carry a very high bed load. Damaging floods during the monsoon season cause considerable downstream damage to land and infrastructure and there is an increasing risk of damage from glacial lake outburst floods in the future. However, distinguishing between natural and anthropogenic causes of erosion is difficult if not impossible.

Bhutan's relatively low population, combined with past policies with a strong conservation emphasis, have resulted in its watersheds being in overall good condition, and the country's forest cover remains at about 72% of the land area. The final report of the Wang Watershed Management project (Anon. 2007) noted that land degradation (as an anthropogenic process) is not a major issue in Bhutan, but it went on to note that the potential for problems is high. There are some notable exceptions to this generally positive situation, particularly in the east.

The production of hydro power for export, mainly to neighboring India, contributes about 24% to Bhutan's GDP and this is expected to rise further with the planned construction of more hydro plants, making electricity generation the single biggest contributor to the economy. Consequently, a reliable supply of quality water is the most valuable commercial product derived from Bhutan's forest and agricultural lands (both tree covered and non tree covered). It is evident that the maintenance and improvement of the country's watersheds is a high management priority, not only for hydropower, but also for domestic use and irrigation. As well as the role that upstream watersheds play in water production, they also play an important role in sustaining the livelihood of upland farmers and grazers in contributing to the resilience of the overall ecosystem.

Watershed Management in the Context of Climate Change

All development planning in the contemporary world takes place in the context of climate change, and an on-going challenge for policy makers and planners is to do this in a meaningful manner. While adaptation to climate change and mitigation of adverse impacts are often mentioned in planning documents, they are generally framed in a somewhat generic manner. A conceptual framework is lacking, as are specific interventions and activities, which makes it difficult for planners to incorporate relevant activities into their plans.

An FAO (2015) study noted "…the occurrence and magnitude of extreme climatic events are traditionally higher in mountains than in lowlands, a situation that is increasing due to climate change." One of the consequences of climate change is increased food insecurity in rural areas, which is leading to abandonment of agricultural land. This has adverse consequences both on the urban areas where rural people end up, and also on the areas they leave, in terms of provision of ecosystem services and preservation of cultural and agro-biological diversity. Khan and Omprakash (2016) argue that rural populations need assistance to achieve greater resilience under short and medium-term climate variations. It is clear that climate change is an added factor in increasing the vulnerability of mountain people and needs to be taken into account in relevant Natural Resource Management (NRM) planning frameworks.

While the global commitment to incorporate Climate-SMART approaches and strategies into land use planning is strong, much needs to be done to translate the commitments into tangible results and scale them up. Khan and Omprakash (2016) noted that climate change researchers and policymakers are increasingly focusing on adapting to a changing climate, but they have not yet spelled out how to do so with ground-level actions. Matthews (2013) also noted that "...operationalization of climate adaptation is a crucial element of a comprehensive response to the impacts of climate change..." (p. 198). He drew attention to the lack of a conceptual framework for codifying practical approaches for climate change adaptation in planning frameworks and institutionalizing them through planning policies and objectives.

An FAO analysis of lessons learned from 15 years of watershed management projects highlighted the importance of embedding watershed management activities into LG planning frameworks and establishing strong linkages with regular interventions planned by line ministries (FAO 2017). This analysis also emphasized the importance of building and strengthening the capacities of local and sub-national institutions that are effectively linked to national decision-making bodies in order to achieve sustainable land management. These institutions include decentralized

government entities and community organizations such as water users' associations, farmers' associations and community forestry management groups.

Emerging insights from adaptive and community-based resource management suggest that building resilience into both human and ecological systems is an effective way to cope with environmental change characterized by future surprises or unknowable risks, such as those associated with climate change (Tompkins and Adger 2004). They emphasize the importance of social learning, specifically in relation to the acceptance of strategies that build social and ecological resilience. Tomkins and Adger further argue that societies and communities dependent on natural resources need to enhance their capacity to adapt to the impacts of future climate change, particularly when such impacts could lie outside their experienced coping range.

Khan and Omprakash (2016) argued that mismanagement of natural resources contributes to the vulnerability of human systems to hazards caused by the changing climate, and conversely, improved management of natural resources can enhance their resilience. Adaptive capacity can be enhanced in two ways: by building networks that are important for coping with extreme events and by retaining the resilience of the underpinning resources and ecological systems.

Key points that come from analysis of the literature include:

- Mountain people are more vulnerable to climate change than non-mountain people.
- Mismanagement of natural resources contributes to the vulnerability of human systems to hazards caused by the changing climate, and conversely, improved management of natural resources can enhance their resilience.
- Climate change researchers and policymakers are increasingly focusing on adapting to a changing climate, but they have not spelled out how to do so with ground-level actions.
- There is a lack of a conceptual framework that codifies measures needed to plan for and implement climate change adaptation in relation to NRM.
- Focused attention is needed on institutionalizing climate change adaptation measures into planning frameworks.
- The capacity of local and sub-national institutions (such as water users' groups, farmers' associations and community forestry management groups) should be strengthened to achieve sustainable land management and to help them withstand shocks.
- Watershed management activities should be embedded into LG planning frameworks to ensure long-term sustainability.

Current Status of Watershed Management in Bhutan

Watershed management refers to the management of river basins (watersheds) in a holistic manner, taking into account all aspects that are likely to influence the quality and quantity of water flowing from the watershed. This infers that approaches to management need to be multidisciplinary and integrated.

Watersheds across the country have been delineated using a minimum threshold area of 5000 ha. This resulted in 186 individual watersheds being identified with each being assigned a unique identity number (Figure 1).

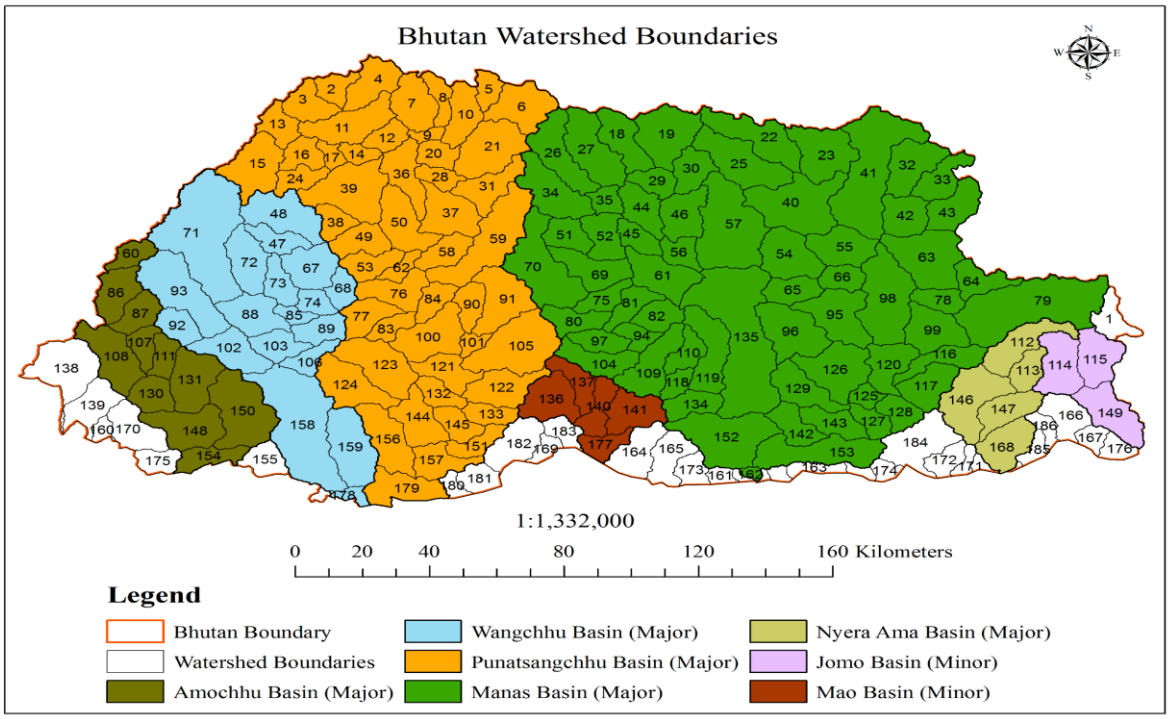


Figure 2. Watersheds in Bhutan identified for assessment of condition

Assessment of watershed condition is carried out for groups of sub-watersheds within each of the numbered watersheds. Those classified as degraded or critical are targeted for the development of individual (or grouped) management plans. Figure 2 shows those watersheds that have been assessed (as at October 2016) and their status in terms of watershed condition.

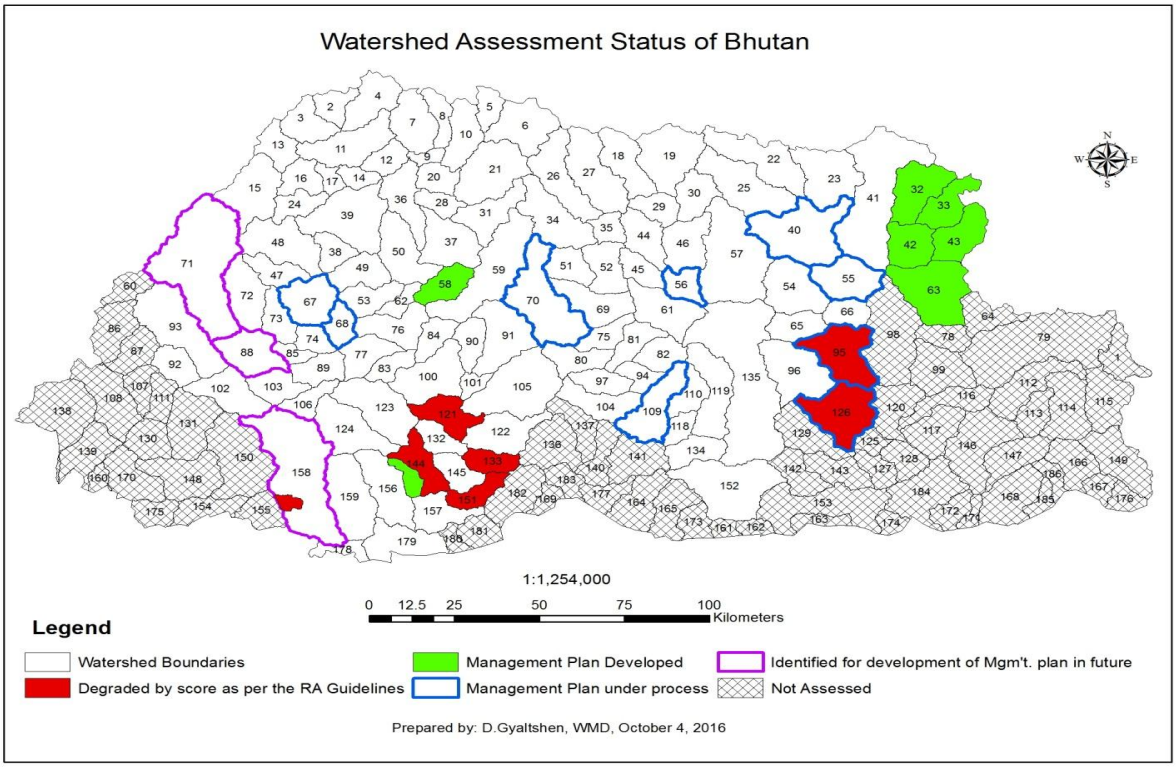


Figure 3. Status of watershed assessment and classification (as at October 2016)

Figure 3. shows the watersheds that have been assessed as degraded/critical and those that have been identified as requiring management plans for other reasons, along with progress in completing management plans.

Assessment of progress:

- Watershed management is given a high profile in the overall regulatory framework for the RNR sectors.
- Good progress has been made in implementing watershed management activities since 2009 and the program is heading in a sound direction.
- The majority of the country's watersheds have been assessed to determine their condition and to identify those that are degraded or critical and should be targeted for the development of watershed management plans.
- A start has been made on developing watershed management plans to address degrading influences in those watersheds assessed as degraded or critical.
- Several watershed management plans have also been developed (or are under development) for watersheds that are not degraded or critical, but for other reasons have been targeted for the development of watershed management plans.

Current Status of Wetlands Management in Bhutan

Wetlands are natural sources and storage tanks for water. They are represented as transitional ecosystems. The general type of wetlands in Bhutan includes lakes, rivers, springs, ponds, vernal pools, marshes, peat bogs, fens and predominantly waterlogged areas.

Functional wetlands are critical segments of the watershed, as they support a high level of biological productivity and diversity. They provide habitat for flora and fauna, maintain local and regional hydrological regimes, remove nutrient and pollutants, act as stores for rain/flood water and support human activities and values. Wetlands are recognized to provide fundamental ecosystem services, such as water regulation, filtering and purification, as well as numerous scientific, cultural and recreational values. Wetlands are important for the maintenance of the broader ecosystems health.

In the past, strong cultural and traditional ethos among the Bhutanese and the lack of modern development technology (heavy dredging equipment and other land conversion technologies) had protected the wetlands. But, in modern day Bhutan, the challenges are different, especially when we notice the disappearance of the significant wetlands in and around growing towns and cities. This has additionally increased the number of complains on quality and quantity of drinking water and reports of drinking waters sources drying up. The main causes of wetland loss have been because of fragmentation of large wetland areas and a real time impact of climate change.

There is a lack of mainstream education on the types of wetlands, its significance and on how to manage them. From policy makers to a simple farmer, knowledge on wetlands management is vague and scattered. Thus there is insufficient information to support wetlands education.

4.0 Anticipated Components and Activities

1. Develop and implement watershed management plans and rehabilitate target drying water sources

- Carry out assessments to identify degraded/critical watersheds (in the process, identify degrading influences) in the southern region.
- Carry out community (and other) consultations to gather additional information on issues/problems associated with watershed degradation.
- Prepare management plans to address (remove or mitigate) degrading influences.
- Implement rehabilitation activities in the watershed.
- Carry out monitoring and evaluation to assess the extent to which degraded/critical watersheds are being returned to normal or pristine condition.
- Monitor the drying up of water sources with a continuous/time-series data system, under a monitoring framework to effectivelt understand climate-induced seasonality water shortages.

2. Carry out nationwide wetlands inventory and develop climate adaptive wetland management guidelines for conservation of water ecosystems

- Carry out nationwide inventory and rapid assessment of wetlands

- Prepare and implement management plans to address (remove or mitigate) climate-induced degrading influences in wetlands
- Carry out monitoring and evaluation to assess the extent to which critical wetlands are being returned to normal or pristine condition.
- Develop climate adaptive wetland guidelines via target community and Chiwog LG stakeholder consultations. Especially in climate-induced degraded areas of high priority.

3. Carry out valuation of wetlands and explore climate-related Payment for Ecosystem Services schemes for implementation
- Carry out valuation study for wetlands.
- Carry out feasibility study and implement PES in wetland areas with community and stakeholder consultations.
- Carry out monitoring and evaluation.

4. Enhance climate-adaptive knowledge & capacity of DoFPS and other stakeholders (especially in target Chiwogs in Central & Southern target communities) on wetlands and watershed management
- DoFPS technical experts, MoH (rural water) water and health specialists, and Chiwog environmental planers and water focals will be trained to carry out wetland inventory and assessments
- The capacity building component of this project will have a number technical experts (DoFPS, Line Ministries, community leaders and key NGOs) trained in wetland and watershed science, wetland assessment, and integration of wetlands conservation in watershed management planning
- Multi-stakeholder training courses, domestic and international study tours, field vulnerability assessment, and visits of scientists from international centers of excellence will be carried out;
- Participation of women will be promoted through targeted training modules
- Awareness raising activities in climate change and impacts, adaptations at community level.

5.0 Risks and Solutions

Risks	Solutions
Limitation of trained DoFPS staff in wetlands and watershed science and assessment	Capacity building of local experts. Multi-stakeholder training courses, domestic and international study tours, field vulnerability assessment, and visits of scientists from international centres of excellence will be carried out
Limited ability of ministries policy makers and practitioners to mainstream climate impact projections in their policies and operations	Awareness raising through DoFPS education and outreach program and dedicated awareness raising activities (include knowledge building and technology transfer through international expert exchange)
Program Sustainability	Leveraging co-financing, and other risks management knowledge products with relevant implementation of policies in place. Include activities and outputs in the 12th FYP
Increased number of identified sites for detailed assessment, resulting to loosing focus and constraining the limited time for completion of the project	Fix a reasonable number of sites through the consultation meeting and stakeholder consultation

6.0: Investment Costing (Notional Allocation – PPCR)

Component	PPCR Support (USD million)	IDA (USD Million)	RGoB Contribution (USD Million)	Other International Cooperation Sources	Project total (USD Million)
Develop and implement watershed management plans	1.5 million	N/A	TBD		1.5 million
Carry out nationwide wetlands inventory and develop climate adaptive wetland management	6 million	N/A	TBD		6 million

Component	PPCR Support (USD million)	IDA (USD Million)	RGoB Contribution (USD Million)	Other International Cooperation Sources	Project total (USD Million)
guidelines					
Carry out valuation of wetlands and explore climate-related Payment for Ecosystem Services schemes for implementation	1 million	N/A	TBD		1 million
Enhance climate-adaptive knowledge & capacity of DoFPS and other stakeholders on wetlands and watershed management	1.5 million	N/A	TBD		1.5 million
Total	10 million				10 million

Value-Added/Value For Money Rationale for Investment Component (Phase II)

The estimated budget of US $10Million was derived from multiple Departmental meetings, and a Team analysis of anticipated costs, both institutional and field-based assessments, carried out by WMD. Core outputs/activities include:

(i) Identifying the causes of water sources drying up across the country, and providing hard scientific field evidence to make informed decisions in applying climate-adaptive interventions in southern and central Bhutan. The end goal of this study is to identify pragmatic solutions towards maintaining healthy ecosystems, and ensuring water and food security in Bhutan. The extent of this Preparatory Project will be nationwide, with a particular focus on Southern and Central watersheds (and target farm lands and women-led CSMIs) – at mid altitudinal zones.

(ii) Developing and implementing the rehabilitation of targeted water sources as a primary focus to promote food and water security. Phase I activities shall help develop the framework for the Nationwide Wetlands Inventory, followed by extensive mapping and valuation in Phase II. This will help provide the tools to implement long-term climate adaptive mechanisms to protect water ecosystems from the unintended consequences of developmental activities, under varying climate change scenarios.

(iii) Valuating wetlands to help explore climate-related Payment for Ecosystem Service Schemes toward implementation and financial sustainability. The climate-adaptive knowledge and capacity of DoFPS and other stakeholders on wetlands and watershed management shall also be enhanced.

7.0 Results and Performance Framework

Outcome	Baseline	Key Project Results
1. Watershed management plans developed and implemented.	7 Watershed Management Plans developed. 9 Watershed Management Plans under process	Watershed management plans developed and implemented with rehabilitation to pristine condition
2. Carry out nationwide wetlands inventory and develop climate adaptive wetland management guidelines.	Hazard inventory and rapid assessment of wetlands. Declared 3 international wetland sites.	Nationwide wetlands inventory carried out Climate adaptive wetland management guidelines developed (strategy & detailed assessment)
3. Carry out valuation of wetlands and explore climate-related Payment for	3 pilot PES sites in Bhutan	Valuation report of wetland in Bhutan Feasibility report of PES schemes

Outcome	Baseline	Key Project Results
Ecosystem Services schemes for implementation.		
4. Enhance climate-adaptive knowledge & capacity of DoFPS and other stakeholders on wetlands and watershed management.	Field officers in climate-oriented hydrogeology mapping Training of Trainers in socioeconomic data collection and developmental performance indicators toward Gross National Happiness Index.	Field staff trained (DoFPS, Line Ministries, community leaders and key CSOs) trained in wetland and watershed science, wetland assessment, and integration of wetlands conservation in watershed management planning Participation of women will be promoted through targeted training modules Awareness raising activities in climate change and impacts, adaptations at community level.

8.0 Dissemination of Knowledge Products/Lessons Learned

The climate-adaptive knowledge and capacity of DoFPS and field staff trained (DoFPS, Line Ministries, community leaders and key CSOs on wetlands and watershed management shall also be enhanced through this SPCR. Climate Adaptive Wetland Management Guidelines will be disseminated to field implementers/managers across the country to effectively manage wetlands (especially climate-degraded ones) with climate-resilience in mind.

In addition, PES schemes designed to protect water-related ecosystems - especially for Chiwog level watershed wetlands compromised by climate-induced impacts in the South - will be promoted and instituted through a series of thematic community-based workshops.

Investment 3

FEMD – Strategic Programme for Climate Resilience
Pilot Programme for Climate Resilience

Investment 3	Strengthening Climate Resilience to Flood Hazards
Principal Implementing agency	Department of Engineering Services, Ministry of Works and Human Settlement
Objective of Proposed Investment Plan	Increase resilience from extreme climate change events by identifying the factors contributing to catastrophic flooding hazards affecting vulnerable human settlements, public & private sector infrastructure & resources, and agricultural land and properties, through ecosystem-based adaptation measures.
Proposed Outputs	1. Flood risk and vulnerability assessment and geotechnical/geoclimatic studies completed in southern Bhutan (Phase 1- Moa River Basin, under Sarpang District). 2. Hazard, risk and vulnerability maps prepared, detailed study and analysis of target catchment & downstream flooding conducted in other southern regions (eg. Samdrup Jongkhar, Phuntsholing, Samtse, Dagana, Sarpang). 3. Implementation of climate-resilient measures along the target river-basins against extreme climate events causing flood hazards - in collaboration with at-risk communities including: women, youth and private sector (Phase II). 4. Strengthened national capacity to respond to climate-induced floods through structured ability to assess, analyse, prepare and apply climate impact science and integrate climate adaptive measures. The above outputs will be achieved through investments in carrying out detailed feasibility studies for mitigation measures, financing of flood mitigation infrastructure including green engineering, capacity building for planning, designing and technical diagnostics, mapping and development of flood risk profiles for critical settlements and strengthening coordination with NCHM and local government.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Funding Required (Notional)	US $28 Million

1.0 Background

Bhutan is among the countries most vulnerable to climate change in the Asia-Pacific region because of its vulnerable mountainous terrain and volatile ecosystems. The country is exposed to multiple hazards, in particular glacial lake outburst floods (GLOF) resulting from glacial melting, flash floods, landslides, windstorms, forest fires, localized changes in rainfall patterns and increasing droughts during dry season. Climate change is projected to significantly magnify the intensity and frequency of such natural hazards, as has already been evidenced by the glacial lake outburst flood (GLOF) of Lugge Tsho in 1994, the high intensity cyclone Aila in May 2009, which caused substantial damages and more recently in July 2016, whereby the rivers and streams in southern Bhutan washed away houses, farmland and affected numerous public infrastructure.

Bhutanese rivers are generally characterized by steep slopes in the upper catchment, which are subject to intense seasonal rainfall and high rates of erosion. As the rivers flow towards the southern foothills, the transition from mountainous areas to flat plains typically occurs and is accompanied by extensive flooding. Although flood occurs in most parts of the country, it is very recurrent in the southern region affecting the people and properties nearby. The towns of Sarpang, Gelephu, Phuntsholing, Samtse, Dagana and Samdrup Jongkhar receives the maximum monsoon rain. Geologically, southern Bhutan falls under Siwalik Zone, where soil predominantly consists of sandstones, siltstones, clay, shale and boulder beds. These types of soils are very susceptible to erosion. The

flooding thus, bring along the eroded sediments /debris from upstream and deposits it in the plains downstream making settlement along the river bank considerably vulnerable and exposed to flooding and debris flow.

The Flood Engineering and Management Division (FEMD) in the country have been investing millions in implementing the flood protection measures in the southern regions every year. However, these measures are no match to the extreme climate events as they are either washed away or buried by the massive debris deposits. These are due to limited technical capacity in understanding the expected risks that climate change poses to critical natural and engineered infrastructure and vulnerable settlements and to national poverty reduction objectives, defeating the country's developmental philosophy of Gross National Happiness.

The Rivers and streams in southern Bhutan flows into the Indian territory and hence experiences the similar flooding impact as in Bhutan. The measures proposed in Bhutan will also benefit the Indian state of Assam and west Bengal as the proposed intervention measures will reduce the velocity of the rivers and sediment loads which otherwise will occur due to erosion of hundreds of acres of land.

1.1 The Phase I Technical Preparatory project: involves an assessment of flooding hazards and development of flood mitigation measures in one of the southern district (Sarpang) in Bhutan. This assessment will ascertain the factors/causes contributing to the flooding and identifying suitable climate-resilient measures both at the catchment and downstream as an adaptation program. Hazard and Risk maps will be prepared and diverse vulnerable groups shall be identified.

1.2 The Phase II Investment: will continue with the broader area of interest covering the rest of the southern districts (Samdrup Jongkhar, Dagana, Phuntsholing and samtse) prone to flooding. This Investment Component will build upon Phase I recommendations and findings on how to address flooding hazards along the streams/rivers in Sarpang District through climate-resilient measures. Similar studies conducted in Phase I will be replicated in other southern districts with the implementation of appropriate adaptation measures during Phase II.

2.0 Project Goal and Specific Objectives

2.1 Project Goal

The primary aim is to conduct comprehensive flood hazard assessments of the southern districts prone to extreme climate events affecting the people, animals, agricultural land, public infrastructures and properties. The assessment is a detailed study of the geotechnical, hydrology, river morphology and catchment studies of the river and streams. Upstream Catchment assessments (including the long term consequences of cryosphere melt and GLOFs on the hydrological cycle and on water resources also considered) and geotechnical studies are very important, as most rivers in south bring along massive quantity of debris during every flooding events.

It is also believed that the southern Bhutan falls under siwalik zone where soil predominantly consists of sandstones, siltstones, clay, shale and boulder beds. Amongst many, Phase I will undertake studies along two streams and a river in Sarpang district. The study will also include the proposal on the most suitable eco-system based approach to climate-resilient measures.

Phase II will take up the implementation of the measures identified in Phase I as a flood hazard adaptation programme. Comprehensive flood hazard assessment will be continued in other southern districts along the critical rivers and streams. Accordingly, resilient measures will be put in place to control and adapt to flooding at the catchment and downstream respectively. National capacity will be built to undertake such adaptation plans and measures in future to cope with climate induced hazards.

2.2 The specific objectives include:

- Comprehensive integrated flood hazard assessment of the streams and rivers in southern districts. Similar to studies in Phase I, Phase II will conduct Catchment analysis, geotechnical, hydrological and river morphological assessments will be carried out to understand the nature and behavior of climate-induced floods.
- Reduce Sensitivity to Climate risks through an eco-system based approach to river basin adaptation, with special emphasis on high risk upstream (High Mountain) and downstream communities. This will address the unique needs of vulnerable communities residing around the upper watershed catchment, as well as those communities subject to impacts in river basins at lower elevation, each with very distinct eco-systems. Within those communities, the

unique needs of the most vulnerable sub-groups will be addressed, especially those of women, female-headed households and youth.

- Climate Resilient Measures. Based on the finding/studies of the Phase I, climate-proofing measures along the rivers and streams will be implemented to support vulnerable communities, eco-systems, critical infrastructures and agricultural lands in Sarpang District. These studies and climate-resilient measures will be replicated along the climate induced floods in other parts of the southern districts (Phuntsholing, Samdrup Jongkhar, Samtse).
- Build adaptive capacity of line ministries, LGs, and communities through climate risk awareness raising, community-based learning, development and implementation of adaptive measures and disaster preparedness, adaptive policy, and knowledge dissemination. This would include gender-aware communications campaigns given the differential impacts of disasters on women and female-headed households and the difficulty in ensuring women possess the same hazard-preparedness and risk management knowledge as men.
- Strengthen National Capacity on Climate induced flood. The central agency for flood management in the country is Flood Engineering and Management Division (FEMD) under the Ministry of Works and Human settlement. Being formed only in 2012, the organization lacks experience and knowledge on assessing flood and proposing the best climate-resilient measures. The central agency also receives many other requests from the LG to support in the climate induced flood. Hence, it is a very important to build the capacity of the engineers and environmentalists working in FEMD and LG.

3.0 Key indicators and baselines

3.1 Key Indicators includes:

- Comprehensive flood hazard assessment of the streams and rivers in southern districts carried out.
- Reduce Sensitivity to Climate risks through an eco-system based approach to river basin adaptation, with special emphasis on high risk upstream (High Mountain) and downstream communities.
- Climate Resilient Measures implemented as part of a climate change adaptation program.
- Built adaptive capacity of line ministries, LGs, and communities.
- Strengthened national capacity on climate induced flood.
- Greater socioeconomic resilience to climate change induced impacts (number of households affected by floods, agricultural lands), disaggregated by age, gender/female-headed households.

Baseline and Project Area

This investment will include a feasibility study and assessment to determine the technical feasibility and economic viability of the PPCR investment, and the potential to build resilience (upscaling) in the existing Sarpang District Flood Risk Management Project.

The project will scale-up project investment with incremental adaptation measures. PPCR funding would allow the project to cover several sectors at risk, including water, energy, irrigation, and disaster management. It will benefit many more community inhabitants, and enable local area Mao river basin (Sarpang) residents and provincial officials to address their own climate change risks.

The project would also introduce select hydromet stations in the catchment of the upper Mao river, Shetekheri and other river basins located in southern Bhutan and to help determine discharge and downstream water flows. This activity will be coordinated closely with the Phase II Hydromet Rehabilitation Programme, the Climate Science Modelling Program, and other PPCR activities to avoid duplication of effort.

This river basin approach is in line with the National Environment Commission and Watershed Management guidelines.

4.0 Anticipated components and activities (including learning and knowledge management activities)

4.1 Component 1 - Comprehensive flood hazard assessment of the streams and rivers in other southern districts. Similar to studies in Phase I, catchment analysis, geotechnical, hydrological and river morphological assessments will be carried out in Phase II to understand the nature and behavior of the climate induced floods in other parts of the southern Bhutan. The following reports will be completed through the studies:

- Flooding impact assessment report for the climate induced floods in other parts of the southern Bhutan.
- Catchment assessment, analysis and modelling to determine the total watershed discharge.
- Report on Causes/factors of flooding and slope instabilities.

- Report on Geotechnical & Slope stability analysis of soil and rock slopes.
- Maps and models for all the analysis and assessments carried out.

4.2Component 2 - Reduce Sensitivity to Climate risks:
Phase I has carried out flood hazard and vulnerability assessment in the flood affected zones in Sarpang District. Phase II will conduct similar studies and of hazard assessments and risk maps in other parts of the southern Districts. The following assessments will be anticipated at the end of the study.

- Development of climate vulnerability, hazard and risk maps through participatory approaches and consultations with vulnerable communities.
- Within those communities, the unique needs of the most vulnerable sub-groups will be addressed, especially those of women, female-headed households and youth.

4.3 Component 3 – Climate Resilient Measures:
Phase I and Part of Phase I, should have conducted a thorough studies/analysis/assessment of the flood hazard in the southern districts of Bhutan. Hence, Phase II will carry out implementation of climate-resilient measures, as follows:

a. Eco-system based reduction of community vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation, such as:
i. Reforestation to prevent mud slides and debris flow
ii. Reintroduction of indigenous shrubs and plants
iii. Sustainable management of grasslands and rangelands

b. Engineering based reduction of community vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation, such as:
i. Climate proofed embankments and dykes
ii. Construction of reservoir (& potential hydro-power plants for cost-effectiveness)
iii. Construction of alternative escape routes (main roads usually built by the river)
iv. Measures to regulate river flows and create preferential flood routes
v. Excavation of the river bed in localized sections of the river
vi. Relocation of communities

c. Introduction of adaptive redesign and operations and maintenance protocols.

4.4 Component 4 - Building Adaptive Capacity
Based on the hazard, vulnerability, and risk assessments and maps prepared unbder Phase I, the following activities of this climate hazard adaptive programme will be carried out, as follows:
1. Raising the awareness of local institutions and communities, with special emphasis on gender-sensitive communities and female-headed households to understand climate risks.
2. Community-based participatory learning and knowledge dissemination (hazard maps, community-based risk frameworks)—undertaken in a manner that actively involves women, youth, female-headed households and small enterprises such as local farmers—to identify adaptation measures and empower people in all-hazard risk management planning and decision-making. Hazard management workshops, public training sessions on local adaptation, and risk-reduction demonstration sites would be developed as well.
3. Development and implementation of all-hazard mapping, Integrated Flood Management (IFM) Plans, adaptive land use planning.
4. Learning events for policy and decision makers to strengthen capacity of central line ministry and LGs to replicate river basin adaptation & risk management methodology in other river basins.

4.5 Component 5 - National Capacity Building on Climate Induced Floods
As part of the Phase II Investment plans, it is also important to build and specialize the engineers and environmentalists working in FEMD and LG in the field of climate induced floods and eco-system based measures to adapt with the hazard.

5.0 Risks
1. Inadequate hydro-met data in the areas of interest for hydrological and hydrodynamic modelling purposes.
Solutions: Work with National Centre for Hydrology and Meteorology (NCHM) to generate the required data.

2. Budget inadequacy for the massive flood resilient measures.
Solutions: Closely monitor Government's compliance with SPCR, with other MDBs partners. Diversification of the funding sources (GCF, GEF, CIF, etc.).
Minimize expense through introduction of eco-system based approach.
3. Government does not provide proper O&M budget allocation.
Solutions: Closely monitor Government's compliance with SPCR, with other MDBs partners.
4. Communities and local residents are not willing to participate in community based and tree planting activities.
Solutions: Possible involvement of experienced and qualified NGO's or other agency's participation in community based activities for strong involvement of community residents

6.0 Investment Costing (notional allocation – PPCR and co-finance including counterpart finance)
The costing is indicative and detailed cost breakdown will be developed during the feasibility study

Component	PPCR Support ($ million)	Other Support ($ m)	Remarks
1. Comprehensive flood hazard assessment of the streams and rivers in other southern districts.	2		
2. Reduce Sensitivity to Climate risks.	2		
3. Climate Resilient Measures.	23		Will be divided into ecosystem based (e.g. creation of forest zone) and engineering based (e.g. dike mudflow diverted facilities) approaches
4. Build adaptive capacity of Line Ministries, LGs, and communities.	0.5		
5. National Capacity Building on Climate Induced Floods.	0.5		
Total	28		

Value-Added/Value For Money Rationale for Investment Component (Phase II)
Component 3: FEMD Investment Rationale
Based on Team and FEMD partner consultations, a review of other field actions, and the preliminary study of costs for the proposed SPCR outputs, the financing requirement for this comprehensive flood hazard assessment and climate-resilient measures is estimated at US $28Million. Due to expected PPCR budget limitations, FEMD was not able to prioritize several other similar flood-prone target areas highly vulnerable to climate change impacts. Core outputs/activities include:

(i) Conducting comprehensive flood hazard assessment of the streams and rivers in southern districts (catchment analysis, geotechnical, hydrological and river morphological assessments); introducing eco-system based approaches to river basin adaptation, with special emphasis on high risk upstream and downstream communities.

(ii) Implementing biological and soft-engineering climate-proofing measures along the target rivers and streams to effectively reduce overall climate vulnerability of communities, eco-systems, critical infrastructure, and agricultural lands in the Southern regions.

(iii) Building adaptive capacity of line ministries, LGs, and communities through: climate risk awareness; community-based learning and program up-scaling; development and implementation of adaptive measures and disaster preparedness; and, knowledge dissemination - including gender-awareness communications given the differential impacts of disasters on women and men.

(iv) Strengthening FEMD institutional capacity on assessing climate-induced floods, and climate-resilient eco-system-based Integrated Flood Management (IFM) design protocols.

7.0 Results and Performance Framework

Outcome	Performance Target and Indicator	Risks
1. Comprehensive flood hazard assessment of the streams and rivers in the identified southern districts (Sarpang/Gelephu, Samtse, Phuntsholing).	1. Flooding impact assessment reports for the climate induced floods in parts of the southern Bhutan. 2. Catchment assessment, analysis and modeling to determine the total watershed discharge. 3. Report on causes/factors of flooding and slope instabilities. 4. Report on geotechnical & slope stability analysis of soil and rock slopes. Maps and models for all the analysis and assessments developed.	Lack of Expertise in the field of watershed management and geological engineering in the country
2. Reduce Sensitivity to Climate risks and hazards.	1. Development of climate vulnerability, hazard and risk maps through GIS and validation through participatory approaches and consultations with vulnerable communities. 2. Within these communities, the unique needs of the most vulnerable sub-groups will be addressed, especially those of women, female-headed households and youth.	Communities and local residents are not willing to participate in community based activities.
3. Climate Resilient Measures implemented.	1. Eco-system based adaptation by communities 'vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation. 2. Engineering based reduction of communities 'vulnerability to climate induced flood, mud/debris flows, landslides, and land degradation. 3. Introduction of adaptive design and operations and maintenance protocols.	Communities and local residents are not willing to participate in eco-system based approach.
4. Build adaptive capacity of line ministries, LGs, and communities on climate-resilence.	1. Raising the awareness of local institutions and communities, with special emphasis on gendered division of labour and vulnerable (female-headed poor households, unemployed village youth to understand climate risks and resiliency. 2. Community-based participatory learning and	Lack of participation from communities and local residents.

Outcome	Performance Target and Indicator	Risks
	knowledge dissemination (hazard maps, community-based risk frameworks)—undertaken in a manner that actively involves women, youth, female-headed households and small enterprises such as local farmers—to identify adaptation measures and empower people in all-hazard risk management planning and decision-making. Hazard management workshops, public training sessions on local adaptation, and risk-reduction demonstration sites would be developed as well. 3. Development and implementation of hazard mapping, Integrated Flood Management (IFM) Plans, adaptive land use planning. 4. Knowledge sharing on good lessons and best practice for policy and decision makers to strengthen capacity of central line ministry and LGs with scalability in outside project & risk management methodology in other river basins.	
5. National Expertise in the field of Climate, Flooding and environment-friendly measures developed.	1. Strengthened national capacity on climate induced flood mitigation, prevention and management.	Budget Inadequacy for capacity building.

8.0 Dissemination of Knowledge Products/Lessons Learned

A number of key Knowledge Products (KPs) will be developed under this Investment Component. They include: Flood Hazard, Risk & Vulnerability Maps and Geotechnical Studies (eg. Moa River Basin, Sarpang District, Samdrup Jongkhar, Phuntsholing & Samtse); and Integrated Flood Management (IFM) Plans.

As well, a series of Reports will be developed, such as: Flooding impact assessment report for floods in the southern belt; Catchment assessments; analysis and modelling for watershed discharge; Causes/factors of flooding and slope instabilities; Geotechnical & Slope stability analysis of soil and rock slopes; and, GIS mapping of overall results.

These KPs will be carefully shared with target vulnerable communities and sub-groups through participatory community-based hazard-management workshops and awareness raising campaigns via local institutions and communities. They will be undertaken in a manner that actively involves women, youth, female-headed households and small enterprises such as local farmers—to identify appropriate adaptation measures and risk management planning and decision-making. Public risk-reduction demonstration sites would also be developed in concert with GNCH and participating CSOs. Learning events will be hosted for policy and decision-makers to strengthen the capacity of Central Line Ministry and LGs Civil servants to replicate this eco-system-based river basin adaptation and risk management methodology in other river basins.

Investment 4

Pillar 3
Climate-SMART Human Settlement Planning and Development
In Samdrup Jongkhar Thromde (Municipality)

Investment 4	*Supporting Climate-SMART Human Settlement Planning and Development for Samdrup Jongkhar Thromde*
Principal Implementing agency	Department of Human Settlement, Ministry of Works and Human Settlement
Objective of Proposed Investment Plan	To make Samdrup Jongkhar more climate-resilient, by increasing their adaptive capacity through Climate-SMART Land Use Planning; and the promotion of climate-resilient urban services and installation of climate-resilient infrastructure, and hazard-free green leisure spaces.
Proposed Outputs	i. Revised climate-oriented Samdrup Jongkhar Urban Development Plan, and replicable Climate-SMART Land Use Plan for use in vulnerable southern Thromdes (Phase I). ii. Enhanced effectiveness and efficiency of municipal services (eg. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate-SMART municipal services and infrastructure. iii. Improved urban resilience with Climate-SMART planning that incorporates hydromet-related hazard risk management approaches to flooding and landslides; and to green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands). iv. Sustainably managed land resources in the target Thromde through climate-proofing of human settlement areas. v. Strengthened governance, institutional coordination, and human resource capacity with private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach. vi. DHS and Samdrup Jongkhar Thromde land use planners and urban designers trained in Climate-SMART planning, along with women-led CSMIs and CSOs. The above outputs will be achieved through investments in upgrading, rehabilitating or installing climate smart green infrastructure, development of green spaces, strengthening database including mapping and inventory, enhancing service delivery to public users and enhancement of capacity for development and implementation of climate smart urban plans.
Level of Funding	USD $7 million

1.0 Background & Justification

1.1 Project Context

Considering the increasing climate risks and vulnerability that Bhutan faces; and to develop a long–term strategic program to address climate-resilience, the Gross National Happiness Commission - which is the central planning agency - submitted an EOI for funding to the Pilot Program for Climate Resilience (PPCR) under the Climate Investment Fund (CIF).

After a rigorous selection process, Bhutan was selected as one only ten countries of 36 submissions to be granted PPCR Preparatory funding to develop a Strategic Program for Climate Resilience (SPCR). This SPCR process is led by GNHC, and is being supported in a coordinated way by Multilateral Development Banks (MDB), including the World Bank as the lead MDB, International Finance Corporation (IFC), and Asian Development Bank (ADB).

The goal of the SPCR is to provide a strategy for climate-resilience, outlining the country's current and future adaptation and development priorities, and an investment program to achieve its goals. The four thematic pillars of the SPCR are:

i. Enhancing the Information Base For Hydromet Services and Climate Resilience
ii. Preparedness, Food and Water Security

iii. Sustainable Growth and Resilient Infrastructure
iv. Strengthening Governance, Institutional Coordination and Human Resource Capacity

This Investment Addresses Pillar 3.

a) Institutional

The Department of Human Settlement (DHS) under the Ministry of Works and Human Settlement (MoWHS) is the lead agency mandated to prepare human settlement plans along with development control guidelines all across the country. Owing to this mandate, the DHS was identified as the lead agency to implement Pillar 3: Sustainable Growth and Resilient Infrastructure and according the DHS will carry out a technical Preparatory Project, entitled "Climate-SMART Human Settlement Planning and Development in Samdrup Jongkhar Thromde," which will be implemented in two Climate-SMART initiatives.

b) Project Description

This SPCR Investment Project will be carried out by a Technical Team comprised of officials from the Department of Human Settlement, and Samdrup Jongkhar Thromde.

Phase I involved the review of urban development plans (and includes peri-urban & peri-rural scoping boundaries) to assess the gaps in relation to Phase Investment Component needs and outputs; and to come up with a Strategic Planning Framework for the development of a Climate-SMART LUP. Climate-SMART LUP is defined as a: Sustainable Mitigation & Adaptation Risk Toolkit for Land-Use Planning (LUP).

This Phase I technical study involved a sectoral inventory of storm water drains, urban roads & transport, water, wastewater treatment plant and land fill site that will be carried out to assess urban vulnerability and risk to climate impacts.

Similarly, a comprehensive stocktaking of open, green and recreational areas across the city was carried out to assess vulnerability and risk to climate impacts. Since the lead agency for this Project and the target Thromde lacks technical expertise in planning Climate-SMART cities, a series of training workshops on Climate-SMART human settlement planning were conducted to train land use planners and urban designers from the DHS and Samdrup Jongkhar Thromde, to make them fully- versed in Climate-SMART LUP practices, prior to the commencement of any SPCR Investment activities.

Phase II will involve the operationalization of knowledge products (identified in Phase I), which include: a review of risks to municipal services and critical infrastructure; and, replication of Project activities and outcomes in other Thromdes which face similar climate change mitigation and adaptation issues. Phase II will prioritize climate-resilient building codes, with adaptive zoning and public and private infrastructure upgrading to be "climate-proofed."

This Investment Project will also directly address existing challenges in fulfilling the *Sustainable Development Goals (SDG): Climate actions, Sustainable Cities and Communities, and Clean Water and Sanitation*, and will provide developmental indicators on sustainable growth and climate-resilient infrastructure, and urban community development, that feed into the Gross National Happiness Index relating to well-being and socio-economic development. In addition, it will support priorities articulated in Bhutan's NDC, and National Strategy and Action Plan for Low Carbon Development

Bhutan is currently developing its 12th Five Year Plan (FYP) to fulfill its timeless vision of Gross National Happiness (GNH). The 12th FYP takes further steps into the operationalization of GNH by adopting the nine-domain approach as the planning framework. This is expected to bring in greater synergy and focus, forming the primary basis of measuring our progress towards achieving GNH. The 12th FYP objective and sixteen National Key Results Areas (NKRA) have been drawn. Among which this project will help achieve the following NKRAs:

i. Enhanced climate-resilience of human settlements.
ii. Sustainable management of land resources for human settlement.
iii. Enhanced climate-adaptive effectiveness and efficiency of municipal planning and service delivery.

c) Background of the Investment Project Area

Location and Connectivity

The areas identified for the Project are Samdrup Jongkhar Thromde (Municipality). Samdrup Jongkhar town is the Dzongkhag (District) headquarters of Samdrup Jongkhar Dzongkhag and is located in the eastern part of the country. The Dzongkhag is bounded by the Indian State of Assam in the south and east, and by the Dzongkhags of Trashigang in the north and Pemaghatshel in the west. The town is well connected to the rest of the Dzongkhags by road. It is also connected to Gelephu and Phuentsholing towns in the south through India via the Asian Highway running along the southern border. The nearest domestic airport is in Yongphula under Trashigang Dzongkhag which will start operating soon. The nearest international airport is in Guwahati, India.

The Thromde area includes the area under the Samdrupjonkhar town as well as the settlement in Dewathang, 18 km uphill with the connecting road in between. The area of Samdrup Jongkhar town is 2.08 sq. Km and the area of Dewathang town is 2.39 sq. Km. In 2009, the Parliament redefined the boundary of Samdrup Jongkhar Thromde to include Dewathang town within its limits and the area along the intermediate 18 km stretch of highway connecting Samdrup Jongkhar to Dewathang. However, for the project, only Samdrup Jongkhar town will be included.

Population

The estimated population for Samdrup Jongkhar town was 7487 in 2013. It is projected to increase to 8462 in 2018 and 13288 by 2033. The annual population growth rate for the town is assumed to be 2.91%. The population density is 2862 persons per sq.km.

Climatic Conditions

According to the reports of the Department of Hydro Met Services, the average monthly mean maximum temperature ranges between 19° C in the months of winter to 27° C in the months of summer while average monthly minimum temperature varies from 10° C during winter to 22° C during summer. The mean monthly relative humidity recorded is highest during monsoon season (93 %) and lowest (48 %) in winter.

According to Annual report of daily data recorded at Dewathang meteorological station, the annual precipitation for the period of 2008 to 2012 ranged between 4200 mm to 6200 mm with heavy rainfall ranging from 300-1400 during months of May, June, July, August and September. The heaviest rainfall of 1393 mm was recorded in June 2012. The average monthly rainfall is usually negligible for winter months of November to February and heaviest in June, July and August.

