KNOWLEDGE for RESILIENCE

CASE study
WATER RESOURCES

Issue date
NOVEMBER 2018

CIF CLIMATE INVESTMENT FUNDS

KEY FINDINGS

- Decentralised water resource systems improve climate resilience
- Groundwater plays an important role in building water resilience
- A focus on "spring-shed" management advances water resilience in Nepal
- Reviving ancient practices for groundwater recharge can revive dry springs
- National policy advances water security by targeting community level solutions
- Involving local water user groups in water management creates a sense of ownership that contributes to the sustainability of such projects
- Spending project funding at the community level directly benefits local householders

Innovative or Ancient? Increasing Water Resilience in Nepal

Climate change introduces new uncertainty to the availability of freshwater resources in many parts of the world. To reduce the impact to vulnerable communities, global climate efforts need to focus on transformative actions that increase water security. The Pilot Program for Climate Resilience (PPCR) is funding many such initiatives.

Spring-shed management solutions in Nepal, using managed groundwater recharge to bring dry springs back to life

CONTEXT: This case study focusses on the innovative solutions that the Nepal PPCR Community of Practice (COP) has introduced to increase water security, and we learn how ancient practices are being reinstated to revive dried-up springs.

NEED FOR ADAPTATION: Climate change and an increase in climate disasters, as well as growing population pressures, have had a tremendous effect on water management systems in Nepal. Many rural and urban communities depend on water from springs for drinking water, and for domestic and agricultural needs. But these springs rely on underground water (groundwater), and people are using these groundwater resources faster than they can be replenished. As a result, springs are drying up, leading to severe water stress (see Box 1). *See* **severe water stress**.

In response to the problem, Nepal has shifted away from the traditional watershed management approach, which focusses mainly on rivers and dams. Instead, the country is focussing on an innovative "spring-shed" management tactic. This relies on **the role of groundwater** in storing and supplying water as a priority, particularly for vulnerable, rural communities.

CASE STUDIES ON DECENTRALISED WATER RESOURCE MANAGEMENT

Centralised water management systems are particularly challenged by climate change variability in many water-stressed countries and communities. Case studies on decentralised water resource management (DWRM) solutions from the PPCR, such as rainwater harvesting and managed aquifer recharge, provide useful learnings relevant for vulnerable countries and regions.

»

The Science

Spring-shed management and managed groundwater recharge

What is groundwater recharge? Groundwater lies within an aquifer, which is the underground soil or rock surface that can become saturated with water or can contain large amounts of water. Groundwater can be stored in the aquifer for long periods, resurfacing in the form of springs. This water can also be extracted by humans, using wells and boreholes. Spring-shed management protects and augments water resources by recharging groundwater and raising the water table so that water is pushed upwards, emerging naturally as springs.

