CASE STUDY | JUNE 2018

PROMOTING CLIMATE RESILIENT AGRICULTURE IN NEPAL

Building Climate Change Resilient Communities through Private Sector Participation

COUNTRY AND REGION
Nepal, South Asia

PROJECT TOTAL COST[1]
CIF-PPCR: 2,000,000 USD

IFC: 290,000 USD

CCCP: 200,000 USD

PROJECT DURATION
2013-2019

ORGANIZATIONAL COMMITMENT

- Enhanced food security through farmers and agri-supply chain members adopting climate resilient agriculture
- Reduced vulnerability of farmers to impacts of climate change
- Increased availability of finance to farmers and agri-supply chain members

PROJECT DATA

PARTNER ORGANIZATION
International Finance Corporation

ORGANIZATION TYPE
International organization

DELIVERY CHALLENGES

i) Using a standardized approach for diverse commodities

ii) Lack of well-defined support, in terms of knowledge and inputs

iii) Non-optimal solutions in some work streams

DEVELOPMENT CHALLENGE
Climate change resilience and increased agricultural productivity through private sector participation

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1 This funding amount covers all three projects of the Building Climate Change Resilient Communities through Private Sector Participation Program, which focuses on agriculture, infrastructure (hydropower stations), and housing. This case study focuses on the agriculture project: Promoting Climate Resilient Agriculture Project.

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In Brief

DEVELOPMENT CHALLENGE

Nepal is one of the world's most climate vulnerable countries due to its harsh geography, largely poor and resource-dependent population, and weak institutional capacity to manage challenges. Climate change is a defining challenge, with impacts to agriculture being especially acute. Nepal aims to expand agricultural adaptation measures to prepare for future climate change impacts, but significant barriers prevent private investment, including a lack of information, knowledge, and inputs (water, seeds, fertilizers, machinery, and finance) and weak commercialization (storage, processing and transportation).

DEVELOPMENT SOLUTION

To address these challenges, the "Promoting Climate Resilient Agriculture Project" aims at "enhancing agricultural productivity contributing to food security through capacity building of farmers and agricultural supply chain members and facilitating better access to finance". Expected outcomes include i) enhanced food security through adoption of climate resilient agriculture by farmers and agri-supply chain members, ii) reduced vulnerability of farmers to impacts of climate change, and iii) increased availability of finance to farmers and agri-supply chain members. The project seeks to increase long-term, on-farm productivity by 20 percent against baseline levels and increase farm-based revenue of 9,000 farmers by 20 percent by the end of the project.

Executive summary

Nepal is one of the world's most climate vulnerable countries due to its harsh geography, largely poor and resource-dependent population, and weak institutional capacity to manage challenges. Its agriculture sector, which employs over two-thirds of the labor force and contributes to roughly one-third of the country's GDP, is particularly vulnerable, affecting both farmers and agribusinesses. Nepal aims to expand agricultural adaptation measures to manage current climate change and prepare for future impacts, but significant barriers prevent private investment, including a lack of information, knowledge, and inputs (water, seeds, fertilizers, machinery, and finance) and weak commercialization (storage, processing and transportation).

To address this and other climate change vulnerabilities, Nepal developed a Strategic Program for Climate Resilience (SPCR) under the Pilot Program for Climate Resilience (PPCR), a dedicated program of the Climate Investment Funds (CIF). Nepal's strategic program features four key areas of intervention, including a three-pronged program on Building Climate Change Resilient Communities through Private Sector Participation. This case study focuses on one of those three projects: The Promoting Climate Resilient Agriculture Project.

Originally conceived with an advisory and investment component, the project is being implemented by the International Finance Corporation (IFC) from September 2013 to June 2019 on the plains of Terai, a region south of the Himalayan foothills. The project focuses on three crops: sugarcane, maize, and rice.

DELIVERY CHALLENGES AND SOLUTIONS

The project faced several challenges, including expectations set in the SPCR itself, and during project delivery with respect to: i) Using a standardized approach for diverse commodities, ii) lack of well-defined support, in terms of knowledge and inputs, and iii) non-optimal solutions in some work streams. A study of these challenges and how they were addressed can help improve future project and program design and implementation.

While some of these challenges were addressed in 2015, a more substantive restructuring of the project was carried out from 2016 to 2017. This included i) introducing additional crops to seasonal crop rotation and having a more crop-specific focus, ii) adopting a more comprehensive approach to support provided, iii) finding more suitable solutions in certain workstreams.

The restructuring was a complex process that took two years to complete. IFC leadership adopted a flexible and forward-thinking approach to ensure identified delivery challenges were addressed and emerging opportunities were considered, such as channeling investment resources through an equity fund.