Some studies have assessed that Bhutan, specially the Southeast region, will have high probability of getting affected by climate change concerns predominant being an increase in rainfall intensity. This would further add to already existing problems of flashfloods, water logging and landslides.

There have been efforts towards mitigating GHGs through some projects like the project funded by GEF/SGP that looked at the possibility of 'Introduction of Fuel Efficient Stoves to reduce the consumption of fuel wood and 'The Samdrup Jongkhar Initiative' that proposes to raise living standards in the South-Eastern district of Samdrup Jongkhar , and by establishing food security and self-sufficiency, protecting and enhancing the natural environment, strengthening communities, stemming the rural-urban migration tide, and fostering a cooperative, productive, entrepreneurial and self-reliant spirit.

Such projects will be helpful in the long run due to the protection of the vegetation cover in the surrounding areas also helping in reducing the surface runoff (UDP, 2013]. The Urban Development Plan, 2013, recommends that vulnerability assessment and Climate Sensitivity Screening will have to be carried out at Samdrup Jongkhar to get a better idea of the likely impacts that the area may face in future and the possible actions that can be suggested.

Climate-Induced Hazards

The Dungsam Chhu River flowing through the heart of the Samdrup Jongkhar Thromde floods during monsoon season because of a shallow river bed. The level of river bed is rising due gradually to siltation. The flood control embankments constructed along the river suffers repeated damage during floods. In addition increasing amount of rainfall also causes flash floods. Other disasters that the town often experiences are erosion, landslides and earthquakes.

Added to these frequent hazards, these peri-urban Thromde's are crying out for the most basic & hazard-free green spaces for basic leisure activities. The steep topographical terrain is subject to high levels of risk from slope deterioration and concomitant landslides, and flash flooding attributed to extreme weather events. As such, because most land surrounding these peri-urban centres are highly unstable, there is a scarcity of livable, safe, low-risk green spaces.

Planning Initiatives and Current Issues

The strategic location of the town, and the multiple roles it has been playing as trading hub, administrative centre and transit point have led to accelerated urbanization of the Thromde. The thromde has prepared three development plans for the town till date. The first one was the Samdrup Jongkhar Urban Development Plan (1986-2000) and the next was the Samdrup Jongkhar Structure Plan (2006-2025).

With the extension of the Thromde boundary, the responsibilities of the LG had also increased and along with development potentials, the Thromde faced numerous urban issues (Urban Development Plan for Samdrup Jongkhar, 2013). Owing to the redefinition of the Thromde boundary and the challenges faced by the Thromde, the Department of Human Settlement, Ministry of Works and Human Settlements, initiated the review and preparation of Urban Development Plan for Samdrup Jongkhar Thromde. The proposed plan period is for twenty years from 2013 to 2033.

As with the cities in the other developing and developed countries, Samdrup Jongkhar too is facing the impacts of climate change. Climate change is an increasing concern in cities where urbanization is happening rapidly. The drying up of water sources, frequent flash floods and fluctuating temperatures are some of the visual impacts of climate change in Samdrup Jongkhar. Over the years the emission of green house gases has increased considerably with increasing number of vehicles hitting the road every year. In addition, poor quality of roads, drains and footpaths, declining green areas and improper solid waste, waste water and water management are other urban issues that the capital city has been facing for years. The town faces acute water shortage and the government spends huge amount of money on improvement of urban services every year but the issue still persists.

Urban inhabitants across Bhutan are crying out for the most basic green spaces for leisure activities, but the topographical terrain in most urban centres is subject to high levels of risks from slope deterioration and concomitant landslides and flooding attributed to extreme weather events. Moreover, because most land surrounding the urban centres are unstable, there is a scarcity of livable, safe, low risk green spaces. Currently the Samdrup Jongkhar Thromde lacks adequate green spaces which are important to reduce urban heat island effect and summer energy use for a hot place like Samdrup Jongkhar. Similarly, the open and recreational areas in the town are not designed for climate resiliency.

Further, the industrial estate of Matanga, 7 km away from the town, is envisaged to become a moderately large industrial development area for the region. This will have an impact on the economy and employment of the Thromde as well as bring about new developmental challenges. Hence there is an urgent need to enhance the planning and management capacity of the LGs combined with appropriate legal mechanisms.

2.0 Project Goal & Specific Objectives

2.1 Project Goal

The primary aim is to implement knowledge products and adaptive measures formulated during the Phase I Preparatory Project, to make Samdrup Jongkhar Thromde climate-resilient by increasing its adaptive capacity via Climate-SMART Land Use Planning, and the promotion and mainstreaming of climate-resilient urban services, adaptive building codes and zoning practices, and climate-proofing of critical infrastructure.

Complementary inputs from this SPCR Investment Component will coincide with, and support NDC adaptation activities expected to commence in 2020; and the National Strategy and Action Plan for Low Carbon Development.

2.2 Specific Objectives

Specific Objectives include:

a. To revise the Samdrup Jongkhar Urban Development Plans to make other Thromdes climate-resilient by incorporating Climate-SMART Land Use Planning (LUP) components.

b. To enhance the effectiveness and efficiency of municipal planning and service delivery (eg. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate SMART municipal services and climate-proofed infrastructure.
c. Improved urban resilience with Climate-SMART planning that incorporates hydromet related hazard risk management for green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands).
d. Enhanced township livelihood security due to improved municipal service, to mitigate migration to nominal urban centers.
e. To sustainably manage land resources in the target Thromde through implementation of Climate-SMART LUPs in identified human settlement areas.
f. To further strengthen governance, institutional coordination, and human resource capacity with Thromde LUP policy makers and practitioners, private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach.
g. To replicate Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) practices that were validated in Samdrup Jongkhar Thromde, for use in the vulnerable southern region.

This SPCR Investment will also strategically reinforce several NDC priorities, including the following:

i. The NECS Climate Change Team, National Statistics Bureau, and World Bank Mitigation Team are conducting a multi-sectoral analysis using a *Computational General Equilibrium (CGE) Model* to understand the dynamic interaction between the local economy and GHG emissions.

   The study will help develop a country roadmap for low carbon development for priority sectors. Low carbon investment options identified and prioritized through the use of the decision support tool and multi-stakeholder dialogue will be incorporated into preparation of sector-specific investment roadmap. The investment roadmap could be expected to inform SPCR and integrate low carbon solutions into the country's national development plan over the long term.

   Outcomes from this analysis will provide inputs to help identify and prioritize low-carbon options as part of NDC implementation. Inputs will equally support the preparation of the 12th Five Year Plan, especially relating to the national Key Result Area (NKRA) Number 6: "Carbon Neutral, Climate and Disaster Resilient Development Enhanced."

   This Investment will support the NDC initiative through identification of entry points to incorporate the NEC/World Bank's *Computational General Equilibrium (CGE) Model* in strategic locations and agencies to test this mitigation model.

ii. From the stocktaking of climate vulnerable open green spaces, and climate-resilient planning tool both developed in Phase I, develop desperately needed climate-safe recreational green spaces in peri-urban and peri-rural Bhutan. The creation of climate-friendly and ecosystem stable green spaces will further contribute to land conservation and serve as carbon sequestration zones.

3.0 KEY INDICATORS AND BASELINE

3.1 Key output indicators include:

a. Revised climate-oriented Samdrup Jongkhar Urban Development Plan, and replicable Climate-SMART Land Use Plan tested and operationalized in Samdrup Jongkhar, and replicated in other Thrombe jurisdictions.
b. Enhanced effectiveness and efficiency of municipal services (eg. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate SMART municipal services and infrastructure.
c. Improved urban resilience with Climate-SMART planning (that incorporates hydromet related hazard risk management from flooding and landslides); and climate-proofed green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands).
d. Sustainably managed land resources in the target Thromdes and identified human settlement areas, using Climate SMART LUPs.

e. Replicable Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) validated for Samdrup Jongkhar Thromde, operqationalized in vulnerable southern region.
f. Strengthened governance, institutional coordination, and human resource capacity with Thromde private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach.
g. Interests of additional Thromde private sector stakeholders, women's groups, and youth CBOs fully structured in Climate-SMART LUPs.

3.2 Baseline Indicators

Currently, the Department of Human Settlement lacks the capacity to formulate climate oriented LUP framework. Therefore, capacity building of the planners, designers, engineers and architects of the DHS as well as the LG is becoming increasingly important. Trainings and workshops on planning Climate-SMART cities will enable to plan, design and implement resilient services and infrastructure.

Climate oriented LUP is also not commonly found and operationalized. Though all development plans are prepared for designated land uses, the Climate-SMART LUP approach is not adopted. However, there are some current initiatives being undertaken by various sectors that are geared towards sustainable land use.

The National Adaptation Plans (NAP), National Adaptation Program of Action (NAPA II) and the Nationally Determined Contribution (NDC) are some such initiatives that assess climate risks and vulnerability across different sectors, and appraise adaptation options. The NDC has identified Climate-SMART cities as one of priority action areas for low GHG emission development. The DHS is also in the process of formulating a Comprehensive National Development Strategy (CNDP) which will help in managing the land resources sustainably. However, these strategies are long-term plans, and in the meantime it is important to address the current climate-related urban issues.

The PPCR funding would be used for the increasing the adaptive capacities of the urban services by incorporating climate-resilient methods of renovation and construction. The funding would cover crucial sectors like water, wastewater, solid waste, roads, public transportation and storm water which are important for to make our settlements more livable. Improving the quality of life of the residents would enhance the happiness index of the country which is important for Bhutan. It will also benefit the local communities and the LG.

The studies and recommendations/ action plans will have linkages with the current initiatives carried out by other sectors like the watershed management plan by the Department of Forest and Park Services, climate change curriculum development in colleges initiated by the National Environment Commission, hydro met modeling by the Department of Hydro Met Services and ongoing activities being carried out by the FEMD in Samdrup Jongkhar.

anticipated components & activities (including learning and knowledge management activities)

The Climate-SMART Investment will involve operationalization of knowledge products identified in Phase I. The detailed activities under each Investment component are outlined below:

Component 1: Revision of Samdrup Jongkhar Urban Development Plans

The LUP will be revised to incorporate Climate-SMART LUP components identified in Phase I. A Climate-Resilient Urban Roadmap to improve the adaptive capacity of the city will also be formulated. This Roadmap will focus on ecosystem-based adaptation. Replication will also take place in the vulnerable southern communities of: Samptse, Gelephu, and Phensoling.

Component 2: Improve the Quality and Safety of Urban Services and Critical Infrastructure

The quality of urban services and critical infrastructure will be improved by incorporating climate-resilient components. The infrastructure like storm water drains and roads will be improved by planning and designing for climate resiliency, and also enhancing the connectivity. Where possible, hard landscaping components will be replaced by soft landscaping components, such as permeable pavements for park roads and hazard-free bike paths to allow natural drainage. Services like water, waste water, and solid waste will also be planned with ecosystem-based adaptation approaches in mind.

Component 3: Enhance the Adaptability & Livability of Human Settlements
Based on the Inventory of Phase I, this activity will include planning and designing climate-resilient (hazard-free) open spaces, green and recreational areas. Aspects like urban heat islands, green shady areas, water smart parks, etc. will be considered in the design. Where possible, hard landscaping will be replaced by soft landscaping to allow natural drainage. Similarly, bicycle lanes and footpaths will be designed for climate hazard-free climate resilience, and also to enhance accessibility for all sections of the society including the differently-abled and senior citizens.

Component 4: Sustainable Management of Land Resources
Vulnerable human settlements identified during Phase I will benfit from the Climate-SMART LUP. Hazard mapping will also be carried out in coordination with the Department of Hydro Met Services and FEMD.

Component 5: Strengthening Governance, Institutional Coordination, and Human Resource Capacity (including Private Sector Collaboration)
Investment activities will include:

i. Carrying out the project in coordination with all relevant stakeholders including government agencies, CSOs [BCCI & the Bhutan Association of Women Enterprises (BAOWE), and Bhutan Network to Empower Women (BNEW)], NCWC, youth groups and private sectors. All activities will be closely coordinated with all agencies, to avoid duplication.
ii. Encouraging community-based participation through public consultation meetings, where local communities can actively participate in decision-making and adaptation processes.
iii. Raising awareness with women, youth, planners, and policy and decision-makers on climate induced risks and adaptations solutions in urban areas through workshops and meetings.
iv. Strengthen the capacity of policy makers, urban planners, urban designers, engineers and architects in the Central Ministry and LGs, through Climate-SMART training workshops to empower them to replicate Project activities and outputs in other vulnerable Thromdes.
v. Development of a Climate-SMART LUP, including: for urban transport and low-carbon planning; and for climate-resilient urban green spaces.

4.0 Risks & Solutions

The likely risks involved in carrying out the activities and the solutions are listed in the table below:

Risks	Solutions
1. Lack of technical capacity in the Central agency and LGs to design and implement the Climate-SMART LUP; and implement proposed activities.	Provision of international expertise to provide Climate-SMART capacity-building (eg. climate-oriented LUP trainings, seminars, workshops); and consequent strengthening of human resources in the central agency, LGs, and private sector.
2. Insufficient funds at the LG level to operationalize LUP in multiple locations (Samdrup Jonghar, Samtse, Phensoling and Gelephu Thromdes).	Formal commitment from the Central Government to provide requisite financing to the LGs for SPCR implementation.

5.0 Financing Plan (notional allocation – PPCR and co-finance including counterpart finance)
The estimates reported below are indicative. Detailed costing will be developed on the basis of the outcomes of Phase I activity.

SPCR Investment Component	PPCR Support (USD Million)	IDA (USD Million)	RGoB (USD Million)	Other International Cooperation Sources	Project Total (USD Million)
1. Revision of Samdrup Jongkhar Urban Development Plan	0.6	N/A	To be discussed		0.6
2. Detailed design and implementation of	5.4	N/A	N/A		5.4

climate-resilient urban services (budget will be divided between: storm water drains, water, waste water, solid waste, open and green spaces, and recreational areas incl. footpaths & bicycle lanes) for Samdrup Jongkhar, Samtse, Phensoling and Gelephu Thromdes.					
3. International Consultants for Climate-SMART LUP capacity-building: DHS, LG BCCI, CSOs [Bhutan Association of Women Enterprises (BAOWE), and Bhutan Network to Empower Women (BNEW)].	1.0	N/A	N/A		1.0
Total	7.0				7.00

Value-Added/Value for Money Rationale for Investment Component (Phase II)
Component 4: DHS Investment Rationale
The fund requirement to implement the DHS's Climate-SMART (Sustainable Mitigation &Adaptation Risk Tools) LUP is estimated at US $7Million. This amount was derived from multiple consultations with the target Thrombe, and internal costing by Team members. This Investment component includes the following core outputs/activities:

i) Reviewing urban development plans to assess the gaps and opportunities; and to design a Strategic Planning Framework for the development of Climate-SMART LUPs for multiple locations, drawing experience and knowledge learned from Samdrup Jongkhar's Climate-SMART LUP, implemented in Phase I.

ii) Enhancing technical expertise in adaptive planning, and implementing Climate-SMART human settlement planning for Urban Planners and relevant SPCR stakeholders. Attention will be given to climate-vulnerable women-led CSMIs, identified in Phase I.

4) Outcomes and Results Framework

A total amount of US $7Million has been proposed for the Investment Phase of the Program from the PPCR. The breakdown of budget is as indicated above, and details of this Investment Component are as follows:

Outcome	Baseline	Project key Results
1. Climate change risks identified in Phase I incorporated into the land use plan proposals of the Samdrup Jongkhar Urban Development Plan.	Findings and recommendations of Phase I activities.	➢ Revised Samdrup Jongkhar Urban Development Plan (& Samptse, Gelephu, Phensoling).Phase I ➢ Climate impacts considerations incorporated into the land use plan proposals of the Plan.
2. Climate-Smart Human Settlements provided with desperately needed hazard-free green and leisure spaces	Findings and recommendations of Phase I activities.	➢ Improved climate-resilient urban services and critical infrastructure. ➢ Increase efficiency and effectiveness of the Thromde management services. ➢ Improved quality of life.
3. Climate-proofed open and green spaces, recreational areas, bicycle lanes and footpaths.	Findings and recommendations of Phase I activities.	➢ Improved climate-resilient open and green spaces, and hazard-free recreational areas, bicycle lanes and footpaths.

4. Informed decision-making in sustainable management of land resources; and implementation of at-risk human settlements, and adaptation solutions.	Findings and recommendations of Phase I activities.	➢ Identified human settlement vulnerable to climate impacts areas attended to wih Climate-SMART LUPs. ➢ Land resources sustainably managed through Climate-SMART LUP.
5. Strengthened Thromde governance, institutional coordination, and human resource capacity (including private sector collaboration from BCCI).	Findings and recommendations of Phase I activities.	➢ Enhanced capacity of the technical team of the central agencies, LGs, policy makers, decision makers in Climate-SMART human settlement planning. ➢ Strengthened institutional collaboration; gender mainstreaming; private sector CSOs/NGOs integration; and youth participation, of Samdrup Jongkhar Thromde and other vulnerable towns.
6. Support of NDC initiative through identification of entry points to incorporate NEC/World Bank's *Computational General Equilibrium (CGE) Model* in Target three Thrombes to test mitigation model.	Findings and recommendations of Phase I activities.	➢ Climate mitigation/adaptation planning capacity using on CGE model enhanced, and benefits for scalability in at least 3 Thrombes. ➢ CSMIs in target Thromdes also engaged/trained.

i) Revision of Samdrupjongkhar Urban Development Plan: The revision of the plan will be outsourced to a consultancy firm/s for which a budget of US $0.15Million has been proposed. Phase I

ii) Detailed design and implementation of climate-resilient urban services (budget will be divided between roads, footpaths, bicycle lanes, storm water drains, water, waste water, solid waste, open and green spaces, recreational areas) for Samdrupjongkhar, Gelephu, Phensoling and Samtse. An estimated cost of US $5.85Million has been proposed for the detailed adaptive design and implementation of climate-proofed infrastructure and municipal services (for roads, footpaths, bicycle lanes, storm water drains, water treatment plants, sewerage treatment plants, solid waste management, parks and recreational areas).

The services and infrastructure will be designed to make them climate-resilient. The estimated budget will also be used for the improvement of the infrastructure and services in Samtse and Gelephu since these areas are very similar to Samdrupjongkhar in terms of location, topography and climatic conditions, and they also need improved services.

iii) Capacity Building (DHS, LG, Private Sector, CSOs, Technical Training Institutes): One of the major focus areas of this Climate-SMART Project is capacity-building of stakeholders across various sectors in the country. Having a climate-resilient city depends a great deal on the technical capacity of the planners, designers and the implementers. Currently, the majority of technical capacity in country lacks the required skills.

Therefore, a budget of US $1.0 Million has been proposed for capacity-building of relevant officials in the central agencies, LGs. CSOs and the private sector [including Bhutan Association of Women Enterprises (BAOWE); and Bhutan Network to Empower Women (BNEW)], and Vocational Training Graduates and lecturers also need to enhance their knowledge and skills in climate-related planning, and will be fully engaged in this Project.

6.0 Implementation Arrangements and Readiness

Investment Component Activities	Implementing Agencies & Beneficiaries
Component 1: Revision of Samdrup Jongkhar Urban Development Plans	DHS (lead), Samdrup Jongkhar Thromde, local communities, CSOs, NGOs, Youth group, Private sectors.
Component 2: Improve the Quality and Safety of Urban Services and Climate-Proof Critical Infrastructure	DHS (lead), Samdrup Jongkhar Thromde, local communities, CSOs, NGOs, Youth group, Private sectors.
Component 3: Enhance the Adaptive Resilience & Livability of Human Settlements	DHS (lead), SamdruP Jongkhar Thromde, NLCS, local communities, CSOs, NGOs, Youth group, Private sectors.
Component 4: Sustainable Management of Land Resources	DHS (lead), Samdrup Jongkhar Thromde, local communities, CSOs, NGOs, Youth group, Private sectors.
Component 5: Strengthening Governance, Institutional Coordination, and Human Resource Capacity (including Private Sector Collaboration)	All relevant agencies, private sectors, CSOs

Monitoring and Evaluation

Monitoring and evaluation will be carried out jointly by the Ministry of Works and Human Settlement in coordination with relevant stakholders which may include, GNHC, World Bank, the BCCI, participating Thromdes; the Bhutan Association of Women Enterprises (BAOWE); and Bhutan Network to Empower Women (BNEW).

It should be noted that the (to-be-completed) NDC will follow the Paris Accord cycle, commencing in 2020 till 2025, about two years into the 12th FYP. With SPCR Preparatory Projects completed in time (mid-2018), inputs from SPCR Preparatory Projects, and partial results from this SPCR Investment Component, will coincide with and support NDC mitigation and adaptation activities in 2020.

Dissemination of Knowledge Products/Lessons Learned

This Investment component shall create a revised climate-oriented Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) Land Use Plan for Samdrup Jongkhar Thrombe. This Plan will then be validated, and measures introduced in Samdrup Jongkhar Thromde will be replicated in other vulnerable Thrombe (township) jurisdictions in southern Bhutan. The Investment will prioritize climate-resilient building codes, with adaptive zoning and public and private infrastructure upgrading to be "climate-proofed."

In addition, the stocktaking of at-risk open green spaces developed in Phase I, will inform the development of desperately needed climate-friendly recreational and leisure green spaces, that will contribute to land conservation and serve as carbon sequestration zones.

To share lessons learned from this Investment, and ensure the strengthened governance, institutional coordination, and human resource capacity of target Thrombe vis a vis Climate-SMART city planning, a series of Township public meetings and inclusive training workshops will be hosted by the Thrombe to raise awareness of the benefits of Climate-SMART urban planning. Private sector stakeholders; women's groups; youth CBOs; LG planners, policy and decision-makers, and engineers/architects will be prioritized for attendance. These participants will provide feedback to Thrombe planners on replicating these KPs in other Thrombes.

Investment 5

Strategic Program for Climate Resilience
Pilot Programme for Climate Resilience (PPCR)

Inter-Woven Component – Strengthening Climate Resilience for Private Sector Intervention
[Led by Gross National Happiness Commission, in collaboration with the Bhutan Chamber of Commerce & Industry)

Investment 5 (Inter-Woven)	*Strengthening climate resilience in Private Sector Interventions*
Principal Implementing Agency	GNHC
Objective of Proposed Activity	To identify realistic and lasting climate-resilient training and solutions to defend CSMI corporate value chains against repeated disruptions from climate hazards; and, bolster CSMI direct involvement in the development of uniquely competitive climate risk management products and services for domestic consumption, and external markets.
Proposed Outputs	1. Evidence of use of NCHM downscaled impact projection models by CSMIs. 2. Reduced risk from a clearer understanding of vulnerability, exposure, and risk to CSMIs assets and value chains. 3. Adaptation-related products and services developed and marketed to support the diversification of local enterprise and strengthen their revenue base as an adaptive capacity benefit. The above outputs will be achieved through an inventory of climate vulnerable CSMIs, including a V&A in the Southern belt; engaging BCCI member firms (especially women-led) in participatory risk management workshops relating to impact projections, climate-proofing value chains, and development and marketing of adaptation services; and, and, certifications/accreditation programs for climate adaptation products and services are expected to be implemented by respective business associations based on participating member company sector needs.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Estimated Level of PPCR Funding	N/A (Inter-Woven throughout SPCR Program Investments)

1.0 Background

1.1 Multidimensional Poverty & Development

1. According to the Mid-Term Review of the 11th FYP (GNHC, 2016), Bhutan has made significant progress in the social and economic development of our country. The 11th FYP objective of "Self-Reliance and Inclusive Green Socio-Economic Development" underpins inclusive development by reducing the national poverty level from 23.2% in 2007 to 12% by 2012 and is on track to reduce multidimensional poverty by 10% in 2018, respectively contributing to the Sustainable Development Goals (SDG) to "End Poverty in all its form everywhere."

2. This was possible due to key pro-poor RGoB initiatives, including The Rural Economy Advancement Program (REAP); National Rehabilitation Program (NRP); and Targeted Household Poverty Program (THPP). The macroeconomic outlook indicates that the economy recovered from slow growth of 2.06% in 2013 to 5.17% in 2014, and stabilization with 5.2% in 2015 (GNHC, 2016).

1.2 Economic Development

3. Since the commencement of planned socio-economic development, Bhutan has witnessed improvement in macroeconomic and human development indicators over the years. The macroeconomic outlook indicates that the economy recovered from slow growth of 2.06% in 2013 to 5.17% in 2014, and stabilization with 5.2% in 2015

(GNHC, 2016). With per capita income of US$ 2,611 (NSB, 2014), Bhutan is categorically placed under the Low Middle Income Group (EDP, 2017).

4. The planned socio-economic development brought significant changes in the structure of economy with a transition from primary sector traditionally based on agriculture to the secondary and tertiary sector- a service-oriented economy (EDP, 2017). This rapid change has been brought about predominantly from public sector development through hydropower projects and financial support from donors. The occupational structure traditional agriculture-based have not changed consistent with GDP trends reflecting jobless growth.

5. Private sector economic growth is guided by the GNH pillars of sustainable socioeconomic growth, promotion of culture and tradition, conservation of the environment and good governance. However, sustainable economic growth through private sector participation remains a challenge. Bhutan's economic growth is largely financed by external aid.

6. The current account deficit is widening, the balance of payment is weak, public debt increases and foreign exchange reserves depletes due to limited exports. Other constraints are; small domestic markets, narrow export markets base, inadequate market infrastructure, high transport costs, low labour productivity, limited access to credits, limited entrepreneurship and management skills.

1.3 Gross National Happiness

7. It is important to note that, as with Bhutan's previous development plans, our primary goal of our upcoming Twelfth Five Year Plan (12th FYP) is the "Maximization of Gross National Happiness." This "Happiness" goal should not in any way be understated or under-estimated as it is the quintessential developmental philosophy of the Royal Government of Bhutan, and as a key pillar of this SPCR. It is undeniably vital to our socio-economic development success.

8. The Bhutan Chamber of Commerce and Industry (BCCI - Chamber) recognizes that the decrease in corporate stress from avoidance of value-chain disruptions attributed to climate hazards would effectively increase the Happiness levels of its membership. The Chamber also tries to promote progressive labour laws to keep member company staff content. It was also clearly suggested that improved profit margins equate to Happiness, as do salary increments for corporate staff.

1.4 Stakeholders For This Private Sector Initiative

9. There are several leading private sector organizations in Bhutan that are expected to be integral players in this SPCR. They include inter-alia: the Bhutan Chamber of Commerce & Industry (BCCI); the Association of Bhutanese Industry (ABI); the Bhutan Association of Women Entrepreneurs (BAOWE); and others. We outline in brief some of these leading privates sector agencies:

Bhutan Chamber of Commerce & Industry (BCCI)

10. BCCI is a trade body that is a profit-oriented entity. It does not have a business license and is governed by the Royal Edict of 1980 supporting Bhutanese industry. It is comprised of an estimated 27,000 licensed businesses, of which about 85% are micro/cottage and small enterprise, and an estimated 65% of those cottage/small enterprise are women-led. There are 10 sectoral Industry Associations in Bhutan, comprised of Industrial Association; Association of Bhutanese Tours Operators (ABTO); Hospital Association; Tourism Association; Handicraft Association; Instruction Association; IT Association; Wood-Based Industry Association; Motion Picture Association; Cable Operator's Association; and, Transport Association.

11. BCCI is represented by 5 regional offices (with 37 staff) and 20 district establishments, each of which is elected by the local membership every 3 years. BCCI's comprised of 10 Executive Committee Members from 10 industry associations. In addition, the Chamber has 5 Regional Executive Committee members from 5 regions, including Gelephu and Phuentsholing (both in the south); Samdrup; Jongkhar; Mongar; and, Thimphu.

12. The Chamber (BCCI) clearly recognizes the need to educate its CSMI membership on ecological preservation; the sustainability of eco-systems & business resource dependency; and, adapting to specific climate risks and hazards commonly impacting member businesses.

13. It was indicated that Bhutan's economy is overwhelmingly reliant on foreign investment and loans and grant financing. This disproportionate reliance on foreign investment justifies the need to build economic resilience within Bhutan's socio-economic development priorities while integrating climate-resilience into policies and practices at the programmatic and operational levels. The private sector can, therefore, play a pivotal role in helping to diversify the national economy, strengthen the gross national product, and incorporate climate-resilient practices throughout its value chain, while creating new lines of climate adaptation products and services for domestic and export markets.

The Association of Bhutanese Industry (ABI)

14. The Association of Bhutanese Industry is among several industry associations in Bhutan. Other Industry Associations include Association of Tourism Operators; Association of Bhutanese Tour Operators (ABTO); Association of Wood-Based Industry; Association of Timber Industry; Contractors Association of Bhutan; Association of Hotels; and others.

15. The ABI has roughly 60 corporate members, mostly located in the Phuentsholing and Pasakha regions of southern Bhutan, where SPCR has a programmatic focus. The Association's predominant focus is on power-intensive businesses, including steal; alloys; calcium and silicon; carbide; and mining (eg. dolomite, gypsum, quartzite - sold for cement and plaster of Paris).

16. ABI was involved in a flood risk reduction project, whereby they prioritized the needs of the private sector. As part of the SPCR, there is a need for ABI member companies to begin to identify their risks associated with climate change extreme events and variability, especially where their value chain is clearly disrupted by climate-induced hazards. It was also suggested that a policy instrument is implemented by the government that decreases the tax burden on those industry sectors that have identified areas of anticipated climate risk to their business infrastructure, ecosystem-dependent resource base, and bottom line.

2.0 Challenges & Justification

2.1 The Economics of Climate Change

17. According to the Asian Development Bank's (ADB) 2014 Report, Assessing the Costs of Climate Change and Adaptation in South Asia, melting glaciers and other climate change-linked extremes pose a serious threat to Bhutan's economy, and could cause annual losses of over 6% of gross domestic product (GDP) by the end of this century.[1]

18. This Report predicts that six countries—Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka—will see an average annual economic loss of 1.8% of their collective GDP by 2050, rising sharply to 8.8% by 2100, if the world continues on its current fossil fuel-intensive path. The Report goes on to say that, without changes to current global behaviour, Bhutan would see an average economic loss equivalent to 1.4% of GDP by 2050, widening sharply to 6.6% by the end of the century. However, if mitigation and adaptation steps are taken, the damage could be limited to around 1.7% by 2100.[2]

19. It was proposed by the Chamber that a Pilot is considered in the SPCR that supports the integration of private sector stakeholders into Bhutan's climate change programs. The Chamber also suggests that a climate-resilient workshop is provided to start-up businesses (especially cottage and micro-industry) to generate new climate-orientated revenue streams.

20. It was agreed that the proposed private sector Preparatory Project would be interwoven into the overall SPCR Program and 5 Investment Components, as a cross-cutting theme, with GNHC as lead. The Chamber, ABI, and the Bhutan Association of Women Entrepreneurs represent private sector interests. This more complex and integrated (inter-woven) approach to privates sector development would avoid a stand-alone SPCR project investment and ensure greater integration of Bhutanese industry in SPCR program activities, outcomes and products.

[1] (2014) Assessing the Costs of Climate Change and Adaptation in South Asia: https://www.adb.org/news/melting-glaciers-climate-extremes-threaten-bhutans-future-report

[2] ibid

2.2 CSMIs and Climate Impacts on Bottom Line

21. Cottage and small industry (CSI),[3] which constitutes over 96% of all licensed industry in Bhutan, continues to grow from 17,364 establishments to 20,143 over the last year (June 2016-May 2017).[4] In 2015, it is estimated that CSIs employed 92,322 people as of May 2017. A cottage industry is defined as a business with a capital investment of less than Nu 1 million, employing 1-4 people. The Department of Cottage and Small Industry (DCSI) Report on CSI indicated that the country's small-scale manufacturing industry is low-tech, and heavily dependent on natural resources, especially forest-related products. It is important to note that there are about 27,000 licensed businesses across the country, of which about 85% are micro/cottage and small enterprise (20,000+), with an estimated 65% of micro/small enterprise women-led.

22. These environment-dependent CSI's are therefore more vulnerable to climate impacts. The Chamber business membership is painfully aware that their value-chains are frequently subject to climate risks, which adversely impact business operations and revenue. This is especially so in the agriculture and tourism sectors, and more so in the southern region of Bhutan.

23. Central Government has identified six key areas of economic growth, that include: (i) Hydropower; (ii) CSMIs; (iii) Mining; (iv) Tourism; (v) Agriculture (TEP); and (vi) Clean Green Industry, that could be targeted for SPCR interventions with industry (EDP 2017). Central Government has also highlighted the need to focus on industry sectors most vulnerable to climate change risks, including the food sector; wood processors; water bottling plants; farming businesses; and rice milling companies, etc.

2.3 Specific Climate Impacts

24. Bhutan is highly exposed to hydro-meteorological hazards such as chronic flooding and extreme flashfloods damaging rural farmlands; frequent landslides and destabilized slopes in human settlements and rural roadsides; climate-induced droughts, water scarcity from groundwater depletion, and consequent food insecurity; and, acute windstorms and greater intensity cyclones destroying cottage industries and critical infrastructure.

25. According to the International Disaster Database, the ten most significant "natural" disasters in Bhutan have all occurred in the last twenty years regarding casualties and number of people affected. Bhutan's SPCR must, therefore, prioritize the incorporation of eco-system-based climate-resilient measures to protect human settlements, critical infrastructure, and at-risk industry - especially in the Southern Dzongkhags where vulnerability and exposure to climate impacts are at their greatest.

26. The industry is at the mercy of frequent extreme weather events continually disrupting value chains and bottom-line. Moreover, with vital market linkages and industry networking between industry producers and consumers (e.g. CBOs, Cooperatives and tourism), any disruption in business chains inevitably disrupts consumer access to products and services.

2.4 Flash Floods, Food Security, and Human Settlements

27. Bhutanese rivers are generally characterized by very steep slopes in the upper catchment areas, which are subject to intense seasonal rainfall and high rates of erosion. As the rivers flow towards the southern foothills, the transition from mountainous areas to flat plains typically occurs and is accompanied by extensive and repeated flooding.

28. Although floods occur in most parts of the country, it is very recurrent in the southern region affecting the people and properties nearby, especially in the rural Dzongkhags and Thromde's of Sarpang, Gelephu, Phuntsholing, Samtse, Dagana and Samdrup Jongkhar. This extreme and repeat flooding generates hazardous debris flows upstream, and deposits these debris flows in the southern plains downstream making human settlements and the precious little arable lands along the river banks considerably vulnerable and exposed. This results in: destroyed crops and food scarcity; damaged critical infrastructure causing a disruption in public services; and consequent disruption of local enterprise value chains and the local economy.

[3] DCSI here does not reference mid-sized companies, hence CSI vs. CSMI.
[4] Kuensel Daily, 14 July 2017; Tshering Dorji

29. Despite concerted RGoB interventions on poverty reduction, reducing multidimensional poverty by 10% by 2018 seems ambitious given: (i) the low level of food security and self-sufficiency from limited cultivable land (2.93% or only 278,000 cultivable acres); (ii) the increased rate of cereal imports from 54,052 tons in 2011 to 79, 375 tons in 2014; (iii) the lack of economic diversification, and private sector development; (iv) income disparity between rich and poor; (v) increasing urban poverty; (vii) a low quality of education; (vii) limited job opportunities for university graduates in the Government, Corporate and Private sectors; (viii) drinking and irrigation water insecurity; (ix) rapid urbanization; and, (x) the slow devolution of power and authority from Central to LGs (GNHC, 2017).

3.0. Project Goal and Specific Objectives

3.1 Project Goal

30. To mainstream climate resilience into Bhutan's private sector to complement the 12th FYP, NDC and Economic Development Policy priorities by developing and implementation of potential investments.

Project Objectives

31. First, through this SPCR, CSMIs identified as moderate-to-high-risk to climate hazards will be supported through training to make their investments and business infrastructure more resilient to expected climate impacts. SPCR will identify realistic and lasting climate-resilient training and solutions to defend CSMI corporate value chains against repeated disruptions from climate hazards.

32. Second, SPCR will Bolster CSMI direct involvement in the development of uniquely competitive climate adaptation products and services for domestic consumption, and external markets. These products and services will be developed, marketed, and exported abroad through a clustered network of local area CSMIs offering more competitive packaged products and services to at-risk clients. This will help to support the diversification of local enterprise, and strengthen their revenue base as an adaptive capacity method.

33. Examples of these business-oriented training workshops may include inter-alia: (i) Conducting climate-oriented EIAs, and designing climate-oriented LUPs; (ii) Offering value-added engineering services that incorporate climate-resilient infrastructure resign protocols in infrastructure engineering projects; (iii) Conducting Portfolio at Risk Assessments for local governments and industry; (iv) Developing sector-based and site-specific hazard-maps and risk assessments for LG and CSMI's; (v) Designing hazard maps for industry sectors, and at-risk eco-systems and downstream critical infrastructure and human settlements; selling Adaptation Bonds.

4.0 Key Indicators and Baseline

Indicators

- Increased number of business entities, CSOs, women-led CSMI in the south using NCHM climate information services to avoid disruptions to their commodity value-chains from the baseline scenario
- Increased number of private sector business that is aware of climate change impacting their business and integrates climate risk management into business management
- Increased number of climate products and services adopted by private sector entities in agriculture, tourism, energy and other green business sectors

Baseline

34. BCCI-led Blueberry cultivation in Gasa, commercial dairy farming in Wongkha, cultivation of kiwi fruit inChukka, and cherry-pepper and asparagus cultivation in Sarpang and pilot cold water fishery farming in Ha. In 2016, training conducted on: marketing and business ethics, Bhutanese culinary preparation and business management, value-chain management, and marketing design and strategy. BCCI also implemented the Green Public Procurement in Bhutan (GPPB) with two major activities: (i) boost public procurement of goods produced by CSMIs; and, (ii) sensitization and awareness on GPPB.

35. BAOWE supports marginalized grassroots societies with gender-based employment to about 70% of its women beneficiaries. BAOWE's works in Chukka, Samtse & Gelephu. In Chukka, the manufacturing of broadleaf-based biodegradable plates and cups provides a green substitute to imported plastics cups and plates. Their green reforestation program in degraded land and eco-friendly wood charcoal production from fast-growing trees is under implementation, in collaboration with the Department of Forest and Park Services (DoFPS).

36. In Gelephu, the popularization of winter vegetable cultivation and marketing by women-led CSMI is under experimentation. To address water scarcity, sourcing Mao river water through pipes and drip irrigation of vegetables and high-value iceberg lettuce is one initiative currently being implemented.

5.0. Anticipated Components and Activities

37. A sectoral and geo-climatic mapping of private sector business opportunities and climate change adaptation would be considered, to ensure that climate-resilience becomes part of the private sector's investment agenda. An independent firm, with multi-sectoral expertise in the private sector and climate adaptation skill, would be recruited to conduct the climate-hazard mapping and to develop the Investment Component in concert with GNHC and BCCI. The private sector will lead this SPCR component, as the government is not in the best position to reflect PPP needs. GNHC would allocate the requisite SPCR funding for these activities. It is important that the SPCR Program focuses primarily rural enterprise and the tourism sector, and possibly energy efficiency issues which speak to NDC priorities.

38. BCCI is involved in the EU-the funded Green Public Procurement in Bhutan (GPPB) Project, to help scope-out public demand for environmentally and socially available goods and infrastructure. Recognizing the important contribution that the Chamber's business members make to food security and rural livelihoods (eg. the cultivation of cherry peppers, blueberries, kiwi fruits, and asparagus, cold water fishery; and, rice production, etc.) their expertise will be beneficial to the SCPR to support climate-resilient cultivation, and adaptive water management and climate-resilient flood prevention practices supporting these business activities.

39. It is recognized that both Bhutan & Tajikistan have a fledgling privates sector, struggling to respond to climate hazards disrupting their value chains: eg. disrupted supply and transport of goods due to landslides and road impasse; unreliable water supply for small industry production processes; risk to local public infrastructure and cottage industry property from flash floods; and, highly vulnerable eco-system based cottage industry and livelihood insecurity. An international mission will be coordinated between both SPCR countries.

40. Examples of potential investments which need to be further elaborated during the Scoping Study may include:

a. Land Reclamation in Gelephu estimated in 5000 acres under SPCR Pillar 3 (Sustainable Growth and Resilient Infrastructure);
b. Cold storage to overcome landslides that disrupt transportation to affect export during summer under SPCR Pillar 2(Preparedness, Food and Water Security)
c. The line of Credit for climate-smart agriculture to Bhutan Development Bank (BDB) under Pillar 2.
d. Drip irrigation in areas where irrigation water is scarce under SPCR Pillar 2.
e. Orange, Cardamom and Apple Resilience against climate change and their pest & diseases under SPCR Pillar 2.
f. The reduced window of high tourist season owing to climate pattern changes (research needed) under SPCR Pillar 3.
g. Strengthening of turbines in power plants that erode quickly owing to more sediment during flash floods under SPCR Pillar 3.
h. Certifications/accreditation programs for climate adaptation products and services implemented by respective business association based on participating member company sectors
i. Provision of climate risk insurance, at moderately raised premiums, to indemillionify co-operative farming entities (and other at-risk industry) at risks from climate perils. Bhutan's World Insurance Corporation and the Bhutan Insurance Limited may be involved.

5.0. Risks and Solutions

Risks	Solutions
1. Limited BCCI/business entities technical capacity on climate-related business knowledge and promotion	1. Training and capacity building on climate-related business ideas, knowledge and exposure visit to Dushanbe Tajikistan
2. Low awareness of business communities on climate-related business and products & services	3. Sensitization workshops on climate-related business knowledge, skills and start-up

6.0 Investment Costing (Estimated Allocation – PPCR)
N/A

7.0 Value-Added/Value For Money Rationale for Investment Component (Phase II)

The private sector outputs will be achieved through investments in training and capacity building of private sector entities in climate-oriented green business and services; sensitization/awareness building workshops; business/entrepreneurship development skills (e.g. business proposal writing); business management/promotion; climate-oriented market products development; packaging; branding Bhutan and marketing.

8.0 Results and Performance Framework

Outcome	Baseline	Project Key Results
1. Climate-hazard mapping identifies levels of vulnerability, exposure, and risk to CSMIs.	Current BCCI & DRM audit of CSMI member firms, and reports of extreme weather risks.	➢ Evidence of use of NCHM downscaled impact projection models for CSMIs. ➢ Reduced risk due to a clearer understanding of vulnerability, exposure, and risk to CSMI assets and value chains.
2. Better informed BCCI and GNHC to formulate V&A Map, based on Phase I stocktaking of CSMI vulnerability to climate impacts.	BCCI & Bhutan Association of Women Entrepreneurs CSMI membership listing.	➢ _ # of CSMI members improved knowledge by vis a vis climate risks.
3. Climate-resilient cultivation, and adaptive water management and climate-resilient flood prevention practices introduced in high-risk areas where CSMIS reside.	Survey of existing CSMIs knowledge; acreage with traditional cultivars; assessment of traditional water management practices.	➢ _ # of acres of non-GMO adaptive cultivars planted and more resilient to projected climate impacts. ➢ Flood prevention practices introduced to _ # of CSMIs.
4. The ability to participate CSMIs to deliver adaptation-related services.	Comparative assessment of BCCI & BAOWE CSMIs interested in providing adaptation business services, versus the number of CSMIs actually participating in SPCR mid-stream.	➢ CRM being provided include: climate risk management services to LGs, and industry; conducting climate-oriented EIAs & LUPs; designing and incorporating climate-adaptive re-design protocols and practices into infrastructure engineering projects; providing CSMI hazard mapping services; conducting portfolio-at-risk assessments of business and host government investments; and, designing hazard maps for industry sectors, and at-risk eco-systems and downstream critical infrastructure and human settlements.
5. Women-led CSMIs make informed decisions on how to safeguard investments made in the food - water-energy nexus through climate-resilient practices.	Comparative assessment of BCCI & BAOWE women-led CSMIs interested in learning about how to safeguard their investments, versus the number of CSMIs actually participating in climate-resilient practices mid-stream. Also, a survey of assets of	➢ $ value of investments protected, particularly in the Central and Rural South.

	participating CSMIs before, mid-stream, and after Programme, especially in relation to SPCR & DRM impact assessments following extreme weather events.	
6. Implementation of Climate-SMART planning practices by participating CSMIs.	Comparative assessment of BCCI & BAOWE women-led CSMIs interested in learning about Climate-SMART business planning and climate change management, versus the number of CSMIs actually participating in climate-resilient practices mid-stream.	➢ _ # of CSMIs, especially in Samdrup Jongkhar Thromde, involved in Climate-SMART planning and climate change management practices to protect their business assets.
7. Certifications/accreditation programs for climate adaptation products and services.	Survey of interested companies.	➢ # of CSMIs and mid-sized firms receive certifications/accreditation programs for climate adaptation products and services.

9.0 Dissemination of Knowledge Products/Lessons Learned

The invaluable lessons learned on climate adaptive knowledge, skills and practice of private sector will be shared both within the business communities and Government Agencies and donors. Internal sharing platform will develop the adaptive capacity to troubleshoot, address, and solve common problems or issues affecting business operations.

As part of BCCI networking alliances, SPCR business results and lessons learned will be widely shared with local & foreign business organizations to mutually benefiting co-operation and development of business ideas in Bhutan and its international partners.

10.0 Implementation Period

11.0 Through an iterative process during the Technical Workshops, it was agreed that the Phase I SPCR Preparatory Projects would commence in September 2017, and continue roughly over a one year period, with completion somewhere between July-December 2018. SPCR Investments would follow suit, commencing in July 2018 through 2023, in alignment with the commencement of the RGoB's 12th FYP in July 2018.

It was pointed out that any new corporate projects proposed by BCCI member companies must pass through the GNHC filter process that relates to GNHC's four Pillars.

Investment 6

Strengthening Capacity for the Development of a Sound Climate Education Programme in Bhutan - led by NEC in collaboration with the Royal University of Bhutan (RUB)
Strategic Program for Climate Resilience
Pilot Programme for Climate Resilience (PPCR)

Investment 6	*Strengthening capacity for the development of a sound climate education program in Bhutan*
Principal Implementing Agency	National Environment Commission
Objective of Proposed Investment Plan	To mainstream environment, climate change, and poverty (ECP) knowledge nationally, through institutionalized education curricula
Proposed Outputs	1. Enhanced and revised curriculum on environment, climate change, and poverty (ECP) within tertiary education sector, with specific focus on Sherubtse College (Trashigang), the College of Science and Technology (Phuntsholing), and Jigme Namgyel Engineering College of Science and Technology. 2. Capacity-Needs Report of participating Colleges Faculties, relevant Civil Service Departments, and LG MRGs. 3. Establishment of ECP teaching and research institute/units. 4. Revised training agenda for Faculty; and revised curriculum of environment, climate change and poverty (ECP). 5. Capacity-building of Faculties, civil service professionals and students on ECP, and climate change projections and impact modeling. 6. Curriculum on Environment, Climate-Resilient & Low-Carbon Development, & Poverty Reduction institutionalized across Faculty & Colleges; in Government Departments; and extended through student practicums in Southern Region The above outputs will be achieved through investments in strengthening climate research facilities in universities, curriculum revision and development as required, enhancement of ICT infrastructure for research purposes, development of capacity and supporting partnerships between universities and relevant agencies such as NCHM, DDM, urban, etc.
Proposed Implementation Period	Five Years (July 2018 – June 2023)
Funding Required (Notional)	US $1.5 Million

1.0 Background

Combating climate change is one of the major challenging issues emerging in Bhutan. Equally challenging is how Bhutan can maintain its declaration of being a carbon-neutral nation in the context of extreme events damaging Bhutan's natural environment. Furthermore, the operationalization of Bhutan's comprehensive NDC presents a significant challenge because of constraints on funding, technology, institutional capacity, and local expertise across all sectors.