BOX 1: CLIMATE CHANGE IMPACTS ON GROUNDWATER

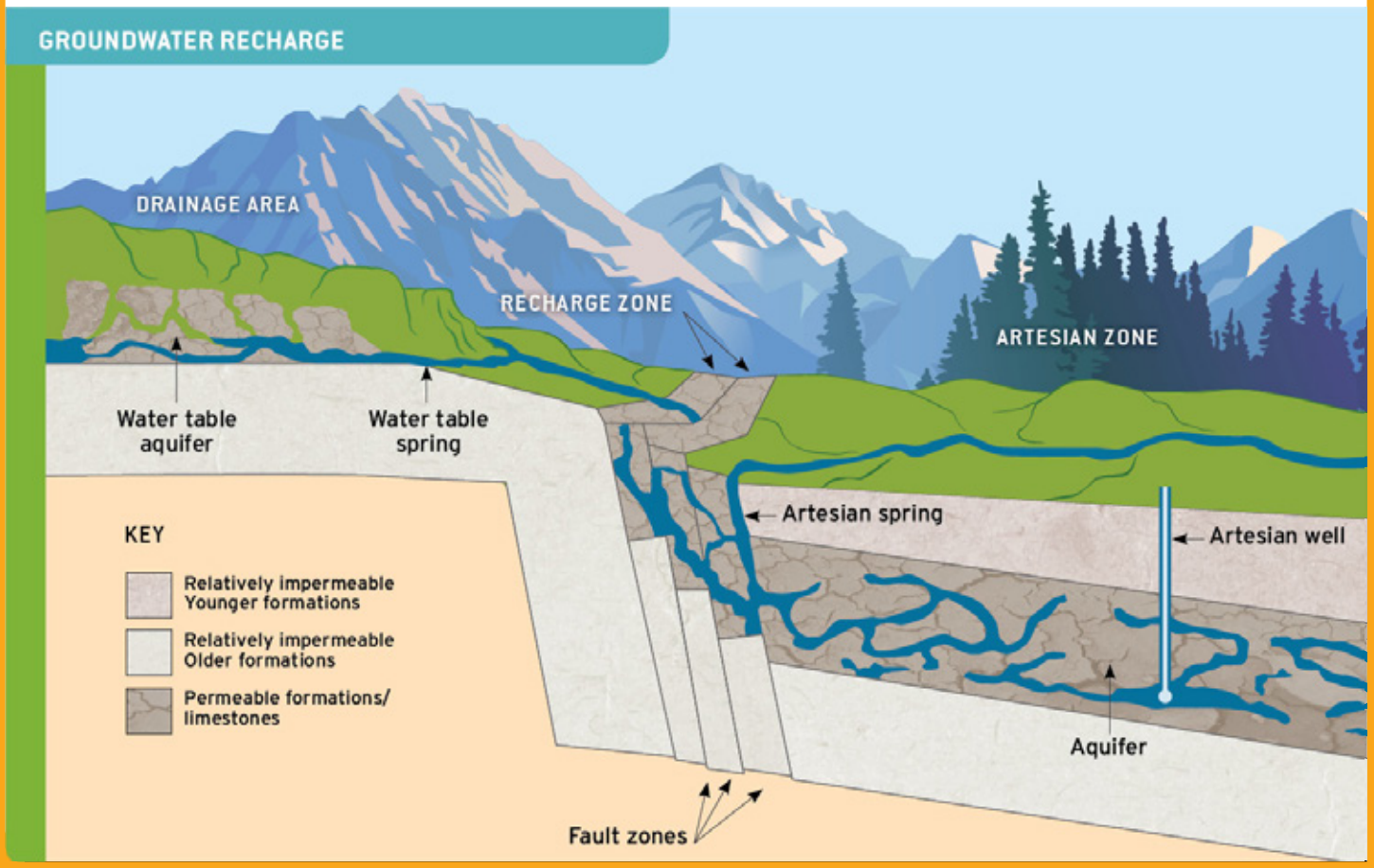
Ordinarily, water stored in aquifers is recharged during periods of rainfall. However, due to urbanization and climate change, surface infiltration has vastly decreased. At the same time, the demand for water has grown and groundwater consumption has increased. As the water table drops, springs and wells run dry, although in the past these same springs provided enough water for community needs, even in the dry season.

Communities in this situation are thus much more vulnerable, especially at a time when rainfall patterns and seasonal cycles are becoming increasingly unpredictable, because of climate change.

How did this work in the past? In Nepal and other parts of the region, people traditionally dug channels and ponds to collect rainwater for domestic and agricultural needs. An unintended result was that the water slowly seeped through the soil at the bottom of these ponds and recharged the shallow aquifers beneath, where groundwater is stored. However, since the introduction of municipal piped water, people have greatly reduced traditional practices for rainwater harvesting and storage. This in turn has reduced the extent of groundwater recharge. Thus the level of water in aquifers (the water table) has dropped, and this has greatly reduced the potential for extracting and using groundwater from wells, boreholes and springs.