There is a sense of urgency in Bhutan in tackling the repeated threats of climate extremes, as they adversely effect Bhutan's long-term development priorities. With a scarcity of established curriculum content on anthropogenic climate change and ecosystem degradation, hydrometeorology, and carbon sequestration issues, etc., the institutional capacity of post-secondary education institutions in Bhutan to generate academic discourse on climate change topics is nominal at best.

Moreover, public institutions and civil society agencies lack the basic knowledge products to advance the climate adaptation agenda within Bhutanese society. This deficiency of knowledge products restricts the overall capacity of the populace to understand the basic principle of climate risk management in their daily lives, and to begin to

respond to those challenges in simple ways that may have a positive cumulative effect on building resiliency within the public domain.

Climate change curriculum has been developed in Shertubtse College and College of Science and Technology from 2016. However, since this subject is new it has been very challenging to both the lecturers and students. Since this is a novel discipline, it has been left as an optional subject. This is of concern as students may not opt for this subject if no proper teaching and guidance is forthcoming from Faculty members and lecturers. Faculty also require a greater appreciation of the fundamental significance of this ECP program, and the climate risks facing Bhutan. Therefore, support is being considered to enhance the capacity of Lecturers and the Faculty to deliver a climate change, environment, and poverty curriculum (ECP) within the University, and across the College system, with participating Colleges.

The Royal Society for the Protection of Nature's (RSPN) major collaboration at present focuses on conservation activities with the Ministry of Agriculture and Forests; and on environmental education with the Ministry of Education. Their major climate change activities have included: development of a Climate Vulnerability Map for Thimphu; participating in a NAPA-financed Climate Vulnerability Assessment for Phobjikha and Kangpara; and some climate change curriculum for schools. The RSPN has completed curriculum for 9th and 10th standards, and will soon embark on curriculum for the 11th and 12th standards. Future priorities of the RSPN relate to sustainable land management and soil conservation.

2.0 Project Goal & Specific Objectives

Goal: The SPCR seeks to develop a robust ECP curriculum plan to mainstream environment, climate change, and poverty reduction through the College Network, under the auspices of the Royal University of Bhutan and the NEC Planning and Mainstreaming Division. It is expected that gender equity and private sector engagement will also be centrally addressed in this investment.

Specific Objectives:

- To enhance and revise the Royal University of Bhutan, and associated College's curriculum to include: environmental sustainability, climate change, and poverty (ECP); with a specific focus on Sherubtse College (Trashigang); the College of Science and Technology (Phuntsholing); and Jigme Namgyel Polytecnic.
- To establish an Academic Centre of Excellence on Climate Change Actions.
- To build capacity on climate change projections and impact modeling, with support from the NCHM.
- To build the overall ECP capacity of University; participating College Faculty Members; the Civil Service (especially Line Ministries and Departments involved in climate-related services and activities); and relevant sectors (Agriculture, CSMIs, Environment).
- To ensure RCSC professionals effectively mainstreaming ECP knowledge in Government investment operations, with improved governance on CRM policies, and strengthened HR capacity to deliver CRM services.
- To provide extensive community-based adaptation capacity-building, supporting the gender equity-enterprise development nexus, through student field practicums that apply their theoretical knowledge of ECP and climate change risk management to real-life risks of climate change on local women-led enterprise, in target vulnerable communities.

3.0 Key and Baseline Indicators

1. Enhanced curriculum on ECP and climate adaptation developed for participating Colleges and Civil Service Departments.
2. Academic Centre of Excellence on Climate Change Actions instituted.
3. Institutional capacity developed (to formulate, teach and apply climate change modeling and downscaled climate impact projection, with students in field).
4. Expertise established for climate projection scenarios modelling.
5. Capacity of Faculty Members to teach and apply climate change science in multiple socio-economic sectors.
6. Improved governance of CRM at the Central and LG levels.

7. Successful mainstreaming of climate change science and climate-resilience knowledge products (eg. impact projection models) applied/trained throughout Central Government; and incorporated in sector-based investments and development plans.
8. Field practicums conducted, to mainstream ECP measures in target communities.

Baseline

The Royal University of Bhutan is the apex body that oversees, guides, supports and assists the functioning of all Colleges in Bhutan. Few colleges, such as Sherubtse College, College of Science and Technology, College of Natural Resources, and Jigme Namgyel Polytecnic have started subjects or research on ECP and climate change.

Moreover, there has been very slow progress in establishing quality climate change data, research, and teaching practices in:

- In climate change and impacts, adaptations at community level.
- Multi-stakeholder training courses, domestic and international study tours, field vulnerability assessments, and visits of scientists from International Centers of Excellence.

5.0. Risks and Solutions

Risks	**Solutions**
Risk 1: Limited collaboration between RUB/colleges, NEC and GNHC	Solution 1: GNHC and NEC collaborate with RUB/colleges on curriculum development, and teaching and research modalities.
Risk 2: RUB lacks budget and technical support.	Solution 2: GNHC to provide budgetary and technical support to mainstream ECP, and gender integration through SPCR and line Ministry technical support.

6.0. Investment Costing (Notional Allocation – PPCR)

Component	PPCR Support (USD Million)	IDA (USD Million)	RGoB Contribution (USD Million)	Other International Cooperation Sources	Project total (USD Million)
Academic Centre of Excellence on Climate Change Actions instituted.	0.4				0.4
Enhancing capacity of Faculty Members; relevant sectors engaged in climate change study actions.	0.1				0.1
Institutional Strengthening; Mainstreaming Impact Projections; Raising Awareness for Grassroots (Gewogs and Chiwogs) End-Users	0.2				0.2
Curriculum development publications/knowledge products/tailored training materials	0.2				0.2
Adaptation Field Practicums by Students and Civil Servants with LGs & CSMIs	0.5				0.5
Project Management	0.1				0.1
Total:	1.5				1.5

Value-Added/Value For Money Rationale for Investment Component (Phase II)

Component 6: NEC Investment Rationale

US $1.5Million is required for the institutional revision of climate-resilient knowledge and skills, and full integration of ECP curriculum within Bhutan's tertiary education sector. This value was calculated in consultation between the NEC Climate Change Team, the Royal University of Bhutan stakeholders and College Network Focals. Core outputs/activities include:

i) Introducing a full suite of curriculum units relating to environmental issues, climate change adaptation (& mitigation) learning/practices, and poverty reduction theory and policy in teaching and research activities.

ii) Building institutional capacity on climate change projections and impact modeling with NCHM's support; incorporating learning modules on community-based adaptation capacity-building, and on Climate-SMART urban planning; and, supporting the capacity of the MRG to spearhead the mainstreaming of ECP issues in national and local development plans and programs.

iii) Integrating gender equity and private sector engagement in the ECP curriculum, and especially through student (and Civil Service professionals) practicums to be conducted in the south with vulnerable Dzongkhag communities and women-led CSMIs.

7.0. Results and Performance Framework

Outcome	Baseline	Project Key Results
1. Environment, Climate Change and Poverty (ECP) curriculum developed and instituted in degree courses in the Royal University of Bhutan and its colleges.	Climate change is an optional subject in Sherubtse College; regular in the college of Natural Resources, Wangdue; same in Jigme Namgyel Polytecnic.	Improved teaching and research curriculum on Environment, Climate Change and Poverty Reduction in all participating Colleges.
2. Climate change research centre/units instituted in selected colleges with increased capacity and research on climate change impact modelling and down-scaling.	Current College curriculum.	Established capacity and research on climate change impact modelling and down-scaling.
3. Improved HR capacity via tailored training of Faculty, students, and Civil Service Department professionals on ECP.	Limited qualified lecturers and Government profersionals on ECP.	X # of Faculty members teaching ECP Student's enrollment and participation (esp. women) increased by at least 30% from baseline (2017). # of Civil Service proferssionals trained as meteorologists, hydrologists and hydro-geologists.
4. ECP Awareness of Grassroots (Gewogs and Chiwogs) end-Users created/heightened.	Low level of awareness	20 Gewogs and 20 Chiwogs participate in, and benefit from ECP and climate-resilient actions.
5. Climate-resilient capacity for mainstreaming climate change, gender and poverty in development planning across multi-sectors.	Reference Group members supporting mainstreaming of climate change into sector policy, plans and programmes.	Mainstreaming of evidence-based ECP policy into national, sectoral and LG plans, programs and projects.
6. ECP Curriculum development activities help operationalize MRG Strategic Work Plans, and strengthen institutional coordination.	Current activity of MRG Strategic Work Plans	Mainstreaming of climate change, environment, poverty reduction, gender and disaster management into target Dzongkhg Plans and Programmes.

Operationalization of MRG Strategic Work Plans. While the Local Level Mainstreaming Reference Group has been formed in all the twenty Dzongkhags, no capacity-building has yet taken place. The MRGs have shown great interest to undertake work, but because of a lack of expertise, they have not been able to operationalize their mandate. It is important to build the capacity of these MRGs, and to establish strong MRGs as fully functional entities in their respective Dzongkhags.

Through this Investment Component, SPCR will facilitate the operationalization of the MRG Strategic Work Plans though ECP Curriculum development activities, both in the target educational institutions, and through field work practicums directly with target Dzongkhags.

National Implementing Agency: National Environment Commission Secretariat (NECS)
Project Beneficiary(ies): College Network, under auspices of Royal University of Bhutan (RUB)

8.0 Dissemination of Knowledge Products/Lessons Learned

This Investment Component seeks to mainstream the National Environment, Climate Change, & Poverty (ECP) within the Post-Secondary Network, with a specific focus on Sherubtse College (Trashigang), the College of Science and Technology (Phuntsholing), and and Jigme Namgyel Polytecnic; and the Royal Civil Service Commission.

To do this, climate change research centre/units will be instituted in select colleges, with increased capacity and research on climate change modelling and down-scaling. Climate change science and policy curriculum will also developed through degree courses at the Royal University of Bhutan and its colleges.

Students ECP and climate risk management knowledge (lessons learned) acquired through this College Program will be confirmed through real-life field practicums in vulnerable target communities, supporting the gender equity-enterprise development nexus. Moreover, Royal Civil Service Commission professionals will also be trained in ECP degree courses as meteorologists, hydrologists and hydro-geologists; and are expected to mainstream this ECP knowledge in Government investment operations (eg. evidence-based ECP policy into national, and sectoral and LG plans and projects), ensuring improved governance on CRM policies, and strengthened Government HR capacity to deliver CRM services.

ECP Curriculum development activities help also help operationalize MRG Strategic Work Plans, and strengthen institutional coordination across Government. Moreover, through NEC and RUB leads, the College will conduct NEC awareness-raising events for Grassroots (Gewogs and Chiwogs) end-users to ensure community acquisition of ECP and climate-resilient approaches.

ANNEX 2. PROJECT PREPARATION GRANT REQUEST

PILOT PROGRAM FOR CLIMATE RESILIENCE **Project/Program Preparation Grant Request**[5]			
1. **Country/Region**:	Royal Government of Bhutan	2. **CIF Project ID#**:	(Trustee will assign ID)
3. **Project Name:**	Reinforcing Bhutan's SPCR Programmatic Approach to Climate-Resilient Investments		
4. **Tentative Funding Request (in USD million total) for Project[6] at the time of SPCR submission (concept stage):**	Loan: n/a	Grant: **US $55.65million**	
5. Preparation Grant Request (in USD million):	US $2,002,000	MDB lead: World Bank	
6. **National Project Focal Point**:	Dasho Thinley Namgyel, Secretary, Gross National Happiness Commission Secretariat (GNHC-S), Royal Government of Bhutan, P.O; Box 127, Tashichho Dzong, Thimphu, Bhutan Tel.; +975 2 325192/325850; Fax.; +975 02 322928 E-mail: tnamgyel@gnhc.gov.bt		
7. **National Implementing Agency (project/program):**	**Coordination, Executing Agency & Fund Manager:** Gross National Happiness Commission Secretariat (GNHC-S) **SPCR Program Management Unit (PMU):** GNHC-S **Supporting Implementing Agency(ies) for Investments:** **Investment 1**: National Centre for Hydrology and Meteorology (NCHM), **Investment 2**:Watershed Management Division (WMD), Department of Forest and Park Services, Ministry of Agriculture and Forests **Investment 3:** Department of Engineering Services (FEMD), Ministry of Works and Human Settlement **Investment 4:** Department of Human Settlement (DHS), Ministry of Works and Human Settlement		
8. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point:* World Bank: Kanta Kumari Rigaud	*TTL:* World Bank Bhutan Resident Mission: Dechen Tshering	

9. **Description of activities covered by the preparation grant:**

Please note that the RGoB (GNHC) has made strident efforts to design and maintain a programmatic SPCR approach to ensure operational cohesion, cross-learning between the 6 Investments (Private Sector -interwoven), transferable Knowledge Products, and maximized budget efficiencies between investments, effectively reducing overall transaction costs.

Although the original intent of the Project Preparation Grant (PPG) was designed to bolster preparation efforts, by investments, toward Phase II investment activities, RGoB believes that a PPG Project approach would defeat the spirit and intent of the SPCR, which is expected to be programmatic. Therefore, out of these 6 investments put forward in the SPCR, the RGoB proposes to request for a PPG for the first 4 Investments, which are closely interlinked. RGoB include a *PPG Investment Summary Table*, below.

[5] Although normally a separate template is presented for each project and program preparation grant request listed in the SPCR, RGoB is herby submitting the PPG as a programmatic application to reflect the same approach in the SPCR. See Section 9 Description.

[6] Including the preparation grant request.

10. **Outputs:**

Deliverable	**Timeline**
See attached	All PPG deliverables are expected to be completed between July 2018 to December of 2019 coinciding with the 12th Five Year Plan commencing July 2018.

11. **Budget (indicative):**

Expenditures[7]	**Amount (USD) -** estimates
Consultants	850,000
Equipment	
Workshops/seminars	570,000
Travel/transportation	250,000
Others (admin costs/operational costs)	150,000
Contingencies (max. 10%)	182,000
Total Cost	**2,002,000**
Other contributions:	
• Government	**US $99.291 million**
• MDB	
• Private Sector	
• Others (please specify)	

12. **Timeframe** (tentative)

Submission of pre-appraisal document for PPCR Sub-Committee Approval: 10 November 2017
Expected Board/MDB Management[8] approval date: December 2017

13. **Other Partners involved in project design and implementation**[9]:

National: NCHM, WMD, FEMD, DHS, Bhutan Chamber of Industry & Commerce (BCCI), National Commission for Women & Children (NCWC), National Environment Commission (NEC) & Royal University of Bhutan (RUB), the Mainstreaming Reference Group (MRG) and Local Government (Dzongkhags, Thromdes, Gewogs), and World Bank.

International: Counterpart SPCR IAs in Tajikistan; SPCR Focals in Nepal, Bangladesh.

14. **If applicable, explanation for why the grant is MDB executed:**

This PPG will be executed by the GNHC-S as the PPCR Focal, and coordination agency for all national level planning, coordination and monitoring of policies, programs and projects.

[7] These expenditure categories may be adjusted during project preparation according to emerging needs.
[8] In some cases activities will not require MDB Board approval
[9] Other local, national and international partners expected to be involved in design and implementation of the project.

15. **Implementation Arrangements** (incl. procurement of goods and services)**:**

The proposed grant will be channeled as a client executed project in discussion with relevant MDBs and executed by the GNHC-S SPCR PMU (now operational) in collaboration with the lead Technical Agencies.

A grant agreement will be signed between the relevant MDB and the RGoB, with GNHC as the main implementing agency. The same implementation model that is being used for the ongoing preparatory SPCR phase will be replicated during the implementation of the PPG where GNHC will take the lead role to coordinate and contract agreement will be put in place between GNHC and the lead Technical Agencies to carry out the preparatory works.

Relevant CSOs, CSMIs, the Mainstreaming Reference Group (MRG), and target Dzongkhags, Thrombes, Gewogs will work closely with GNHC-S as executing agency, as the 12th Five Year Plan is highly decentralized toward Local Government ownership and bottom-up operationalization of country transfer payments. This implementation "from Below" of SPCR resources will guarantee the maximization of community stakeholder participation and engagement, and strong GESI and CSMI integration in proposed Investment activities proposed under this grant.

The PPG will follow the required fiduciary rules and regulations based on the requirement of the RGoB and the MDB.

16. **Description of Activities Covered by the grant preparation:**

The overall objective of this PPG Program is to carry out detailed preparation of the proposed Investments based on the findings from the ongoing technical studies.

The PPG will support (i) detailed design of projects, (ii) conduct detailed field consultations with target groups, (iii) identification of exact locations for interventions of the project activities, (iv) prepare environemt and social management frameworks and plans through detailed consultations, (v) preparation of technical designs, (vi) preparation of Terms of References for implementation of the projects and, (vii) prepare technical specification for procurement of equipment.

The above activities will be conducted through procurement of consultants, workshops and consultations. Some of the activities will be carried out inhouse depending on the capacity of the Lead Technical Agencies. The activities will also involve intensive travel within the country as well as ex-country travel for capacity building.

This "Programmatic" Preparation Grant will be used to conduct the above activities. The cost break up of the use of the fund will be as contained in the Table below.
(All cost in US$)

Lead Technical Agencies	**Consultant**	**Workshops and Seminars**	**Transportation**	**ADMs cost**	**Contingency**	**Total**
National Center for Hydrology and Metereology	150,000	120,000	50,000	30,000	35,000	385,000
Watershed Management Division	150,000	120,000	50,000	30,000	35,000	385,000
Flood Engineering and Management Division	250,000	120,000	50,000	30,000	45,000	495,000
Department of Humand Settlement	200,000	120,000	50,000	30,000	40,000	440,000
Gross National Happiness Commission secretariat	100,000	90,000	50,000	30,000	27,000	297,000
Total	850,000	570,000	250,000	150,000	182,000	**2,002,000**

Adaptation Strategies & Plans

1. Second National Communication Project

GEF Contribution: USD 405,000
Project Duration: 2007- 2009
Implementing Agency: National Environment Commission

The Second National Communication project from 2007-2009 supported the National Environment Commission Green House Gas Inventory and other climate change adaptation and mitigation interventions to fulfill the international commitment under the UNFCCC.

Global Environmental Management in Bhutan's Local Governance
GEF Contribution: USD 475,000
Bilateral Contribution: USD 53,846
DANIDA Contribution: USD 317,690
RGoB Contribution: USD 168,846 (In-kind)
Total Budget: USD 1,040,382
Project Duration: 2008- 2011
Implementing Agency: National Environment Commission

Brief Project Description
The key objective of the project is to support enhancing global environmental management through mainstreaming the provisions of the RIO Conventions into enhanced decentralized environmental management. The main intervention of the project includes a) strengthening central-level framework to enhance decentralized capacity for environmental management and implementation of the provisions of the 3 RIO Conventions; b) ensuring decentralized institutional framework and personnel to enhance local environmental management, which include implementation of the Rio Conventions' provisions; and c) strengthening existing Environmental Information Management System to backstop national policy and decision making in response to global environmental management needs as per the provisions of the Rio Conventions.

2. National Adaptation Programme of Action (NAPA) 2006

Brief Project Description
The NEC coordinates the implementation of National Adaptation Programme of Action (NAPA II) project on "Addressing the risks of climate induced disasters through enhanced national and local capacity for effective actions" from 2014-2018. Bhutan's National Adaptation Programme of Action (NAPA) was prepared and finalized in 2006 in response to the decision by the seventh session of the Conference of the Parties (COP7) of the United Nations Framework on Climate Change (UNFCCC) on the Least Development Countries (LDC) Work Program (NEC, 2012).

The nine identified priority adaptation projects in NAPA 2006 were: 1) Disaster Management Strategy-planning for food security and emergency medicine to vulnerable communities; 2) Artificial Lowering of Thorthormi Lake; 3) Weather Forecasting System to Serve Farmers and Agriculture; 4) Landslide Management and Flood Prevention in critical areas; 5) Flood Prevention of Downstream Industrial and Agricultural Areas; 6) Rain Water Harvesting; 7) GLOF Hazard Zoning (Pilot-scheme Chamkhar Chu Basin); 8) Installation of Early Warning System in Po Chu Basin; and 9) Promote Community-Based Forest Fire Management and Prevention.

Due to fund limitations, Bhutan implemented only 3 out of its 9 NAPA projects under the LDCF funded project on Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar valleys.

Updated National Adaptation Programme of Action (NAPA) 2012

Brief Project Description
Since 2006, other climate risks and vulnerabilities (windstorms, cyclones) emerged and necessitate revisiting the priority activities identified in NAPA 2006 including a revisit of estimated costs. The updated NAPA 2012 was developed through a series of consultation and analysis of the proposed options involving multi sectoral task force from various sectors.

Based on the consultations, 8 priority projects were identified as follows; 1) Landslide Management and Flood Prevention; 2) Disaster Risk Reduction and Management- planning disaster management interventions and providing emergency medical services to vulnerable communities; 3) Enhancing National Capacity in Weather Stations and Seasonal Forecasting in Bhutan; 4) Application of Climate Resilient and Environment Friendly Road Construction (EFRC) Nationwide; 5) Community-based Food Security and Climate Resilience; 6) Flood Protection of Downstream Industrial Areas; 7) Rainwater Harvesting and Drought Adaptation and, 8) Community-Based Forest Fire Management and Prevention.

Climate Adaptation Project Investments

Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar Valleys

GEF Contribution: USD 3,445,050
RGoB contribution: USD 2,680,000 (in-kind)
UNDP contribution: USD 396,224
Austria: USD 800,000
WWF: USD 30,000
Total Budget: USD 7,351,274
Project Duration: April 2008 – March 2012
Implementing Agency: Department of Geology & Mines, MoEA

Brief Project Description

The 3 projects on Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar valleys was funded by the LDCF (US$ 3.4 million) with co-financing from the RGoB, UNDP, Austrian Development Agency(ADC), and the World Wildlife Fund (WWF) Bhutan. The project was implemented in 2008 for a period of 5 years.

The project improved national, regional and local capacities by institutionalizing disaster and climate risk management, GLOF hazard mapping in critical areas; GLOF and floods hazards awareness creation, GLOF risks from Thorthormi Lake reduced successfully by lowering the water level artificially, human and property losses of vulnerable communities reduced by establishing a functional early warning systems and knowledge shared on lessons learned and up scalability.

The remaining 6 projects were also implemented to varying degrees with funds from the UNDP and RGoB. The National Disaster Risk Management Framework (NDRMF) was prepared and approved by the Government and the Disaster Management Bill passed by the National Assembly in 2012 and Health Sector Emergency Contingency Plan with support from WHO and GEF.

The Weather Forecasting System to serve Farmers and Agriculture has been enhanced with the institutionalization of the National Centre for Hydrology and Meteorology Services (NCHM) under the MoEA.

The Land Management and Flood Prevention schemes were piloted with the communities in Ramjar, Chaskar and Khaling in eastern Bhutan through the Sustainable Land Management Project (SLMP) funded by GEF/World Bank under the UNCCD Framework and landslide mitigation of critical road Riju-Rangjung Highways by the MoWHS adopting environmental-friendly road construction techniques (EFRC).

These interventions demonstrate that communities benefit from landslide and flood prevention and control adaptation measures. Flood protection of downstream industrial and agricultural areas has been achieved successfully at Pasakha. Rainwater harvesting has been piloted in Gelephu in the south, Dremetse and Bartsham Geog in eastern Bhutan with financial assistance from GEF Small Grants Program (SGP) including Kengkhar, Jurmi and Kilikhar in eastern Bhutan with successful harvesting and use of rainwater for irrigation.

The Department of Forest and Park Services under the Ministry of Agriculture and Forests (MoAF) implemented the Community-Based Forest Fire management with funds from GEF SGP, Bhutan Trust Fund for Environmental Conservation (BTFEC) and capacitated foresters and communities on forest fires knowledge and combating techniques in collaboration with US Forest Service, University of Montana and Ugyen Wangchuck Institute for Conservation and Environment (UWICE).

Sustainable Land Management Practices

GEF Contribution: USD 7.66 m
RGoB Contribution: USD 1.51 m
Local Communities: USD 0.95 m (in-kind)
Danida Contribution: USD 5.77 m
Total Budget: USD 15.89 m
Project Duration: March 2006 – December 2012
Implementing Agency: National Soil Service Centre, MoAF

Brief Project Description
The key objective of the project is to strengthen institutional and community capacities in managing land degradation and rehabilitate degraded land in Bhutan through the uptake and adoption of sustainable land management technologies and practices. The project was piloted in three Dzongkhags namely Trashigang, Zhemgang and Chukha. The key interventions under the project includes land terracing, development of stone contour bunds, fodder development, promotion of cover crops, construction of check dams and dairy sheds and capacity building of the beneficiaries.

Building Capacity & Mainstreaming Sustainable Land Management in Bhutan
GEF Contribution: USD 500,000
RGoB contribution: USD 350,000(in-kind)
AMEPP contribution: USD 50,000
UNDP Contribution: USD 15,000
Total Budget: USD 1000,000
Project Duration: 2007 – 2009
Implementing Agency: National Soil Service Centre, MOAF.

Brief Project Description
The primary objective of the project is to build and enhance institutional capacities including that of civil societies and user groups in applying and up-taking sustainable land management technologies and practices. The project also intends to mainstream sustainable land management practices into public policies and plans.

European Union (EU) Global Climate Change Alliance (GCCA)
Brief Project Description
The assistance of GCCA in Bhutan embarked with a grant support of Euro 4.397 aiming to enhance resilience of Bhutan's rural households to the impacts of climate change and natural variability and to ensure to put in place climate change readiness within RNR sector of Bhutan through mainstreaming climate change into the sector. It also intends to put in place required steps and measures towards increasingly addressing climate change in multi-sectoral and faceted manner. Under GCCA support, the RNR sector is expected to enhance resilience of rural households across all major watersheds of the Country. However, to begin with, the GCCA is targeting its intervention in the critical watershed of Kurichu River Basin. As of August 3, 2015 the RGoB received EUR 1.5 million under GCCA.

The Global Climate Change Alliance–Climate Change Adaptation in the Renewable Natural Resources Sector is an EU financed project with a total budget of Euro 4.397 million (EUR 0.797 million – Contribution from the Republic of Estonia). The project covers four Dzongkhags; Lhuentse, Mongar, Pemagatshel & Zhemgang encompassing 44 Geogs with 16,023 households. Various climate-resilient activities under the MoAF are being implemented by agriculture, livestock and forestry sectors.

High Altitude Northern Areas (HANAS).
GEF Contribution: USD 4.080 million (The GEF support is through GEF 5 Trust Fund/ STAR Allocation)
Project duration: 2010-2014
Implementing Agency: MoAF

Brief Project Description
The primary objective of the project is to enhance conservation management of the High Altitude Northern Areas (HANAS) landscapes. Broadly, the project has three components. Component one with fund of USD 0.800 million supports BTFEC to build and strengthen its institutional capacity and prepare in becoming one of the accredited GEF implementing agencies. Component two has fund allocation of USD 2.840 million and supports the HANAS landscape in terms of environmental conservation and enhancement of rural livelihood. Component three with fund allocation of USD 0.440 million intends to mainstream conservation and sustainable forest and natural resource management approaches into national polices and plans.

The project is expected to be completed by 2014, however for un-avoidable reasons, failed to meet this timeline. The current status of the project is component I and III and four projects out of eight projects under component II are under implementation. The remaining four projects of Component II are still under design and review.

During the GEF 5 cycle under STAR allocation, RGoB received a grant support of USD 4.880 million of which USD 4.080 has been allocated to the HANAS project, and the remainder of USD 0.80 million allocated to Small Grants Program (SGP).

For the GEF 5 project, BTFEC is the Coordinating Agency /Grantee Institution while the World Bank is the GEF Implementing Agency.

REDD+ Readiness Progamme

Brief Project Description

REDD+ Readiness Programme in Bhutan commenced in 2010 with support from the UN-REDD Programme. Several seminars and workshops were conducted to communicate REDD+ awareness and capacity building of national and LG and communities. The Watershed Management Division (WMD) of the DoFPS conducted a scoping study prepared REDD+ Readiness Roadmap with financial support from UNDP, UNEP, and FAO.

The REDD+ Readiness Project with a grant of US$ 3.8 million from FCPF window, World Bank is under implementation. As part of the progress towards developing REDD+ National Strategy and Action Plan, stakeholder engagement guidelines, corruption risk assessment, country approach to safeguards, and national forest inventories have been completed. Currently, identification of drivers of deforestation and forest degradation, forest reference emission level (FREL), quantification and valuation of ecosystem services, monitoring, reporting and verification (MRV), benefit-sharing mechanism, fund mobilization and grievance redress mechanism, social and environmental strategic assessment (SESA), environment and social management framework (ESMF), and safeguard information management system (SIS) is underway for implementation.

IFI and UN-Led Climate Resilience Activities

United Nations Development Programme (UNDP)

Brief Project Description

The UNDP supported implementation of 3 priority projects under the Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar valleys.

The remaining 6 projects were also implemented to varying degrees with funds from the UNDP and RGoB.

GEF- Small Grant Progamme

Brief Project Description

The SGP was established in 1992 coinciding with the year of Rio Earth Summit. It supports projects that conserve environment while enhancing people's well-being and livelihood. One of the unique features of SGP is it provides direct funding to the local communities in implementing projects that make a significant difference to their lives and global environment benefits. SGP is funded by GEF as a corporate program, implemented and managed by UNDP on behalf of GEF and executed by the United Nations Office for Project Services (UNOPS).

The GEF-SGP under UNDP in Bhutan was launched in October, 1998. It has to date supported over 130 projects covering the GEF focal areas of biodiversity conservation, climate change and land degradation and demonstrated concrete successful results on the ground. Recognizing the SGP's contribution particularly to the local communities and global environmental benefit at large, RGoB during the GEF 5 cycle, provided USD 0.80 million from its share of GEF STAR allocation to SGP. Currently, there are over 55 on-going SGP projects spread across the country.

United Nations Environment Programme (UNEP)

Brief Project Description

The first support of UNEP to Bhutan dates back to the late nineties with an assistance to a project titled: "Strengthening Environmental Assessment and Management Capabilities in Asia Pacific" (SEAMCAP). Since then, UNEP became one of the prominent donors in the field of environment. Bhutan is also party to several environmental conventions, hosted by the UNEP. Bhutan is party to the Convention on the Biological Diversity, Cartagena Protocol of Bio-safety of CBD, International Trade in Endangered Species of Wild Fauna and Flora, Basel Convention on the Trans-boundary Movement of Hazardous Wastes and their Disposal, the Vienna Convention for Protection of Ozone Layer and Montreal Protocol on Substance depleting Ozone Layer.

The UNEP supports environmental activities including climate resilience in Bhutan. UNEP's grants to Bhutan starting from 2010 to 2015, totaling US $585,500. The major programs and projects implemented include revision of the NBSAP and development of 5th National Report to CBD, implementation of HCFC Climate-SMART Management Plan, technology needs assessment and support to LG sustainable development program to mainstream the crosscutting issues of environment, climate change, poverty, gender and disaster risk reduction into policies and practices. Besides direct project support, UNEP also channeled resources to the RGoB through the United Nations Development Assistance Framework (2008-2012) to support MDG 7 & UNDAF Outcome 5 in strengthening national capacity for environmental sustainability and disaster management.

GEF TRUST Fund (GEF 6 cycle)
GEF/Trust Fund Contribution: USD 5 million approximately
Project duration: 2014-2018
Tentative Implementing Agency: LGs, MoAF & MoIC

Brief Project Description
With the help of the Implementing Agency, UNDP, we have begun the ground works of GEF 6 programming. The detailed PIF preparation will begin once we receive NPFE fund. The GEF 6 will primarily focus on alternate modes of transport, including electric vehicles, reducing threats to biodiversity and making rural livelihoods resilient to climate risks, and up-scaling of sustainable land management practices.

Considering the merits of innovative landscape level approach and based on the government's directive, LDCF project proposal of sustainable agriculture/ climate-resilient village has been merged with GEF 6 project component of biodiversity, land degradation and sustainable forest management. The integrated PIF for these combined projects been submitted to GEF Secretariat on 24th July, 2015 for discussion and approval by October, 2015 GEF Council Meeting.

LDCF
Addressing the Risk of Climate-induced Disasters through enhanced National and Local Capacity for Effective Actions (NAPA II Project)
GEF/LDCF Contribution: USD 11.491 million
Project duration: 2014-2017
Implementing Agency: MoEA, MoWHS, MoHCA, MoAF, Mongar –
Municipality, Phuntsholing Thromde & Tarayana Foundation

Brief Project Description
The project is designed to respond to the immediate and urgent climate change adaptation needs prioritized in NAPA, published in 2006. The main objective of the project is to enhance national, local and community capacities to prepare for and respond to climate-induced multi-hazards and thereby reduce potential losses of human lives, national economic infrastructure, livelihoods and livelihood assets.

The key project interventions include putting in place effective measures to reduce flood and landslide risks in Phuntsholing and Pasakha Industrial Estate, building community resilience by designing and building systems for water harvesting, storage and distribution in selected villages and improving the quality, analysis and dissemination of climate information on a timely and reliable manner to respond to extreme weather events.

The project is ready to kick- start and its first inception workshop to approve the AWP of each Implementing Partner will be held sometime in June 2014. The project is also the World's largest climate change adaptation project under LDC Fund.

Global Agriculture Food Security Program (GAFSP)
Brief Project Description
This $8Million GAFSP-funded Food Security and Agricultural Productivity Project (FSAPP) will be implemented over five years (2017-2022), and will support Bhutan's efforts to reduce rural poverty, food insecurity, and malnutrition. The project seeks to address multiple problems faced by farmers and rural households through a set of integrated, consolidated, and area-specific interventions responding to local constraint and opportunities.

Specific interventions include strengthening farmers' groups and building their technical and business capacities; increasing the productivity of food and high-value crops through water use efficiency and improved agri-inputs and

technologies, and enhancing access to markets for farmers through post-harvest and market infrastructure support and linkages to domestic and export markets.

NGO & CSO-Led Climate Resilience-Activities
Bhutan Trust Fund for Environmental Conservation (BTFEC)

Brief Project Description
The BTFEC was created in 1992 under a Royal Charter as an NGO with the objective to promote social welfare through environment conservation. The initial capital of the BTFEC was USD 21 million raised from various multilateral and bilateral donors. As per the Royal Charter 1996, the Trust Fund is managed by a Management Board which in turn is supported by a Technical Appraisal Committee (TAP) that reviews the project proposals technically prior to the Management Board's approval. The Management Board is also supported by another Committee: Assessment Management Committee, mandated to guide and advise the Management Board on any matters relating to the fund management of the trust fund.

The Management Board consists of 6 members, representing members from the Royal Government of Bhutan (RGoB), private sectors and Non-Governmental Organizations. The Chairperson of the Management Board is selected by consensus among the RGoB member representatives while the Director of the BTFEC is an ex-officio Members.

The Bhutan Trust Fund for Environmental Conservation (BTFEC) focuses its program and projects on climate change adaptation strategies and interventions, awareness and educational program, green sector projects, rural and community development projects and promoting integrated water resource management. The total completed and on-going BTFEC support amounts to Nu. 564 million (GNHC, 2017). Currently, it has a total of 27 ongoing projects with an investment of Nu.13.5 million.

Annually, BTFEC's assistance to RGoB totals to, on average of USD 1.5 million to USD 1.8 million. Given the BTFEC's long history and considerable experience in the field of nature conservation and social welfare projects, the RGoB has designated BTFEC as a potential candidate to become GEF Implementing Agency for Bhutan. Accreditation in this regard is underway. The RGoB has also recently recommended BTECF as its potential candidate in becoming Green Climate Fund (GCF) Implementing Entity, to GCF.

With a view to accommodate these new developments, refocus programs and funding objectives, increase funding support and maximize investment returns from it, improve organizational performance and effectiveness and strengthen project management and delivery, BTECF is in the process of developing its Strategic Plan.

World Wildlife Fund (WWF Bhutan)
Brief Project Description
The WWF Bhutan in collaboration with Government agencies particularly the DoFPS of the MoAF supports implementation of number of climate mitigation and adaptation programs and activities on biodiversity conservation for building resilience in protected areas. From 2008-2015, WWF Bhutan financial support to RGoB amounted to Nu.160 million (GNHC, 2017). The longer-term strategy focuses on education, climate change monitoring and adaptation, the creation of conservation areas, developing human resource capacity and sustainable financing for protected areas.

In the 12th FYP (2018-2023), WWF Bhutan will expand its conservation programs to cover sustainable forest management, community forestry and protection of terrestrial and freshwater ecosystems for sustainable livelihoods. Bhutan for Life initiative is an innovative long-term mechanism for sustainable financing of the protected areas in Bhutan.

Centre for Integrated Mountain Development (ICIMOD)
Brief Project Description
The International Centre for Integrated Mountain Development (ICIMOD) supported climate mitigation and resilience activities such as black carbon monitoring, Rural Livelihoods & Climate Change Adaptation in the Himalayas, Establishment of Bhutan Climate Observatory to monitor the Atmospheric Pollutants and Cryosphere Monitoring Programme with relevant stakeholders with an investment of US$ 2,578,550.

Bilateral-Supported Climate-Resilience Activities

Government of Finland
The Government of Finland supported BTFEC, RSPN and NCHM with a trust, an endowment fund and strengthening of hydro-meteorological services, respectively.

Government of Netherlands
The Government of Netherlands supported projects in agriculture, renewable energy and water through SNV, 4 pilot projects, 11 bilateral projects and 5 trilateral projects with a total investment cost of US$ 11.7 million.

Swiss Development Cooperation (SDC)
The Swiss Development Cooperation through HELVETAS supported participatory forestry project Phase II, Local Governance Sustainable Development Program on mainstreaming gender, environment, climate, disaster, and poverty in LG plans and development of National Waste Management Regulation policies & practices with an investment of US$ 3 million and 0.140 million Swiss Franc.

Government of Denmark
The Government of Denmark supported environment and urban development sector programme with a total investment of DKK 356.4 million. It co-financed sustainable land management and contributed to the BTFEC Trust Fund with an investment of US$ 5.77 and 2.33 million, respectively.

Government of the Republic of India
The Government of Republic of India supports hydropower projects under CDM in Dagachhu; Punatsangchhu-I; (Puna-II, Mangdechhu, Nikachhu, Kholongchhu, Chamkharchhu-I and Wangchhu) under the Five Year Plan assistance to the Royal Government of Bhutan. Its contribution in the 11th FYP amounted to Indian Rs.4500 corers.

Inventory of Climate Adaptation Programs and Activities

Table 1 below provides stocktaking of climate adaptation activities implemented across different Government sectors presented during the Climate Change Dialogue held during May 2015 organised by NEC and NGOs. According to NEC, there are 53 climate change projects, with their activities spread across different sectors across the country.

Table 1. Stock taking of climate change mitigation and adaptation activities across different sectors in Bhutan

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
National Environment Commission	Second National Communication	US$ 405,000	2007-2009	National Environment Commission	GEF
	Enhancing Global Environmental Management in Bhutan's Local Governance	US$ 0.915 million	2008-2011	National Environment Commission	GEF, DANIDA, Bilateral, RGoB
	World Bank *Computational General Equilibrium Initiative,* to develop low carbon scenarios for local mitigation options	BETF	2017	National Environment Commission	World Bank
	Human Resources Development at the National Environment Commission	Nu. 7.3 million	2000-2002	NEC	BTFEC
Ministry of Education	Nurturing the nature: Transforming young minds on climate change			Curriculum Development Centre, Royal Education Council, Paro	
Ministry of Agriculture and Forests	Global Climate Change Alliance (GCCA) in the RNR Sector	Euro 4.397 million	2013-2016	Council for Renewable Natural Resources of Bhutan	EU and Government of Estonia
	Rural Renewable Energy Development Project (Bhutan Biogas Phase I)	US$ 1.2 million	Mar 2014-Dec 2015	Department of Livestock	ADB
	Strengthening the Role of	US$	2014-	Department of Forests &	FAO

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
	Communities in Climate Change Mitigation through Participatory Forest Management in Bhutan	175,000	2015	Park Services	
	Climate change adaptation potentials of forests in Bhutan – building human capacities and knowledge base	Euro 1.1 million	July 2013 - Nov 2016	Department of Forests & Park Services	Austria Development Cooperation
	Comprehensive assessment of climate change impacts on endemic plant diversity (mitigation)	Nu. 7.51 million	Jul 2012-Dec 2015	National Biodiversity Centre, Serbithang	BTFEC
	Integrating Payment for Environmental Services and REDD+ in Bhutan: Market-based solutions for climate change mitigation and adaptation (mitigation)	Nu. 31.596 million	Jul 2013-Jun 2016	Watershed Management Division(WMD)/DoFPS	BTFEC and Blue Moon Fund, SNV
	Climate Change Adaptation in the Himalayas	US$ 500, 000	Feb 2015-2018	Agriculture Sector, Tsirang Dzongkhag	ICIMOD
	High Altitude Northern Areas (HANAs)	US$ 4.080 million	2010-2014	MoAF and LG	GEF
	Sustainable Land Management Practices	US$ 15.89 million	2006-2012	National Soil Service, MoAF	GEF, RGoB, Danida
	Building capacity and mainstreaming sustainable land management in Bhutan	US$ 0.5 million	2007 – 2009	National Soil Service, MoA	GEF
	Integrated Livestock Crop Conservation	US$ 0.922 million	2007-2011	Ministry of Agriculture and Forests	GEF
	Implementation of Nagoya Protocol on Access to Genetic Resources and Benefit-Sharing	US$ 1.0 million	2014-2018	National Biodiversity Centre. MoAF	GEF
	Biodiversity Conservation and Low Carbon Development	US$ 5.640 million	2015-2019	Department of Forests and Park Services, MoAF	GEF
	Environmental monitoring of Forest Management Units	Nu. 7.65 million	2000-2002	DoFPS, MoAF	BTFEC
	Integrated River Basin Management Plan for Kulong Chu Sub-basin	Nu 2,841,666	2013-2015	WMD	WWF
	Priority Conservation actions in Bhutan's protected areas in the TRAMCA-RMILLIONP, PWS, JWS	Nu 439, 627,50	2013-2015	DoFPS, MoAF	WWF
	Sustaining Ecosystem for Livelihoods	Nu 53,185,280	2014-2017	DoFPS, MoAF	WWF
	Building institutional Climate Analysis and Increasing Community Resilience to Climate change	Nu. 3,648,000	2015	WCNP, DoFPS	WWF
Ministry of Economic Affairs	Renewable Energy Development Programme	US$ 1.8 million		Department of Renewable Energy, MoEA	
	Energy Efficiency Programme	US$ 1.206 million		Department of Renewable Energy, MoEA	
	Improved Cooking and Heating Stoves for efficient firewood consumption	US$ 4.4 million		Department of Renewable Energy, MoEA	GEF, BTFEC
	Mitigation of Thorthormi lake (GLOF) under NAPA I	US$ 3.4 million		Department of Geology and Mines	NAPA

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
	Technical assessment and feasibility study for landslide mitigation activities for Phuntsholing town under NAPA II; integrated geo-hazard and risk assessment mapping in four critical landslide flood-prone areas in Bhutan (Moshi, Barsa watershed, Lamsorong and Box cutting); developing thresholds for landslide slope failure in different geological zones (mitigation)	US$ 246,700	2014-2018	Department of Geology and Mines	GEF; LDCF
	Time series monitoring of glaciers and glacial lakes in Bhutan Himalayas (mitigation);	Nu. 1 million/year		Department of Geology and Mines	RGoB
	Reducing Climate Change-induced Risks and vulnerabilities from glaciers lake outburst flood in Punakha-Wangchu and Chamkhar River Basin;	US$ 7.35 million	2008-13	Department of Geology and Mines	GEF, UNDP, WWF, RGoB, Austria and PHPA
	Capacity Development of GLOF and Rainstorm Flood Forecasting and Early Warning System	Nu. 157 million	2013-2016	Department of Hydrology and Meteorology Services	JICA
	Strengthening of hydro-meteorological services for Bhutan	Euro 462,076	2013-16	Department of Hydrology and Meteorology Services	Finland
	Strengthening Disaster Preparedness and Climate Resilience in Bhutan, Phase-I	US$ 200,000	2013-14	Department of Hydrology and Meteorology Services	World Bank
	Regional Flood Information System in the Hindu Kush Himalayan Region	US$ 108,000	2010-2014	Department of Hydrology and Meteorology Services	Finland through ICIMOD
	Addressing the risk of climate induced disasters through enhanced national and local capacity for effective action	US$ 11.491 million	2014-2017	Department of Hydrology and Meteorology Services	GEF
	Cryosphere Monitoring Program (mitigation)	US$ 1.086 million	2014-2018	Department of Hydrology and Meteorology Services	Norway through ICIMOD
	Hydropower Projects under CDM in Dagachhu; Punatsangchhu-I; (Puna-II, Mangdechhu, Nikachhu, Kholongchhu, Chamkharchhu-I and Wangchhu			Department of Hydropower and Power System	
Ministry of Finance	Public Environmental Expenditure Review			Ministry of Finance	RGoB
Ministry of Works and Human Settlement	Climate Change and Human Settlement Development			Ministry of Works and Human Settlement	RGoB
	Human Settlement Policy, Spatial Planning Act & Guidelines and Human Settlement Plan			Ministry of Works and Human Settlement	RGoB
	Guidelines for Planning and Development of Human Settlements in Urban and Rural Bhutan to minimize environmental impacts			Ministry of Works and Human Settlement	RGoB
	Bhutan Green Building Design Guidelines			Ministry of Works and Human Settlement	RGoB

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
	Strategy for Eco-Efficient Water Infrastructure Development in Bhutan			Ministry of Works and Human Settlement	RGoB
	Flood Engineering and Management			Ministry of Works and Human Settlement	RGoB
	Environment-Friendly Road Construction			Ministry of Works and Human Settlement	RGoB
Ugyen Wangchuck Institute for Conservation and Environment	Bhutan Phenology Network (mitigation)	US$ 432,700		UWICE	Bhutan Foundation & Karuna Foundation
	Asia High Mountain	US$ 180, 000		UWICE	WWF
	Water Scarcity Survey in Mongar and Lhuntse; Assessment of Community Vulnerability and Adaptive Capacity in Kurichu Watershed (mitigation)	Nu. 2.6 million		UWICE	GCCA
	Economics of Ecosystem and Biodiversity (mitigation)	US$ 194,000	2015-2016	UWICE	UNEP
Ministry of Home and Cultural Affairs	Addressing the Risks of Climate-induced disasters through Enhanced National and Local Capacity for Effective Actions	US$ 638,200		Department of Disaster Management	NAPA II
	Institutional Strengthening & Set-up GLOF Early Warning & Rainstorm Flood Forecasting in Mangdechu & Chamkhar Basin, NAPA II	Nu. 40.8 million	2014-2016	Department of Disaster Management	JICA and MHPA
	Local Climate Adaptive Living Facility (LoCAL)	US$ 504,000	2011-2016	Department of Local Governance	UNCDF
	Research on the wind- and rain-storm hazards and their impacts on housing structures (mitigation)			MoWHS, DDM, MoE	
	Local Governance Sustainable Development Program	US$ 500,000		Department of Local Governance	
Ministry of Health	Climate Change Adaptation to Protect Human Health;	US$ 549000		Environmental Health Program, MoH	
Ministry of Information and Communication (MoIC)	Transport policy of Bhutan			MoIC, Thimphu Thromde	GEF 6
	Vehicle Emission Test (mitigation)			MoIC, Thimphu Thromde	GEF 6
	Electric Vehicle Initiatives	US$ 3 million		RSTA, Thimphu Thromde	GEF 6
Tarayana Foundation	PICO Hydropower	US$ 115,697	Jan 2015-Mar 2016	Tarayana Foundation	ALSTOM Foundation
	Energy Efficient Fuel wood Stove		Nov 2014-May 2015	Tarayana Foundation	DRE, MoEA
	Solar Drier in Dagana & Sarpang			Tarayana Foundation	
	Eco-Stove in Dagana			Tarayana Foundation	ALSTOM
	Biogas in Samtse			Tarayana Foundation	
	Eco-San in Zhemgang			Tarayana Foundation	UNDP
UNDP	Reducing Climate Change	US$ 3.4	2008-	Department of Geology	LDCF, UNDP,

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
	Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar valleys	million	2013	and Mines, MoEA, DDM, MoHA, LGs	Austria, WWF, RGoB
	Development of NDC with gender component	US$ 400,000		National Environment Commission	UNDP
GEF Small Grant Programs	GEF-SGP supports # of small-scale projects on biodiversity conservation, climate change & land degradation/sustainable livelihoods	US$ 0.800 million	2010-2014	LGs, NGOs, Communities, CSOs including private sector	GEFSGP
	Small Grant Program (SGP) during GEF 6 cycle- OP 6	US$ 0.500 million	2015-2019	LGs, NGOs, Communities, CSOs including private sector	GEF
SNV Bhutan	Climate-SMART Agriculture with a focus on water for Agriculture in 6 Dzongkhags	US$ 1 million	2013-2015	SNV and Dzongkhags	
BTFEC	Grant to Bhutan Trust Fund for Environmental Conservation	US$ 10 million	1992-1996	BTFEC	GEF
	Environmental Education at lower primary level	Nu. 5.587 million	1997-2002	Schools	BTFEC
	Environmental Research & Building Capacity for NRM	Nu. 20.69 million	1999-2003	Sherubtse College	BTFEC
	Electrical Cookers as an Alternative to Firewood	Nu. 0.99 million	1999-2000	Schools and Monastic institutes	BTFEC
World Wildlife Fund	Securing Ecological Connectivity between the Northern Protected Area Complex and Greater Manas in B2C2 Landscapes	Nu. 395,263	2011 – 2012	NCD, Parks and Biological Corridors	WWF
Bhutan Climate Summit Secretariat	Support to Bhutan Climate Summit Secretariat	Nu 13,75, 400	2012-2013	Bhutan Climate Summit Secretariat	WWF
WWF	Strengthening capacity on strategic environmental planning	Nu. 400, 00, 00	2015	NEC	WWF
UNEP	Revision of the NBSAP and Development of 5th national Report to CBD	US$ 250,000	2012-2014	National Biodiversity Centre	UNEP
	SSFA: Implementation of HCFC Phase Out Management Plan	US$ 100,000	2012-2014	National Environment Commission	UNEP
	SSFA to guide the development of National REDD+ Strategy	US$ 21,000	2012	WMD, DoFPS	UNEP
ICIMOD	Black carbon monitoring	US$ 125,000	On-going	NEC	ICIMOD
	Rural Livelihoods & Climate Change Adaptation in the Himalayas	US$ 0.35 million	2014-2017		ICIMOD
	Establishment of Bhutan Climate Observatory to monitor the Atmospheric Pollutants	US$ 0.125 million	2014-2017	NEC	ICIMOD
	Cryosphere Monitoring Programme in Bhutan	US$ 0.47 million	2014-2017	Department of Geology and Mines	ICIMOD
Government of Finland	Contribution to Bhutan Trust Fund for Environmental Conservation	US$ 66,312 million	1989-1994 & 1995-2000	BTFEC	Finland
	Contribution to RSPN Endowment Fund	Euro 82,000	2003, 2004 & 2005	RSPN	Finland
	Strengthening Hydro-	US$	2013-	NCHM	Finland

Sector	Programs, Projects and Activities	Budget	Timeline	Lead Implementing Agency	Donors /Development Partners
	Metrological Services	4,640,000	2016		
Government of Netherlands	Projects in agriculture, renewable energy and water through SNV	US$ 7.8 million	Since 1998	MoAF, MoE	Netherlands
Swiss Development Cooperation	Local Governance Sustainable Development Program on mainstreaming gender, environment, climate, disaster, and poverty	US$ 1 million	2013-2016	Department of Local Governance	SDC
Government of Denmark	Environment Sector Program	DKK 85 million	1998-2005	NEC	Denmark
	Environment and Urban Sector Program	DKK 124.4 million	2004-2010	NEC	Denmark
	Sustainable Environment Program/Joint Support Program	DKK 70 million	2009-2013	NEC	Denmark
	Co-financing to Sustainable Land Management Projects	US$ 5.77 million	2006-2012	National Soil Service, MoA	Denmark
	Contribution to BTFEC	US$ 2.33 million	1992-1998	BTFEC	Denmark

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ANNEX 4: CHRONOLOGICAL LIST OF CLIMATE ADAPTATION INVESTMENTS

National Adaptation Policies & Related Strategies
(1998) National Environment Strategy (NES). Identifies and describes the main avenues and approaches for sustainable development. The Strategy is currently under review and in the absence of a separate CC policy, the revised NES will among other things focus on low-carbon and climate-resilient development, addressing both climate change mitigation and adaptation.

Gross National Happiness (GNH). The GNH is an overarching policy of Bhutan's development pathways (GNHC, 2013). It articulates that spiritual and cultural development is central to social, economic and environmental development. GNH has four pillars: (i) Sustainable and Equitable Socioeconomic Development; (ii) Preservation and Promotion of Culture; (iii) Conservation and Sustainable Utilization and Management of the Environment; and, (iv) Promotion of Good Governance.

(2006) National Disaster Risk Management Framework. This Framework describes seven key Components, comprised of:

a. Appropriate institutional and legislative framework defining the mandates and inter-relationships of various organizations across sectors and administrative levels;
b. Hazard, Vulnerability and Risk Assessment to identify the probability of occurrence of various hazards in a specified future time period, as well as the intensity and area of impacts;
c. Early Warning Systems to generate advance warnings and thus improve capacity of decision makers to take required action prior to the occurrence of a disaster;
d. Disaster Preparedness Plans to prepare multi-hazard disaster preparedness and response plans at national, Dzongkhags, Dungkhag (sub-division of District), Gewog and Thromde (township) levels to ensure requisite levels of preparedness and functioning of sectoral response plans;
e. Mitigation and integration of disaster risk reduction in development sectors;
f. Public Awareness and Education to establish partnerships with media and community organizations for dissemination of the disaster risk management agenda; and incorporation in education curricula to promote a people-centric approach to mitigate disaster risks; and,
g. Capacity Development to create a cadre of trained and skilled professional and disaster management practitioners with requisite knowledge and capacity to initiate and implement disaster risk management programs.

(2006) National Adaptation Program of Action (NAPA)
National Adaptation Program of Action (NAPA). The NEC coordinates the implementation of the National Adaptation Program of Action (NAPA II) Project on "Addressing the risks of climate induced disasters through enhanced national and local capacity for effective actions" from 2014-2018. Bhutan's National Adaptation Program of Action (NAPA) was prepared and finalized in 2006 in response to the decision by the Seventh Session of the Conference of the Parties (COP7) of the United Nations Framework on Climate Change (UNFCCC) on the Least Development Countries (LDC) Work Program (NEC, 2012).

The nine identified priority adaptation projects in NAPA 2006 were: 1) Disaster Management Strategy-planning for food security and emergency medicine to vulnerable communities; 2) Artificial Lowering of Thorthormi Lake; 3) Weather Forecasting System to Serve Farmers and Agriculture; 4) Landslide Management and Flood Prevention in critical areas; 5) Flood Prevention of Downstream Industrial and Agricultural Areas; 6) Rain Water Harvesting; 7) GLOF Hazard Zoning (Pilot-scheme Chamkhar Chu Basin); 8) Installation of Early Warning System in Po Chu Basin; and 9) Promote Community-Based Forest Fire Management and Prevention.

Due to fund limitations, Bhutan implemented only 3 out of its 9 NAPA projects under the LDCF funded project on Reducing Climate Change Induced Risks and Vulnerabilities from GLOF in Punakha, Wangdi Phodrang and Chamkhar Valleys.

The NAPA regarded Glacier Lake Outburst Floods or GLOFs as the highest priority climate hazard. The NAPA was reviewed and updated in 2012 to incorporate new climate hazards such as windstorms and cyclones, and also to take stock of the implementation status of the priority projects.

(2008) Constitution of the Kingdom of Bhutan
Article 5 of the Constitution stipulates that 'every Bhutanese is a trustee of the Kingdom's natural resources and environment for the benefit of present and future generations.' It charges the RGoB and individuals to: (i) protect, conserve and improve the pristine environment and safeguard the biological diversity of the country; (ii) prevent pollution and ecological degradation; (iii) secure ecologically balanced sustainable development while promoting justifiable social and economic development; and, (iv) ensure a safe and healthy environment (RGoB, 2008). The constitution also charges to ensure a minimum of 60% of the total geographical area under forest cover at all time.

(2000/2011) National Communications to the UNFCCC.
The Initial National Communication (1NC) of Bhutan was produced in 2000; and the Second National Communication (2NC) in 2011. These National Communications provide inventories of GHG emission and sequestration, describe climate change vulnerabilities, and outline a wide range of adaptation and mitigation options across various climate-sensitive development sectors.

(2012) Updated National Adaptation Program of Action (NAPA)
Since 2006, other climate risks and vulnerabilities (windstorms, cyclones) emerged and necessitated revisiting the priority activities identified in NAPA 2006, including a revisit of estimated costs. The updated NAPA 2012 was developed through a series of consultation and analysis of the proposed options involving a multi-sectoral task force from various sectors.

Based on the consultations, 8 priority projects were identified as follows: 1) Landslide Management and Flood Prevention; 2) Disaster Risk Reduction and Management- planning disaster management interventions and providing emergency medical services to vulnerable communities; 3) Enhancing National Capacity in Weather Stations and Seasonal Forecasting in Bhutan; 4) Application of Climate Resilient and Environment Friendly Road Construction (EFRC) Nationwide; 5) Community-based Food Security and Climate Resilience; 6) Flood Protection of Downstream Industrial Areas; 7) Rainwater Harvesting and Drought Adaptation and, 8) Community-Based Forest Fire Management and Prevention.

(2012) National Strategy & Action Plan for Low Carbon Development.
Has been primarily prepared in support of Bhutan's commitment to remain carbon-neutral at the 15th Conference of Parties of the UNFCCC in Copenhagen in December 2009. It presents a long-term national strategy comprised of various scenarios that analyse development paths from 2005 until 2040. Concomitant to these scenarios, the Action Plan articulates a number of short and medium-term interventions under various development sectors to achieve sustainable economic growth through green and low-carbon growth.

(2013) National Disaster Management Act
Establishes the National Disaster Management Authority at the central level, chaired by the Prime Minister; formalizes the establishment of Dzongkhags Disaster Management Committee in all Dzongkhags and Sub Committees at Dungkhag and Gewog levels. The implementation of the Act will necessitate a great deal of capacity development for institutions at various levels, especially of LGs, non-state actors and local communities.

(2013-2018) 11th Five-Year Plan
The 11th FYP provided 27.6% of government allocations, "untied," to LG, followed by an increased allocation of "untied" resources of 50% outlay to LG. The 11th FYP's key objective is of "Self-Reliance and Inclusive Green Socio-Economic Development," and underpins inclusive development by reducing the national poverty levels. Many of Bhutan's National Key Result Areas (NKRAs), Agency Key Result Areas (AKRAs), and Key Performance Indicators (KPIs) in Bhutan's Eleventh Five-Year Plan (11th FYP) are well-aligned with international development goals such as the SDGs, NAPs, and INDC/NDC.

(2015) INDC
Bhutan has reconfirmed its target to remain carbon-neutral at the COP 21 in Paris. Bhutan also committed itself to maintain a minimum of 60% of land area under forest cover. Based on the information from the NAPA process and on the Second National Communication, along with plans and programs, and several priority adaptation actions were identified in Bhutan's INDC, are as follows[10]:

1. Increase resilience to the impacts of climate change on water security through Integrated Water Resource Management (IWRM) approaches;

[10] Taken from Bhutan's INDC document submitted to UNFCCC at CoP21, Paris.

2. Promote climate-resilient agriculture to contribute towards achieving food and nutrition security;
3. Sustainable forest management and conservation of biodiversity to ensure sustained environmental services;
4. Strengthen resilience to climate change induced hazards;
5. Minimize climate-related health risks;
6. Climate proof transport infrastructure against landslides and flash floods, particularly for critical roads, bridges, tunnel and trails;
7. Promote climate-resilient livestock farming practices to contribute towards poverty alleviation and self-sufficiency;
8. Enhance climate information services for vulnerability and adaptation assessment and planning;
9. Promote clean renewable and climate-resilient energy generation;
10. Integrate climate-resilient and low-emission strategies in urban and rural settlements.

For the purpose of aligning the SPCR to National Development Strategies, and to develop program synergies, the following National Strategies are described:

(2018-2023) 12th Five-Year Plan

In the 12th FYP (2018-2023), SPCR relevant NKRAs are; (5) Healthy ecosystem Services maintained; (6) Carbon-neutral, climate and disaster-resilient development enhanced; (8) Food and nutrition security enhanced; (10) Gender equality, women and girls empowered; (11) Productive and gainful employment created; and (13) Democracy and decentralization strengthened.

NAP

The preparation of the NAP is currently underway by the NECS. The SPCR will be integrally linked to, and complement the broader climate adaptation priorities of the NAP. The National Environment Commission meeting directive of February 2016 has given the NEC Secretariat the lead role in NAP formulation and implementation, in collaboration with the Gross National Happiness Commission and UNDP as the delivery partner. In October, 2016, a letter of intent was sent to GNHC on accessing the NAP Readiness Fund through GCF, in collaboration with UNDP. On 25th January, 2017, GNHC informed the NECS that they have indicated to GCF their intent to work with UNDP on NAPs.

(July 12, 2017) During the Consultation Workshop for finalization of the NAP Readiness Proposal, four Outputs were identified:

a. Output 1: National mandate, strategy and mechanisms are in place and gaps are assessed and addressed.
b. Output 2: Preparatory elements are in place to support an iterative and continuous NAP Process.
c. Output 3: Develop a NAP and enhance adaptation planning process to support medium and long term adaptation planning, with particular focus on multi-sectoral water issues.
d. Output 4: NAP implementation and monitoring facilitated.

NAPA

The objective of the NAPA is to: reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience; and to facilitate the integration of climate change adaptation in a coherent manner into relevant new and existing policies, programs and activities. The NAPA is a process for LDCs to identify priority activities that respond to their urgent and immediate needs. Bhutan has implemented the following NAPs:

NEC is the lead coordinating agency for Bhutan's NAPA. The various NAPA projects are listed as follows:

NAPA (LDC GEF-FINANCING)

Sector/Theme	Project Phase	(USD) Funding	IMPLEMENTING AGENCY
GLOFs.	First Project	$ 3.5 Million	Ministry of Home and Cultural Affairs & Ministry of Economic Affairs
Landslide and flood management, disaster risk reduction, water management, automatic weather and water level stations	Second Project	$ 11.49 Million	NEC Plus 8 Agencies
Capacity building in DRM: Flood management and drought-resilience.	Third Project	$ 12 Million	GNHC & Ministry of Agriculture

GCF Projects in pipeline

Currently, RGoB is working on three grant projects to be submitted to the GCF for financing, through three different GCF implementing entities including: the UNDP, World Bank and WWF US. The projects include:

a) Climate-Resilience & Food Security, costing USD 42.567 million with UNDP. The project mainly focuses on climate smart agriculture and climate proofing of access roads.
b) Green Transport Program or Bus Rapid Transit (BRT) for Thimphu City, costing around USD 22 million with World Bank. It aims to set-up a dedicated bus lane starting from south to north Thimphu to reduce traffic congestion and carbon emissions.
c) Bhutan for Life Initiative, costing USD 26.5 million from GCF is a 14-year transition fund to finance the country's protected area system and biological corridors. The implementing entity for this Project is WWF US.

Status of the GCF Projects

The above projects are at different stages in terms of design. The Green Transport Program with WB is at an early stage, with a Concept Note completed. The Climate-Resilience & Food Security Project with UNDP and Bhutan For Life Initiative with WWF US is at an advanced stage, and will be ready for submission to GCF during its Board meeting in June 2017.

ANNEX 5: INDEPENDENT REVIEW (& UPDATED REVIEW) OF THE STRATEGIC PROGRAM FOR CLIMATE RESILIENCE OF THE ROYAL GOVERNMENT OF BHUTAN

Reviewer: Maarten van Aalst
Date of CIF Review Completion: 22 September 2017
Date of RGoB Responses: 03 October 2017
Date RGOB responses (and updated SPCR) shared with CIF Reviewer: 26 October 2017
Date CIF Reviewer Updated/Finalized Review: 29 October 2017

[Note by SPCR reviewer: this is an updated version of my original review. The update was carried out based on an revised working draft of the SPCR provided to me by the RBOB on October 26 including the matrix below with responses to my original review. My updated comments are included in the table below in italic. The other substance of the review below (in normal font) is as it was in the original review.]

PART I: Setting the context (from the reviewers overall understanding of the SPCR document)

The Strategic Program for Climate Resilience of the Royal Government of Bhutan (SPCR) is an ambitious document with a powerful vision of creating a strategic framework to mainstream climate-resilience into development planning in Bhutan (complementing the NAP, NDC, and SDG processes). It aims to establish a coordinated mechanism and process of engagement on climate issues (building on existing institutional arrangements); to build institutional capacity; to support the government in achieving its National Key Results Areas (NKRAs); and to do so partly through specific climate adaptation Investment Projects as well as climate investment opportunities with local civil society participation.

The Bhutan SPCR is composed of six proposed investments across four pillars.

The first pillar "Enhancing Information Base for Hydromet Services and Climate Resilience" contains a US$ 6.5 investment project C1, Building Climate Resilience Through Enhancement of Hydro-Meteorological and Cryosphere Information, coordinated by the National Center for Hydrology and Meteorology (NCHM), MoEA.

The second pillar "Preparedness, Food and Water Security" contains two investment projects: a US$ 10 million Climate-Resilient Watershed Management Program (C2), coordinated by the Watershed Management Division, Department of Forests and Park Services, Ministry of Agriculture and Forests; and a US$ 28 million investment in Flood Hazard Assessment & Climate-Resilient Measures (C3), coordinated by the Flood Engineering Management Division, Department of Engineering Services, Ministry of Works and Human Settlements (FEMD).

The third pillar addresses "Sustainable Growth and Resilient Infrastructure", includes a US$ 7 million investment on Climate Smart Human Settlement Planning (C4) coordinated by the Department of Human Settlements, Ministry of Works and Human Settlements, and a component (C5) interwoven across the other investments, aiming to engage the private sector in climate resilience, coordinated by the Gross National Happiness Commission.

The fourth pillar "Strengthening Governance, Institutional Coordination and Human Resource Capacity" is cross-cutting, but also contains a US$ 1.5 million investment C6 to Mainstream Climate-Resilient Knowledge & Skills Through Curriculum Development in Bhutan's Education Sector, coordinated by the National Environmental Commission (NEC) & Royal University of Bhutan (RUB)

Part II: General criteria: The SPCR complies with the general criteria indicated in the ToRs [11] (Please provide here an extensive discussion how the SPCR meets the following criteria)

A. Takes into account country capacity to implement the plan	
The SPCR builds on work in a range of prior assessments and policy documents on climate change adaptation, but also recognizes the remaining capacity constraints, and aims to fill some of those gaps with targeted investments that also build capacity in government agencies (including at subnational level), private sector and civil society.	

[11] Each criterion is assessed in 3 colors: green = met the criteria; yellow = need for some additional work; red = did not meet the criteria yet.

B. Developed on the basis of sound technical assessments	
The SPCR identifies all the key risks facing Bhutan. On a very detailed level, there are some aspects to the technical background that could be further refined (e.g. reference to somewhat older climate models, approaches to combine observed and projected trends, ways to capture uncertainties in risk assessments), but these minor comments do not affect the overall soundness of the technical grounding of the strategy. In addition, it should be noted that further technical work is currently under way as part of phase I of the SPCR. These technical assessments might have further informed the current SPCR, but are in practice unlikely to affect the overall analysis of strategic priorities, and will of course in due course still inform the specific investments.	
C. Demonstrates how it will initiate transformative impact	
The SPCR describes the following five transformative elements: (i) introduction of approaches to climate-proof key investments, including through eco-system-based adaptive measures (ii) promotion of climate-resilient private sector activities, including economic diversification especially for women-led CSMIs& CSOs; (iii) introduction of low-carbon & climate-resilient planning & development policies and practices at the Thromde (Township) level; (iv) mainstreaming climate in tertiary education; and, (v) establishing an incremental adaptation co-efficient that calculates requisite funding to cover climate-resilient measures.	
D. Provides for Prioritization of investments, capturing of lessons learned, M&E, and links to the PPCR results framework	
Comment: The SPCR results framework does not follow the specifications of the PPCR results framework. The prioritization of investments is also not always explicit. However, this could partly be because the strategy aims to be complementary to a range of other plans, including the INDC, NAPA and NAP. Overall prioritization of national adaptation objectives might be seen to occur in those other documents, with the SPCR picking up a subset of those. *[**Updated comment based on response provided**: while the exact match with the PPCR results framework is still missing, the additional section on lessons learned, and the responses provided to the earlier comments would lead to an updated yellow (rather than red) rating, reflecting that additional work may be needed on the alignment with the PPCR results framework, which could partly be carried out when specific CIF-financed projects are being prepared.]*	**Response:** 1. It was suggested that this PPCR Results Framework may be an internal document, different from the one we have formulated. Further, the SPCR draft contains a detailed Comparative Results Framework Table in Chapter 4 on *Synergies between SPCR & National and Internation Development Plans*, in alignment with: GNH Domains, the 12th FYP, the NAP, and NDC. An email request was sent to RGOB on 03 Oct to confirm through the World Bank whether this RF needs inclusion. It appears that it does not, and our Results Framework meets international standards but with national and local level indicators to measure the progress. 2. M&E: GNHC only partially agrees with this assessment, and cited various draft document references to M&E under: *General Rationale*, regarding an SPCR GIS-platformed Program Results Framework and M&E; in the GNHC-S Mandate & Roles section (SPCR M&E forms part of the broader Happiness M&E process); in the section on SPCR Staff [Chief Planning Officer: Planning, Monitoring and Coordination Division, GNHC-S (Member Secretary)]; in the section on the SPC PMU (Chapter 4), and TORS for SPCR Project Manager. All are very comprehensive descriptions of strategic M&E approach. Refer 4.6.4/5/6 under chapter 4. An entire section has also been added on Lessons Learned, by Investment in Chapter 4. *Lessons learned.* See *SPCR Mobile App For Marginalized Communities.* Knowledge sharing from this Mobile App) will be disseminated to SPCR focals in Nepal, Tajikistan, and Uganda to broaden the overall international SPCR experience. Also added Lessons Learned under *Approach*. Also a reference to *Local Mainstreaming Reference Group* (MRG) in C6 Preparatory Phase. As well, see full section on *Knowledge Products* also in Chapter 4.

	Investments Prioritization: The prioritization of investments process may need a little additional comment, but 4 smaller sections and two entire and very detailed sections on this prioritization process are contained in Chapter 1 (*General Rationale - SPCR Themes From Scoping Mission; SPCR Participatory Consultative Process; the 4-Day First Joint Mission Workshops; Section 1.5: SPCR Consultative Process);* and in *Section 4.2: Process of SPCR Investment Prioritization.*

E. Has been proposed with sufficient Stakeholder consultation and stakeholder engagement

The SPCR document lists ample consultation, certainly with the full range of government institutions, and also with civil society organizations and other stakeholders including donor agencies.

F. Adequately addresses social and environmental issues, including gender

Social and environmental issues, including gender, are prominently considered throughout the SPCR. It is noted that some of the investments will require an EIA to be carried out during implementation.

G. Supports new investments or funding additional to on-going/planned MDB investments

Comment: The current investments are stand-alone SPCR grants, with the prospect of additional government or other donor finance, but this finance is not fully specified, and certainly not programmed as additional to on-going or planned MDB investment. *[**Updated comment based on response provided**: notwithstanding the proposed parallel financing modalities, the specific complementarity to ongoing or planned MDB investments remains unclear. This aspect merits further attention in continued investment dialogues with the World Bank and ADB (probably also in wider country dialogues rather than just in the context of the SPCR). For now, this remains a point for attention, so my rating on this criterion remains red.* *Additional information from the joint mission mentioned in the response might yield additional insights on this point.]*	**Response:** See our response to "stand-alone" comment in *PPCR Objectives*, below. GNHC mentioned that it may not be timely to access GCF Readiness financing (fast-tracking), as other GCF financing requests are pending and the RGOB may not want to stir the pot too much; and, that the GCF is generally not designed as core financing for PPCR, but can serve as parallel financing for SPCR. This parallel financing is reflected as such in Chapter 5 *(Indicative Resource Mobilization Strategy Table*). Moreover, the proposed *Bhutan Adaptation Bond* and proposed *adaptation co-efficient* are additional and creative (non-traditional) sources of SPCR revenue that deserve attention and recognition as viable new and bold investment financing mechanisms for Bhutan's SPCR. The RGoB is currently in discussions with the GCF about SPCR funding guidelines. MDBs recently held a Second Joint Mission on 24-25 October to discuss co-financing and technical support measures.

H. Takes into account institutional arrangements and coordination

The SPCR builds on existing coordination mechanisms for development planning by the Gross National Happiness Commission, as well as in the decentralization process. Continued close coordination and collaboration between the Gross National Happiness Commission (coordinating the SPCR, conducive to integration into overall development planning) and the National Environment Commission (NEC, which coordinates specific climate policy including the NAP and NDC) will be critical for the success of these efforts.

I. Promotes poverty reduction

The SPCR is strongly aligned with overall government priorities as spelled out in the five-year plan, with a

prominent focus on poverty reduction.	
J. Sufficiently considers cost effectiveness of proposed investments	
Comment: Cost-effectiveness is explicitly reflected in the emphasis on considering of ecosystem-based approaches for flood risk management rather than only infrastructural solutions. More generally, the investments do make sense, but specific cost-effectiveness is not always clearly established. This merits further attention during specific investment design. *[**Updated comment based on response provided**: based on the additional sections in each investment component, and the responses provided to the earlier comments, this rating would be updated to green (rather than red) rating, recognizing that more detailed work on cost-effectiveness still deserves attention during specific investment design.]*	**Response:** Added several value-added components in section: *Building on Existing Processes & Value-Added of SPCR* (under 1.3.1: *Rationale*), including: adaptation co-efficient; Bhutan Adaptation Bond, SPCR alignment with resource decentralization process to grassroots. In addition, added value for money/value-added section to each Investment Component (Annex 12). The value-added of the RGOB intending to commit disproportionate national resources to this SPCR must not be understated. Far and away the most cost-effective/value-added contributions of Bhutan is its contribution to national net-negative carbon sequestration to minimize anthropogenic climate change impacts on Annex I and Non-Annex 1 signatory countries. This selfless acts by Bhutan's citizenry to maintain biodiverse land conservation and to surrender their forests and farmable lands to avoid disruption of wild animal migrations, both in honour of the Paris Agreement, represents the ultimate value-added sacrifice. As suggested, cost-effectiveness will be further developed/rationalized during specific SPCR Investment design.

<u>Part III</u>: Compliance with the investment criteria of SPCR

Provide extensive comment on whether the SPCR complies with the following criteria specific for PPCR (see TORs).

A. Climate risk assessment: The SPCR has been developed on the basis of available information on the assessment of the key climate impacts in the country; the vulnerabilities in all relevant sectors, populations and ecosystems; and the economic, social and ecological implications of climate change impacts.	
As noted above, the SPCR identifies all the key risks facing Bhutan. On a very detailed level, there are some aspects to the technical background that could be further refined, but this does not affect the overall soundness of the technical grounding of the strategy. In addition, further technical work is currently under way as part of phase I of the SPCR.	
B. Institutions/ co-ordination: The SPCR specifies the coordination arrangements to address climate change: cross-sectoral; between levels of government; and including other relevant actors (e.g., private sector, civil society, academia, donors, etc).	
The SPCR specifies the roles and responsibilities of the various actors involved in addressing climate risks, including in some cases their weaknesses and how the SPCR will address these. This includes the full range of government agencies, national and local government, private sector (as a cross-cutting dimension of the SPCR), civil society, academia (particularly through component 6 on curriculum development). Engagement of donors is mentioned but not fully specified in terms of alignment with specific other donor investments.	
C. Prioritization: The SPCR has adequately prioritized activities taking into account relevant climate/risks and vulnerabilities and development priorities, sectoral policies; ongoing policy reform processes and existing, relevant activities and strategies.	

Comment: The proposed investments respond to the identified climate/risks and vulnerabilities, are in line with development priorities and sectoral policies, and fit ongoing policy reform processes (such as decentralization). Prioritization of investments has been based on a range of criteria laid out in the SPCR, although the precise application of these criteria is not fully explicit. It is also not explicit which other potential activities have been *deprioritized* (whereas there are some areas of investment that I would have expected to see considered, including for instance early warning and early action systems, financial risk management / insurance options, specific agriculture interventions, etc.). As noted above, this could partly be because the SPCR aims to be complementary to a range of other plans, including the INDC, NAPA and NAP. Overall prioritization of national adaptation objectives might be seen to occur in those other documents, with the SPCR picking up a subset. If so, it would be good to be more explicit about those choices. *[**Updated comment based on response provided**: it is good to see that there has been explicit consideration of the potential other priorities (and I agree with the concerns about not seeing insurance as a panacea, especially when the market is still undeveloped). While I still feel the prioritization could have been spelled out more explicitly in the SPCR document, the additional reflections in the response, but also further clarification during a call, give me confidence that the prioritization has indeed been solid and well-considered, so I would update this rating to green.]*	**Response:** As per Part III D, we explained that the prioritization process eliminated other sectoral priorities/issues put on the table, such as hydropower (too expensive, already funded) and glacial melt monitoring (Japanese Government Funded Project). As well, early warning systems have been referenced in the NAPA section, the NCHM Mandate/Roles section, description of DDM, and the section on JICA Mandate/Role (Annex). Moreover, in Activity 3 of C1 (Annex), capacity-building will be conducted on hydrology-based early warning systems. Some draft wording on catastrophic risk insurance is contained in the draft Proposal in the Annex [Bhutan's national insurance industry (World Insurance Corporations, and Bhutan Insurance Limited) may consider the idea of providing climate risk insurance, at moderately raised premiums, to indemnify co-operative farming entities (and other at-risk industry) at risks from climate perils]. However, the insurance industry is tiny/ fledgling, and the notion of risk insurance coverage within the farming industry for example may be quite premature.
D. Stakeholder engagement/ participation: The SPCR has identified and addressed the needs of highly vulnerable groups.	
One aspect of vulnerability is geographic, and the project particularly prioritizes vulnerable southern belt river basins, including Indigenous and marginalized communities in those areas. The SPCR also addresses the specific needs of women, and has been developed in consultation with relevant stakeholder groups and NGOs. The SPCR also specifies that issues related to youth, child rights/orphans, single parent, old aged, senior citizen and differently abled people wherever relevant, will be considered.	

(1) Complies with the principles and objectives of PPCR as specified in the design documents and programming modalities.

PPCR principles:
A. Embedded in the broader context of sustainable development
The SPCR is led by the Gross National Happiness Commission, the government's central planning agency. The SPCR is strongly aligned with the 12th Five Year Plan, as well as other national planning documents including the NDC (alignment presented in Table 7, page 63-65)
B. Ambitious and innovative in their objectives towards climate resilience
The scope of the SPCR is certainly ambitious, covering a fairly wide range of investments, and targeting capacity building across a wide range of institutions at different levels. It contains a number of innovative elements, in terms of planning processes as well as substance (including systematic attention for both infrastructure and eco-

system based approaches for flood risk management for instance)

C. Strengthen collaboration and complementarity with other development partners and seek to identify other sources of financing

Comment: Other development partners are mentioned and listed as partners, but no specific co-financing is listed in the SPCR, and it is unclear to which extent the SPCR investments will directly leverage or influence activities by other development partners (other than through the regular development planning mechanisms coordinated by the Gross National Happiness Commission, which also coordinates the SPCR). The references to an "adaptation co-efficient" that would be leveraged over other investment to cover climate resilience seems to be exactly what the SPCR could be covering to influence those investments (rather than these add-ons already being an additional source of finance that could co-finance the SPCR itself, as currently seems to be suggested). *[**Updated comment based on response provided**: Regarding other sources of financing, I indeed want to acknowledge the strong complementarity with government financing, which in my view is a more important aspect than other donor financing. However, given the wording of this criterion as related to synergies with development partners, that aspect of the rating remains yellow; additional updates on this front might come from of the Second Joint Mission (not yet reflected at the time of this updated review)]*	**Response:** GNHC highlighted the very significant fact that the RGOB is committed to provide host government financing, inter-alia, of $12.5 Million (Nu. 750Million) as per the 12th FYP RGOB allocation to Local Government. In fact, combined donor and Central Government monies amounts to $77.24Million which represents a significant 58% of the entire PPCR resource envelope of $132.89 ($55.65Million + 77.24Million = $132.89Million). Moreover, there are several references to parallel financing in Chapter 5. Other proposed non-traditional sources of funding like the *Adaptation Bond* and *Adaptation Co-Efficient* merit significant acknowledgement. Nonetheless, MDB's recently held a Second Joint Mission to discuss co-financing options.

D. Build on existing efforts supporting climate resilience (including NAPAs), taking care not to duplicate

The SPCR clearly specifies that it intended to be complementary to other climate planning processes, including NAPA, NAP and NDC. As noted above, continued close coordination and collaboration between the Gross National Happiness Commission and the National Environment Commission (which coordinates specific climate policy including the NAP and NDC) will be critical.

E. Outline how lessons learned will be captured and widely shared

The SPCR stresses that its success will depend on effective dissemination of adaptation measures and policies, the transfer of adaptation technology and expertise, and effective sharing of knowledge products and lessons learned. It includes plans for dissemination and learning workshops as well as a mobile app for engagement with communities. It is recommended to focus these efforts not just on dissemination, but especially on two-way communication with key stakeholders to facilitate joint learning and continued tailoring of knowledge, services and investments to user needs (especially component 1 may still have a risk of being too supply-driven and would benefit for iterative learning through the implementation of the SPCR).

PPCR Objectives:

Help countries transform to a climate resilient development path, consistent with poverty reduction and sustainable development goals. As a pilot program and supporting learning-by-doing, PPCR implementation ultimately aims to result in an *increased application of knowledge on integration of climate resilience into development.*

A. *Pilot and demonstrate approaches for integration of climate risk and resilience into development policies and planning*	
The SPCR is coordinated by the Gross National Happiness Commission (coordinating overall development planning) and thus facilitates integration into national planning processes. In addition, the SPCR targets the decentralization of budgets as an opportunity for integration of climate risk into planning and investment at the subnational level.	
B. *Strengthen capacities at the national levels to integrate climate resilience into development planning*	
The SPCR contains several components that strengthen capacities of the institutions carrying out the components, including generation of new knowledge and human resources. In addition, curriculum development (C6) will, over the long term, result in increased human capacity on these issues available in the country.	
C. Scale-up and leverage climate resilient investment, building on other ongoing initiatives	
Comment: As noted above, the proposed SPCR investments currently do not explicitly leverage other development investments, but seems to consist of stand-alone grants, possibly attached to (as yet unspecified) government or other donor financing. There is a good prospect of leveraging if the SPCR influences wider development planning by the Gross National Happiness Commission, but this is currently not explicitly reflected in the financial planning for the proposed SPCR investments. In this context, I would also note that the potential co-financing of SPCR investment by NAPA (LDCF/SCCF?) or GCF (as currently suggested as an option in the SPCR) seems to defeat the SPCR purpose (which should be inject resilience thinking into much bigger "regular" investment flows, thus truly leveraging a much larger resilience impact with relatively scarce climate resources). *[**Updated comment based on response provided**: I welcome and agree with the response regarding the programmatic approach taken in this SPCR, and the alignment with NAP/NAPA and NDC. As noted in the response, attracting additional* external *resources and building on* external *initiatives may be more challenging given the shrinking donor commitments Bhutan is facing more generally. Interpreting this criterion more leniently and including internal processes, including the devolved government finance that the SPRC aligns with, I could update this rating to green.]*	**Response:** It must be understood that these are not stand-alone grants for the proposed investments. In fact, The SPCR articulates a highly programmatic approach to investment activities, with: all 6 Investment Components supporting one another; C1 (NCHM downscaled impact scenarios) supporting C2 through C6; C2 (WMD Water Scarcity) informing C3 (flood & food security issues); C4 (Climate-SMART planning) providing inputs to C3 (eco-system-based flood management), the C5 CSMI initiative, and the C6 ECP curriculum initiative; and C5 (private sector) and GESI inter-woven throughout all Program Investment Components. That being said, if PPCR financing is limited, each Investment Component could serve as stand-alone adaptation actions, capable of producing significant developmental and climate adaptation outcomes, with transformational impact, on their own merit. GNHC points out that SPCR does strongly align with the NAP/NAPA and NDC (see Chapter 4: *Synergies between SPCR & National Development*). Perhaps it is not understood how significant SPCR scaling-up actually is in the context of the broader 12th FYP devolution of power and decentralization of funding to 50% to Local Government, and how the SPC squarely fits into this decentralized scaling-up developmental process at the grassroots. Leveraging of international co-financing does require more attention, but is being impeded by the reduction in donor support to Bhutan as an anticipated LMIC, in spite of Bhutan's severe food insecurity, its high level of vulnerability to climate shocks, and its unbending net negative carbon commitment to the world.
D. *Enable learning-by-doing and sharing of lessons at country, regional and global levels*	
Comment: As noted above, the SPCR pays ample attention to in-country dissemination and learning. However, it does not yet explicitly spell out how this learning will be shared at regional and global levels, other than through interaction with the Tajikistan	**Response:** Agreed. We reference sharing of SPCR Results and lessons learned both within the country (Implementing Agencies) and possible broader knowledge gain in partnership with the SPCR regional (Nepal, India, Bangladesh and elsewhere) partner

SPCR process. *[**Updated comment based on response provided**: It is good to see the inclusions of additional elements on lessons learned, including synergies with other countries and academic networks. On that basis, I would update the rating to green. I would recommend continued attention to explicit documentation of lessons learned in the process of implementing the SPCR, so other countries can benefit from Bhutan's experiences.]*	countries to enrich national capacity. Dissemination of lessons learnewd is now broadened to include financial and curriculum support for C6 from Australian Universities (e.g. the Australian National University, the University of Melbourne, and the University of Sydney) where Bhutan's civil servants frequent for degree accreditation. This has been incorporated into the draft SPCR document (especially re C6 - ECP Curriculum Development). In addition, lessons learned from the proposed mobile phone (see Knowledge Sharing – Mobile App) will be shared with SPCR focals in Nepal, Tajikistan, and Uganda to broaden the experience. These components have been duly incorporated into the draft. The proposed missions between SPCR countries of Tajikistan (PPCR Round I) and Bhutan (SPCR Round II) are a significant opportunity for sharing of Lessons Learned.

(2) Assessment towards the PPCR results framework

Comment: The results framework in the SPCR (Table 9, page 87) follows a rather different structure than the PPCR results framework, so I have not been able to cross-compare indicator-by-indicator. Additional work may be required to align the current SPCR results framework with the requirements of the PPCR results framework, and add the required core indicators. *[**Updated comment based on response provided**: While the logic for the results framework is clearly presented, including its alignment with other development plans, it is still not aligned with the PPCR results framework, including its core indicators, which makes it difficult to rate its consistency with the guidance. I could update this rating to N/A, with the advice to seek additional guidance on the extent to which specific CIF-supported investments require indicators that allow aggregation of results into the overall PPCR results framework (which I presume is the intention for reviewing this alignment). This could then be taken up during specific investment design.]*	**Response:** Table 9 of Chapter 4 (page 80) reflect SPCR's thematic and programmatic alignment with Bhutan's other national and international Development Plans. By Investment Component, the SPCR Results Framework is actually given in Section 4.7 (Table 9 in the final draft), which include: Outcomes/Results, Indicators, Baseline and Target for measuring progress, and Risks & Solutions – all through a gender & PS lens. The PPCR Results Framework core indicators by indicaors are less relevant and therefore national and investment-based indicators that are measurable based on the existing national capacity of the Implementing Agencies were designed. Futher section 4.8 mentions the Theeory of Change (higher level impact) that SPCR contribute to national and international climate commitments with special reference to NDC, 12th FYP and SDG.	

<u>Part III:</u> Conclusions and Recommendations

Overall assessment of the SPCR

The SPCR general presents a convincing case for the needs for strategic investments in climate resilience, and for the range of investments proposed, which span various sectors, types of solutions (including for instance nature-based solutions instead of just infrastructure), levels of government, and other stakeholders. It is very compelling in terms of its close integration with overall development ambitions and institutional embedding in the national planning agency (the Gross National Happiness Commission).

The SPCR also meets many of the criteria of the PPCR, with a few exceptions as outlined above and below, some of which could possibly be addressed during specific project design.

Overall, the reviewer assessed a total of 24 criteria and indicators with the following scoring:

16	The criteria and/or indicator has been generally met and there is no need for any revision or larger complement at this stage
5	The criteria and/or indicator is partially met, it is recommended to relook at some of aspects that need further clarification
3	The criteria and/or indicator is partially met and need to be developed [or, at the current stage the criteria is not relevant]

[Note by the reviewer: the updated rating of the revised SPCR taking account of the responses to the comments in the original review would be].

20	The criteria and/or indicator has been generally met and there is no need for any revision or larger complement at this stage
2	The criteria and/or indicator is partially met, it is recommended to relook at some of aspects that need further clarification
1	The criteria and/or indicator is partially met and need to be developed [or, at the current stage the criteria is not relevant]
1	N/A

Recommendations:

Priority issues for attention seem to be:

(i) The synergy of proposed SPCR investments with other MDB and donor investments, and/or more specific clarity on how the SPCR investments will be influencing/complementing other government budget flows, rather than acting just as stand-along grant investments. This is particularly relevant given the fairly substantial amount of requested SPCR resources compared to the size of the country. This alignment could possibly be achieved partly during subsequent detailed investment design, but the ambition could, in my view, be more clearly spelled out in the SPCR itself.

(ii) Clarity on how the results framework aligns with the PPCR results framework, including for instance rather basic indicators such as the numbers of beneficiaries. Depending on formal PPCR requirements, this may partly be addressed during detailed investment design.

In addition, I would recommend to pay specific attention, during investment design, to the capacity building for integration into development planning. This applies both at national level (mainstreaming into regular development plans and investments) as well as for local government (where the proposed Climate-Resilience Promotes Happiness toolkit will be critical -- also for M&E -- but is currently budgeted at only US$90k).

This could also dovetail with further refined plans for iterative learning and knowledge sharing (also beyond Bhutan). In this context, it is relevant to note that component C6 includes the ambition to build "Strengthening Governance, Institutional Coordination, and Human Resource Capacity" but the investment in this component currently only addresses curriculum development. The other aspect (capacity for mainstreaming) could be considered cross-cutting, but does merit specific attention during the design of each of the components, and requires dedicated budget.

A more specific technical comment for Investment C1 (hydromet) is that the proposed activities currently come across as somewhat supply-driven (with the user interface primarily seen as "dissemination"). I would suggest a much stronger focus on co-production of climate services between the National Center for Hydrology and Meteorology and various types of users (within government agencies, in private sector and among local communities), informed by their needs for specific decisions, rather than shaped by whatever variables happens to come out of downscaled international models.

This might also require more attention for generation of *risk* information (combining geographic and socio-economic data with hydrometeorological observations, forecasts and projections across timescales). This could then also include more attention for early warning (explicitly addressing risk information across timescales), as well as capacity building for early action based on those warnings (which could be a cross-cutting element across other

investment components of the SPCR). In the results framework for component 1, this would be reflected by making the desired outcome not just *dissemination* of information, but *use* of that information for better decisions.

Finally, a small technical comment for Investment C6 (curriculum design) is that it would be good to consider linking into international networks, including South-South linkages with other universities in countries in the region or globally that have already developed similar curricula.

Agreed. All addressed in responses above, and in SPCR document.