Is there a way to replicate this today? A variety of modern solutions allows for water to be channelled down into the aquifer for storage and later extraction. This replicates the effects of ancient, traditional practices. These solutions involve capturing and channelling rainwater into the aquifer at a faster and greater rate than occurs naturally, a process called groundwater recharge. This can be done in two ways:

- By pumping captured water into existing dry wells or into newly bored recharge wells
- By building recharge pits or percolation tanks/ponds that allow water to seep through the surface layers of soil and rock.



»

Using bamboo as vegetative check dams to prevent water run off and erosion loss down slopes, enhancing water infiltration and recharge.

SOLUTIONS:
The PPCR Nepal project

PPCR Nepal has piloted a project for catching rainwater to recharge aquifers at the community level. This project brings the traditional practices of local communities back to life with some added innovation, contributing to the revival of dry springs and wells. The target of the initial project is to build 15–20 small, groundwater recharge systems. The communities will manage these themselves. These systems will ultimately provide more reliable water supplies in the dry season.

Overall, the project is in line with the broader Government policy on community-based water resource management. Stakeholders see this alignment as contributing to the success and sustainability of the project. The Government has a history of working with communities on water research and innovation. Under this system, local government, in consultation with local communities, takes the lead on the choice of projects and provides technical advice and capacity as needed.

At the same time, local Water User Committees play an active leadership role in managing water resources. A partnership was formed for the PPCR project, including communities, government, and an international company with technical knowledge and experience in Nepal to execute the project.

Community members built stone and gabion walls to prevent soil and water losses, and to reduce the impact of landslides.

Rainwater is channeled into a catchment pit with concrete walls, allowing for infiltration and water use.

»

PROJECT SUCCESSES:

Direct benefit
The project directly benefits households. Out of the USD30m budget, more than USD17m is spent at the local level. This directly benefits 40,000 households.

Active community management
Small-scale, decentralized solutions like this are generally within the abilities and capacities of local communities, who can play a more active role in their management.

Sense of community ownership
Ownership is increased when communities view projects like these as common property, that plays a vital role in day-to-day livelihood activities, such as agriculture and household needs.

Manageable size
The smaller scale of such projects and investments means that local government officials can manage them, without a need for additional technical capacity.

ACKNOWLEDGEMENTS

We would like to thank representatives of the CIF and the PPCR Community of Practice (COP) for their support of and inputs to this document. We would particularly like to thank the participants at the Regional Learning Exchange for Latin American and Caribbean (LAC), held in Grenada in September 2017, for the discussion that contributed to the conceptualisation and content. Special thanks to PPCR COP members from Nepal for participating in discussions and interviews which formed the basis of this series of case studies; your time and expertise were invaluable.

Integrated soil and water management supports diversifying agriculture enterprises benefiting communities.

Groundwater storage is possible thanks to increased availability.

Context of PPCR Learning

The PPCR Knowledge for Resilience series aims to share the observations of and lessons learnt by countries implementing projects under the PPCR. Such lessons facilitate evidence-based learning to advance climate resilience goals, both in the PPCR and globally. The knowledge products in this Series are co-created by designated implementing entities in each PPCR country and the appointed Learning Partner for the PPCR, drawing on interviews with a range of stakeholders. The Series is part of the work undertaken by the Learning Partner to create and facilitate a dynamic, actively-engaged knowledge and learning network amongst the PPCR Community of Practice (COP).

The Climate Investment Funds (CIF) community recognises that the onset of climate change requires urgent responses, that often does not allow the time for academic, traditional, or compliance-driven evaluation and learning. Instead the emphasis needs to be on generating practical and timely insights, through learning by doing, that guide decision-making among investors and practitioners. The Knowledge for Resilience series seeks to address these aims, and includes a range of products, from case studies and photo stories, to policy and research briefs.

COMPILED BY

oneWORLD
We build resilient futures

Oxford Policy Management

PHOTOGRAPHIC CREDITS: PPCR Nepal

DESIGN: Pete Bosman (pete@guineafolio.co.za)