[Updated comment by reviewer: good to see the agreement on the priority issues outlined here, including initial responses above and in the SPCR document]

References

Main document reviewed:

- Royal Government of Bhutan: Strategic Program for Climate Resilience: August 2017 (Working Draft)
- Royal Government of Bhutan: Strategic Program for Climate Resilience: 26 October 2017 (updated Working Draft)

Additional documents consulted:

- PPCR Design Document (2009)
- PPCR Programming and Financing Modalities (2011)
- Revised PPCR Results Framework (2012)
- PPCR Revised procedures for the preparation of independent technical reviews of the SPCR (2016)
- Bhutan NAPA
- Bhutan INDC
- Bhutan Second National Communication to the UNFCCC
- Bhutan 11th 5-year plan 2013-2018
- ADB Climate Change Country Risk Assessment for Bhutan (part of ADB Country Partnership Strategy: Bhutan, 2014-2018)
- Various IPCC assessment reports, including AR5 WGII Asia chapter
- ICIMOD Bhutan resources (http://www.icimod.org/?q=bhutan)
- WHO Climate change adaptation to protect human health - Bhutan (http://www.who.int/globalchange/projects/adaptation/PHE-adaptation-final-Bhutan.pdf?ua=1)
- Bhutan pages on World Bank climate change knowledge portal

First Preparatory Project
NATIONAL CENTER FOR HYDROLOGY AND METEOROLOGY (NCHM)
SPCR Component 1: Enhancing Information Base for Hydromet Services and Climate Resilience

Title: Hydro-Meteorological Extreme Analysis, Climate and Glacier Mapping, Risk Identification and Services

1.0 Background

1.1 Country Context

Bhutan is highly vulnerable to hydro-meteorological hazards such as: extreme rainfall, windstorms, floods, flash floods, landslides and Glacier Lake Outburst Floods (GLOF). Climate variability and extreme events have increased the risks of irregular and extreme precipitation and prolonged droughts, thereby affecting people's lives and livelihoods. As per the international disaster database referred in the Document of the World Bank (2017), during the last 20 years, Bhutan had experienced the 10 most significant natural disasters. For instance, GLOF event from Luggye Tsho in 1994 killed 21 people and damaged 91 houses besides damage to acres of land. Similarly, in 2009 Bhutan incurred an estimated loss of US$ 17 million including a loss of 13 lives due to heavy rainfall brought by Cyclone Aila. According to IPCC AR5, it is expected that, with climate change the frequency and intensity of hydro-meteorological hazards will be increased. Of late, Bhutan started experiencing increased number of disasters related to hydro-meteorological hazards that were not observed before, causing significant socio-economic consequences and adversely affecting people's lives and livelihoods.

To address and reduce the climate induced hazards, there is a pressing need to provide more reliable and comprehensive weather, climate and water related services. Moreover, hydro-meteorological information and knowledge provide a scientific basis for resilient planning and development of vulnerable sectors (infrastructures like hydropower projects, bridges, irrigation, etc.) and population. Thus, SPCR Phase I and II will result in providing reliable and timely hydro-meteorological information ensuring sustainable development of Bhutan's socio-economy as outlined in our: 12th Five Year Plan Guidelines; Nationally Determined Contribution (NDC); the National Adaptation Plan (NAP); Second National Communication (SNC); and developmental priorities set out in the Gross National Happiness (GNH) Index.

1.2 Project Context

The primary aim of this Preparatory Project (Phase I) is to support the formulation of the investment plan and implementation of SPCR Phase II, in alignment with: 12th Five Year Plan Guidelines; Nationally Determined Contribution (NDC); the National Adaptation Plan (NAP); Second National Communication (SNC); and developmental priorities set out in the Gross National Happiness (GNH) Index.

Accordingly, during the Phase I, the NCHM will undertake the assessment of existing baseline hydro-meteorological and cryosphere data. The study will include the extreme analysis of historical data, generate climate maps and update glacier and glacial lakes inventory. The study will also assess the current institutional capacity of NCHM, identify gaps and will formulate the institutional development plans and activities for Phase II.

In addition, user need assessment will be carried out through various level of consultations including vulnerable population like women and youths in the process. Through this project, a designated gender focal official will be appointed at NCHM in mainstreaming gender issues during Phase I and Phase II, and also for future projects and plans of NCHM. The establishment of such gender focal official will enable in mainstreaming gender especially the vulnerable populations (women, youth and children) into planning and development of works NCHM.

1.3 Institutional

The National Center for Hydrology and Meteorology (NCHM) is the national focal agency responsible for the collection and dissemination of information on weather, climate, hydrology, water and cryosphere (ice, glaciers, snow, etc.). Thus, the Centre is mandated to provide reliable and timely hydro-meteorological information and services to various agencies, users and the public, so that the impacts of climate-induced hydro-meteorological hazards are better anticipated, and adapted to.

The NCHM is structured into five divisions: (i) Hydro-met Operations and Infrastructure Division (HOID)-which looks after the hydro-meteorological networks and other infrastructures; (ii) Cryosphere Services Division (CSD)-responsible for generation of products and services on snow, ice and glaciers; (iii) Weather and Climate Services Division (WCSD)-responsible for providing products and services on weather and climate; (iv) Hydrology and Water Resources Services Division (HWRSD)-responsible for providing products and services on hydrology and water; (v) Information and Communication Services Division - provides support on system administration and IT services to the Centre.

1.4 Current NHCM Services

A brief overview on the status of current functions and services provided by NCHM is given below:

1. Operation and maintenance of 20 Class A and 59 Class C meteorological stations, and 82 Automatic weather stations.
2. Operation and maintenance of 16 principal and 9 secondary hydrological stations, and 59 Automatic water level stations.
3. Operation and maintenance of 14 manual snow stations, and 20 (including NAPA II) automatic snow stations (snow incidence and depth, SWE).
4. Maintaining an inventory of climate data (processing, storing, retrieving and publication), and dissemination of data to end users.
5. Providing 72-hour weather forecast and early warnings.
6. Providing seasonal climate information.
7. Maintaining an inventory of hydrological data (processing, storing, retrieving and publication), and dissemination of data to end users.
8. Providing Early Warning on Glacier Lake Outburst Floods (GLOF) and Rainstorm Floods, based on the principle of a water level detection system in three (03) main river basins in Bhutan. These include:
    d) Punatsangchhu River Basin in 2011, under UNDP GEF (NAPA-I Project)
    e) Mandgechhu Basin in 2015, under JICA supported Project
    f) Chamkharchhu Basin in 2015, under JICA supported Project
9. Maintaining an inventory of glaciers and glacial lakes.
10. Undertaking glacial mass balance studies.

2.0 Project Goal and Description

2.1 Project Goal

To protect the socio-economic development priorities and developmental happiness of Bhutanese society through the proper integration of weather, climate, water and climate change information into national and sectoral policy and planning; using science-based and climate-informed decision-making processes, thereby strengthening NCHM's overall institutional capacity to promote, introduce and facilitate the mainstreaming of impact projections data and climate-resilient measures across all developmental sectors.

2.2 Project Description

This Phase I Preparatory project will focus on analysing the historical climate and hydrological data available with NCHM to assess the trends and occurrences of extreme events, reassess and remap the potentially dangerous glacial lakes for future water resource assessment, water budget studies and develop capacity of the NCHM and partner staff towards devising a climate impact modelling framework during the implementation for the Phase II SPCR.

2.3 Objectives

This Phase I Preparatory Project for SPCR will pursue the following objectives:

a. To assess observed or historical trends in climate and hydrology: Provide analytical information on historical climate, hydrological data and assess their trends to understand the retrospective climate variability and occurrence of extreme events; towards the formulation of a Downscaled Impact Projection Modelling Framework, during the Phase I Investment.

b. To assess cryosphere data: To analyse existing cryosphere data and update the inventory on potentially dangerous glacial lakes of Bhutan; and re-map the glaciers for future water budget studies downstream (especially in the vulnerable southern region).

c. To build capacity for climate resilience: To improve NCHM and partner agency skills in operational weather and climate, hydrological/flood modelling, melt models and user-oriented workshops on climate, hydrology and cryosphere.

2.4 Scope

This Phase I Preparatory Project will be carried out under Component I of the SPCR: *Enhancing Information Base for Hydro met Services and Climate Resilience*: This Project will: gauge the existing climate adaptation capacity of NCHM; identify institutional and information gaps; and, come out with some improved hydro-meteorological baseline information and case study reports that can:

(i) Prepare NCHM in the formulation of the SPCR Investment Component, based on improved climate data access; and,
(ii) Help to better inform NHCM users and beneficiaries on climate hazard, forecasting; and
(iii) Improve upon climate impact projections data collection and analysis toward greater formulation of Government climate-resilient policies and developmental practices to reduce vulnerability to critical infrastructure, human settlements, and fragile mountain and water-dependent eco-systems.

2.5 Approach

This SPCR Preparatory Project will undertake a study on the existing hydro met and cryosphere data available for Bhutan. The results of this data analysis and subsequent report will capture the retrospective (historical data & model hindcasting) climate variability and changes in hydrology and glacier regimes; and consequently, provide baseline hydro met information for climate-resilient hydro-meteorological planning and decision-making at the national, sub-national, LG, and civil society.

This preparatory research will also look at mainstreaming gender equality to better facilitate women's access to invaluable weather, climate, water and glacier information, especially in anticipating climate-induced hazards threatening their crop lands and livelihoods; and in helping them to assess climate-induced hazards to their eco-system-dependent micro/cottage industries. The project will highlight the need of institutional strengthening and capacity development.

2.6 Activities

Activity 1 will address Objective (a).
1. Carry out extreme analysis on the historical climate data of Bhutan and generate spatial maps to understand the basic climate of Bhutan for further studies in climate-resilience and basin characteristics and flood return periods for major rivers of Bhutan. Under this activity, Government user agencies (eg. NEC, FEMD, WMD, DHS); and target civil society groups (especially the BCCI and CSOA membership) will be consulted and fully engaged in incorporating the results of NCHM's impact projections modelling data in their climate-resilient operations.

Activity 2 will address Objective (b).
2. Re-map glaciers of the northern frontiers using satellite imagery, and updating data on potentially dangerous glacial lakes in Bhutan for EWS and water budget studies downstream, especially in the high-risk Southern region. Data may also be borrowed/reviewed from both India's and China's Hydro met facilities.

Activity 3 will address Objective (c).
3. Capacity Building components:

- Understanding the process and implementation of SPCR; learning best practices of Tajikistan (workshop)
- Climate change projection, vulnerability and risk assessment
- Weather forecasting (medium range) and GTS, climate prediction (extended range)
- Calibration and validation of hydrological (HBV, Mike 11) and weather forecast models (WRF) for improved prediction and early warning which will include seeking technical assistance from Regional and International Centres.
- Flood hazard risk assessment and mapping
- Glacier mass balance and melt models
- Hydro-met observation, operation, maintenance and instrumentation
- User oriented training workshop

Activity 4: Will be undertaken to understand community based knowledge on hydro-meteorology and cryosphere, and to assess their climate risk management needs. This will involve men, women and youth at community level.

2.7 Risks & Solutions

Risks	Solutions
1. Adequate availability of historical data to hind cast models for historical trends in climate impact modelling &hydrology trends	Acquisition and compilation of relevant hydro-met data (Global observed data, hind cast model data, met data).
2. Inadequate cryosphere data, at mid-elevation levels, to practically assess potential GLOF risks	Acquisition and compilation of relevant cryosphere data (Global data satellite data, published information).
3. Failure of enhanced data sets, and impact projection models to be operationally useful to end-users/general public, especially women, vulnerable human settlements, CSMIs, and LG.	Awareness raising through public consultations, stakeholder meetings and forums such as NCOFs, outreach education to BCCI, CSO, NCWC, RENEW, BAOWE, schools and institutes.

3.0 Expected Outcomes, Outputs and Impacts

The study is expected to contribute to the proper integration of hydro met factors and climate change into national and sectorial policy and planning for investment in resilience. It is also expected to strengthen NCHM capacity to facilitate and support mainstreaming climate resilience in national, sub-national and sector based planning and decision making.

The results delivered through this study is expected to mainstream climate information for the formulation of national communication report, and priority adaptation needs for the NDC, 12th FYP, SDGs, NAP, and line ministries, civil society groups and lead to the investment plan for PPCR Phase II "*Building Climate Resilience* Through Enhancement of Hydro-Meteorological, and Cryosphere Information Services". Moreover, the results will provide baseline hydro-met information for implementation of other pillars of SPCR and enhance availability and quality of hydro-met information for other user agencies and public.

While the Phase I study is for the whole country particularly in terms of providing retrospective climate information, more in-depth study will be carried out through Phase II in the southern part of the country in terms of providing high resolution climate projection data enabling better planning and investment in climate resilience.

4.0 Results & Performance Framework

Component Outputs	Indicators	Outcome	Impacts
1. Extreme analysis on the historical climate data of Bhutan, hydrology and generate spatial climate maps	No. of user agencies/public/CSOs have access to published information on Climate, hydrology, cryosphere of Bhutan and past weather and flood events.	Research in climate, hydrology and cryosphere enhanced for four divisions of NCHM	Improved adaptive capacity to climate change induced hydro-meteorological hazards at national, sub-national and sector level
2. Re-mapping of glaciers and updating of potentially dangerous glacier lakes in Bhutan	A new glacial map re-produced and inventory of potentially dangerous glacial lakes of Bhutan updated, published and made available for users	An updated glacial map for water budget studies and inventory of potentially dangerous glacial lakes and GLOF risk produced	Downstream vulnerable communities informed and updated on the number of potentially dangerous glacial lakes and GLOF risks through public awarness.
3. NCHM's critical mass of technical experts in	Number of officials trained on medium range, extended range, Climate extremes, risk assessment, instrumentation, hazard mapping, melt model, observation,	NCHM's officials and staff including women staff knowledge and	NCHM institutional and personnel capacity strengthened.

Component Outputs	Indicators	Outcome	Impacts
climate science built up	calibration and validation of hydrological and weather models (HBV, Mike 11, WRF) instrumentation, and research and climate projection.	skills enhanced.	
4. Awareness and public consultation on hydro-met and cryosphere services in Bhutan performed.	Number of public consultations conducted and community needs assessed to carry out studies on building a climate-resilient community in the southern Bhutan and with stakeholders	Stake holders and public knowledge on climate resilience enhanced	Climate impact & risks knowledgeable and resilient communities
5. NCHM gender focal designated		Gender issues (woman, children and youth) addressed	Mainstreaming of the gender issues in the SPCR Phase I & II

4.0 Expertise (National & International) Required

The NCHM has the necessary capacity to carry out the studies of the SPCR Phase I . However, the NCHM will seek the expertise of regional and international partners like RIMES, Tajikistan Hydro met, ICIMOD and WMO and national experts for peer reviewing of the report. For the Phase II NCHM will list out the requirements for National and International experts during its investment planning.

5.0 Duration & Reporting Procedures

This Phase I Preparatory Project will commence in September 2017, with expected completion of overall outputs, activities, and analysis by June 2018. This will enable the completion of Investment Project Documentation by June 2018 with commencement of the respective Investment Component (Phase II) from July 2018 – June 2023, in alignment with the RGoB's 12th FYP and NAP, both expected to commence in mid-2018.

6.0 Implementation Arrangements/Partners

Cross sectoral information on hydro-meteorology and cryosphere data is in increasingly great demand in Bhutan, due to its fragile mountain ecosystem terrain and climate-induced hydrological vulnerability. Accordingly, the following government partner agencies, and industry and civil society users will be involved and consulted throughout this preparatory project period:

A. Central Government
The MoWHS (DoES, DHS); MoHCA (DDM); NEC; NCWC; MoAF (WMD)

B. LG
Dzongkhags, Gewogs and Chiwogs in the Southern Region

C. Civil Society
The BCCI; The CSOs

7.0 Project Beneficiaries
It is envisaged that Central and LG policy-makers, planners, and practitioners will greatly benefit from the availability of downscaled impact projection models, which will better inform them about potential anticipated hydrological risks to already vulnerable human settlements and critical eco-systems, especially in the southern portion of Bhutan. By extension, grassroots CSOs and CBOs, as well as CSMIs at the vulnerable community level, will specifically benefit from these hydrological risk scenarios which we better prepare them for climate-induced hazards through improved LG climate risk management planning and climate-resilient capacity-building.

The information derived from this Preparatory Project will particularly enhance the knowledge and increase awareness on climate resilience among women and youth, through the sharing of impact modelling data with the

NCWC and Tarayana, for example. Moreover, this information will directly benefit farming cooperatives and private sector entities in the South, through climate-resilient planning and community-based workshops.

8.0 Investment Costing

A. Preparatory Phase I : US$ 250,000
B. (National) Investment Phase I I: US$ 6million (PPCR: 6)

Second Preparatory Project

Watershed Management Division, Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan

Pillar 2: Preparedness, Food and Water Security - Analysis Of Climate Impact On Water Scarcity

1.0 Background

Country Context

Today, developing countries like Bhutan face enormous challenges trying to meet the growing demand of water, food and energy, which is further compounded by climate change. Reports of water sources drying have been coming from across the Himalaya (Nepal, Sikkim and Bhutan) for several years. Most reports have been anecdotal, and typical of the claims are that "…almost 70 per cent of the water sources in the Himalayan region are…now half of what they were some years back, while as many as five per cent of the waterfalls that were once a common sight have dried up." Bhatt (2015). There tends to be very little empirical evidence to support the claims.

Climate change, particularly a change in the frequency and intensity of monsoon rain events, is frequently hypothesized as being at the heart of the phenomenon, although this is not universal. Tambe et al (2012) claim "Due to the impacts of climate change on precipitation patterns such as rise in rainfall intensity, reduction in its temporal spread, and a marked decline in winter rain, coupled with other anthropogenic causes, the problem of dying springs is being increasingly felt across this region."

In Bhutan, there are persistent reports from many parts of the country, especially in the southern rural areas, that water sources, particularly springs, are drying, and causing problems for local people to obtain water for domestic consumption, and for irrigation. In Bhutan, water for domestic use and for irrigation is tapped from springs. NEC (2016) also reports, in the State of the Environment Report that drying of water sources is one of the challenges Bhutan grapples with in the water sector. Many of the critical watershed management plans developed by the Watershed Management Division (WMD) also report the drying of water sources. The wetlands program in WMD has also been assessing reported drying springs and lakes that are used as water sources.

This Preparatory Project - Scoping Study on Springs Drying-Up - is one of the five technical Projects approved for the SPCR, and covers Pillar 2: "Analysis of climate impact on water scarcity, and development of implementation plan for critical watersheds." This Preparatory Project will explore the causes of why springs are drying up across the country. The outcomes of this Project will provide empirical evidence to design interventions for climate adaptation in the water sector. This will help central and LG policy makers and practitioners, and civil society organizations (including CSOs, CSMIs, and CBOs particularly in the central and rural south) make informed decisions on how to safeguard investments made in the food - water - energy nexus through climate –resilient practices.

1.1 Institutional

Under the provisions of The Water Act of Bhutan 2011, The Water Regulation of Bhutan 2014 and The Forest and Nature Rules and Regulation (FNCRR 2017), the Secretariat of the National Environment Commission (NEC) has the mandate to form River Basin Committees (RBCs) and, with the assistance of the RBCs, to prepare River Basin Management Plans for each river basin in the country. The Ministry of Agriculture and Forestry (MoAF) has the mandate under these three legal instruments to develop and implement watershed and wetland management plans.

To operationalize watershed management interventions, both the 10th Five Year Plan (FYP) (2008-2013) and the national vision document (Bhutan 2020) indicated that master plans should be developed for all river basins in the country. In 2009, the Government established the Watershed Management Division (WMD) under the Department of Forests and Park Services (DoFPs). The WMD was designated as the national focal agency to operationalize a watershed management program and to enable the Government to meet its watershed management policy commitments.

The 11th FYP (2013-2018) contains a vision that emphasizes self-reliance and inclusive green socio-economic development. The Department of Forests and Park Services (DoFPS) implemented three programs in the 11th FYP, one of which is: Integrated watershed management to ensure sustainable environmental service delivery. This emphasizes the importance that the Government places on watershed management.

A "Roadmap" to guide the implementation of strategies aimed at improving the management of the country's watersheds was developed in 2009 and adopted by the WMD. This included a strategy to focus watershed management planning initially on those watersheds requiring urgent management interventions. A document "Guideline for Classification of Watersheds" was prepared in 2010 (and revised in 2016) to provide guidance on the assessment of watersheds and their classification according to the level of degradation. Watersheds are classified as pristine, normal, degraded or critical, with those classified as degraded or critical being scheduled for the development of management plans. This approach is codified in the FNCRR 2017, which describes the role of the DoFPS in watershed management as to:

- Carry out assessments to identify degraded/critical watersheds (in the process, identify degrading influences).
- Carry out community (and other) consultations to gather additional information on issues/problems associated with watershed degradation.
- Prepare management plans to address (remove or mitigate) degrading influences.
- Carry out monitoring and evaluation to assess the extent to which degraded/critical watersheds are being returned to normal or pristine condition.

2.0 Project Goal & Description

2.1 Goal

The goal of the project is to identify the causes of the phenomenon – water sources drying up – and to help provide evidences to make informed decisions in applying climate - adaptive interventions in southern and central Bhutan. The end goal of the project is to provide water and food security in Bhutan.

2.2 Description

The SPCR preparatory Project will carry out a *scoping study on water sources drying up in the country*. The extent of the study will be nationwide, with particular focus on Southern and Central watersheds – mid altitudinal zones. Water-dependent ecosystems and human settlements shall be assessed to identify the causes of the problem and to design appropriate solutions.

The project outcome will also help provide guidance in the preparation of the Phase II SPCR Investment plan in the country. The results of this work will directly feed to provide appropriate science based intervention in the wise use of water ecosystems in the country, by applying a landscape approach. The project will help identify the cause of the problem. Solutions to solve the problem will be designed through community based watershed management plans in Phase II.

What are "water sources"?
Rainwater is transmitted through the soil and through pore spaces or fractures in rocks. If conditions are right, it can accumulate and be stored in permeable geologic strata (aquifers[12]) that generally sit above an impermeable layer. Groundwater can then be released down slope if the aquifers emerge at the ground surface. Such aquifers are referred to as unconfined aquifers as they are not confined by other rock structures and they have a natural outlet.

Springs are points in the landscape where groundwater emerges. Mountain springs emanating naturally from unconfined aquifers are the primary source of water for rural households (and cottage industry) in much of the Himalayan region (Table et al. 2012). The capacity of an aquifer to store and transmit groundwater is reflected in the nature of the springs-their total discharge, and the seasonality of discharge. A spring is a natural groundwater discharge point.

Thus, in understanding a spring, it is important to obtain some knowledge about the aquifer providing the spring discharge, particularly the location and condition of its recharge zone, as well as other key information such as rainfall patterns, and climatic impacts, both variable and extreme, on water resources. *Figure 1* shows a conceptual model of the relationship between aquifers, springs and aquifer recharge areas.

[12] Aquifers are saturated geological formations, which can yield water to springs. In simple words aquifers are rock layers, which allow storage and movement of groundwater within them.

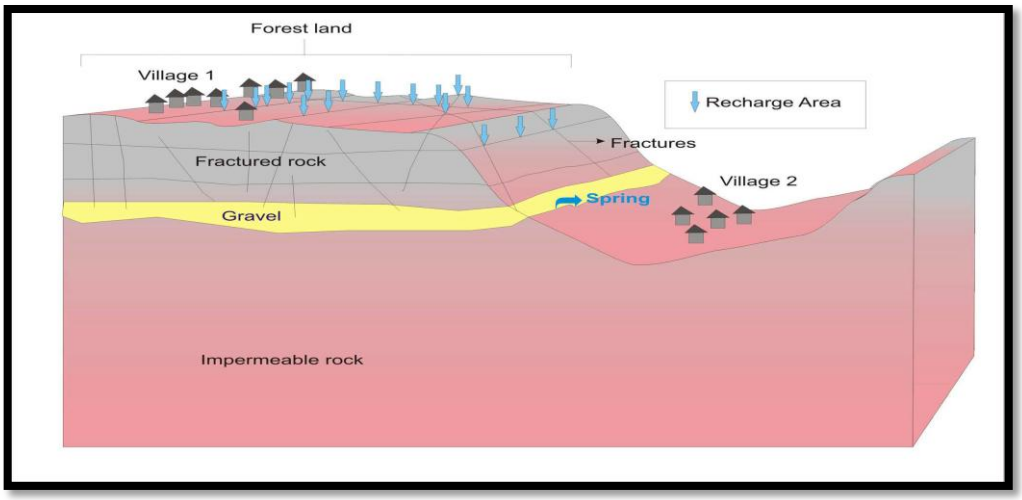


Figure 1. Conceptual model of a spring water source and recharge zone (from Mahamuni, and Upasani (n.d.))

In many situations, the surface watershed does not coincide with the sub-surface watershed so that the recharge zone of an aquifer may be outside the boundary of the surface watershed (Figure 2).

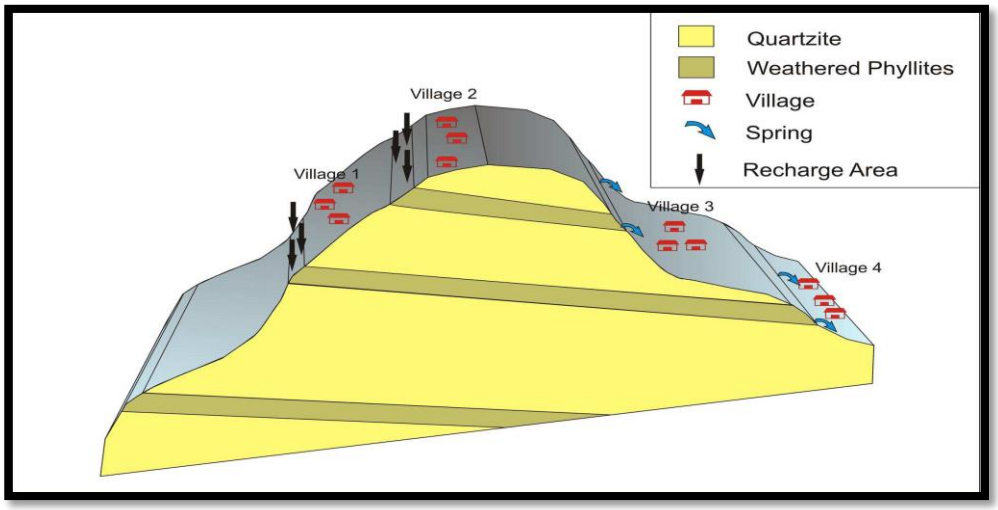


Figure 2. Aquifer recharge areas are always contiguous with surface watershed boundaries (from Mahamuni & Upasani (n.d.)

In fragile high-mountain ecosystems like the Himalayas, the high relief and complex geological structure plays an important role in the formation of mountain aquifers. Hydrogeological mapping of the springs often reveals that the recharge area and the area of protection of the springs show a very site-specific relationship. The extent and location of these recharge areas are governed by local geology and the rock structure, and changing climate scenarios.

Considering the aforementioned, and given the importance of aquifers in understanding springs, a hydrogeological approach should be an integral part of the investigation. This will be particularly important when considering what, if any, activities can be carried out to improve recharge of the aquifers and restore their flow. Ideally, recharge areas should be demarcated based on the hydrogeology. And the information will also be important in avoiding development activities in environmental sensitive areas, such as the recharge zones and water source areas. The study will help guide climate-resilient development in the country.

2.3 Objectives

This preparatory technical study for SPCR will pursue the following objectives:

A. To map water sources drying up in Bhutan;
B. To identify the causes of the water sources drying up; and
C. To design appropriate recommendations to reduce the impact or revive the water sources.

The overall objective of the assignment is to support RGoB in scoping the problem of water sources drying in Bhutan and attempt to identify the causes and recommend appropriate solutions.

2.4 Purpose and Scope

The purpose of this Preparatory Project is to: obtain an initial indication of the extent of drying springs across the country; identify the possible climatic and socio-economic reasons to explain this phenomenon; and, during the Investment Phase, prepare management plans and provide climate-adaptive measures to wisely use water ecosystems in providing water, food and energy security.

This Project supports Pillar II of the SPCR: Preparedness, Food and Water Security. It will provide the requisite information required to design the Phase II SPCR Investment, and help formulate a decision-making Framework for the climate-resilient management of the water, food and climate change nexus, particularly at the Chiwog (village) level.

Given the importance of aquifers in understanding springs, a hydrogeological approach should be an integral part of any water-related investigation. This will be particularly important when considering what, if any, activities can be carried out to improve recharge of the aquifers and restore their flow. Ideally, recharge areas should be demarcated based on the hydrogeology. Project information will also be important in avoiding development activities in environmental sensitive areas, such as recharge zones and water source areas. Most importantly, the Project will help guide climate- resilient development policies and practices relating to adaptive watershed management for highly vulnerable water-dependent rural settlements in the South and Central Bhutan.

This scoping Project will provide an initial idea of:

- The geographic spread of the "drying" springs phenomenon
- The extent of the drying and its climate-induced seasonality, in the context of climate impacts and climate scenarios provided by the NCHM
- The impact that this drying has on local rural communities, CSO operations, and CSMI value chains
- Local perceptions of causes, including from Traditional Environmental Knowledge from indigenous groups, and the repercussions for women and girls, family livelihood security, and village-based microenterprise
- Links between drying and changes in rainfall patterns and climate scenarios, or other environmental criteria
- A Framework for climate-resilient actions by LG water focals and high-priority target communities; to be developed during the Phase II Investment Component

This Preparatory Project will also directly address existing challenges in fulfilling the Sustainable Development Goals (SDG) #6 – Clean Water and Sanitation, and will developmental indicators on water and community development that feed into the Gross National Happiness Index relating to well-being and socio-economic development.

Bhutan is currently developing its 12th Five Year Plan (FYP) to fulfill its timeless vision of Gross National Happiness (GNH). The 12th FYP takes further steps into the operationalization of GNH by adopting the nine-domain approach as the planning framework. This is expected to bring in greater synergy and focus, forming the primary basis of measuring our progress towards achieving GNH. The 12th FYP objective and sixteen National Key Results Areas (NKRA) have been drawn. Among which this project will help achieve NKRA 8: Water Food and Nutrition Security Ensured.

This SPCR Preparatory Project shall have nationwide benefit. It will help make informed decisions supporting a climate-resilient water sector. The information provided, upon completion of this technical Project, will guide LGs (Dzongkhag and Gewog administrations) to make proper investment plans especially in the water sector, and in particular, will help Chiwog-level CSOs and CBOs to make better climate-oriented decisions around resource allocation and development plans in water-scarce areas.

This Project shall not only build on the existing capacity of the Watershed Management Division to better plan for water management in the context of climate variability and extremes, but will also strengthen the overall institutional and technical capacity of field offices of the Department of Forests and Park Services in climate-resilient springs monitoring and assessments. The various agencies and local communities involved will also be able to make better decisions in climate adaptive water resource allocation and developmental planning for rural irrigation, potable water use, and water for village-level enterprise.

2.5 Approach

This Preparatory Project will be conducted by first sending out questionnaire survey to identify and map the water sources that have dried out in the country. Then the project will prioritize areas by selecting several locations in different Dzongkhags where water source drying has been reported in the South and Central Bhutan. Field inspections will be carried out to gather relevant water resource data. This information will be supplemented by collating rainfall data and geological and topographic maps for each of the sites and with community consultations.

We will also rely on historical and impact projections data from the NCHM to complement anecdotal and field data sets. After the data has been collected and collated, it will be analyzed to see if there are any common patterns, and whether initial conclusions can be drawn to explain the systematic drying of water sources, especially with climate scenarios in mind. This will lead to the formulation of a more comprehensive assessment of the water source-drying phenomenon during the Phase II Investment; through formulation of climate-resilient watershed management plans.

A climate-oriented Wetlands Inventory Framework will also be developed for Phase II, mapping the various types of wetlands (water sources) in the country. This will enable the protection of water ecosystems from haphazard developmental activities, and may reduce some of the unintended consequences of water sources drying up. The results of the Phase II mapping of wetlands will contribute to proper town planning, and designing climate change adaptive water management measures in southern Bhutan.

2.6 Activities

The following are the indicative activities for this Preparatory Project:

1. Development of questionnaire survey, and technical framework
2. Stakeholder consultation workshops in Thimphu
3. Community consultation meetings, in 1 southern target regions, targeting: CSOs, CSMIs, Women's Groups, and indigenous organizations
4. Field Survey and Assessments, in 1 southern target regions, targeting: CSOs, CSMIs, Women's Groups, and indigenous organizations
5. Hydrogeology Mapping & formulation of a Framework for a Wetlands Inventory (conducted during Phase II Investment)
6. Write shops – Analysis of the information gathered
7. Climate-oriented capacity building, and training of trainers, particular targeting LG water Focal and planners, CSOs and women-led local enterprise.

2.7 Risks & Solutions

Risks	Solutions
Limitation of local experts to carry out hydrological studies	Capacity building of local experts in hydrological studies
Limitation of local experts in structural geology and wetlands inventory	Capacity building of local geologists and wetland managers by availing technical capacity building from regional institutes (such as ICIMOD) Hiring of a consultant
Limited ability of ministries policy makers and practitioners in hydrology and water resources management	Awareness raising through education and outreach program and dedicated PPCR awareness raising activities (include knowledge building and technology transfer through international expert exchange)
Program Sustainability	Leveraging co-financing, and other risks management knowledge products. Include as one of the outputs in the 121th FYP
Increased number of identified sites for detailed assessment, resulting to loosing focus and constraining the limited time for completion of the project	Fix a reasonable number of pilot sites through the consultation meeting

3.0 Expected Outcomes & Deliverables

The expected outputs of the technical project are:

GIS Topographic Map:

a. Collate GIS-based topographic map of target area with location of water sources, settlements, forest, agricultural fields, vulnerable groups (CSOs/CBOs, CSMIs, indigenous Groups), and climate scenarios data, etc.
b. Overlay with anticipated climate hazards (from NCHM)

Report:

c. Obtain local traditional perceptions of changes to the water source, triangulated where possible, and covering a wide spectrum of informants' ages and backgrounds, including disaggregated gender, industry, and indigenous population data. Attempt, where possible, to obtain quantitative indicators of the changes. Information could include:
    i) The usual pattern of seasonal discharge of the water source
    ii) Changes in discharge over time (seasonally and annually)
    iii) Climate-projection adjusted anticipated changes in discharge (varying climate scenarios)
d. Obtain information on changes in land use patterns over past several decades (expansion/contraction of agricultural and forest areas, local industry water consumption changes, eco-system impacts, etc.) in the immediate area of the water source, as well as across the wider landscape up-slope of the water source(s).
e. Collect historical rainfall records, and couple with climate projections data
f. Collect geological information, with interpretation of underlying structural geology
g. Delineate aquifers and springs across the landscape, and identify high-risk climate hazard areas
h. Identify recharge areas, based on local geology and its structural setting

Capacity-Building:

i. Train WMD, LG, and MoH (responsible for rural water) field officers in climate-oriented hydrogeology mapping, and formulation of Framework for development of a region-specific climate-adaptation wetlands inventory to be completed during Phase II Investment.
j. Training of Trainers in socioeconomic data collection, and developmental performance indicators toward Gross National Happiness Index.
k. Purchase and use of field equipment to carry out the field survey, and assessments of water sources.

The following questions could be further explored during the Phase II Investment Component:

- Is it feasible to establish a simple monitoring system for collection of periodic spring discharge data, with climate projections in mind?
- How can ecosystem-based watershed management measures be designed and introduced to improve recharge of aquifers, with climate variability and extremes in mind?
- How can such measures be implemented through the full integration of civil society stakeholders, especially from indigenous groups, women's associations, and CSMIs?

During the Phase II Investment Component, the information generated from this Phase I Project will contribute to a more comprehensive climate-resilient strategy for water source management. This Phase II will help to develop and implement a Climate-Adaptive Watershed Management Plan in Bhutan, particularly in the vulnerable southern and central regions. Information on water ecosystems such as a climate-oriented wetlands inventory shall also be included. Moreover, payment for ecosystem services, as a sustainable financial tool, will be explored and established according to feasibility.

4.0 Results & Performance Framework

Component	Output (Product)	Outcome	Impact
1. Development of questionnaire survey, and technical	1. Survey Questionnaire 2. Technical Framework for the project	1. Drying of water sources mapped in the country 2. Way forward of the project for timely delivery of the results - preplanning	Strategize the areas of intervention to achieve water and food security

Component	Output (Product)	Outcome	Impact
framework protocols			
2. Stakeholder consultation workshops in Thimphu	Task force members identified	Guidance in the development of the technical framework and overall project implementation provided	Integration of all stakeholders involved with water resources management
3. Community consultation meetings, in target regions, targeting: CSOs, CSMIs, Women's Groups, and indigenous organizations	Traditional perception of the water sources drying up mapped	Obtain information on changes in land use patterns over past several decades (expansion/contraction of agricultural and forest areas, local industry water consumption changes, eco-system impacts, etc.) in the immediate area of the water source, as well as across the wider landscape up-slope of the water source(s).	Inclusion of traditional knowledge in water sources drying up to design appropriat4e community based intervention in the management plan in Phase I I
4. Field Survey and Assessments, in target regions, targeting: CSOs, CSMIs, Women's Groups, and indigenous organizations	1. Aquifers and water sources across the landscape with identify high-risk climate hazard areas identified. 2.Geology with interpretation of underlying structural geology mapped	The water ecosystem in the target areas shall be mapped to guide in proper planning of developmental activities in the landscape to reduce further impact in the water recharge areas.	Strategic planning enhanced with proper zoning of protected areas in the landscape related to critical water ecosystems. Guide developmental planners in avoiding unintended destruction of water ecosystems.
5. Hydrogeology Mapping & formulation of a Framework for a Wetlands Inventory (conducted during Phase II Investment)	1. GIS maps for wetlands (water sources) in the landscape 2. Hydrogeological maps of the landscaped 3. Framework for wetlands inventory in the country developed	Provide guidance in the recharge areas for Phase II interventions and development of watershed management plans	Strategic planning enhanced with proper zoning of protected areas in the landscape related to critical water ecosystems. Guide developmental planners in avoiding unintended destruction of water ecosystems.
6. Write shops – Analysis of the information gathered	Report of the scoping study of water sources drying up	Identify the causes of the phenomenon – water sources drying up – and help provide evidences to make informed decisions in applying climate - adaptive interventions in southern and central Bhutan	Achieve water and food security
7. Climate-oriented capacity building, and training of trainers, particular targeting LGs, CSOs and local enterprise.	1. Number of individual trained in water resources inventory and mapping 2. Number of individuals trained in hydrogeology 3. Number of people	Capacity development in overall water resources management in the country	Achieve water an food security

Component	Output (Product)	Outcome	Impact
	aware of proper water resources management		

4.0 Expertise (National & International) Required

To carry out the study, the Watershed Management Division will lead this Preparatory Project. The Territorial Divisions and the Park Offices of the Department of Forests and Park Services will assist in the field. And, if a structural geologist and a hydro geologist cannot be found in the Department of Geology and Mines, a specialist will be hired accordingly.

International and Regional Non Governmental Organizations such as the International Water Management Institute, and the International Center for Integrated Mountain Development (ICOMOD) shall be involved in providing technical assistance in the technical project. Additionally, we will include NCHM, NEC, and DGM (hydro-geologist) in the task force to be aware of the work being carried out in the project. It both will guide us with their respective fields of expertise and guide them in their work by the overall outcome of the project. Finally, initial inputs will be shared between the WMD and other agencies to formulate site-specific water recharge and drought hazard maps during the Investment Phase; and WMD, MoWHS, MoH and DMD will create a Framework for the design and implementation of a replicable climate-oriented Water Management Plan for a southern Thromde and Gewog vis a vis watershed management and water use.

5.0 Brief Consultant TORs

There is currently no requirement for a consultant. However, if there is no expertise in developing wetlands inventory framework and carrying out the hydrogeological work, expertise will be sourced to provide the required deliverables in the project.

6.0 Duration & Reporting Procedures

This Phase I Preparatory Project will commence in September 2017, and be implemented over a one-year period, with expected completion of overall outputs, activities, and analysis by December 2018. This will enable the completion of Investment Project Documentation by December 2018, and commencement of the respective Investment Component (Phase I I), with implementation from July 2019 – June 2023, in alignment with the RGoB's 12th FYP and NAP, both expected to commence in mid-2018.

7.0 Implementation Arrangements/Partners/Linkages

The Watershed Management Division of the Department of Forests and Park and Services shall take the lead. National stakeholders and Technical Advisory Group shall include all agencies involved with water (policy and implementation) such as Ministry of Health, Ministry of Work and Human Settlement, Ministry of Home and Cultural Affairs, Ministry of Agriculture and Forests, Ministry of Economic Affairs, National Center for Hydro metrological Services and National Environment Commission. Civil Society Organizations, who are involved with water and water solutions, shall be involved. Likely CSO partners would include: the Royal Society for Protection of Nature, Tarayana Foundation, Mawongpa Water Solutions, and others.

Financial agencies such Bhutan Trust Fund for Environmental Conservation, Bhutan Foundation and United Nations Development Program and World Bank shall be also included as part of the Technical Advisory Group. International and Regional Non Governmental Organizations such as International Water Management Institute and International Center for Integrated Mountain Development shall be involved in providing technical assistance in the technical project.

At the district level, all LG units shall be involved. The Territorial Division and the Park Offices of the Department of Forests and Park Services shall lead the fieldwork with technical guidance from the Watershed Management Division. Community groups and local participants shall be involved, particularly with local information and historical data of the respective areas.

The study will make sure that during stakeholder consultation meetings, women from the community are involved and their inputs are considered. National Center for Women and Children will be part of the Technical Advisory Group at the national level and women community groups at the local level shall be involved in the community consultation meetings.

Central Government
The Watershed Management Division will report to GNHC, and provide half yearly updates on progress made. Clear lines of communication and inter-agency responsibilities will be assured under the auspices of the GNHC's Program Steering Committee, and NEC's C4.

Local Government
Dzongkhags, Gewogs and Chiwogs in high-priority Chiwogs in the Central and Southern Regions.

Civil Society
CSOs working in the respective field of work and region; and women-led CSMIs impacted by water scarcity, in high-priority Chiwogs in the Central and Southern Regions.

8.0 Project Beneficiaries

It is envisaged that Central and LG policy-makers, planners, and practitioners will greatly benefit from the scoping study. The identified causes of the phenomenon – water sources drying up – through this project will help provide evidences to make informed decisions in applying climate - adaptive interventions in southern and central Bhutan.

The project will guide central and LG in achieving water and food security in Bhutan. The availability of wetlands inventory maps and drying water sources with its hydrogeological maps, will better inform them about potential anticipated hydrological risks to already vulnerable human settlements and critical eco-systems, especially in the southern and central areas of Bhutan. By extension, grassroots CSOs and CBOs, as well as CSMIs at the vulnerable community level, will specifically benefit from information generated through this project. They shall be better prepared for climate-induced hazards through improved LG climate risk management planning and climate-resilient capacity building.

The information derived from this Preparatory Project will particularly enhance the knowledge and increase awareness on climate resilience among women and youth, through the sharing of the evidences of why water sources are drying up. Moreover, this information will directly benefit farming cooperatives and private sector entities in the South, through climate-resilient planning and community-based workshops.

9.0 Investment Costing

C. Preparatory Phase I : USD 200,000
D. (Notional) Investment Phase II: USD 7 Milion

Third Preparatory Project

Flood Engineering and Management Division, Department of Engineering Services, Ministry of Works and Human Settlements, Royal Government of Bhutan

Pillar 2: Preparedness, Food & Water Security - Assessment of Flooding Hazards & Development of Climate-Resilient Flood Mitigation Measures in Southern Bhutan.

1.0 Background

1.1 Country Context

Bhutan is among the countries most vulnerable to climate change in the Asia-Pacific region because of its vulnerable mountainous terrain and volatile and climate vulnerable ecosystems. The country is exposed to multiple hazards, in particular glacial lake outburst floods (GLOF) resulting from glacial melting, flash floods, landslides, windstorms, forest fires, localized changes in rainfall patterns and increasing droughts during dry season.

Climate change is projected to significantly magnify the intensity and frequency of such natural hazards, as has already been evidenced by the glacial lake outburst flood (GLOF) of Lugge Tsho in 1994, the high intensity cyclone Aila in May 2009, which caused substantial damages and more recently in July 2016, whereby the rivers and streams in southern Bhutan washed away houses and farmland, and extensively damage the public infrastructure.

1.2 River Basins & Climate Hazards

Bhutanese river systems are generally characterized by steep slopes in the upper catchment, which are subject to intense seasonal rainfall and high rates of erosion. As the rivers flow towards the southern foothills, the transition from mountainous areas to flat plains typically occurs and is accompanied by extensive flooding. Although flooding occurs in most parts of the country, it is recurrent in the southern region, affecting the local human settlements, ecosystems, and localized infrastructure and industry.

The towns of Sarpang, Gelephu, Phuntsholing and Samdrup Jongkhar receive maximum impacts from monsoon rains. Geologically, southern Bhutan falls under a Siwalik Zone, where soil predominantly consists of sandstone, siltstone, clay, shale and boulder beds. These types of soils are highly susceptible to erosion. Flooding events carry the eroded sediments and debris from upstream catchments, and deposit this immense debris across the downstream plains. The result is extensive degradation e of vast stretches of farm land, and other usable lands, and consequent disrupted local enterprise and family livelihoods. Already compromised food security is further exacerbated by these repeat extreme events.

Bhutan is in the process of formulating its Strategic Program for Climate Resilience (SPCR). This Preparatory Project forms an integral of the SPCR, and seeks to: better understand the complex geo-climatic, geomorphic, and socio-economic causes of flooding in the south, in the context of climate-induced changes in river-basin hydrology; and introduce replicable climate-resilient flood risk management measures, benefitting vulnerable Southern district, Gewogs and Chiwogs.

The Southern foothills have become more densely settled due to increased local populations, and an increased rate of economic development as landscapes are gentle, fertile and most suitable for agricultural farming. Meanwhile, flood damage continues to increase from climate change, despite increased public investment in flood control measures.

With the heavy monsoon rainfall every summer, and the increase in intensity and frequency of extreme flood events, these Southern communities are highly susceptible to the risk of flooding, recurrent landslides, and other climate-induced disasters. Numerous streams and rivers swell up enormously during the intense rainfall season, and the surface runoff from the catchment area transports vast amounts of upstream debris downstream to the arable flatlands, making these human settlements, precious farmland, and public infrastructure and local industry highly vulnerable to climate hazards.

1.3 Institutional

Till 2012, there was no dedicated national flood management capability. After recurrent flooding in all parts of the country and more devastatingly in southern Bhutan, Central Government ordered the institution of a central Flood Management Office under the Ministry of Works and Human Settlement (MoWHS) in 2011. Flood Engineering and Management (FEMD) was formally established in 2012 under the Department of Engineering Services, MoWHS to

provide technical backstopping to the districts and gewogs affected by flood. The organization however being new, lacked experience and a professional approach to address flood hazard issues across the country.

At the national level, the technical capacity of FEMD engineers and technicians to develop and introduce flood risk management plans and practices in the field is minimal. Their interventions are generally limited to verifying and validating the technical accuracy of the findings of the consultancy firms conducting the vulnerability assessments. Moreover, with the Government and the Department's strong decentralization approach of service provision, Dzongkhag and Gewog engineers are left to design and propose ad-hoc climate-resilient measures in their respective Districts, for which there are currently significant technical and capacity gaps.

As such, this Preparatory Project seeks to assess the complex geo-climatic, geomorphic, and socio-economic conditions and causes of downstream flooding, and adaptive incapacity of southern regions. In doing so, the role of the FEMD in reinforcing its flood management practices is a critical contribution to Bhutan's environmental and socio-economic sustainability, especially in the context of our Nations' climate-resilient developmental goals, as outlined in our: Twelfth Five Year Plan Guidelines; Indicative Nationally Determined Contribution (INDC); the National Adaptation Plan (NAP); Second National Communication (SNC); and developmental priorities also set out in the Gross National Happiness (GNH) Index.

1.4 Study Area

A. Mao River

Mao river is the main river in Gelephu town, and is joined by a number of tributaries along the way to the Indian border. Over the decades, the banks of the Mao river and its tributaries have been eroding , their course notably changing every year. The Mao River has developed a very wide river bed, and at certain sections the width of the river bed is as wide as 1,500 meters. Without immediate attention, these plains are under high-risk from the threat of degradation.

Further, built with a huge cost is the water treatment plant of Gelephu Town, which is located on the right bank of Mao River. There are also other infrastructures like government and private fisheries located very close to the right bank. These infrastructures are in great risk of being flooded and washed away. Moreover, the left bank has been experiencing constant erosion. A few meters width of land are being eroded with every monsoon.

A well-planned and scientific climate risk management approach to alleviate flood risk is long overdue in Gelephu. While some ad-hoc flood protection measures have been implemented by the LGs in the past, most of the measures have failed to serve the purpose, and the loss of properties are still continuing. A more traditional ad hoc and reactive flood management approach has also persisted, instead of looking at anticipated upstream geo-climatic conditions, and climate impact projection modeling, and how these conditions impact downstream resources.

Critical public infrastructure like roads, bridges, power lines, and local business, etc. are being washed away by the flood every year. The Dungkhag (Sub-District, between a Dzongkhag & Gewog) continue to invest huge amounts of post-disaster money for rehabilitation and reconstruction works every financial year. However, these works are again damaged by the monsoon floods the following summer. The need for a proper Mao basin climate impact study, emphasizing flooding and land degradation along the waterway, and implementing more sustainable climate-resilient hard and soft measures along the Mao rivers and its tributaries (Shetikheri, Thewar, Dawla Khola etc.) have become very critical for food and economic security.

B. Shetekheri

The seasonal stream at Shetekheri is one of the tributaries of Mao river in Gelephu Dungkhag. Each year, during heavy monsoon rains over an extended period of time, this stream significantly expands, and brings along huge volumes of debris (boulders, sand, logs, etc.). This massive debris is deposited along the riparian areas , and continues to accumulate each and every year, leading to meandering and severe encroachment towards the settlement of Pelrithang and Zomlithang villages.

Agricultural lands adjacent to the flowpath are covered with this accumulated debris, and houses and roads downstream are frequently washed away. The debris also blocks the culvert at the Gelephu-Zhemgang highway, and flows over the road resulting in periodic road blockages. Vehicles and people get stranded, sometimes for weeks; students are unable to attend their classes; and businesses' bottom-line is severely affected due to area flooding. Over the past 5 years, Central and LG has invested over Nu. 30 million on flood protection work. However, every season the basic protection structures are either washed away or covered with more debris flow.

C. Aiepoly

Aiepoly is the name of seasonal streams flowing through either end of the Gelephu domestic airport. The streams are named "Big" and "Small" Aiepoly. These seasonal rivers flow in enormous discharge, and with high velocity towards the Indian border towns during the monsoon season or extreme climate events. The aiepolies streams are basically comprised of the collection of runoff water from the upstream watershed after incessant rain for days, and flowing disastrously downstream.

The Big Aiepoly flows from one side of the airport, and carries massive amounts of boulders and sandy soil through lateral and bed erosion. Often, vehicles and people get stranded at this point, as the boulders block the culvert and flow over the road. The stream flows towards the Indian border though the border town. The small Aiepoly flows from the other end of the airport, and goes right through downstream infrastructure and human settlements towards the India-Bhutan Gate. Although a detention pond and flood embankments has been constructed following repeated flooding downstream during the extreme rainfall season. Nevertheless, the prolonged duration of flooding still has disastrous downstream impacts to farming land, business, and the local ecology.

2.0 Project Goal, Description & Objective

2.1 Goal

To make Bhutan safe from climate induced hazard (go beyond flood) through eco-system based approach and climate risk management plans. The country also has its National Key Result Area (NKRA) focused on enhancing carbon neutral, climate and disaster resilience development and Agency Key Result Area (AKRA) set on reducing vulnerability to flooding though proper flood risk management.

2.2 Description

This SPCR Preparatory Project will prepare the institution for a comprehensive study on factors contributing to the flooding and debris flow in the study area. The study will focus on the catchment analysis and hydrological modelling for the three study areas (one river and two streams). Hazard assessment and risk maps area expected from the study while also carrying out the vulnerability assessment to actually ascertain the number of houses, families, infrastructures and agricultural lands affected. The Shetekheri study area will cover additional of geotechnical and landslide studies to determine the major factors contributing to the debris flow/flood. Eco-system based climate-resilient measures along the stream as an extreme climate change adaptation measure will be proposed. The project will basically serve as basis and rationale for the investment in the area as the long term measures.

2.3 Objective

2.3.1 Overall Objective

To conduct a detailed hydrological, geotechnical and catchment management study for long-term climate-resilient flood measures along the Maochu, Shetekheri and Aiepoly streams in Gelephu Dungkhag under Sarpang Dzongkhag

2.3.2 Specific Objectives

We will pursue the following specific objectives:

a. Study the complex geo-climatic, geomorphic, and socio-economic conditions along the study area and ascertain the causes of downstream flooding and extreme climate change adaptation capacity failure in southern regions of Bhutan.
b. Assess the impact of climate induced hazard in the affected area of the study area.
c. Formulate the climate-resilient, eco-system based measures to withstand/adapt to the water based hazard and debris flow in the study areas.

3.0 Project Purpose, Scope & Approach

3.1 Purpose

This Preparatory Project supports Pillar II of the SPCR: Preparedness, Food and Water Security. It seeks to provide an "Assessment of flooding hazards and flood mitigation options for flood vulnerable districts (southern belt)." Experience, outputs, and lessons learned from this Preparatory Phase I will provide the requisite information required to design the Phase II SPCR Investment, and help formulate a decision-making Framework & Action Plan for long-term climate-resilient flood measures in the South, particularly benefitting vulnerable farm land, indigenous populations, and CSMIs.

3.2 Project Scope

The scope of work for the entire study area to be investigated shall include, but not be limited to the following:

1. Detailed review and assessment of previous climate-resilience and disaster management reports, V&A & Hazard maps, drawings, water flow and climate change project inventories, historical and GCM/RGM climate projections data, etc.

2. Undertake targeted field trips in the vulnerable geo-climatic target area(s), in the Southern region, and carry out detailed field surveys, including: topographic survey (if required); ecosystem-based river basin impact assessment; and, demographic analysis of vulnerable target groups (women, industry sectors, CSMIs, CBOs, indigenous/traditional groups) to confirm desk study interpretation and to gather supplementary data.

3. Identify, assess and mark on a GIS-platformed map all water bodies (springs, creek, stream both seasonal and perennial, seepages, rivers, etc.) that may have impacts on the study area(s).

4. Assess the current climate-related impacts/risk of flooding and debris flow on land use, with particular emphasis on: critical catchment areas; agricultural and forest land; human settlements; critical public infrastructure; associated localized ecosystems; and, potable and irrigative water resources. Also create a Climate-Resilient Flood-Management Framework for development and implementation during the Investment Phase, supporting the determination of the aforementioned, with climate change impact projections scenarios in mind.

5. Carry out a socio-economic impact study on people, land, properties, critical infrastructure, and localized ecosystems that may be protected from flood hazards in the study area(s). In preparation for the Investment Phase, also provide a *Climate-Resilient Flood-Management Framework* for the aforementioned with projections data and expected climate impacts.

6. Design an *Ecosystem-Based Framework for River-Basin Flood Management*, that can be further developed during the Phase II Investment, that proposes and institutes hard and soft infrastructure measures in vulnerable critical target catchments; and that quantifies and qualifies the environmental risks to beneficiaries from climate-induced flood hazards, as well as the benefits of upstream climate-resilient measures in catchment areas and downstream risk reduction.

7. Estimate the following benefits that could be generated if climate-resilient measures would be put in place: alleviation of poverty in the affected area(s); improvement/stabilization of food security; reclamation of public and private lands; viability of economic activities in the area(s); and, protection of family economy and CSMI livelihoods.

3.3 Approach

3.3.1 General

This Project will directly address existing challenges in fulfilling the Sustainable Development Goals (SDG) 1. "Action to end poverty" 2."Clean water and sanitation" and 3."Ensure every citizen enjoy peace and prosperity" and will provide developmental indicators on preparedness, food and security, and community development that feed into the Gross National Happiness Index relating to well-being and socio-economic development.

Bhutan is currently developing its 12th Five Year Plan (FYP) to fulfill its timeless vision of Gross National Happiness (GNH). The 12th FYP takes further steps into the operationalization of GNH by adopting the nine-domain approach as the planning framework. This is expected to bring in greater synergy and focus, forming the primary basis of measuring our progress towards achieving GNH. The 12th FYP objective and sixteen National Key Results Areas (NKRA) have been drawn. Among which this project will help achieve NKRA #6: Carbon Neutral, Climate and Disaster Resilient Development Enhanced.

FEMD will work with the LG partners (Engineers, Planning & Environment Officers in Southern Gewogs) towards benefiting from the extensive climate-resilient flood management capacity-building such as: (i) better management of river basin ecosystems degraded by climate extremes; and, (ii) help reduce overall climate vulnerability of Southern farm villages, and introduce climate-resilient interventions benefitting local cottage industry, indigenous populations, and CSOs/CBOs at high risk.

3.3.2 Climate Adaptation Institution - Strengthening

Considering the limited technical capacity of FEMD engineers and technicians to develop and introduce flood risk management plans and practices in the field, there is an urgent need for institution strengthening and capacity-building support to enable FEMD engineers and LG partners and civil society groups to develop and introduce: (i) ecosystem-based climate-resilient measures (mostly soft infrastructure) to high-risk river basins; and, (ii) comprehensive flood risk assessment and vulnerability reduction measures in high-risk southern Gewogs, especially for vulnerable farmlands where food insecurity is great, and for local CSMIs and indigenous groups particularly at-risk from these climate extremes.

3.3.3 Transboundary Co-Benefits

All major Bhutanese river systems and streams in southern Bhutan flow into Indian Territory. Thus, cross-border human settlements experience similar flood impact as in Bhutan. It is proposed that the climate-resilient measures being considered for Bhutan within this SPCR initiative will directly benefit the Indian state of Assam and West Bengal. These vulnerability reduction interventions are expected to reduce the velocity of river flow, and minimize sediment loads and debris flow, to minimize the erosion of thousands of acres of arable land.

A. Study Area: Mao River

1. Carry out a detailed hydrological study, including determination of peak discharge, flow velocity, & scour depth, etc. The hydrological study shall include, inter-alia, a collection of historical data onflood discharge, high flood discharge forecast, compute Return Period, maximum HFL, mean-low water level, seepage flow, maximum velocity of flood flow, river flow characteristics, rainfall intensity and catchments area characteristics.

   The hydro meteorological data will be obtained from the National Centre for Hydrology and Meteorology (NCHM). Further, discussions will also be carried out with NCHM during the Investment Phase I. NCHM to ground truth data.

2. Formulate a climate adaptation Flood Hazard Map that considers both historical and projections data, using SDM or DDM climate change scenarios and impact projections. This Geo-Climatic Flood Hazard Map will highlight risks posed to human settlements, critical public infrastructure, particular industry sectors and at-risk CSMIs, key agricultural land, and ecosystem-dependent populations and CBO interest groups.

3. Formulate a Vulnerability and Adaptation Toolkit for downstream beneficiaries, including inter-alia: Southern farm villages, local cottage industry, indigenous populations, and CSOs/CBOs at high risk.

B. Study Area: Shetekheri Stream

1. Conduct a detailed catchment study, modeling and analysis to ascertain the causes/factors of flooding and slope instabilities. Propose the most suitable climate-resilient measures and programs to control downstream flooding and climate hazards to target beneficiaries (see above). Collaborate with the Watershed Management Division, of the MoAF, to conduct the catchment studies, and to adopt appropriate upstream measures, especially relating to hard and soft ecosystem stabilization.

2. Identify, assess and prepare GIS Geo-Climatic Instability Inventory Maps (landslides, erosion, debris flow, scouring, toe erosion, creep, subsidence, land degradation, rock fall, planar failure, wedge failure, toppling, etc.) within the study area(s), and indicate the level of climate hazards posed by these instabilities. All the instabilities identified within the study area should be mapped to appropriate scale.

3. Identify and assess the strength of geological materials by conducting necessary field and laboratory tests and analysis. Conduct necessary geotechnical and geo-physical tests based on IS or any internationally accepted standard.

4. Assess the correlations between the instabilities and geology (rock type, soil and deposits), topography (slopes), land use, hydrology (rainfall, seepages, and ground water), and determine the most significant factors responsible for causing downstream riverine flood events. Hydrological impact projections data will be overlaid with the aforementioned data sets on a GIS platform to obtain a combined picture of possible geomorphic and climatic risks.

5. Estimate and analyze the sediment transport capacity of flooding, by river basin and flood zone. Study the forms, erosion and deposition pattern along its course. A detailed river morphology also needs to be studied through remote sensing, or other methods using satellite imagery.

6. Carry out a detailed hydrological study, including determination of peak discharge, flow velocity, & scour depth, etc. The hydrological study shall include, inter-alia, a collection of historical data on flood discharge, high flood discharge forecast, compute Return Period, maximum HFL, mean-low water level, seepage flow, maximum velocity of flood flow, river flow characteristics, rainfall intensity and catchments area characteristics. Hydro meteorological data and impact projection models can be obtained from the National Centre for Hydrology and Meteorology (NCHM).

7. Carry out Flood modeling using appropriate software like MIKE 11/ coupled 1D, and 2D model, using MIKE FLOOD/or equivalent standard software.

8. Prepare a Climate Adaptation Flood Hazard Map that considers both historical and projections data, using SDM or DDM climate change scenarios and impact projections. This Geo-Climatic Flood Hazard Map will highlight risks posed to human settlements, critical public infrastructure, particular industry sectors and at-risk CSMIs, key agricultural land, and ecosystem-dependent populations and CBO interest groups.

9. Formulate a Vulnerability and Adaptation Toolkit for downstream beneficiaries, including inter-alia: Southern farm villages, local cottage industry, indigenous populations, and CSOs/CBOs at high risk.

10. The Climate Adaptation Flood Hazard Map and Vulnerability and Adaptation Toolkit will respond to the specific climate risk management needs of the target vulnerable groups, especially: women and girls, indigenous peoples, CVSOs and CBOs, , and CSMIs at high-risk. By overcoming the anxiety and fear of repeat flooding hazards through climate-adaptation tools and capacity-building, the project will fulfill the philosophy of the country's motive (Gross National Happiness) - to bring happiness to every citizen.

11. Provide detailed design, drawing, and estimation with detailed rate analysis (for all items) and specifications of the structural/non-structural flood protection and river training measures recommended throughout the Preparatory Project and in preparation for the Phase II Investment. Designs/drawings should be done using appropriate engineering software in CAD format. The drawings should contain all the details required for execution of the proposed measures, without the need for any further designs or construction drawings. The proposed climate-resilient structural/non-structural measures should be eco-system based, using natural materials and green solutions.

Study Area: Aiepoly (Big & Small)

1. Conduct a detailed catchment study, modeling and analysis to ascertain the sources and upstream discharge collection for small and big Aiepoly using appropriate software. Same as above.

2. Recommend appropriate adaptation measures in the catchment and downstream to protect the settlement, infrastructure and reclaim land along the stream course considering the extreme climate change events, and necessary transboundary water issues. Same as above.

4.0 Risks & Solutions

Risks	Solutions
1. Inability to distinguish between DRM & CRM protocols and practices.	FEMD technical staff and field partners will receive training workshops on CR water resource management; and it is expected that CR activities and knowledge products were strategically complement existing DRM policies and practices vis a vis risk management practices.
2. Inadequate hydro-met data in the areas of interest for hydrological and hydrodynamic modelling purposes.	Work with National Centre for Hydrology and Meteorology (NCHM) to generate the required data.
3. Siwalik nature of the geology (young and erodible) in southern Bhutan (difficulty in controlling the debris flow)	Conducting desktop, fieldtrips, testing-based Comprehensive geological studies with the recruitment of an experienced geologist.

Risks	Solutions
4. Lack of adequate Capacity in FEMD (central flood agency) to conduct proper hydrology and geotechnical, eco-system based flood control approach or climate related studies.	Capacity building through exposure training or long term specialization in flood and climate change filed.

5.0 Expected Outcome, Outputs and Impacts

The outputs and recommendations from this technical Preparatory Project shall be considered for implementation in the 12th Five Year Plan of the government. The measures shall all be ecosystem-based, complying with the National Environment Commission Watershed Management Guidelines of reducing environmental impact.

6.0 Results & Performance Framework

Component	Output (Product)	Outcome	Impact
1. Preparation of Flood Hazard Map	b. Climate Adaptation Flood Hazard Map for Shetikheri stream and Mao river.	1. 2 Hazard Maps for Shetikheri and Mao river.	Hazard maps will guide in exactly locating the adaptation measures and making the vulnerable communities, critical infrastructures and agricultural land safe. Integration of government plans and policies in the affected area.
2. Assessment of flooding impact in the affected area of the study area	2. Flooding impact assessment report for Maochu, Shetikheri and Aiepoly (big and small) study area.	2. Details of flooding impact on households, critical infrastructures, agricultural land and properties along the study area.	2. Strong rationale for huge investment in the affected area.
3. Vulnerability assessment along Shetikheri stream	3. Vulnerability Assessment; & Vulnerability and Adaptation Toolkit for Shetikheri study area.	3. Climate adaptation programms and plans along the affected area.	3. Proper land use planning along the flood area in the Local Area Plan of the Municipal and District.
4. Detail catchment studies and assessment of geological instatbiliyt and hydrology upstream	4.1. Report on Causes/factors of flooding and slope instabilities in the area. 4.2. Report on Geotechnical & Slope stability	4. Identification of Factors contributing to the Flooding – Geological instabilities and Catchment disruption at the upstream.	4. Climate resilient measures at the catchment

Component	Output (Product)	Outcome	Impact
	analysis of soil and rock slopes report for Shetikheri stream.		
5.Formulate climate risk management framework as long term measures	5.1 Proposed climate-resilient adaptation measures at the catchment and affected areas. 5.2 Detail design, drawing, cost estimate, specifications for the proposed ecosytem-based structural & nonstructural measures. 5.3 Documentation readied for Phase II Investment Component	5. Eco-system based structural/non-structural measures at the affected areas.	5. Adaptation to Extreme Climate Event in the hazard exposed areas in Sarpang District.
6. Socio-Economic benefit/loss study	6.1 Socio-economic impact/benefit report for Shetikheri.	6. Cost-Benefit Analysis Report	6. Decision-makers will be able to decise on need of climate-resilient measures.

7.0 Expertise Required (National & International)

To carry out this Phase I Preparatory Project, the Flood Engineering Management Division will lead, with support from the Territorial Divisions and the Park Offices of the Department of Forests and Park Services, the Watershed Management Division, Department of Forests and Park Services, the National Center for Hydrology and Meteorology (NCHM) and the LG.

International and Regional Non Governmental Organizations such as the UNDP, International Water Management Institute, and the International Center for Integrated Mountain Development (ICOMOD) may be involved in providing technical assistance. Domestically, Taryana and the CSOA will facilitate project engagement with Women's Groups and community-level CSOS and CBOs, while the BCCI will assist in identifying at-risk CSMI member companies in the target areas.

Finally, during the Phase II Investment, DHS will assist FEMD to introduce a replicable Climate-SMART Land-Use Plan for at-risk Thromdes and Gewogs in the target areas, vis a vis watershed management and water use, and basic infrastructure and local industry physical planning.

Experienced Local Consultancy Firms in collaboration with International individual experts shall be hired for the service. This is also for the ease of contacting the consultancy firms during the time of any clarification and implementation of the Phase II – Investment Plan.

8.0 Duration & Reporting Procedures

This Phase I Preparatory Project will commence in September 2017, and be implemented over a one-year period, with expected completion of overall outputs, activities, and analysis by June 2018. This will enable the completion of Investment Project Documentation by June 2018, and commencement of the respective Investment Component (Phase I), with implementation from July 2018 – June 2023, in alignment with the RGoB's 12th FYP and NAP, both expected to commence in mid-2018.

9.0 Implementation Arrangements/Partners/Linkages

9.1 Central Government

The FEMD will: (i) report to GNHC SPCR Focal, with half yearly updates on progress made; (ii) ensure ongoing engagement with and inputs from the GNHC and MoWHS Gender Focals; (iii) provide clear lines of communication and inter-agency responsibilities under the auspices of NEC's C4; and, (iv) work in close collaboration with the NEC's Water divisions and Climate Change Team to ensure strong complementary program activities and outcomes. Concrete synergies will be developed with: NEC, NCHM. WMD, DHS and DDM Preparatory Projects & Investment Components.

9.2 Central Government

The FEMD shall take the lead. National stakeholders and Technical Advisory Groups shall include all agencies involved with disaster risk management and water, such as: the DDM; National Environment Commission Water Commission, Ministry of Work and Human Settlement, Department of Human Settlement, Department of Geology and Mines, Ministry of Home and Cultural Affairs, Ministry of Agriculture and Forests, National Center for Hydro Metrological Services, etc.

9.3 Local Government

At the District level, all LG units (Dzongkhag, Gewog, Chiwog) shall be involved. The FEMD shall lead the fieldwork, with technical guidance from the NCHM, DDM, Watershed Management Division, and DHS.

9.4 Civil Society

Community groups and local village participants shall be involved, particularly in providing local information and historical data of their respective areas, and in the design and implementation of village-level climate-resilient inputs and activities for both Phase I & II.

Civil Society Organizations, who are involved with water and water solutions, farming, riverine ecosystem management, and disaster management shall be directly involved. Likely CSO partners would include: the Royal Society for Protection of Nature, Tarayana Foundation, Mawongpa Water Solutions, and others. As important, at-risk BCCI member entrepreneurs will provide sector-based industry data and be involved in the formulation and implementation of the Vulnerability and Adaptation Toolkit for downstream beneficiaries, and the Climate Adaptation Flood Hazard Map and Vulnerability and Adaptation Toolkit.

10.0 Project Beneficiaries

This Preparatory Project will make sure that during stakeholder consultation meetings, women leaders from the affected southern communities are integrally involved through the Project life-cycle, and that their tangible inputs are duly considered. The National Center for Women and Children (NCWC) will be part of the Technical Advisory Group at the national level, and women community groups at the local level shall be involved in Phase I & II Project design, and the community consultation meetings.

It is envisaged that Central and LG policy-makers, planners, and practitioners will greatly benefit from the availability of the Climate Adaptation Flood Hazard Map and Vulnerability and Adaptation Toolkit. This will better equip LG and civil society with the requisite tools to minimize climate-induced flood hazards in already-vulnerable human settlements, critical eco-systems, and industry, especially in the southern portion of Bhutan. By extension, grassroots CSOs and CBOs, as well as CSMIs at the vulnerable community level, it will specifically benefit from these adaptation tools to: better prepare them for climate-induced flood hazards; and introduce climate risk management planning and community-based adaptation measures in their operations and daily lives.

11.0 Investment Costing

a. Preparatory Phase I : USD 250,000
b. (Notional) Investment Phase I I: USD 30 Million (PPCR)

12.0 Consultant TORs

12.1 Tasks

For all three Project areas, the Consultant Firm shall perform the following tasks:
ToR for the Phase I Preparatory Study Attached

12.2 Expert Requirements

Experience of the consultancy firm and experts

The Management Consulting Firm should possess a registered business license, and have a minimum of 10 years of professional experience in conducting Climate Adaptation & Flood Risk Management Feasibility Studies; design of landslide mitigation; and flood risk management, including watershed management. A past working experience in the region with similar geological conditions (of project areas in Bhutan) will be a strong asset. The firm should have implemented at least two similar projects with contracts value not less than USD 200,000 each in the past 7 years. The firm should have adequate technical and financial capability to implement the project.

All experts who have a crucial role in implementing the contract are referred to as key experts, and details of the profiles of these key experts follows. Overall, the Consultancy Firm shall provide a qualified Team (national or international) to carry out the detailed studies, and design of climate-resilient flood risk management measures for landslide and floods. The following areas of expertise are required:

- Climate Hazard Mapping
- Vulnerability & Adaptation Mapping
- Stakeholder Consultations
- Geotechnical Engineering
- Structural Design
- Hydrology/Geo-hydrology
- River Morphology
- Watershed Risk Management
- Materials Engineering
- Quantity Surveying
- Environmental Impact Assessment
- Surveying
- Technical Drawing

The Consultancy Firm shall appoint a Hydrologist who shall be responsible for management and co-ordination of all Project activities. The following key personnel and relevant education and work experiences are considered to be essential for the proper execution of the assignment:

Sl. No	Expert	Qualification/Experience	Tasks and Responsibilities
1	Geotechnical Engineer	• Minimum Masters Degree in Geotechnical Engineering or Engineering Geology. • 7 years of professional experience in undertaking climate risk management projects/contracts; subsoil investigations and testing and evaluation of construction materials used in modern construction techniques. • Must be thoroughly familiar with all the standard laboratory and field testing procedures adopted in case of landslide and flood studies, particularly in construction of retaining and drainage structures, and familiarity with climate impact projections and hazard risk modelling. • Should have recent practical experience in the landslide and flood hazard mitigation projects, preferably in the region. • Should have a proven record of supervising, organizing, managing project preparation and execution of major flood/landslide hazard and climate-resilient projects.	• Will function as the Team Leader. • Will be responsible for the implementation of all activities including timely completion. • Shall guide, supervise, coordinate and monitor the work of other experts. • Provide protocols for material testing; assist with test formats, procedures of quality control tests required by the project. • Verify and approve material test certificates, and identify appropriate historical hydromet data, and climate impact projection data sets. • Provide technical backstopping on designs, technical standards and specifications. • Undertake all geotechnical investigation works which may also include resistivity

Sl. No	Expert	Qualification/Experience	Tasks and Responsibilities
		• Must possess good interpersonal and teamwork skills. • Must be fluent in oral and written English. • Have good knowledge of computer and other project management skills.	survey. • Advice on overall project planning and logistics • Coordinate the input of consultancy firms. • Review and edit draft reports produced by the consulting team. • Provide instruction and training relevant to the project. • Report to the Project Manager.
2	Hydrologist/Hydraulic Engineer	• Engineering Graduate with specialization in hydrology or related field. • Masters Degree or equivalent preferable. • Minimum 5 years work experience on hydrological and drainage studies, preferably in the region. • Should be fully familiar with the acceptable study methods, flood studies, engineering best practices (including climate impact redesign protocols) and must have experience of successfully using various methods of studies in different situations. • Preferably should have experience in planning and design of climate-resilient river training structure networks. • Should have experience in handling flood modelling software such as HECRAS/GEO-HECRAS, and DDM/SDM climate impact projection modelling. • Water Professionals with expertise in river morph dynamics and remote sensing. • Should possess good communication (oral and written), interpersonal and teamwork skills.	• Collect, review, and confirm information/data about hydrology, e.g. catchment characteristics, rainfall, stream/channel characteristics, design discharge, linear waterway, scour depth etc., for all cross drainage works and river training works. • Carry out flood modelling using climate impact projections modeling and appropriate GIS software. • Modelling of possible river training measures. • Propose watershed protection and restoration activities, and climate-resilient design approaches, with detailed cost and cost-benefit analysis. • Provide technical assistance in the planning and implementation of structural and non-structural best management practices designed to restore and protect watershed areas and riverine areas. • Prepare hydrological, climate-resilient flood hazard and risk maps. • Determine the requirements of risk reduction structures including drainages and soft ecosystem-based alternatives. • Work closely with the design engineer to design the flood risk reduction structures. • Prepare cost estimates and technical specifications. • Study the sediments transport capacity of the river, and identify erosion and deposition of pattern of the river.

Sl. No	Expert	Qualification/Experience	Tasks and Responsibilities
3	Structural Design Engineer	• Graduate in civil engineering with at least 5 years of professional experience or Diploma in Civil Engineering with 10 years of professional experience. • Should have 5 years of professional experience in structural analysis and design of structures. • Shall also possess experience in structural analysis and adaptive redesign protocols for retaining structures within the past 5 years.	• Review the existing relevant documents, reports, designs, information/data, etc., • Advice the Team leader to carry out necessary surveys and investigations required to prepare the detailed engineering designs of the proposed flood/debris flow climate-resilient structures (both hard and soft). • Prepare and finalize design concepts and design criteria in close consultation with the Team Leader and the client. • Prepare preliminary engineering designs, with climate impacts in mind. • Prepare detailed adaptive engineering re-designs for the proposed mitigation measures. • Prepare detailed working drawings in international standard using AutoCAD. The drawings should contain all the details required for execution of the project. • Prepare cost estimates (item rate analysis)
4	Development Economist	• Should have Bachelor degree in economics or any socio-economics related field. • Should have at least 5 years' work experience having undertaken socio-economic assessments and reporting in the past (especially including an assessment of CSMI, gender, indigenous peoples, and CSO integration). • Should possess good communication (oral and written), interpersonal and teamwork skills.	• Undertake studies on the socio-economic front in the expected affected areas as per the adaptation hazard map produced by the hydrologist and Project stakeholders.

The task and responsibilities specified above are generic in nature, and the experts will have to undertake all the activities required of them to complete the project as defined in the detailed scope of work.

Preparatory Project Deliverables Required Maps/Drawings

Sl. No.	Type of Maps/Drawings	Description
1	Location Map	This map should show the location of the study areas.
2	Engineering Geological Map	The map should contain detailed information of the different geological technical units based on their mechanical properties. Map should also contain information on landslides, soil slips, rock falls, general rock types, geological structures, dip orientation and other structures like joints, folds and faults. It shall also contain general information on soil. This map shall be produced at appropriate scales.
3	Hydrological map	Map showing all the drainage system in the study area. This map shall be

Sl. No.	Type of Maps/Drawings	Description
		produced at appropriate scales.
4	Vulnerability and Adaptation Toolkit	Adaptation Risk Toolkit to respond to the specific climate risk management needs of the target vulnerable groups (human settlements, critical public infrastructure, particular industry sectors and at-risk CSMIs, key agricultural land, and ecosystem-dependent populations and CBO interest groups)
5	Geo-Climatic Climate Adaptation Flood Hazard Map	Map showing the geo-climatic hazards of flooding of the stream/river to the settlement/properties in the study areas. This map shall be produced at appropriate scale.
6	Mitigation Structures Map	Map indicating location and type of critical climate-resilient engineering works (walls, subsoil drains, barriers, bioengineering, etc.) both new and old, cross reference to concept drawings. This map shall be produced at appropriate scales.
7	Engineering Drawings	Should contain detailed engineering climate redesign of all proposed structures to mitigate flood hazards.

Fourth Preparatory Project
Department of Human Settlement, Ministry of Works and Human Settlement; Royal Government of Bhutan
SPCR Preparatory Technical Project - Pillar 3: Sustainable Growth and Resilient Infrastructure
Climate-SMART Human Settlement Planning and Development
In Samdrup Jongkhar Thromde (Municipality)

1.0 Background

1.1 Country Context

Bhutan is a small country in the eastern Himalayas with an area of 38,394 sq. km and population of around 790,222 (National Statistics Bureau, 2017). The country mostly consists of high mountains and steep slopes. About 72% of the country is covered with forest. The altitude ranges from 200 metres in the southern regions to 7000 metres in the northern parts resulting in diverse climatic conditions and biodiversity.

The climatic conditions vary greatly as one moves from the southern parts to the north. The southern areas are relatively warmer with heavy rainfall, especially during the summer seasons. On the other hand, the northern parts are normally cold, and experience snowfall during winters. The varying climatic conditions, coupled with difficult high mountain topography, makes urban planning process and construction activities difficult in the country. Bhutan is also prone to multiple climate-induced hazards that constantly pose threats to its human lives, property, and ecosystems.

Climate change is becoming an increasing concern for the country and the government has been proactive in working towards adaptation and mitigation measures across all sectors including the human settlement sector. However, not much can be done until the current approach towards human settlement planning is changed and planning for Climate-SMART city is adopted.

Similarly, gender mainstreaming, youth, civil society organization and private sector participation in the human settlement planning process need to be further strengthened. Though the current plan preparation process entails numerous stakeholder consultations but there are negligible efforts towards bringing in private sectors, women and youth groups and the CSOs. Thus, this project is one such step towards planning for climate resiliency.

1.2 Project Context

Considering the increasing climate risks and vulnerability that Bhutan faces; and to develop a long–term strategic program to address climate-resilience, the Gross National Happiness Commission - which is the central planning agency - submitted an EOI for funding to the Pilot Program for Climate Resilience (PPCR) under the Climate Investment Fund (CIF).

After a rigorous selection process, Bhutan was selected as one only ten countries of 36 submissions to be granted PPCR Preparatory funding to develop a Strategic Program for Climate Resilience (SPCR). This SPCR process is led by GNHC, and is being supported in a coordinated way by Multilateral Development Banks (MDB), including the World Bank as the lead MDB, International Finance Corporation (IFC), and Asian Development Bank (ADB).

The goal of the SPCR is to provide a strategy for climate-resilience, outlining the country's adaptation and development priorities, and an investment program to achieve its goals. The four Thematic Pillars of the SPCR are:

i. Enhancing the Information Base For Hydro Met Services and Climate Resilience
ii. Preparedness, Food and Water Security
iii. Sustainable Growth and Resilient Infrastructure
iv. Strengthening Governance, Institutional Coordination and Human Resource Capacity.

1.3 Institutional

The Department of Human Settlement (DHS) under the Ministry of Works and Human Settlement (MoWHS) is the lead agency mandated to prepare human settlement plans along with development control guidelines all across the country. In addition, the Department also provides technical backstopping to the LGs. However, the Department has limited manpower and the technical capacity of the planners and designers in the Department to plan Climate-SMART cities is minimal at best.

As such this preparatory projects aims to enhance the technical capacity of the Department of Human Settlement and the Thromdes involved in the project through capacity building in planning Climate-SMART cities. In doing so, the role of the Department of Human Settlement in reinforcing its climate-resilient urban planning practices is a critical contribution to Bhutan's environmental and socio-economic sustainability, especially in the context of our Nations'

climate-resilient developmental goals, as outlined in our: Twelfth Five Year Plan Guidelines; Indicative Nationally Determined Contribution (INDC); the National Adaptation Plan (NAP); Second National Communication (SNC); and developmental priorities also set out in the Gross National Happiness (GNH) Index.

2.0 Project Goal & Description

2.1 Goal

To mainstream climate-resilience planning policies and practices in Bhutan's human settlement land use planning, policies and investments.

2.2 Description

2.2.1 General

This SPCR Preparatory Project will be carried out in-house by a team comprising of officials from the Department of Human Settlement, and Samdrup Jongkhar Thromde. Phase I of the project will assess the existing issues in Samdrup Jongkhar and accordingly prescribe adaptation measures to address climate related planning issues through the revision of Samdrup Jongkhar's Urban Development Plan. Phase 2 of the project will be implementation of the activities outlined in Phase I.

2.2.2 Background of the Project Area

Location and Connectivity

The area identified for this Preparatory Project is Samdrup Jongkhar Thromde (Municipality). Samdrup Jongkhar town is the Dzongkhag (district) headquarters of Samdrup Jongkhar Dzongkhag and is located in the eastern part of the country. The Dzongkhag is bounded by the Indian State of Assam in the south and east, and by the Dzongkhags of Trashigang in the north and Pemaghatshel in the west. The town is well connected to the rest of the Dzongkhags by road. It is also connected to Gelephu and Phuentsholing towns in the south through India via the Asian Highway running along the southern border. The nearest domestic airport is in Yongphula under Trashigang Dzongkhag which will start operating soon. The nearest international airport is in Guwahati, India.

The Thromde area includes the area under the Samdrupjonkhar town as well as the settlement in Dewathang, 18 km uphill with the connecting road in between. The area of Samdrup Jongkhar town is 2.08 sq. Km and the area of Dewathang town is 2.39 sq. Km. In 2009, the Parliament redefined the boundary of Samdrup Jongkhar Thromde to include Dewathang town within its limits and the area along the intermediate 18 km stretch of highway connecting Samdrup Jongkhar to Dewathang. However, for this Investment, only Samdrup Jongkhar town will be included.

Population of Thromde

The estimated population for Samdrup Jongkhar town was 7487 in 2013. It is projected to increase to 8462 in 2018 and 13288 by 2033. The annual population growth rate for the town is assumed to be 2.91%. The population density is 2862 persons per sq.km.

Climatic Conditions of Thromde

According to the reports of the Department of Hydro Met Services, the average monthly mean maximum temperature ranges between 19° C in the months of winter to 27° C in the months of summer while average monthly minimum temperature varies from 10° C during winter to 22° C during summer. The mean monthly relative humidity recorded is highest during monsoon season (93 %) and lowest (48 %) in winter.

According to Annual report of daily data recorded at Dewathang meteorological station, the annual precipitation for the period of 2008 to 2012 ranged between 4200 mm to 6200 mm with heavy rainfall ranging from 300-1400 during months of May, June, July, August and September. The heaviest rainfall of 1393 mm was recorded in June 2012. The average monthly rainfall is usually negligible for winter months of November to February and heaviest in June, July and August.

Some studies have assessed that Bhutan, specially the Southeast region, will have high probability of getting affected by climate change concerns predominant being an increase in rainfall intensity. This would further add to already existing problems of flashfloods, water logging and landslides.

There have been efforts towards mitigating GHGs through some projects like the project funded by GEF/SGP that looked at the possibility of 'Introduction of Fuel Efficient Stoves to reduce the consumption of fuel wood and 'The Samdrup Jongkhar Initiative' that proposes to raise living standards in the South-Eastern district of Samdrup Jongkhar and by establishing food security and self-sufficiency, protecting and enhancing the natural environment,

strengthening communities, stemming the rural-urban migration tide, and fostering a cooperative, productive, entrepreneurial and self-reliant spirit.

Such projects will be helpful in the long run due to the protection of the vegetation cover in the surrounding areas also helping in reducing the surface runoff (UDP, 2013]. The Urban Development Plan, 2013, recommends that vulnerability assessment and Climate Sensitivity Screening will have to be carried out at Samdrup Jongkhar to get a better idea of the likely impacts that the area may face in future and the possible actions that can be suggested.

Climate-Induced Risks For Both Thromdes

The Dungsam Chhu River flowing through the heart of the Samdrup Jongkhar Thromde floods during monsoon season because of a shallow river bed. The level of river bed is rising due gradually to siltation. The flood control embankments constructed along the river suffers repeated damage during floods. In addition increasing amount of rainfall also causes flash floods. Other disasters that the town often experiences are erosion, landslides and earthquakes. Air pollution is also on the rise which has been affecting the ambient air quality. Transportation of raw material, mainly gypsum in trucks through town also adds to the problem of dispersal of dust particles.

Added to these frequent climate-induced hazards, these peri-urban Thromde's are crying out for the most basic & hazard-free green spaces for basic leisure activities. The steep topographical terrain is subject to high levels of risk from slope deterioration and concomitant landslides, and flash flooding attributed to extreme weather events. As such, because most land surrounding these peri-urban centres are highly unstable, there is a scarcity of livable, safe, low-risk green spaces.

Planning Initiatives and Current Issues For Thromdes

The strategic location of the town, and the multiple roles it has been playing as trading hub, administrative centre and transit point have led to accelerated urbanization of the Thromde. The Thromde has prepared three development plans for the town till date. The first one was the Samdrup Jongkhar Urban Development Plan (1986-2000) and the next was the Samdrup Jongkhar Structure Plan (2006-2025). With the extension of the Thromde boundary, the responsibilities of the LG had also increased and along with development potentials, the Thromde faced numerous urban issues (Urban Development Plan for Samdrup Jongkhar, 2013). Owing to the redefinition of the Thromde boundary and the challenges faced by the Thromde, the Department of Human Settlement, Ministry of Works and Human Settlements, initiated the review and preparation of Urban Development Plan for Samdrup Jongkhar Thromde. The proposed plan period is for twenty years from 2013 to 2033.

As with the cities in the other developing and developed countries, Samdrup Jongkhar too is facing the impacts of climate change. Climate change is an increasing concern in cities where urbanization is happening rapidly. The drying up of water sources, frequent flash floods and fluctuating temperatures are some of the visual impacts of climate change in Samdrup Jongkhar. Over the years the emission of green house gases has increased considerably with increasing number of vehicles hitting the road every year. In addition, poor quality of roads, drains and footpaths, declining green areas and improper solid waste, waste water and water management are other urban issues that the capital city has been facing for years. The town faces acute water shortage and the government spends huge amount of money on improvement of urban services every year but the issue still persists.

Urban inhabitants across Bhutan are crying out for the most basic green spaces for leisure activities, but the topographical terrain in most urban centres is subject to high levels of risks from slope deterioration and concomitant landslides and flooding attributed to extreme weather events. Moreover, because most land surrounding the urban centres are unstable, there is a scarcity of livable, safe, low risk green spaces. Currently the Thromde lacks adequate green spaces which are important to reduce urban heat island effect and summer energy use for a hot place like Samdrup Jongkhar. Similarly, the open and recreational areas in the town are not designed for climate resiliency.

Further, the industrial estate of Matanga, 7 km away from the town, is envisaged to become a moderately large industrial development area for the region. This will have an impact on the economy and employment of the Thromde as well as bring about new developmental challenges. Hence there is an urgent need to enhance the planning and management capacity of the LGs combined with appropriate legal mechanisms.

It should also be noted that currently no Thromdes (Township) contain any design, planning, or budgetary consideration for climate impacts in their Land Use Plans.

Climate-SMART city is a broad entity which encompasses numerous tools that have been identified to assess resilience of city. It integrates all aspects of social, ecological, environmental and economical factors. As such a Climate-SMART city is low carbon city which encompasses all components of climate resiliency.

Today, planning for Climate-SMART cities has become a matter of priority for long-term sustainability. Many initiatives are being taken at international levels to raise awareness on the importance of making cities Climate-SMART, and to formulate strategies to increase the adaptive capacities of these cities. The *100 Cities Initiative* by the UN-Habitat is one such initiative which provides a platform for countries from all across the globe to come forward and share their stories and experiences on their initiatives in making their cities Climate-SMART.

Climate-SMART planning also has impacts on national economic development, as this form of planning addresses issues like damage to infrastructures, and productivity losses and health hazards which will otherwise have huge financial implications for Government. It also has implications on liability costs, credit ratings and investment from outside.

Bhutan too has recognized the importance of planning for climate resiliency and the government has been proactive in carrying out activities and coming up with strategies to combat climate change. The National Adaptation Plans (NAP), National Adaptation Program of Action (NAPA II) and the Nationally Determined Contribution (NDC) are some such initiatives that assess climate risks and vulnerability across different sectors, and appraise adaptation options.

The NDC has identified Climate-SMART cities as a priority action area for low-GHG emission development. The DHS is also in the process of formulating a Comprehensive National Development Strategy (CNDP) which will help in managing land resources sustainably. However, these strategies are long-term plans, and in the meantime it is important to address the current climate-related urban issues. As such, this *SPCR Preparatory Project* is aimed at coming up with investment activities that will be aligned with the upcoming 12th Five-Year Plan objectives, which will commence in 2018 through 2023.

3.0 Objective

3.1 Overall Objective

To make Samdrup Jongkhar Thromde climate-resilient by increasing its adaptive capacity via Climate-SMART Land Use Planning (LUP); and to promote climate-resilient urban services and infrastructure.

3.2 Specific Objectives

We will pursue the following specific objectives:

i. To review the Samdrup Jongkhar Urban Development Plan to conduct a stock taking and identify entry points for the incorporation of land use planning components that are Climate-SMART;
ii. To carry out a detailed inventory of existing urban services and critical infrastructure in Samdrup Jongkhar Thromde; that would be improved through climate-resilient measures in Phase II;
iii. To create a Climate-SMART LUP Framework that is replicable across three levels of government, including Dzongkhags, Thromdes and Yenlag Thomdes; for implementation during Phase II Investment;
iv. To enhance the capacity of the DHS and the LG to plan and implement Climate-SMART Cities.
v. To implement a strategy to incorporate an incremental adaptation co-efficient into all development planning processes within municipal jurisdiction, formulated during this Preparatory Phase.

4.0 Goal

To mainstream climate-resilience planning policies and practices in Bhutan's human settlement land use planning, policies and investments.

4.1 Description

4.2 General

This SPCR Preparatory Project will be carried out in-house by a team comprising of officials from the Department of Human Settlement, and Samdrup Jongkhar Thromde. Phase I of the project will assess the existing issues in Samdrup Jongkhar and accordingly prescribe adaptation measures to address climate related planning issues through the revision of Samdrup Jongkhar's Urban Development Plan. Phase 2 of the project will be implementation of the activities outlined in Phase I.

5.0 Purpose, Scope & Approach

5.1 Purpose

The purpose of this Preparatory Project is to make Samdrup Jongkhar Thromde climate-resilient by increasing the adaptive capacity of the city by mainstreaming Climate-SMART land use planning in the Samdrup Jongkhar Urban Development Plan and promoting climate-resilient urban services and critical infrastructures. This project is also aimed at capacity building of the project team members, DHS and LG officials through knowledge transfer.

5.2 Project Scope

The scope of work for this Preparatory Project will include the following:

i. Review of Samdrup Jongkhar Urban Development Plans.
ii. Inventory of existing urban services and infrastructure in Samdrup Jongkhar Thromde.
iii. Capacity-building of Project Team members.

5.3 Approach

This Project will also directly address existing challenges in fulfilling the Sustainable Development Goals (SDG): Climate actions, Sustainable cities and communities and Clean water and sanitation, and will provide developmental indicators on sustainable growth and climate-resilient infrastructure, and urban community development, that feed into the Gross National Happiness Index relating to well-being and socio-economic development.

Bhutan is currently developing its 12th Five Year Plan (FYP) to fulfill its timeless vision of Gross National Happiness (GNH). The 12th FYP takes further steps into the operationalization of GNH by adopting the nine-domain approach as the planning framework. This is expected to bring in greater synergy and focus, forming the primary basis of measuring our progress towards achieving GNH. The 12th FYP objective and sixteen National Key Results Areas (NKRA) have been drawn. Among which this project will help achieve the following NKRA:

i. Enhanced adaptability and livability of human settlements.
ii. Sustainable management of land resources for human settlement.
iii. Enhanced effectiveness and efficiency of the municipal services.

The Project approach considers the following key components:

a. Formation of a Human Settlement Climate-SMART Taskforce to carry out the Project, and prepare outputs and the Final Report toward development of the Phase II Investment. The Climate-SMART Taskforce will be comprised of members from the Department of Human Settlement, and Samdrup Jongkhar Thromde.

   The Climate-SMART Taskforce will not have limited membership, as additional members from urban CSOs, LG, and private sector must come on board. In addition, relevant officials from the Royal Society for the Protection of Nature (RSPN), the Bhutan Trust Fund for Environmental Conservation, the National Commission of Woman and Children (NCWC), the Department of Youth and Sports (DYS), the CSOA, and the BCCI will also be invited during consultation meetings.

   These entities will help highlight issues concerning environment protection, gender mainstreaming, the promotion of youth participation, and grassroots CSO and industry engagement, and in all stages of the Climate-SMART human settlement planning process. Further, the gender focal persona from the Ministry of Works and Human Settlement will be involved in consultation meetings and project design.

6.0 Activities

The activities for each component of the project have been outlined below:

i. Review of the Samdrup Jongkhar Urban Development Plan: The Plans will be reviewed to assess the gaps in relation to Climate-SMART components and a framework for the development of a Climate-SMART LUP. This will be the major focus of this Project, since the technical studies to be carried out will directly result from the review of the Plan.

ii. Enhance climate resilience of urban services and critical infrastructure: Comprehensive inventory of storm water drains, urban roads, water, wastewater treatment plant and land fill site will be carried out to assess vulnerability and risk to climate impacts.

iii. Enhance Adaptability & Livability of Human Settlements: Comprehensive stocktaking of vulnerable and hazard-ridden open, green and recreational areas across the city will be carried out to assess vulnerability and risk to climate impacts.

iv. Institutional Strengthening of LUP policy makers and practitioners for climate-resilient planning: A series of trainings and workshops on Climate-SMART human settlement planning will be conducted to train the

land use planners and urban designers from the DHS, and Samdrup Jongkhar Thromde to make them fully-versed in Climate-SMART planning practices.

7.0 Risks & Solutions

Risks	Solutions
1. The Climate-SMART LUP Urban Development Plan remains in operational, and restricted to Samdrup Jongkhar Thromde.	1. Involve other Thromdes in the preparatory process and consultative meetings to increase awareness on Climate-SMART LUP approach and policies.
2. Inability to distinguish between Climate Risk Management (DRM) and disaster risk management RM & DRM protocols and practices for land use planning.	2. Capacity-building of the policy and decision-makers, DHS and the target Thromdes LG officials.
3. The Climate oriented LUP insufficiently addresses the needs of the target group which includes the target Thromdes, private sectors, CSMIs and NLCS	3. Involve all relevant stakeholders in the consultation process.
4. Inability to provide requisite expertise to train the DHS in Climate-SMART LUP.	4. Capacity-building of the DHS staff and target Thromdes in Climate-SMART LUP.

8.0 Expected Outcomes, Outputs and Impacts

Project deliverables will include a report and Urban Climate Hazard Maps which will comply to the scales specified in the Spatial Planning Standards. The report will comprise of the following sections/chapters:

Section 1: Introduction and Background of the Technical Project – This section will introduce the Project, the concept of Climate-SMART human settlement planning, and priority climate-related urban issues.

Section 2: Methodology and Assessment of Existing Policies, Legislations, Standards & Guidelines – This Section will cover the methodologies that will be adopted to carry out the Project, and also include a stocktaking and analysis of existing national and international documents on urban climate adaptation and Climate-SMART human settlement planning, as well as review of international best practices on urban resilience to climate change (eg. *100 Resilient Cities Initiative*).

Section 3: Review of Samdrup Jongkhar Urban Development Plan – This section will include a review of the Plans, with regards to climate-resilience. It will cover the implementation status, and current barriers to introduce climate-resilience measures in municipal planning, which will form the basis for the proposed detailed studies. The detailed study will include the following components:

a. Assessment of storm water, urban roads, water, waste water, and solid waste management, and the level of vulnerability to climate-induced hazards.
b. The study of urban roads, footpaths, bicycle lanes, green and open spaces and recreational areas will include an assessment of their current quality and hazard risks and safety; and adaptive capacity to anticipated climate impact projections (sourced from the NHCM). The assessment will focus on how to promote shady green spaces to reduce the urban "heat island" effect and summer energy use. It will also focus on identifying recreational areas and open spaces that can be designed as water-smart parks and green alleys which will address absorb rainfall and reduce flooding.
c. A study to identify possible hazard-avoided open spaces, green and family recreational areas (a Climate Adaptation Hazard Map will help to eliminate high-risk areas, and select climate-resilient sites at risk from Dungsam River, urban landslides, and slope deterioration and debris falls. Formulation of a GIS Urban Infrastructure Climate Hazard and Climate-Resilient Sectoral Map, to be used in Samdrup Jongkhar Thromde and replicated in other vulnerable Southern Thromdes during the Investment Climate-SMART. Map data will highlight businesses and public infrastructure at particular risk from climate-induced hazards.
d. Identification of possible low-carbon synergies, with the World Bank, for incorporation into the Climate-SMART LUP.
e. Estimation of climate-related costs to justify incremental adaptation co-efficient into all development planning processes within municipal jurisdiction.

Section 4: Strategies for Climate-SMART Human Settlement Planning – This section will include a detailed study on Climate-SMART Land Use Planning, recommendations on improving and managing urban services, and

increasing the climate resilience of the desperately-needed open, green spaces and recreational areas. The analysis, recommendations, lessons learned, and knowledge products from this Preparatory Project will be applicable to the entire country, since most of the towns in Bhutan are facing similar climate risk issues.

Project linkages with other SPCR initiatives will be made, including use of the Climate-resilient Watershed Management Plan being formulated by the Department of Forest and Park Services; the climate change curriculum development, initiated by the National Environment Commission; the hydro met impact projections modeling being developed by the Department of Hydro Met Services, etc. The Water, Sanitation and Hygiene (WaSH) program, initiated by UNICEF across schools and institutions to provide climate-resilient quality water and sanitation facilities will also be assessed for potential improvement of urban WaSH services. The capacity development of LGs is also essential to effectively implement Climate-SMART Land Use Plans and policies at the local level.

Section 5: Conclusion – This section will include action plans and an implementation framework for Phase I.
Expected outcomes will include:

- Sustainably managed land resources in the target Thromdes through identification of potential human settlement areas, and Climate SMART LUPs.
- Enhanced effectiveness and efficiency of municipal services (eg. climate-resilient urban roads; climate adaptive drinking water services & infrastructure; climate-resilient waste & waste-water networks), through planning, design and implementation of Climate SMART municipal services and infrastructure.
- Increased adaptive capacity of line ministries, LGs and local communities to manage urban resources.
- Improved urban resilience with Climate-SMART planning that incorporates hydromet related hazard risk management (from flooding and landslides), and green infrastructure (including hazard-free hill-side footpaths, riverside bicycle lanes, dedicated flood-free & land-slide-avoided green zones and climate-resilient family park lands). This will also greatly increase access for the differently-abled and senior citizens.
- Identify and develop low-carbon & climate-resilient planning and development synergies, relying in part upon the World Bank's multi-sectoral analysis using a *Computational General Equilibrium (CGE) Model* to understand the dynamic interaction between the local economy and GHG emissions.
- Replicable Climate-SMART (Sustainable Mitigation & Adaptation Risk Toolkit) validated for Samdrup Jongkhar Thromde, and for use in vulnerable southern region.
- Strengthened governance, institutional coordination, and human resource capacity with Thromde private sector stakeholders, women's groups, and youth CBOs via training workshops and inclusive participatory approach.
- Interests of Thrombu private sector stakeholders, women's groups, and youth CBOs fully structured in Climate-SMART LUPs.

9.0 Results & Performance Framework

Component	Output (Product)	Outcome	Impact
1. Review of Samdrup Jongkhar Urban Development Plan	Enabling Framework for the development of a Climate-SMART land use plan.	Climate change risk components identified for incorporation into the land use plan proposals of the Samdrup Jongkhar Urban Development Plan in Phase I I.	Creation of an enabling environment to implement Climate-SMART LUP in Phase I I.
2. Enhance climate-resilience of urban services and critical infrastructure	Comprehensive inventory of storm water drains, urban roads, water, wastewater treatment plant, land fill site, vulnerability and risk to climate impacts.	The ability to identify at – risk urban services and critical infrastructure, for future climate proofing during Phase II investment.	Improved capacity to plan and design low hazard urban and critical infrastructure.
3. Enhance Livability of Human Settlements	Comprehensive stocktaking of open, green and recreational areas across the city, vulnerable to climate impacts.	The ability to identify at – risk open, green and recreational areas, footpaths and bicycle lanes in the target Thromdes, for future climate-proofing during Phase II. Investment.	Improved capacity to plan and design low hazard urban and critical infrastructure.

Component	Output (Product)	Outcome	Impact
4. Institutional Strengthening of LUP policy makers and practitioners for climate-resilient planning	Conducting a series of trainings and workshops on Climate-SMART human settlement planning.	Land use planners and urban designers from the DHS, and Samdrup Jongkhar Thromde will be fully-versed in Climate-SMART planning practices.	Institutionalization of Climate-SMART Planning capacity across the DHS, and Samdrup Jongkhar Thromde. Civil Society stakeholders (women's groups, CSOs, CSMIs) better informed about climate-resilient human settlement planning.
5. Low-Carbon & Climate Resilient Development Synergies	Mitigation-Adaptation LUP	Both climate disciplines practiced by Thromde Planners and developers	Lowered Thromde emissions and climate-induced hazards.
6. Incremental adaptation co-efficient incorporation in LUPs	Costing estimation of climate-related costs to justify incremental adaptation co-efficient into LUPs; Strategy to integrate incremental adaptation co-efficient into Thromde LUPs.	More climate-resilient planning instruments.	Safer Townships, with minimized hazard incidents

10. Expertise Required

To carry out this Phase I Preparatory Project, the DHS will lead, with support from the Samdrup Jongkhar Thromde in carrying out the review of the Plan and inventory of urban services and infrastructures in Samdrup Jongkhar Thromde Thromde. The National Center for Hydrology and Meteorology (NCHM) will provide climate impact projection model at a resolution useful for urban planning.

Taryana and the CSOA, will facilitate project engagement with Women's Groups, community-level CSOS and CBOs in Samdrup Jongkhar Thromde, while the BCCI will assist DHS in identifying at-risk CSMI member companies in vulnerable urban areas.

Finally, during the Phase II Investment, DDM will assist DHS to introduce a replicable Climate-SMART Land-Use Plan for at-risk Thromdes and Gewogs in their target areas, vis a vis watershed management and water use, and basic infrastructure and local industry physical planning.

11. Duration & Reporting Procedures

This Phase I Preparatory Project will commence in September 2017, with expected completion of overall outputs, activities, and analysis by June 2018. This will enable the completion of Investment Project Documentation by July 2018, and commencement of the respective Investment Component (Phase I), with implementation from July 2018 – June 2023, in alignment with the RGoB's 12th FYP and NAP, both expected to commence in mid-2018.

12. Implementation Arrangements/Partners/Linkages

12.1 Central Government

The DHS will: (i) report to GNHC SPCR Focal, with half yearly updates on progress made; (ii) ensure ongoing engagement with and inputs from the GNHC Gender Focal; (iii) provide clear lines of communication and inter-agency responsibilities under the auspices of NEC's C4; and, (iv) work in close collaboration with the NEC's Water Commission and Climate Change Team to ensure strong complementary program activities and outcomes. Concrete synergies will be developed with: NEC, NCHM, FEMD, WMD, and DDM Preparatory Projects & Investment Components.

12.2 Central Government

The DHS shall take the lead, with support from several agencies including: the NEC, DDM (Ministry of Home and Cultural Affairs),National Center for Hydro Metrological Services, FEMD and DES (Ministry of Works and Human Settlement , WSM 9 Ministry of Agriculture and Forest) and Public Health (Ministry of Heath), National Land Commission etc.

12.3 LG

Samdrup Jongkhar municipal officials will be engaged in Project activities to ensure successful institution-strengthening, especially regarding formulation of the Climate-SMART LUP, for implementation during the Investment Phase I.

12.4 Civil Society

Municipal community groups and civil society participants shall be involved in the design and testing of the Climate-SMART LUP and associated activities for both Phase I & II. Likely CSO partners would include: Tarayana Foundation for gender integration, and BCCI to identify member vulnerable to urban climate-induced hazards and disrupted municipal services.

13. Project Beneficiaries

It is envisaged that Municipal Government policy-makers, planners, and practitioners will greatly benefit from the availability of the *Climate-SMART LUP; &* GIS Urban Infrastructure Climate Hazard and Climate-Resilient Sectoral Map. These tools will also better equip municipal citizens with the requisite tools to minimize climate-induced hazards in already-vulnerable urban settlements, and critical eco-systems. The project can be replicated across other Thromdes in Phase II Investment and also across the country in future.

14. Investment Costing

A. Preparatory Phase I : USD 100,000
B. (Notional) Investment Phase I I: USD 10Million (PPCR: $7 Million /Other: $3 Million

Annex 1: Reference Documents

1. Samdrup Jongkhar Urban Development Plan (2013-2023)
2. The Land Pooling Rules of the Kingdom of Bhutan(2009)
3. Draft Land Pooling Regulations (2017)
4. Bhutan 2020: A Vision for Peace, Prosperity and Happiness
5. National Housing Policy of Bhutan (2002)
6. Draft National Human Settlement Policy (2015)
7. Draft National Human Settlement Studies (2016)
8. Draft Spatial Planning Standards (2015)
9. Draft Spatial Planning Act (2016)
10. Bhutan Building Rules (2002)
11. Draft Building Regulations (2017)
12. Rural Construction Rules (2013)
13. Guidelines for Planning and Development of Urban and Rural areas in Bhutan to minimize Environmental Impacts (2013)
14. Bhutan National Urbanization Strategy (2008)
15. Repealed Acts: Bhutan Municipal Act (1999) and the Thomde Act of Bhutan (2007)
16. National Adaptation Plans (NAP, 2017)
17. Nationally Determined Contribution (NDC, 2017)
18. Bhutan Transport 2040 Integrated Strategic Vision
19. Draft Comprehensive National Development Plan (2017)

Fifth Preparatory Project
Gross National Happiness Commission & Bhutan Chamber of Commerce & Industry (BCCI)
Pillar 3: Sustainable Growth and Resilient Infrastructure - (Inter-Woven Component) Private Sector for Climate-Resilience

1.0 Background

1.1 Country Context

1. Private sector economic growth is guided by the GNH pillars of sustainable socioeconomic growth, promotion of culture and tradition, and conservation of the environment and good governance. However, sustainable economic growth through private sector participation remains a challenge, as Bhutan's economic growth is largely financed by external aid.

2. The current account deficit is widening, the balance of payment is weak, public debt increases and foreign exchange reserves depletes due to limited exports. Other constraints are; small domestic markets, narrow export markets base, inadequate market infrastructure, high transport costs, low labour productivity, limited access to credits, limited entrepreneurship and management skills.

3. Despite these constraints, the EDP, 2017[13] stipulates that Bhutan has a comparative advantage due to its political stability, peace and security, a vibrant traditional Bhutanese culture, natural landscapes and pristine environment, access to regional markets, reliable hydro-based energy supplies, and wide use of the English language.

4. The EDP priority growth sectors in terms of their potential and impact to the business communities are; hydropower, cottage and small industries, mining, tourism and agriculture (organic farming, agro-processing, biotechnology, forest-based products, poultry, fisheries, floriculture, health food, animal feed, Apiculture, Horticulture and Diary) identified as five jewels of economic growth. Other areas include; high-quality green services, renewable energy, Information, Media and Culture Industry, Transportation and Related Services and, Construction and Manufacturing.

1.2 Project Context

5. The primary aim of this Preparatory (Phase I) Study is to support the formulation of the Business Investment plan and implementation in SPCR Phase II, in alignment with: the 12th Five Year Plan Guidelines; Nationally Determined Contribution (NDC); the National Adaptation Plan (NAP) and; the Economic Development Policy 2017.

1.3 Institutional

Bhutan Chamber of Commerce and Industry (BCCI)

6. BCCI represents business community in Bhutan and holds regular dialogues with the Royal Government of Bhutan to advocate, provide feedback & represent businesses of Bhutan in fine-tuning policies and legislation regulating the business procedures and practices. It also establishes alliances with local & foreign business organizations to develop mutually beneficial relationships via Memorandum of Understanding (MoU) and, Joint Consultative Committees. BCCI is industry-based entity willing to partake in Government's efforts on climate initiatives.

7. However, BCCI fully lacks professional and technical capacity on climate-related businesses and financial support to undertake and promote climate-resilient business ventures. In an effort to promote Public-Private Partnership (PPP), BBCI has spearheaded Blueberry cultivation in Gasa, commercial dairy farming in Wongkha, cultivation of kiwi fruit in Chukka, and cherry-pepper and asparagus cultivation in Sarpang and pilot cold water fishery farming in Haa under the One Geog Three Product (OGTP) initiative[14]. In 2016, training was also conducted on marketing and business ethics, Bhutanese culinary preparation and business management, value-chain management, and marketing design and strategy.

8. BCCI also implemented the Green Public Procurement in Bhutan (GPPB) - an EU funded Program under its Europe Aid SWITCH - Asia Program. It aimed to scale-up public demand for environmentally and socially preferable goods and services. Two major activities carried out were: (i) helping to boost public procurement of goods produced by CSMIs; and, (ii) sensitization and awareness on GPPB.

[13] Economic Development Policy, January 2017, Royal Government of Bhutan.
[14] BCCI Annual Report 2016.

9. CSMIs are resource (e.g. water) dependent communities, and thus are vulnerable to climate change. However, how to integrate their unique hazard vulnerability concerns and opportunities into national development policy and planning remains unclear. The EDP has documented over 4091 CSMI beneficiaries between 2010-2016.

Bhutanese Association of Women Entrepreneurs

10. The Bhutanese Association of Women Entrepreneurs (BAOWE) is an NGO mandated to support marginalized grassroots societies. BAOWE is a small but impactful agency, providing gender-based employment to about 70% of its women beneficiaries. BAOWE's targeted areas of work in southern Bhutan are; Chukka, Samtse & Gelephu. In Chukka, the manufacturing of broadleaf-based biodegradable plates and cups provides a green substitute to imported plastics cups and plates. Their reforestation program in degraded land and eco-friendly wood charcoal production from fast-growing trees is under implementation, in collaboration with the Department of Forest and Park Services (DoFPS).

11. In Gelephu, the popularization of winter vegetable cultivation and marketing by women-led groups is under experimentation. However, water supply for winter vegetable irrigation is not properly sourced and is cause for concern. To address water scarcity, sourcing Mao river water through pipes and drip irrigation of vegetables and high-value crop (iceberg lettuce) is one initiative currently being implemented.

12. BAOWE plans are to establish bottling plants for potable drinking water supplies, and the networking of women's groups through digital technology (e.g., Wechat) for information dissemination on disasters awareness, product pricing and marketing.

13. BAOWE lacks the technical capacity and requires training on: business proposal development, climate-oriented business risk assessment, and digital networking amongst women-led agricultural groups. Technical support on the cultivation of high value, low volume products, and the networking of women-led agricultural farmers groups are potential SPCR interventions.

2.0 Project Goal, Objectives & Description

2.1 Project Goal

14. To mainstream climate resilience into Bhutan's private sector to complement the 12th FYP, NDC and Economic Development Policy priorities and identify investments.

2.2 Project Objectives

15. This SPCR Phase I Preparatory Project seeks to integrate Bhutan Chamber of Commerce and Industry (BCCI) member firms to:

a. Conduct a Scoping Study to identify private sector entities vulnerable to climate risks, and opportunities to climate-proof their business value & supply chains;
b. Identify capacity building gaps and training needs on climate-proofing business assets, and identifying risk management business product and service opportunities.

2.3 Project Description (Scope, Approach)

2.3.1 Scope

16. During this Phase I, a Scoping Study will be conducted, led by GNHC in collaboration with the private sector under the umbrella of BCCI (including participating CSOs/NGOs). Outputs generated from this Preparatory Phase will provide purposeful baseline information and identify practical opportunities for climate-proofing measures relevant to privates sector (especially in the South); and climate risk management business opportunities.

17. During Phase II, information garnered from Phase I will enable those at-risk enterprises to effectively introduce a climate-proofing business plan for those enterprises that are vulnerable to climate change to protect their value-chains; and to formulate marketable risk management products and services.

2.3.2 Approach

18. An independent firm, with multi-sectoral expertise in the private sector and climate adaptation business skills will be recruited to: conduct a climate-hazard mapping of CSMIs in high-risk southern communities; help CSMIs to develop low-hanging fruit Investment opportunities that are climate-resilient; formulate risk management training workshops for BCCI member firms; and assist private sector firms to develop tangible risk management products and services.

19. In concert with GNHC, BCCI will lead this PS initiative. GNHC will allocate requisite SPCR funding to carry out Project activities. It is important that this SPCR Program focuses primarily on women-led rural enterprise and the tourism sector - in line with the EDP Strategy and 12th FYP gender priorities.

3.0 Activities

Training Workshops

20. This private sector initiative is interwoven within all SPCR Investments, and reflected as follows:

21. The private sector (BCCI and CSOs) will participate in NCHM's hydrometeorology and cryosphere workshops, which supports SPCR Implementing Agencies (NEC, WMD, FEMD, DHS, NEC & LGs in the south) and civil society groups. Private sector stakeholders and CSOs will be consulted during the Study period to understand/ assess their climate risk management needs at the community level.

22. With WMD's Water Scarcity Survey Questionnaires, women-led CSMIs and indigenous communities will be consulted during stakeholder consultation workshops in southern target Gewogs to better understand industry water needs in the context of climate variability and hydro-meteorological extremes.

23. In FEMD's work on flood vulnerability assessments in southern Bhutan, CSMIs, CSOs, and indigenous communities will be consulted during their field surveys, including ecosystem-based river basin impact assessments; and, geoclimatic and demographic analysis of vulnerable target groups - to triangulate and validate science-based downscaled impact projections.

24. In DHS's preparatory work on reviewing Samdrup Jongkhar's Urban Development Plans, an inventory of at-risk urban services and critical infrastructure will be conducted in Samdrup Jongkhar Thromde. Its CSMI, CSO, resident and peri-urban community beneficiaries will be consulted.

25. A Joint Mission will also be undertaken in Dushanbe Tajikistan, between the more recently established Bhutan SPCR Focals and Technical Leads with the now-seasoned Tajikistan PPCR Focal and Technical Leads. Select members of the lead Government Implementing Agency Technical Teams (eg. NCHM, WMD, FEMD, DHS), LG Leads (eg. Gewog), and BCCI and CSMI representatives shall meet with their counterparts, and discuss lessons learned from their now completed SPCR.

4.0 Risks & Solutions

Risks	Solutions
3. Limited BCCI technical capacity on climate-related business knowledge and promotion	4. Training and capacity building on climate-related business ideas, knowledge and exposure visit to Dushanbe Tajikistan
5. Low awareness of business communities on climate-related business and products & services	6. Sensitization workshops on climate-related business knowledge, skills and start-up

5.0 Expected Outcomes & Deliverables

26. Outcomes and Deliverables are as follows:

1. Scoping Study, which will detail private sectors entities/business and their vulnerability to climate risks and adaptive capacity gaps, needs & priorities.
2. Sector-Based Technical Report on climate risk management business prospects for target CSMIs in southern belt.

6.0 Results & Performance Framework

Component	Output (Product)	Outcome	Impact
1. Development of questionnaire survey, and technical framework protocols	Survey questionnaire on private sector entities, questions for pre-testing, & final survey protocols	Private sector entities and their vulnerability to climate risks, impacts, potential priorities	BCCI's business entities aware of climate-related knowledge, impacts and investment opportunities
2. Technical Report on climate change vulnerability, impacts & investments priorities	Report outlining vulnerability, impacts & investments priorities	Private sector entities and their vulnerability to climate risks, impacts, potential priorities are known	BCCI's business entities aware of climate-related knowledge, impacts and investment opportunities

6.0 Expertise (National & International) Required

An International Consultant with senior expertise in climate-oriented business development; and a National Consultant well-versed in business sectora across Bhutan, strong ties to BCCI and other Industry Associations, and climate-related knowledge, skills and practices. Both Consultants will be fielded to conduct the technical studies, and preparation of the technical report on private sector climate Resilience; and on climate risk management industry opportunities.

7.0 Brief Consultant TORs

Background

GNHC-S as an SPCR focal agency has received a grant of US$ 1.5 million from the CIF under Pilot Programme for Climate Resilience (PPCR) from the MDBs. The grant includes component 5 on Private Sector capacity building and investment on Climate Resilience.

Bhutan's private sector has been recognized as an engine of economic growth by the RGoB in line with the 12th FYP. To accelerate the socioeconomic development consistent with the environmental sustainability pillar of the GNHC policy framework, the Ministry of Economic Affairs recently formulated the Economic Development Policy 2017 prioritizing key economic sectors and strategizes to implement the provisions of the policy with the participation of private sector entities. The policy envisions enlightening "Brand Bhutan" image with the promotion of green business and services amongst others banking on Bhutan's comparative advantage of natural landscapes and culture.

Description of the Assignment

Overall Objective

27. To mainstream climate resilience into Bhutan's private sector to complement the 12th FYP, NDC and Economic Development Policy priorities and identify potential investments.

Consultancy Objectives

a. Conduct a Scoping Study to identify private sector entities vulnerable to climate risks, and opportunities to climate-proof their business value & supply and demand chains;
b. Identify capacity building gaps and training needs on climate-proofing business assets, and identifying risk management business product and service opportunities.

Scope of the Work

The selected International Consultant, with support from the National Consultant, will assist GNHC-S in the preparation and finalization of work as follows:

i) Review of key national documents (12th FYP, NDC, EDP, etc.) SPCR Documents, Mission Documents for assessment of policies, institutional gaps, arrangements in discussion with the private sector entities in close collaboration with the Ministry of Economic Affairs and BCCI in particular under the overall guidance of GNHC-S.
ii) Provide technical, institutional, regulatory and strategic policy inputs on all aspect of the preparation and finalization of the Scoping Study.
iii) Development of questionnaire survey, and technical framework protocols on private sector entities and their vulnerability to climate risks, gaps, impacts and potential priorities/investments, policy incentives for climate-oriented business, markets, products and services.
iv) Pre-testing of survey questionnaire, and technical framework protocols in collaboration with the select private sector entities in collaboration with BCCI and other related entities.
v) Technical Report on: (i) climate change vulnerability, impacts & investments priorities outlining vulnerability, impacts & investments priorities; and, (ii) Potential climate risk management business products and services, relevant to industry sectors identified in concert with GNHC and BCCI.
vi) Ensure full alignment between this Investment and all other SPCR Investments, and full integration of private sector interests across SPCR Program activities, and throughout the Program life-cycle.
vii) Presentation of the findings, and incorporation of comments for finalization of the document for submission to the GNHC-S, MoE and BCCI.

Expected Outputs and Deliverables

1. Scoping Study, which will detail private sector entities/business and their vulnerability to climate risks gaps, impacts and potential priorities/investments, policy incentives for climate-oriented business, markets, products and services.
2. Technical Report on Private Sector Climate Risk Management business opportunities, and domestic and overseas market assessment.

Expertise Required

- Advanced degree in business, economics, climate change, natural resource economics and management.
- Minimum 10 years of experience of climate-oriented business development; wholly familiar with climate risk management products and services, adaptation knowledge products, adaptation skills, and climate-resilient practices and policy linkages.
- Proven experience in advising Government, International Development Partners, and business entities on risk management business ideas, products and services; and the market promotion of these associated products and services - in line with the emerging national, regional and international markets.
- Familiarity with climate funding instruments (concessional loans and grants) for private sector entities, and rules of engagement to access such funds.
- Excellent writing, and high level of analytical and communication capability, with strong track record of relevant publications, studies, and contracts.

8.0 Duration & Reporting Procedures

The consultancy will be for a total duration of 6 months, with 2 months of in-country field mission (Thimphu and selected target areas to meet with private sector stakeholders), in consultation with GNHC-S, MoE and BCCI. This Phase I Preparatory Project will commence in November 2017, and be implemented over a one-year period, with an expected completion of overall outputs, activities, and analysis by between July and December 2018. This will enable the completion of Investment Project Documentation by December 2018, and commencement of the respective Phase II activities from July 2019 to June 2023 - in alignment with the RGoB's 12th FYP and NAP, both expected to commence in mid-2018.

9.0 Implementation Arrangements/Partners/Linkages

The technical studies will be implemented under the overall guidance and supervision of the GNHC-S, in close collaboration with the MoE and BCCI. BCCI will link with other private sector entities for logistical and technical support needed for Phase I Project implementation, and overall coordination and collaboration between the various stakeholder agencies.

10.0 Project Beneficiaries

GNHC-S, MoE, BCCI and Private enterprise (especially women-led CSMIs).

11.0 Investment Costing

Preparatory Phase I: US$ 100,000

Sixth Preparatory Project
Pilot Programme for Climate Resilience (PPCR)
SPCR Preparatory Technical Project – Pillar 4: Strengthening Governance, Institutional Coordination, and Human Resource Capacity

Strengthening Capacity for the Development of a Sound Climate Education Programme in Bhutan

1.0 Project Context & Background

Environmental conservation, combating climate change impacts and alleviating poverty are some of the major challenging issues emerging in Bhutan. Environment, climate change and poverty are the cross-cutting issue that required great attention at the policy and planning levels both at the central and local levels. The impacts of environmental degradation brought about by rapid economic development along with increase in population and impacts of climate change are more severely felt, which also further aggravates on poverty.

Recognising the importance of environment, climate change and poverty (ECP), the Royal Government of Bhutan is committed to addressing the concerns related to environment, climate change and poverty in an integrated manner via policy and planning processes, in all sectors, both at the Central and LG levels and civil society.

Therefore, to facilitate and support all sectors in integrating ECP, one of the important and sustainable programs identified is to bolster the pan-institutional curriculum on environment, climate change, and poverty (ECP)[15] in colleges and schools. Climate change and mainstreaming curriculum has been developed in Shertubtse College, and the College of Science and Technology, starting in 2016.

However, since this subject is new, it has been very challenging to both the lecturers and students, and has been left as an optional subject. This is of concern, as students (and Faculty) may not opt for this subject if there is no proper teaching and guidance from Faculty members and Lecturers, or prioritization of ECP withion the Colleges for Faculty to fully appreciate the fundamental importance of this thematic mainstremaing. Therefore, SPCR support will enhance the capacity of Lecturers and the Faculty to ensure widespread mainstreaming of the ECP Program across the country, and in the target Southern belt.

3. Project Goal

To enhance and revise the curriculum on climate change, environment and poverty reduction at Education sectors with specific focus to Sherubtse College, College of Science and Technology, & Jigme Namgyel Polytecnic.

3.1 Scope of Work and Activities

1. Conduct detailed capacity needs assessment of Faculty members, research components and climate change curriculum
2. Conduct a gap analysis of existing technical capacity in climate-related fields of study/training, including: meteorologists, hydrologists and hydro-geologists, and determine how such expertise can be developed within the existing curriculum of university level colleges
3. Engage relevant experts from Bhutan and internationally to discuss the outcome of the current ECP, and propose a revised version of the ECP curriculum
4. Design an International Climate Change Exchange Program for Bhutanese lecturers/College teachers and relevant Civil Service professionals, to build the requisite climate-related skills and expertise for ECP mainstreaming across Bhutan
5. Lessons learned shall be shared with universities in other participating SPCR countries (e.g. Nepal, Tajikistan, India, Bangladesh)
6. Conduct Needs Assessment for CSMI and CSO community needs and potential engagement.

3.2 Expected Outputs

1. Assessment report of current curriculum on climate change, environment and poverty (ECP)
2. Gap Analysis and Capacity Needs Report on Faculty and Civil Service re climate-related professional capacity
3. Revised curriculum of climate change, environment and poverty

[15] Framework to Mainstream Environment, Climate Change and Poverty (ECP) concerns into the Eleventh Five Year Plan (2013-2018)

Methodology

1. Overall project will be managed by PPS, NECS
2. Recruitment of consultants, experts and others will be done in consultation and collaboration with Sherubtse College; RUB; Jigme Namgyel Polytecnic; and GNHC (for Civil Service).
3. Work Plan and Budget will be developed in consultation with above agencies
4. The Local Level Mainstreaming Reference Group (MRG), referenced below, has an ECP mandate, and will help the RUB to facilitate stakeholder engagement and CSOs/CSMIs in target communities for the student field practicums.

Local Mainstreaming Reference Group (MRG):

The Local Level Mainstreaming Reference Group (MRG) has been instituted in all twenty Dzongkhags since 2015. This local level MRG will help their respective sectors to integrate climate change, environment, poverty, gender and disaster management into their Plans and Programmes. Each Dzongkhag MRG has 6-7 Sector Heads, chaired by their respective Dzongda. Dzongkhag Planning Officers play a Member Secretary role.

The Department of Local Governance, Ministry of Home and Cultural Affairs is the lead agency in coordinating and facilitating MRGs at the Dzongkhag level. With the support of the Central MRG, all local MRGs have developed a Strategic Work Plan for their respective Dzongkhags. However, from a lack of financial and technical expertise, they have been unable to commence implementation.

While the MRG has been formed in all the twenty Dzongkhags, no capacity-building has yet taken place. The MRGs have shown great interest to undertake work, but because of a lack of expertise, they have not been able to operationalize their mandate. SPCR will build the capacity of these MRGs, and to establish strong MRGs as fully functional entities in their respective Dzongkhags. Moreover, the Environment, Climate Change and Poverty Mainstreaming (ECPM) Reference Group - comprised of members from GNHC, NEC, MoAF, UNDP and DLG (MoHCA) – will continue to work with target Sectors and LGs (including Class 'A' Thromdes) to identify ECP concerns and mainstreaming opportunities for the 12th. FYP towards smarter development.

Stakeholder Engagement

The overall project will be facilitated and coordinated by NECS in collaboration with the Royal University of Bhutan and participating colleges. The specific activities will be implemented by participating colleges, with support from GNCH (Civil Service component) and target CSOs and CSMIs (to ensure civil society engagement). Any proposed curriculum revisions for students, and training program revisions for Faculty and Civil Service, will be based on university academic guidelines and procedures.

Target

To enhance the knowledge and skills of participating Faculty, students, and Civil Service Departments, on CEP, and acquire the capacity to promote climate-resilience to climate change impacts in Bhutan.

Implementation of Preliminary Project

The NECS, in consultation and collaboration with Royal University of Bhutan and participating colleges, will implement this initiative. Experts and consultants will be recruited to undertake the referenced Needs Assessments/Gap Analysis. Collaboration with other international Universities and countries will also be explored. Capacity-building will be initiated, benefitting Faculty members and researchers, and for the Civil Service.

Linkage to SDGs

Enhancing and revising the climate change curriculum will be contribute towards SDG goal 13, which is climate change. Taking urgent action, including long term action, to combat climate change will be fulfilled by equipping Faculty, Bhutanese students, and the RCSC with the requisite skills and knowledge on ECP and adaptation to climate change.

Linkage to NAPA

To provide complementarity, and avoid duplication, this SPCR Program will provide ECP capacity-building, while the NAP will provide the climate adaptation research component.

Timeframe & Duty Station

This Phase I Preparatory Project is being targeted for one year.

Costing
Approximate cost required for this is estimated at USD 50,000.

Expected Program Outcomes/Outputs (and indicators including targets)		Planned Activities	Budget (US$)
Enhancement of curriculum on ECP & mainstreaming climate change adaptation.	1	Detailed assessment of curriculum and research component	14,000.00
	2	Revision of ECP curriculum and Training components	14,000.00
	3	Reference Group Members, experts and consultancies	19,000.00
	4	Lessons learned from this Investment will be disseminated to lead Universities in SPCR recipient countries, including Nepal, India, Tajikistan, and Bangladesh for their consideration. This may be broadened to include participation from Australian Universities where Bhutan's civil servants frequent for degree accreditation (e.g. the Australian National University, the University of Melbourne, and the University of Sydney). Australian Universities may provide ongoing financial and curriculum support to C4, in the form of scholarships to the Civil Service and Faculty, to sustain investment activities beyond the life of the SPCR.	3,000.00
		GRAND TOTAL	**50,000.00**

The approximate cost required in investment Preparatory Project is US $1 Million. The modeling and projection capacity building will be coordinated with NCHM.

Implementing Agency: National Environment Commission Secretariat.
Beneficiary: Royal University of Bhutan; College Network.

ANNEX 7. STAKEHOLDER ORGANIZATIONS CONSULTED DURING SPCR PREPARATION PROCESS

List of Persons consulted during the Scoping Mission, October 26 - 30, 2015

Sl.no	Name / Designation	Agency
1	Mr. Sonam Wangchuk, Secretary	GNHC
2	Mr. Rinchen Wangdi, Chief Program Coordinator,	Development Cooperation Division, GNHC
3	Mr. Wangchuk Namgay	DCD, GNHC
4	Mr. Passang Dorji	DCD, GNHC
5	Mr. Ngawang Dorji	DCD,GNHC
6	Mr. Tashi Dorji, Intern	GNHC
7	Mr. Phuntsho Wangdi	Policy and Planning Division, Ministry of Finance
8	Ms. Rinzin Dema	PPD, Ministry of Home & Cultural Affairs
9	Ms. Sonam Deki	Department of Disaster Management, MoHCA
10	Ms. Sonam Desel	PPD, Ministry of Works and Human Settlement
11	Ms. Sonam Peldon	PPD, MoWHS
12	Mr. Phuntsho Tshering	Department of Geology and Mines, Ministry of Economic Affairs
13	Mr. Thinley Namgyel	National Environment Commission
14	Mr. Karma Tshering	NEC
15	Mr. Kencho Thinley	Ministry of Agriculture and Forests
16	Mr. Toyanath Acharyh	CoRRB, MoAF
17	Mr. Phuntsho Wangdi	MoAF
18	Mr. Sangay Chophel	PPD, MoAF
19	Mr. Sangay Wangdi	Thimphu Thromde
20	Mr. Phuntsho Namgyal	DHMS
21	Ms. Rinzin Wangmo, Planning Officer	Punakha Dzongkhag
22	Ms. Tshewang Dema, Planning Officer	Wangdue Dzongkhag
23	Ms. Kinga Wangmo, Planning Officer	Paro Dzongkhag
24	Mr. Wangdi Gyeltshen, Asst. Program Officer	Department of Local Governance, MoHCA
25	Ms. Pema Choki	DLG, MOHCA
26	Mr. Kinely Tenzin	DLG, MOHCA
27	Mr. Kencho Rigzin, Asst. Monitoring & Coordination Officer	Thimphu Dzongkhag
28	Mr. Tashi Dorji, Program Manager	UNDP
29	Mr. Dorji, Program Officer	Bhutan Trust Fund
30	Ms. Wangchuk Lhamo	FAO
31	Mr. Tashi Jamthso, Program Coordinator	WWF
32	Mr. Kinga Wangdi	RSPN
33	Ms. Chhime P. Wangdi, Secretary General	Tarayana Foundation
34	Mr. Nedup Tshering	Clean Bhutan
35	Mr. Choiten Wangchuk, Director General	Department of Public Accounts, Ministry of Finance
36	Ms. Chimmi Pem, Program Officer	Department of Public Accounts, Ministry of Finance

List of Persons Consulted First Joint Mission, February 6-10, 2017

Sl.no	Name / Designation	Agency
1	Mr. Thinley Namgyel, Secretary	Gross National Happiness Commission
2	Mr. Wangchuk Namgay, Dy. Chief Program Coordinator	
3	Mr. Pasang Dorji, Program Coordinator	
4	Mr. Kinley Dorji, Dy. Executive Engineer	Flood Engineering Management Division, Department of Engineering Services, Ministry of Works and Human Settlements
5	Mr. Tashi Phuntsho, Dy. Exe. Engineer	
6	Mr. Karma Tenzin, Engineer	
7	Mr. Jigme Phuntsho, Exe. Engineer	
8	Ms. Bhawana Chhetri, Dy. Chief Urban Planner	Department of Human Settlements, MoWHS
9	Ms. Sonam Pelden, Sr. Environment Officer	PPD, MoWHS
10	Mr. Tshering Wangchuk, Program Officer	Department of Disaster Management, Ministry of Home & Cultural Affairs
11	Ms. Lotay Pem, ICT	
12	Ms. Sonam Choden, Sr. Forest Officer	Department of Forest and Park Services, Ministry of Agriculture
13	Mr. Chador Wangdi, Program Officer	Ministry of Health
14	Mr. Yonten Phuntsho, Geologist	Department of Geology and Mines
15	Mr. Tashi Tenzin, Sr. Geologist	
16	Mr. Karma, Head of Department, Cryosphere Monitoring Division	National Center for Hydrology and Meteorology
17	Mr. Karma Dupchu, Chief of Hydrology Division	
18	Mr. Phuntsho Tshering, Sr. Geologist	
19	Mr. Tshencho Dorji, Dy. Exe. Engineer	
20	Mr. Tshering Dorji, Engineer	
21	Mr. Sangay Tenzin, Engineer	
22	Ms. Dema Yangzom, Engineer	
23	Mr. Thinley Namgyel, Chief Environment Officer	Climate Change Division, National Environment Commission
24	Ms. Sonam L. Khandu, Dy. Chief Environment Officer	
25	Mr. Chimi Wangchuk, Env. Officer	Pemagatshel
26	Mr. Karma Wangdi, Engineer	Gelephu Thromde

Sl.no	Name / Designation	Agency
27	Mr. Shera Doelkar, Sr. Forest Officer	Env. Division, Thimphu Thromde
28	Yeshey Wangdi, Offtg. Chief	Env. Division, Thimphu Thromde
29	Ms. Kazumi Shimaoka, Project Formulation Advisor	JICA
30	Mr. Krishna Subba, Sr. Program Officer	
31	Mr. Ngawang Gyeltshen, National Coordinator	UNDP
32	Dasho Lam Dorji, Lead Consultant	
33	Ms. Niamh Smith, Dy. Resident Representative	
34	Mr. Chimi Rinzin, CCA, DRM	
35	Mr. Tashi Jamtsho, Director CEP	WWF
36	Ms. Karma D. Tshering, DRR Program Manager	Save the Children
37	Mr. Binai Lama, Sector Leader	SNV
38	Mr. Sangay Wangdi, Sr. Program Officer	HELVETAS
39	Dr. Lobzang Dorji, Sr. Program Officer	WHO
40	Mr. Sonam Gyaltshen, WASH Officer	UNICEF
41	Ms. Namgay Dema, Program Officer	BTFEC

Stakeholder Organizations Consulted during SPCR Process (accumulated 201 organizations & 423 representatativs/stakeholders)

Stakeholder	Scoping Mission (26- 30 October, 2015)	First Joint Mission (6-10 February, 2017)	First Technical Working Group Meeting (29 May, 2017)	Second Technical Working Group Meeting (4-5 July, 2017)	Third Technical Working Group Meeting (17 July, 2017)	Stakeholder Round Table Meeting (20 July, 2017)	Second Joint Mission (23-25 October, 2017)
Ministries And Departments							
Gross National Happiness Commission	✓	✓	✓	✓	✓	✓	✓
Flood Engineering Management Division, Department of Engineering Services, Ministry of Works and Human Settlement		✓	✓	✓	✓	✓	✓
Department of Human Settlement, Ministry of Works and Human Settlement		✓	✓	✓	✓	✓	✓
Department of Forest and Park Services, Ministry of Agriculture and Forest Affairs	✓	✓	✓	✓	✓	✓	✓
National Center for Hydrology and Meteorology		✓	✓	✓	✓	✓	✓
Climate Change Division, National Environment Commission	✓	✓			✓	✓	✓
Policy and Planning Division, Ministry of Works and Human Settlement	✓	✓					
Department of Disaster Management, Ministry of Home and Cultural Affairs	✓	✓				✓	✓
Department of Geology and Mines, Ministry of Economic Affairs	✓	✓				✓	
Ministry of Health		✓					
Policy and Planning Division, Ministry of Finance	✓						

Stakeholder	Scoping Mission (26- 30 October, 2015)	First Joint Mission (6-10 February, 2017)	First Technical Working Group Meeting (29 May, 2017)	Second Technical Working Group Meeting (4-5 July, 2017)	Third Technical Working Group Meeting (17 July, 2017)	Stakeholder Round Table Meeting (20 July, 2017)	Second Joint Mission (23-25 October, 2017)
Policy and Planning Division, Ministry of Home and Cultural Affairs	✓						
Academic and Research							
CBS						✓	
LG							
Phentsholing Thromde						✓	
Thimphu Thromde	✓	✓				✓	
Gelephu Thormde		✓					
Punakha Dzongkhag	✓					✓	
Wangdue Dzongkhag	✓					✓	
Paro Dzongkhag	✓					✓	
Department of Local Governance	✓						
Environment Division, Pemagatshel		✓					
Donor Organization							
World Bank	✓	✓	✓	✓		✓	✓
IFC	✓	✓				✓	✓
ADB	✓						
International Organization							
UNICEF		✓					
BTFEC		✓					
FAO	✓						
UNDP	✓	✓					
WWF	✓	✓					
Save the Children		✓					
SNV		✓					
HELVETAS		✓					
WHO		✓					
JICA		✓					
Civil Society Organizations							
Tarayana Foundation	✓					✓	✓
YDF						✓	✓
NCWC						✓	✓
Private Sector							
BCCI						✓	✓
Other (CSO/Pvt. Sector/NGO)							
DHMS	✓						
RSPN	✓						
Clean Bhutan	✓						
Bhutan Trust Fund	✓						

List of Technical Members Consulted (First, Second and Third Technical Working Group Meeting for the Preparation of SPCR between May and July, 2017)

No.	Name	Designation	Organization
1.	Mr Tshencho Dorji		NCHM
2.	Ms Sonam Choden	Dy. Chief Forest Officer	Watershed Management Division, Department of Forest and Park Services, Ministry of Agriculture and Forests
3.	Ms Bhawana Chettri	Dy. Chief Urban Development Planner	Department of Human Settlement

No.	Name	Designation	Organization
4.	Mr Tashi Phuentsho	Deputy Executive Engineer	Flood Engineering and Management Division, MoWHS
5.	Mr Karma Tshering		NEC
6.	Mr Wangchuk Namgay	Chief Programme Coordinator	Development Cooperation Division, GNHC
7.	Mr Norbu Wangchuk	Chief	PMCD, GNHC
8.	Ms Dechen Tshering	Disaster Risk Management Specialist	World Bank Group, Bhutan Office
9.	Mr Peter J. Hayes	SPCR International Consultant	GNHC
10.	Mr Mani Ram Moktan	National Consultant	Green Growth Consultancy Private Limited
11.	Mr Karma		National Centre for Hydrology and Meterology
12.	Mr Karma		Ministry of Economic Affairs
13.	Mr Passang Dorji	Senior Program Officer	DCD,GNHC
14.	Mr Phuentsho Tshering	Senior Glaciologist	NCHM
15.	Mr Ugyen Chophel	Senior Statistician	NCHM
16.	Mr Pema Wangyel	Engineer	NCHM
17.	Mr Pema Wangdi	Assistant Engineer-I	NCHM
18.	Mr Pem Bazar	Senior Planning Officer	LDD, GNHC
19.	Mr Sangay Choedhar	Planning Officer	PMCD, GNHC
20.	Mr. Gyembo Dorji	Project Coordinator	PMCD, GNHC
21.	Ms. Krishna Lungeli	Assitant Program Coordinator Officer	DCD, GNHC
22.	Ms Tashi Wangmo	Chief Urban Planner	DHS, MoWHS
23.	Ms Sonam L Khandu	Dy. Chief Environment Officer	NEC
24.	Ms Dago Zangmo	Chief Engineer	DHS, MoWHS
25.	Mr Kinley Dorji	Dy. Executive Engineer	DES, MoWHS
26.	Mr Thinley Norbu	Chief Urban Planner	UPD, TT
27.	Mr Sonam Jamtsho		UPD, TT
28.	Mr Thinley Namgyel	Chief	Climate Change Division, NEC
29.	Mr Jamtsho	Office Staff	GNHC

List of National Stakeholders Consulted (Round Table Meeting July 20, 2017)

No	Name	Designation	Organization
Government Agencies – Central			
1	Ms Tshoki Zangmo (F)	Researcher	Centre for Bhutan Studies
2	Mr Tshering Wangchuk (M)	Program Officer	Disaster Risk Management
3	Ms Bhawana Chhetri (F)	Dy. Chief Urban Development Planner	DHS, MoWHS
4	Ms Tashi Wangmo (F)	Chief Urban Planner	DHS, MoWHS
5	Ms Dago Zangmo (F)	Chief Engineer	DES, MoWHS
6	Mr Tshencho Dorji (M)	Dy. Executive Engineer	NCHM
7	Mr Tashi Phuentsho (M)	Dy. Executive Engineer	DES, MoWHS
8	Mr Kinley Dorji (M)	Dy. Executive Engineer	DES, MoWHS
9	Mr Pema Wangdi (M)		NCHM
10	Mr Tashi Tenzin (M)		DGM
11	Mr Pema Bazar (M)	Senior Planning Officer	GNHC
12	Mr Sonam L Khandu (M)	Dy. Chief Environment Officer	NEC
13	Mr Thinley Namgay (M)	Chief Environment Officer	NEC
14	Ms Kuenzang Om (F)	Senior Agriculture Officer	Watershed Management Division, Department of Forest and Park Services
15	Ms Sonam Choden (F)	Dy. Chief Forest Officer	Watershed Management Division, Department of Forest and Park Services
16	Mr Norbu Wangchuk (F)	Chief Planning Officer	PMCD, GNHC
17	Mr Passang Dorji (M)	Program Officer	DCD, GNHC
18	Mr Sangay Choedar (M)	Planning Officer	PMCD, GNHC
19	Mr Gyembo Dorji (M)	Project Coordinator	PMCD, GNHC
Autonomous Agencies- Central			
20	Mr Ugyen Wangchuk (M)		National Commission on Women and Children, Thimphu
21	Ms Dorji Ohm (F)	Executive Director	Youth Development Fund, Thimphu
22	Ms Roma Pradhan (F)	Program Coordinator	Youth Development Fund, Thimphu
Government Agencies – Dzongkhag			
23	Mr Rinchen Penjor (M)	Environment Officer	Dzongkhag Administration, Punakha
24	Mr Saha Dev Thapa (M)	Principal Planning Officer	Dzongkhag Administration, Wangdi Phodrang
25	Mr Tshering Dorji (M)	Dzongkhag Tshogdu Thrizin (Chairman)	Dzongkhag Tshogdu, Paro
26	Mr Yeshi Wangdi (M)		Thimphu Thromde
27	Mr Norbu (M)	Chief Urban Planner	Thimphu Thromde
28	Mr Sonam Jamtsho (M)		Thimphu Thromde
29	Mr Phuentsho Wangdi (M)	Planning Officer	Phuentsholing Thromde
Government Agencies – Geog			
30	Mr Chogay Tenzin (M)	Geog Administration Officer	Lhamoizhingkha Drungkhag, Dagana Dzongkhag
Donors/Development Partners			
31	Ms Dechen Tshering (F)	Disaster Risk Management Specialist	World Bank Office Bhutan
32	Mr Keisuke Iyadoni (M)	Consultant	World Bank
33	Mr Chandra Shekhar Singh (M)	Climate Change Consultant	Word Bank
34	Mr Om Bhandari (M)		International Finance Corporation
Civil Society Organization			
35	Mr Jamyang Phuentsho (M)	Program Officer, Green Technology	Tarayana Foundation
Private Sector Organization			
36	Mr Chandra B. Chhetri (M)	Dy, Secretary General	Bhutan Chamber of Commerce and Industry
37	Mr Yeshi Dorji (M)	Senior Research Officer	Bhutan Chamber of Commerce and Industry
38	Peter J. Hayes (M)	SPCR International Consultant	GNHC
39	Mani Ram Moktan (M)	National Consultant	GNHC

List of SPCR Stakeholder Consultation (Month of July)

Agency	Focal	Contact Info	Date	Type of Meeting/Issue(s)
GNHC Lead	Mr. Thinley Namgay ,Secretary of GNHC Mr. Wangchuk Namgay, Chief Program Coordinator	tnamgay@gnhc.gov.bt wnamga@gnhc.gov.bt	10/07/17	Courtesy Visit & Scoping
GNHC Gender Focal	Mrs.Sonam Chokey	schokey@gnhc.gov.bt	07/07/17	Scoping/Briefing; Gender Integration
National Environment Commission (NEC)	Mr. Thinley Namgay, Chief Climate Change Division Mr. Tshewang Dorji, Dy. Chief Climate Change Division Mr. Tshering Tashi, Third nation communication officer	tn@nec.gov.bt tsheringtt@nec.gov.bt	07/07/17	Courtesy Visit & Scoping: Investment Priorities; Coordinating Mechanism; MIS; Ecosystem-Based Adaptation Measures; Strategic Thematic Programmes
World Bank Group (WBG)	Mrs. Dechen Tshering, Disaster Risk Management Specialist	dtshering@worldbank.org	11/07/17	Scoping/Briefing: Investment Priorities; Coordinating Mechanism; Fiduciary Considerations; DRM Synergies
International Finance Cooperation (IFC)				Same
Asian Development Bank (ADB)	Mr. Tshewang Norbu, Senior Country Program Officer	tnorbu@adb.org	14/07/17	
SNV				
National Center for Hydrology and Meteorology (NCHM)	Mr.Karma Dupchu, Chief of NCHM Mr. Phuentsho Tshering,CSD,NCHM Mr. Pema Wangyal,HOID,NCHM Mr. Pema Wangdi, HWRSD, NCHM Mr. Ugyen Chophel, WCSD, NCHM	kduochu@nchm.gov.bt ptshering@nchm.gov.bt pwangyel@nchm.gov.bt pemaw@nchm.gov.bt ugyenchophel@nchm.gov.bt	06/07/17	Scoping/Briefing: Sector-Based SDM & DDM Impact Modelling; Climate-Oriented Water Resource Inventory
Department of Disaster Management	Mr. Pema Singye, Officiating Director Mr. Yang Dorji, Chief Of Department of Disaster Management Mr. Sangay Dawa, Sr. Program Officer Mr. Tshering Wangchuk, Program Officer	pemasingye@mohca.gov.bt yangdorji@mohca.gov.bt sdawa@mohca.gov.bt twangchuk@mohca.gov.bt	07/07/17	Scoping/Briefing : DRM-CCA Synergies; GLOF Climate-Oriented Early Warning Systems; DRM and Climate-Oriented Land Use Management;
Bhutan Chamber of Commerce & Industry	Mr.Phub Tshering, Secretary General	ftsheringphub@gmail.com 17612680	11/07/17	Scoping/Briefing : CSMI Integration
Association of Bhutanese Industries	Mr. Chimi Dorji Norbu, Vice President	chumidn@yahoo.com/dwalloys@gmail.com/17110434		Scoping/Briefing: CSMI Integration
Civil Society Organization Authority (CSOA)	Mr. Thinley Norbu, Member Secretary	Thinlayn99@yahoo.com 17333084	06/07/17	Scoping/Briefing: CSO & Dz Integration
Watershed Management Division, Ministry of Agriculture and Forests,	Dr.Pema Wangda, Chief of Watershed Management Division Mrs. Sonam Choden, Sr. Forest Officer	pemaparop@gmail.com sonamchoden@moaf.gov.bt	07/07/17	Scoping/Briefing: Sectoral V&As; Adaptive Food Security; Climate-Oriented Land Use Management; Adaptive Silviculture; Eco-System-Based IWRM;
Ministry of	Mr. Sonam Tashi, Chief Planning	stashi@moea.gov.bt	11/07/17	Scoping/Briefing

Agency	Focal	Contact Info	Date	Type of Meeting/Issue(s)
Economic Affairs	Officer	17115160		
Ministry of Works and Human Settlements	Mrs. Dago Zam, Chief of Flood and Engineering Department Mr. Tashi Phuentsho, Dy. Exe Engineer Mr.Kinley Dorji, Dy. Exe.Engineer	dagozangmo@mowhs.gov.bt tashiphuentsho@mowhs.gov.bt kdorji@mowhs.gov.bt	06/07/17	Scoping/Briefing: Participatory Adaptation; Adaptive Human Settlements; GLOF Early Warning Systems; GESI & Youth Integration; Climate-Adaptive Re-design Protocols
Ministry of Finance	Mrs. Lhaden Lotay ,Chief Program Officer	llotay@mof.gov.bt	07/07/17	Scoping/Briefing
Ministry of Information and Communications	Mr. Bhimlal Suberi, Chief Program Officer	bsuberi@moic.gov.bt	06/07/17	Scoping/Briefing
Japan International Cooperation Agency (JICA)	Mr. Masamiro Shiomi, Project Formulation Adviser, Agriculture Mrs. Kazumi Shimaoka, Project Formulation Adviser, Disaster Management Mr. Krishna Subba, Senior Program Officer, Infrastructure	Shiomi.Masahiro@jica.go.jp Shimaoka.kazumi@jica.go.jp Krishnasubba.BT@jica.go.jp	11/07/17	Scoping/Briefing
Department of Local Governance, ,Ministry of Home and Cultural Affairs	Mr. Wangdi Gyeltshen	wgyeltshen@mohca.gov.bt	10/07/17	Indigenous Participatory Adaptation; Adaptive Human Settlements; GLOF Early Warning Systems; GESI & Youth Integration
Center for Bhutan Studies and GNH (CBS)	Mrs.Tshoki Zangmo	tzangmo@bhutanstudies.org.bt17341648	11/10/17	Scoping/Briefing: CSMI Risks & SPCR Integration
Respect Educate Nurture and Empower Women (RENEW)	Mrs. Tandin Wangmo, Exe Director Mrs. Meenakshi Rai, Director of community outreach	Tandinwangmo606@gmail.com	10/07/17	Scoping/Briefing
National Council for Women and Children (NCWC)	Mr.Lham Dorji, Legal Assistant Mr. Ugyen Wangchuk, Program Officer Mr. Yeshey Dhendup, Senior Accounts Officer	ldorji@ncwc.gov.bt uwangchuk@ncwc.gov.bt 17544813 ydhendup@ncwc.gov.bt 77106677	11/07/17	Scoping/Briefing
United Nation Development Program (UNDP)	Mr. Ugyen Dorji, Climate change Policy Specialist	Ugyen.dorji@undp.org	14/07/17	Scoping/Briefing: MIS; Ecosystem-Based Water & Biodiversity Adaptation Measures
World Wildlife Fund (WWF)	Mr.Vijay Maktan		08/07/17	Scoping/Briefing: MIS; Ecosystem-Based Water & Biodiversity Adaptation Measures
Tarayana Foundation	Mr. Jamyang Phuentsho, Program Officer Green Technology	jamyang.phuentsho1989@gmail.com	10/07/17	Scoping/Briefing: SPCR Integration

Milestones for SPCR Consultative Process

Milestone	Date(s)	Number of Agencies Engaged	Number of Agency Stakeholders	Meeting Purpose
1. Scoping Mission Meeting	26 - 30 October, 2015	2 Central Government Agencies & 6 Line Ministries with 7 Dpts or Divisions 1 Thromde & 4 Dzongkhags 1 private sector agency & 4 NGOs 2 MDBs 2 Un Agencies	23 agency stakeholders, with 30 SPCR Participants	PPCR Pilot Countries Meeting: Mr. Wangchuk Namgay, Deputy Chief Program Officer & National Focal Point for PPCR, GNHC Development Cooperation Division.
2. Introductory Conference	July, 2016 (Frascati, Italy)	RGoB 3 MDBs PPCR Focals	10 agency stakeholders, with 12 SPCR Participants	Between RGoB & MDBs, during PPCR Pilot Countries Meetings in Frascati, Italy, Mr. Wangchuk Namgay (Deputy Chief Program Officer & National Focal Point for PPCR, GNHC Development Cooperation Division) presented the SPCR proposal to PPCR representatives.
3. Audio Conferences (International)	September 10, 2015	GNHC 3 MDBs	4 agency stakeholders, with 10 SPCR Participants	Audio Conference (led by Mr. Wangchuk Namgay of GNHC, with 3 MDBs). Overview on: government priorities, ongoing activities, and institutional arrangements re Bhutan's climate-resilience. Overview on: government priorities, ongoing activities, and institutional arrangements re Bhutan's climate-resilience.
4. World Bank First Technical Mission (SPCR Preparation)	02-05August, 2016	GNHC MDB (WB)	10 agency stakeholder with 9 SPCR Participants	To discuss SPCR preparation plan & timeline for the development of the SPCR: for submission to the CIF Committee; and, commencement of associated Technical Studies
5. (Day I) First Joint Mission Workshop, Development Partners and NGOs	06 February, 2017 (Dorji Element Hotel, Thimphu)	1 Central Government Agency 1 private sector agency 3 MDBs 1 bilateral 3 UN Agencies 3 International NGOs	12 agency stakeholders, with 20 SPCR Participants	Initial preparation of Bhutan SPCR; extensive inter-agency and technical discussions on composition of SPCR. Discussion with: GNHC; priority sectors; development partners & NGOs; Technical Studies, SPCR Timeline; GNHC & MDB engagement; and NEC engagement.
6. (Day II) First Joint Mission Workshop, Sector Agencies from the Government	07 February, 2017 (Dorji Element Hotel, Thimphu)	2 Central Government Agencies 4 Line Ministries with 8 Dpts or Divisions 2 Thromdes 1 Dzongkhag; 2 MDBs	19 agency stakeholders, with 15 SPCR Participants	…
7. (Day III) First Joint Mission Workshop, Sector Agencies	08 February, 2017	2 Central Government Agencies; 7 Line Ministries with 10 Dpts/Divisions; 1 Thromdes & 1 Dzongkhag; and 2 MDBs	16 agency stakeholders, with 20 SPCR Participants	…
8. (Day IV) First Joint Mission Workshop	09 February, 2017 (Dorji Element Hotel, Thimphu)	4 Line Ministries with 5 Dpts/Divisions 2 Thromdes 1 Dzongkhag	8 agency stakeholders, with 15 SPCR Participants	Training on Space Observation Techniques

Milestone	Date(s)	Number of Agencies Engaged	Number of Agency Stakeholders	Meeting Purpose
9. Wrap up Meeting for First Joint Mission	16 February, 2017	2 Central Government Agencies 5 Line Ministries with 7 Dpts/Divisions 2 Thromdes & 1 Dzongkhag 1 private sector agency 1 Bilateral 2 MDBs (WB & IFC) 2 UN Agencies 3 International NGOs	20 agency stakeholders, with 36 SPCR stakeholders	Follow-on meeting with the DMEA under the MoF; and the GNHC, having facilitated stakeholder consultations.
10. Management Letter of 1st Joint Mission	09 March, 2017	3 Central Government Agencies 1 Line Ministry with 1 Dpt/Division and 1 MDB	5 agency stakeholders, with 9 SPCR Focals	Details on SPCR approach & Sectoral/Technical priorities
11. World Bank Technical Mission	22 May- 02 June, 2017	1 Central Government Agency 6 Line Ministries with 6 Dpts/Divisions	7 agency stakeholders, with 13 Representatives	Preparation Plan and Time line
12. First Technical Working Group Meeting	29 May, 2017	1 Central Government Agency 3 Line Ministries with Dpts/Divisions 1 MDB	7 agency stakeholders, with 10 Representatives	Discuss the Preparatory Project TORs (Half Day)
13. 2nd Joint Technical Mission	02 June, 2017	1 Central Government Agency 4 Line Ministries with Dpts/Divisions 1 MDB		To review discuss preparation plan & timeline for the development of the SPCR: for submission to the CIF Committee; and, commencement of associated Technical Studies. Wrap-up meeting chaired by the MoF, following consultations with several technical agencies, including: GNHC; the Department of Macroeconomic Affairs of the MoF; the Department of Disaster Management, Ministry of Home & Cultural Affairs; the National Centre for Hydrology & Meteorology; the Ministry of Agriculture and Forests; and 14 Technical Team experts from the DDM, DES, NCHM, DITT, NLC, & Thimphu Thrombe.
14. Second Technical Working Group Meeting	0 4-05 July, 2017 (Paro)	1 Central Government Agencies 3 Line Ministries with 5 Dpts/Divisions 1 MDB	7 agency stakeholders, with 18 Technical Staff	Present the Preparatory Project TORs; and provide guidance on the draft Preparatory Project descriptions, and Structure the draft Investment Project Concept Notes.
15. SPCR Stakeholder Consultative Meetings	06-15 July, 2017	28 meetings with Line Ministries Bilaterals UN Agencies MDBs International NGOs Bhutanese CSOs CSMI Associations	28 agency stakeholders, with an estimated 75 Staff/Representatives	…
16. Third Technical Working Group Meeting	17 July, 2017 (Ro Cho Pel Hotel, Babesa)	2 Central Government Agencies 3 Line Ministries, with 5 Dpts/Divisions	8 agency stakeholders, with 20 participants	Provide additional guidance on, and consistency with SPCR draft Preparatory Project descriptions; and standardize draft Investment Project Concept Notes.
17. Round	20 July,	2 Central Government	18 agency stakeholders	Hosted by GNHC: To present and discuss

Milestone	Date(s)	Number of Agencies Engaged	Number of Agency Stakeholders	Meeting Purpose
Table Meeting	2017 (Jamyang Resort, Thimphu)	Agencies 5 Line Ministries, with 5 Dpts/Divisions 2 Thromdes 3 Dzongkhags 1 private sector agency 3 CSOs; 2 MDBs	& 65 SPCR Participants	SPCR overall approach & core contents of SPCR; and obtain stakeholder feedback and consensus in principle to continue to move forward with preparation and submission.
18. Fourth Technical Working Group Meeting	25 July, 2017 (Ro Cho Pel Hotel, Babesa)	4 Line Ministries, with 4 Dpts/Divisions	4 agency stakeholders, with 10 Ministry Specialists	Further streamline Preparatory Project drafts, and Investment Project Concept Notes.
19. Second Joint Mission	23-25 October, 2017 (Thimphu Hotel)	GNHC 3 Line Ministries with 5 Dpts/Divisions MDBs (WB & IFC)	8 agency stakeholders with 10 Technical Staff; and 4 MDB representatives	Discussions on final SPCR inputs; & discussion on MDB engagement.

Feedback from Consultative Stakeholder Meetings

Central Government

- NCHM. Current flood hazard assessment maps, vulnerability maps, spatial urban planning, and water resource inventories are all based on the use of historical and anecdotal data, and geo-physical mapping. Climate impact projection data is not available.

- As such, NHCM requires institution strengthening through the SPCR to formulate high-resolution downscaled impact projections models and maps, especially at the river-basin level, to better inform government and civil society on expected climate impacts, based on multiple impact scenarios. It also requires strategically located hydromet stations to improve field benchmarking/ground-truthing data capture to support the formulation of downscaled impact models, and to strengthen field monitoring.

- WMD. The Water Management Division (WMD) was established in 2009. It is now a Division under the Department of Forest and Park Services, within the Ministry of Agriculture and Forest. Its mandate is to assists the status of Bhutan's Watersheds, especially at the river basin level from West to East, with a downscaled focus from Gewog-to-Chiwog-to-Village level. WMD is currently drafting Watershed Management Plans, as well as a Wetland Strategy and Management Plan.

- WMD has been fully engaged in the SPCR process. It envisions the possibility of scaling-up its activities to be fully integrated into the SPCR initiative. The WMD Preparatory Phase I Project was precipitated by a national interest in water resource management, especially in target regions where there are recurrent water scarcity issues. This issue was also raised in Bhutan's national management plans as a nationwide concern.

- FEMD. The Flood Engineering Management Division operates under the Department of Engineering Services, Ministry of Works and Human Settlement. It recognizes the fundamental need to understand and implement an ecosystem based approach to climate adaptation, to ensure the successful implementation of flood management practices. FEMD has a strategic focus on high-risk vulnerable human settlements in southern Bhutan, which are highly prioritized due to seasonal flooding events. Like the WMD, it is fully engaged in the SPCR process as a lead Implementing Agency.

- DHS. The Department of Human Settlements plays the leading role in development planning across the country. It has increasingly recognized the effects of climate change on urban infrastructure, and the difficulty in planning and designing investments in the absence of climate change considerations. As such, it is fully committed to developing an SPCR Climate-SMART Land Use Plan to better equip LGs and peri-rural/peri-urban centres to plan and design climate-resilient and climate-proofed public infrastructure and human settlements.

- DDM. To date, the Department for Disaster Management (DDM), Ministry of Home & Cultural Affairs (MoHCA) has had minimal engagement with the SPCR. That being said, DDM has a strong desire to be an integral part of the SPCR experience, recognizing the DRM and CRM synergies. The DDM actually sits on the NEC's C4 coordinating body; and was peripherally involved in the May 2017 Joint Mission.

- The DDM articulated its vision of being integrally involved throughout the SPCR, with the following contributions:

- Complementing SPCR climate adaptation activities with disaster risk management capacity-building, especially with the NCHM for EWS on infrastructure and human settlements; and to the other SPCR Implementing Agencies;
- Developing synergies through climate and disaster risk management knowledge products; and,
- Assisting GNHC and NEC in the formulation of climate-resilience indicators to specifically inform NKRA #6 (Carbon Neutral Climate and Disaster Resilience, Development Enhanced NKRA), and other national NKRAs.

- NCWC. Although unfamiliar with the SPCR, the National Council for Woman & Children (NCWC) sees the need to be integrally involved in SPCR activity, as women and children are clearly disproportionately vulnerable to climate hazards.

Donors, UN-Agencies and MDBs

- It was the three MDBs (WB, IFC, ADB) that jointly collaborated with the GNHC on preparation and submission of the SPCR to the CIF.. ADB was initially involved in SPCR consultations during the first scoping mission in October of 2015, but its involvement has been limited after that.

Civil Society (CSOs and CSMIs) SPCR Engagement

CSO Engagement

- Several civil society stakeholder organizations were invited both during the Scoping, the First Joint Mission and the Second Joint mission. All in all, stakeholders viewed the SPCR process as very positive and inclusive. The Civil Society Organization Association (CSOA) has generally not been involved in climate change programming, other than the SPCR consultations.

CSMI SPCR Engagement

- The Bhutan Chamber of Commerce & Industry (BCCI) - which represents all 10 Bhutanese industry associations (20,143 CSMIs) - has been moderately engaged in the SPCR process. BCCI previously met with GNHC's Secretary General, and with the WB Focal to discuss climate change activities. As well, the Chamber attended the first SPCR Joint Mission in 2016, and at the July SPCR Round-Table

- In BCCI's estimation, the private sector needs to be considered as one of Bhutan's most important partners within the climate change agenda, especially when considering: the need for sustainable industry in the context of climate risks; and, the need for donor organizations to engage private sector stakeholders to help protect their corporate investments, and guard the national economy. As such, it was suggested that the BCCI negotiate on behalf of private sector for greater access to financing institutions, including climate change funding; and closer ties with climate change investments.

Gender & Youth Engagement

- National Gender Focals and senior women leaders were thoroughly consulted within the GNHC and NCWC; at the Central Government level; through consultative meetings with the WMD and DHS Technical Teams; and during the three Technical Workshops, where SPCR Preparatory Project and Investment Component approach and proposal content was discussed in detail.

- During the July consultative meetings alone, a total of 39 Gender Focals and Senior Women Leaders from 25 agencies were engaged in SPCR dialogue (see list below). We reiterate that Gender Equity and Social Integration (GESI) is a predominant component of this Program. They included:

List of Gender Focals and Senior Women Leaders Consulted

1. Technical Teams, during 4 Technical Workshops
2. GNHC & NCHM Gender Focal
3. FEMD Department Chief
4. DMEA Accountant, DMEA of MoF
5. WMD Department Chief
6. NEC Climate Change Division Senior Program Manager x 3
7. DDM Gender Focal
8. RENEW Executive Team
9. CBS Lead Researcher x 2
10. World Bank Resident Mission Representative x 5
11. NCWC Gender Focal
12. UNDP South Asia Regional Representatives
13. World Bank PPCR Focal (Washington)
14. SPCR Round-Table: 26% women (10 women and 29 Men)

- According to one of the large ENGOs, generally the segregation of duties by gender in the community does exist, but it is usually not of significant concern. This is because Bhutanese culture has widely adopted and continues to promote matrilineal inheritance and family decision-making by women. It was suggested that Bhutan's modernization process is influencing localized economies towards a greater sharing of wealth between sexes.
- NCWC is the overriding authority for all government Gender Focals, and therefore plays a principle role in gender equity mainstreaming. NCWC stated that women, as the heads of households, generally face greater challenges from climate impacts. They are also at higher risk from extreme weather events because of their greater representation in unpaid and labor intensive agricultural field activities, which are eco-system dependent and subject to the rigors of climate extremes. In rural farming areas, men plow and women seed and harvest.
- Each Dzongkhag has a Gender Focal, whereas Gewogs and Chiwogs do not have Gender Focals. At best, Dzongkhag Statistics Officers currently collect one-dimensional sex aggregated data. This data needs to be more disaggregated to capture the effects of climate impacts on women and girls. To prepare targeted interventions by NCWC using a gender lens, NCWC requires gender and disaster statistics from the Department of Disaster Management (DDM).

ANNEX 8. BHUTANESE ADAPTATION/GREEN BOND MARKET: PRELIMINARY CONCEPT

Bckground

1. Adaptation granting mechanisms [Kyoto Adaptation Fund - $50M; World Bank Climate Investment Fund (CIF); ADB Climate Change Fund - est. $40M; GEF Strategic Priority on Adaptation (SPA) - $50M, etc.)] are essential to the success of developing nations. However, developing nations' predominant reliance on international good will for adaptation financing places the fledgling adaptation 'industry,' and recipient countries, at certain risk.

2. Furthermore, in spite of this seeming diversity of funding opportunities from multilateral[16], bilateral,[17] UN agencies,[18] and research and policy organizations, Bhutan is seeing competitive climate financing becoming less accessible due to Bhutan's geopolitical location and small size; and its inability to effectively prospect for adaptation program financing.

3. Added to this, international adaptation co-financing prerequisites have placed undue programmatic and economic burden on developing countries, especially because of their limited capital financing and human resource capacity, and their overall vulnerability to the ravages of climate extremes and variability.

4. In response to the aforementioned, there has been increasing dialogue in recent years around the need to establish creative grant funding mechanisms for adaptation: to diversify UNFCCC non-aligned country access to adaptation funding; to enable developing countries to satisfy donor agency co-financing requirements for adaptation-related projects; and/or to create adaptation funds which participating developing countries can then leverage without relying upon administratively burdensome and time-constrained granting mechanisms.

5. Examples of this emerging dialogue include: discussion amongst Small Island Developing States (SIDS) within the Organization of American States (OAS) to set-up an *Adaptation Trust Fund* generated from the collection of tourism receipts; MunichRe's & SwissRe's development of catastrophic insurance and risk management (adaptation) schemes; and bond mechanisms to finance everything from immunization programs to carbon emission markets.

6. In this context, it would be timely for the RGoB to establish complementary grant funding and co-financing mechanisms to support climate adaptation efforts in climate-vulnerable areas of the country. To be sure, Bhutan's climate change portfolios would greatly benefit from alternative adaptation financing approaches that defend its vulnerable hard and soft infrastructure, and local enterprise.

A pioneering market-driven *Adaptation Bond* in Bhutan would: meaningfully contribute to its existing adaptation funding portfolio; help convert its partially grant-dependent adaptation sector into a more commercially sustainable endeavour; create a market-driven adaptation enterprise, with downstream benefits to adaptation projects; and, increase its adaptation portfolio, while minimizing risks to its investments from climate impacts.

[16] For example, World Bank, Global Environment Facility Special Climate Change Fund – GEF SCCF; GEF Least Developed Country Adaptation Funds - GEF LDC; GCF

[17] i.e., UK Department for International Development – DFID; Japan International Cooperation Agency – JICA

[18] i.e., United Nations Development Fund – UNDP; United Nations Environment Program – UNEP

7. This *Bhutanese or* Asian *Adaptation Bond Market* could be modelled along the lines of the following bond markets:

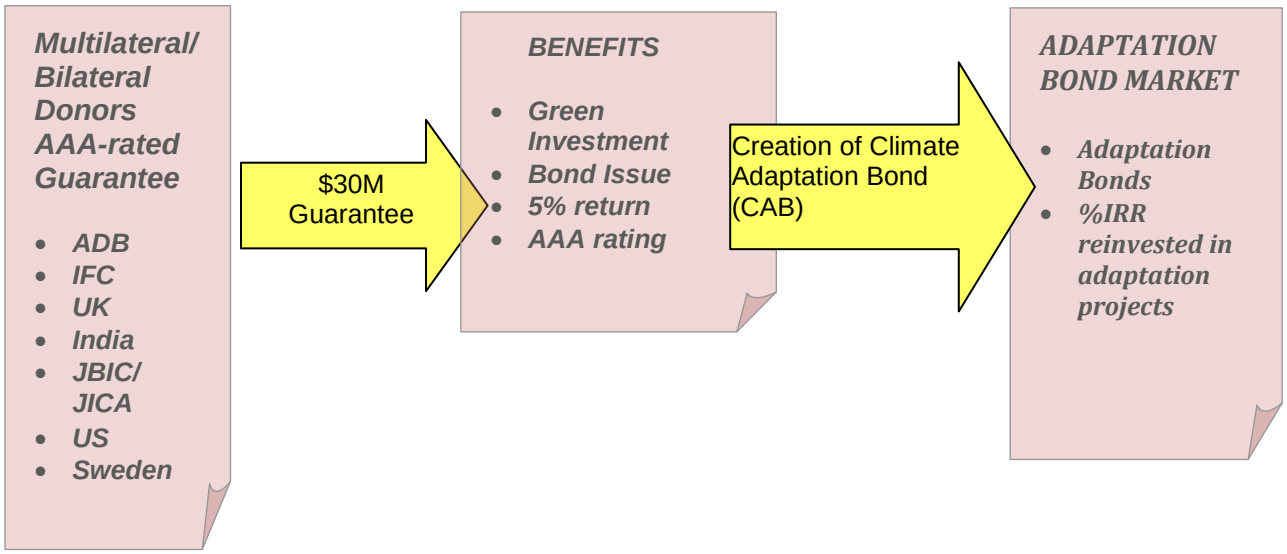
(EIB) Climate Awareness Bond (www.EIB.org): The EIB has issued a *Climate Awareness Bond* combining innovative features focused on climate protection with unique investment opportunities. Named EPOS II (European Public Offering of Securities), the bond provides for the earmarking of funds raised to be invested in EIB lending projects in the fields of renewable energy and energy efficiency (wind, hydro, solar and geothermal production and district heating, cogeneration, building insulation, energy loss reduction in transmission and distribution, etc.). A unique feature of the bond is that, when the bond matures, investors will be given the option to help reduce greenhouse emissions by purchasing and removing from the market EU allowances. The EIB has financed renewable energy projects for over Euro 2.2bn over the last five (5) years.

IFFIm Vaccine Bond (http://www.iff-immunisation.org/index.html): The International Finance Facility for Immunisation Company (IFFIm) represents an anticipated IFFIm investment of US$4 billion. It is expected to help prevent five million child deaths between 2006 and 2015, and more than five million future adult deaths by protecting more than 500 million children in campaigns against measles, tetanus, and yellow fever.

IFFIm is an international development financing institution that is supported by sovereign donors (currently the governments of France, Italy, Norway, South Africa, Spain, Sweden and the United Kingdom). IFFIm funds the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunisation). The World Bank is the Treasury Manager for IFFIm. IFFIm's financial base consists of legally-binding payment obligations from sovereign donors. It is intended for IFFIm to borrow operating funds in the international capital markets over the next 10 years, up to a prudently limited proportion of the sovereign obligations making up its financial base (gearing ratio). Given the strength of its backing from largely triple-A-rated sovereigns, and its conservative financial policies, IFFIm has been rated AAA/Aaa/AAA by FitchRatings, Moody's Investors Service, and Standard & Poor's. Goldman Sachs International was the financial advisor for the establishment of IFFIm on a pro bono basis.

CAT: http://www.imf.org/external/pubs/ft/fandd/2008/03/mills.htm

8. Pre-Concept Flowchart



9. Possible Features & Benefits of Adaptation Bond Market.

i. When bonds mature, this would trigger the release of proceeds earmarked for climate adaptation projects.

ii. Country & Region-based (ASEAN/APEC) Bond Markets: Would broaden bond market reach (as in the case of the EIB Climate Awareness Bond); and reflect regional adaptation financing priorities.

iii. Regional National Adaptation Bond Markets: Would afford each country the right to develop their own *Adaptation Bond Market* and economic incentives, and enable each participating country the right to administer its own bond market shares, and adaptation investments.

iv. Provide Bhutan with a market-driven avenue for investment in climate adaptation projects.

v. Create a public offering of adaptation bond issue in Asian markets/international markets.

vi. AAA rating (Moody's/Standard & Poor/Fitch).

vii. Perhaps a 5-year bond, with minimum guarantee of 5% at maturity.

viii. Help Bhutan (& other developing countries) leverage needed co-financing to satisfy existing adaptation fund co-financing requirements.

10. Proposed Steps.

I. Internally discuss with GNHC, NEC, & MoF an Adaptation Bond viability, based on existing models, and Bank interest

II. Consult with couple of leading experts on bond markets to determine market fundamentals; develop preliminary business case

III. Internally discuss interest and potential National champion(s)

IV. Establish a shopping list of potential G8 (triple-A-rated sovereigns), bilateral, and Asian investors

V. Desk-top investigate existing models (EIB, IFFIm, etc.); and consult with bond mechanism focal points

VI. Consult with multilateral/bilateral donors and partner counries: to measure interest in adaptation bond mechanism; to determine possible involvement; and to identify prospective investment capital (Investment Syndicate) for establishment of Bhutan or South Asia adaptation bond market.

Link to the Immunisation Bond & website: http://www.iff-immunisation.org/

IFFIm's financial base consists of legally binding grants from its sovereign sponsors (initially France, Italy, Norway, Spain, Sweden and the United Kingdom, South Africa joined in March 2007, Brazil is expected to follow suit). By signing the grant agreements, these countries have agreed to pay these obligations in a specified schedule of payments over 20 years.

Sponsoring countries committed to pay the following amounts:
United Kingdom has committed a total of £1,380,000,000 over 20 years;
France has committed €372,800,000 over 15 years and an additional €867,160,000 over 20 years;
Italy has committed a total of €473,450,000 over 20 years;
Spain has committed a total of €189,500,000 over 20 years;
Sweden has committed a total of SEK 276,150,000 over 15 years;
Norway has committed a total of US$27,000,000 over 5 years;
South Africa has committed a total of US$20,000,000 over 20 years;
Other donors are expected to follow suit. Brazil for example, has announced that it will pay $20 million over 20 years.

World Bank has partnership with SEB and several key Scandinavian institutional investors for a "World Bank Green Bond" to raise funds for projects seeking to mitigate climate change or help affected people adapt to it.
The bond issue is one example of the kind of innovation the World Bank is trying to encourage within its "Strategic Framework for Development and Climate Change," to help stimulate and coordinate public- and private-sector activity in this area. The offering is the first time both the World Bank and SEB have offered bonds to raise funds identified to a specific World Bank program.

"We are very pleased to partner with the World Bank for this green bond issue," said Annika Falkengren, President and CEO, SEB. "With this issue we have been able to offer our clients a product through which they can accomplish three things: take a stand towards fighting global warming, support the World Bank and its members in their efforts to fight poverty, and secure a higher return than government securities by investing in the World Bank's Aaa/AAA-rated bonds."

"Tackling climate change is going to take immense resources that will only come from a well-orchestrated flow of public and private finance. This transaction is an important early effort to show one way in which this can be done. We hope it demonstrates that private citizens can safely and profitably invest their savings today while also helping provide a better world for their children," said Robert B. Zoellick, (Former) President of the World Bank Group.

The first World Bank Green Bonds are denominated in Swedish kronor (SEK) for a total amount of SEK 2.325 billion and have a maturity of six years. The interest rate payable annually is 0.25 percent above Swedish government bond rates. SEB is the sole lead manager and will offer the bonds to investors through its distribution network. The bonds responded to demand from a group of Scandinavian investors. Credit Suisse International is a senior co-manager and Landesbank Baden-Württemberg is a co-manager for the transaction.

Summary Terms
Issuer: International Bank for Reconstruction and Development (IBRD)
Rating: Aaa/AAA
Amount: SEK 2.325 billion
Settlement date: 12/11/2008
Maturity date: 12/11/2014
Issue price: 100,157
Redemption: 100%
Coupon: 3.5%

ANNEX 9. DEVELOPMENT PARTNERS MANDATE/ROLE, RISK MANAGEMENT GAPS AND SPCR INVOLVEMENT

MDB Partners

World Bank Mandate/Role & SPCR Involvement

The World Bank, as lead MDB, has a strong and organized presence in Bhutan. With $35Million in fiscal commitments for FY 2017, the World Bank Group's investment portfolio in Bhutan is focused on rural access, rural development, urban development, wildlife conservation, and private sector development.

It has five ongoing investment operations totaling $82 million in IDA commitments, with a number of Trust Funded projects and Technical Assistance (TA) support in various fields including DRM, Climate Resilience, and Environment. For example, there is: a Global Facility for Disaster Recovery and Reduction-financed Project; a Global Environment Facility grant-financed Project; as well as three Institutional Development Fund-financed activities. World Bank also supports the Hydromet Services and Disaster Resilience Regional Project, worth US $3.8 million.

World Bank is the trustee of the PPCR, and it is responsible for administering the current SPCR Preparatory Grant for RGoB. WB has played a pivotal role in helping to drive the SPCR process from the start, including: supporting the PPCR submission and approval process with GNHC; playing a leading role in co-hosting many of the SPCR events (Scoping, First and Second Joint Missions, Technical Workshops); and providing advice and administrative support to propel the SPCR forward.

International Finance Corporation (IFC) Mandate/Role & SPCR Involvement

The IFC has helped small-scale local businesses import materials and machinery to expand their enterprise, including a $28.5 million investment for a 20% equity partnership in the Bhutan National Bank. In 2015, it also committed a $3.5 million loan to the Zhiwa Ling 5 Star Hotel in Paro. In addition, the municipality of Thimphu partnered with IFC to develop the first private sector multi-level off-street parking facilities.

The IFC participated in the scoping and both Joint MDB Missions, and the Roundatable. The IFC may play a future role in supporting the SPCR Investment 5 (CSMI) activities, that are inter-woven in each of the five Investment Projects.

As well, state owned enterprises (SOEs) dominate key sectors of the Bhutanese economy such as energy, banking, manufacturing, transport, telecommunications and infrastructure. Within the current scope of private sector activities, investments in making energy infrastructure more resilient, ensuring transportation networks (roads etc.) can cope with climate variability, and climate-proofing agriculture and other supply chains in food and beverage manufacturing, and tourism are some areas where private sector investments could play a role to address Bhutan's climate vulnerabilities.

ADB Mandate/Role & SPCR Involvement

Since 1982, ADB has supported Bhutan through various programs, mainly in energy, transport, finance, and urban development. ADB has approved loans totaling $498.81 million, grants of $222.4 million, and $73.48 million in technical assistance for Bhutan.

ADB support to Bhutan reflects a strong emphasis on green energy, key urban infrastructure projects, and transport connectivity. It seeks to expand its support to infrastructure development (particularly energy, transport, water, urban sectors), trade facilitation, and development of the finance sector.

ADB's National Irrigation Masterplan (estimated at hundreds of millions of dollars) is being developed in concert with the RGoB. It is looking at the identification of perhaps 100 target irrigation streams. This Integrated Irrigation Agricultural Development Project is expected to commence in 2019 through a $26.46 Million Appraisal TA to assess the RGoB's potential commitments. ADB is currently not involved in explicit climate change programming in Bhutan, except for involvement in one TA with the NEC.

Other Development Partners

JICA Mandate/Role & SPCR Involvement

JICA is Bhutan's second largest bilateral donor. JICA is expected to provide $3-4Million to support Bhutan's comprehensive development planning 2017 – 2020, involving DHS, MoA, the GNHC Chair, NEC, CBS, the National Land Commission, and the MoEA. JICA's current cooperation activities in Bhutan focus on: agricultural

rural development; infrastructure development (bridges, road connectivity and rural electrification); and, public service improvement.

JICA was involved in SPCR's First Joint Mission, and Consultative meetings. It is proposed that JICA be approached to consider aligning its development resources with the SPCR for fund leveraging, especially relating to the JICA-supported NCHM's Early Warning on Glacier Lake Outburst Floods (GLOF) and Rainstorm initiatives.

UNDP Mandate/Role & SPCR Involvement

UNDP has been the Implementing Agency for NAPA I, the NAPA update of 2012, and NAPA II. Other cross cutting initiatives that the UNDP is engaged in are poverty-environment initiatives - in partnership with DANIDA, SDC, UNEP and the EU. Future priorities of UNDP include work on the NAP (US $1.98Million from LDCF); and its role in Smart Agriculture as the Implementing Agency for the GCF.

FAO Mandate/Role & SPCR Involvement

The overall strategic objective of FAO is to "Increase resilience of livelihoods to threats and crisis," focusing on increasing Bhutan's capacity to cope with the impact of climate change on agriculture, and food and nutritional security - which aligns well with the SPCR.

Although not directly involved in the SPCR, the FAO is aiming to support initiatives like the SPCR, as well as CR-related investment projects through its technical assistance delivered through its regular country programs.

WWF Mandate/Role & SPCR Involvement

Activities of WWF include species surveys and conservation (eg. national tiger survey; livelihood programs to mitigate human wildlife conflicts, and ecotourism). One of WWF's new engagements is the Bhutan for Life (BFL) initiative – a sustainable new financing option for innovative conservation financing.

BFL is a potential platform for partnership in the SPCR, relating to landscape conservation to address climate-resilience, especially in relation to Investments C2 (water scarcity) and C3 (eco-system-based river basins and flood management). WWF may be engaged in SPCR activities.

BTFEC Mandate/Role & SPCR Involvement

As an NGO, the Bhutan Trust Fund for Environmental Conservation (BTFEC) is a prospective Adaptation Fund (AF) entity, and is in the final stages of accreditation as a GCF National Implementing Entity (NIE).

This Trust Fund is expected to play a substantial SPCR role in providing complimentary financing through its AF and GCF funding role.

ANNEX 10: LIST OF KEY REFERENCE DOCUMENTS FOR INCEPTION REPORT & SPCR FORMULATION

Strategic Planning & Policy Documents

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b. 12th Five Year Plan (FYP) Guideline, 2016
c. Eleventh Five Year Plan, (2013-2018), Mid Term Review Report, GNHC, November 2016
d. Bhutan 2020: A Vision for Peace, Prosperity & Happiness, Planning Commission (Part I)
e. Bhutan 2020: A Vision for Peace, Prosperity & Happiness, Planning Commission (Part II)
f. Strategy for GNH 2008 (draft)
g. Transforming Our World: The 2030 Agenda for Sustainable Development

Climate Adaptation Reference Documents

a. Bhutan National Adaptation Programme of Action, National Environment Commission, Royal Government of Bhutan, 2012
b. Vision 2020 National Development Plan
c. Integration of Climate Adaptation into Development and Conservation Planning in Bhutan: Issues and Recommendations, Adaptation Knowledge Platform, Partner Report Series No. 1., Stockholm Environment Institute, Bangkok (2012)
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f. Technology Needs Assessment & Technology Action Plans For Climate Change Adaptation, March 2013
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h. Technology Needs Assessment & Project Idea Report Adaptation "March 2013"
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k. Bhutan – Water Risk Scenarios & Opportunities for Resilient Development, Insights from a Participatory Scenario Building Process December 2015 (Volumes I & II)
l. Improving adaptive capacity and resilience in Bhutan, Harsha Meenawat & Benjamin K. Sovacool, 2 December 2010
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Biodiversity

a. Biodiversity Persistence and Climate Change in Bhutan
b. National Paper on Biodiversity Persistence & Climate Change, Climate Summit for A Living Himalayas, Bhutan 2011
c. Environmental and Social Management Framework, PPCR, Submitted to the World Bank By Gross National Happiness Commission Secretariat (GNHCs), August 2016

Mitigation References

a. Kingdom of Bhutan Intended Nationally Determined Contribution (INDC), 30 September 2015
b. Bhutan's Intended Nationally Determined Contribution (INDC) to the Paris Agreement, 13th Round Table Meeting, 15 March 2017, Thimphu; Thinley Namgyel, Chief, Climate Change Division, National Environment Commission Secretariat, Royal Government of Bhutan
c. Kingdom of Bhutan, Second National Communication to the UNFCCC, November 2011

Funding Documents

a. PPCR Operational And Results Report, CIF, Meeting of the PPCR Sub-Committee, Washington, DC Thursday, December 8, 2016 (Agenda 3)
b. National Strategy and Action Plan for Low Carbon Development, June 2012

c. International Development Association, Project Paper On A Proposed Grant To The Royal Government of Bhutan For A Preparation Of Strategic Program For Climate Resilience, February 10, 2017; Social, Urban, Rural and Resilience Global Practice, South Asia Region
d. Integrated Safeguards Data Sheet, Appraisal Stage, Bhutan SPCR, WB Appraisal ISDS-Print-P159600-01-19-2017-1484831655242
e. CIF PPCR Operational & Results Report Summary Table (Nov 10, 2016) (Bhutan, Ethiopia, Gambia, Honduras, Kyrgyz Republic)
f. CIF PPCR Operational & Results Report Summary Table (Nov 10, 2016) (Bhutan, Ethiopia, Gambia, Honduras, Kyrgyz Republic)

Institutional |Docs/Briefs

a. PM Office Order, Establishment of C4 (18Oct2016)
b. National Centre for Hydrology and Meteorology (NCHM) Brief
c. Brief on NECS
d. NCHM Strategic Document
e. Socio-Economic Study on Improved Hydro-Meteorological Services in the Kingdom of Bhutan (2014)

Other

a. Bhutan Living Standard Survey, 2012
b. Labor Force Survey Report, 2015
c. Provisional Findings of 2015 GNH Survey
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a. Agenda for Technical Working Group Meeting (04-05 July, 2017)