The restructuring introduced changes to the project that improved its ability to deliver results. For example, new demonstration plots increased demand for training and adoption of climate-smart farming practices, therefore contributing to the climate resilience of smallholder farmers. In sugarcane, mechanization showed excellent results, and in maize, crop rotation with soybeans allowed for more continuous private firm and farmer engagement and interaction. These changes contributed to strengthening the links between

private firms and farmers to improve farming output resilience, as originally sought.

While restructuring afforded more time, financial resources, and flexibility to the project, these were all limited as the project could not deviate from the original approved design and the broader SPCR.

LESSONS LEARNED

Several lessons can be drawn from project implementation. A standardized approach for all commodity supply chains was not the most suitable option for the project. Also, the project implementation highlighted the importance of adaptive management, as it faced delivery challenges. Project design should promote more systemic (comprehensive and integrated) approaches, focus on feasible activities, and promote longer time frames to allow for unforeseen events. Phasing would support this. Stakeholder roles, including government involvement, must be clearly defined. ■


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Introduction

Climate change is a defining challenge of the 21st Century, with impacts to the world's agriculture especially acute. Linking private sector firms and farmers can build climate resilience in agriculture, but the barriers are many. To address this and other climate change vulnerabilities, Nepal developed a Strategic Program for Climate Resilience (SPCR) under the Pilot Program for Climate Resilience (PPCR), a dedicated program of the Climate Investment Funds (CIF). Nepal's strategic program features four key investments, including a program on Building Climate Change Resilient Communities through Private Sector Participation. Its three projects address agriculture, infrastructure (mainly hydropower), and housing.

This case study focuses on the agriculture project: The Promoting Climate Resilient Agriculture Project. It is being implemented by the International Finance Corporation (IFC) from September 2013 to June 2019 in the districts of Bara, Parsa, Morang, Sunsari, and Rautahat in Terai, a region south of the Himalayan foothills.

The project aims at "enhancing agricultural productivity contributing to food security through capacity building of farmers and agricultural supply chain members and facilitating better access to finance"[2]. Expected outcomes include i) enhanced food security through adoption of climate resilient agriculture by farmers and agri-supply chain members, ii) reduced vulnerability of farmers to impacts of climate change, and iii) increased availability of finance to farmers and agri-supply chain members. The project seeks to increase long-term, on-farm productivity by 20 percent against baseline levels and increase farm-based revenue of 9,000 farmers by 20 percent by the end of the project. ■

2 Program approval request, p. 5.

Context

DEVELOPMENT CHALLENGES

The project aims to address several development challenges. Nepal has experienced significant changes in temperature and precipitation, which have affected the country in significant ways. German Watch's Global Climate Risk Index 2018 ranked Nepal 26th in the global list of most vulnerable countries to climate change between 1997 and 2016. Under various climate change scenarios, mean annual temperatures are projected to increase 1.3-3.8°C by 2060 and 1.8-5.8°C by 2090, while annual precipitation is projected to decrease 10 to 20 percent nationwide. These climate changes, compounded by non-climatic stressors like earthquake risk[3], compromise Nepal's ability to further increase human development, reduce poverty, and address people's basic needs.

Climate change affects Nepal's agriculture sector, which employs over two-thirds of the labor force and contributes to roughly one-third of the country's GDP. Impacts are felt by both farmers and agribusinesses. Farmers produce less and the quality of their yields suffers due to increased temperatures (and thus evaporation), decreased and more uncertain rainfall, and increased presence of pests and diseases as a result of climate change. With low supply, agribusinesses run their plants below capacity and risk being unable to meet market demand. Despite progress at the national level, Nepal still faces food security issues.

Barriers that prevent Nepali farmers from making significant progress on climate change adaptation include limited access to knowledge. Farmers have limited access to weather and climate information and early warning systems, which could help them anticipate weather events and better manage their crops. Moreover, farmers typically have limited knowledge of climate-smart agriculture practices, such as soil fertility, disease-resistant crop care, and irrigation practices, due to weak extension services. Research indicates that the coverage of government-provided extension is meagre and the extension services of agro-processors and aggregators are few in numbers and inadequately trained[4].

In addition, most of the Nepalese farmers have limited access to high quality inputs. These include improved (more climate resilient and high yielding) seed varieties and fertilizers, modern machinery, finance[5], and markets, as links with agribusinesses tend to be rare and weak in most crops. These barriers prevent significant private investment in adaptation within Nepal's agriculture sector, despite the enormous potential that private actors—large farmers, processors, and input suppliers—could unleash[6].

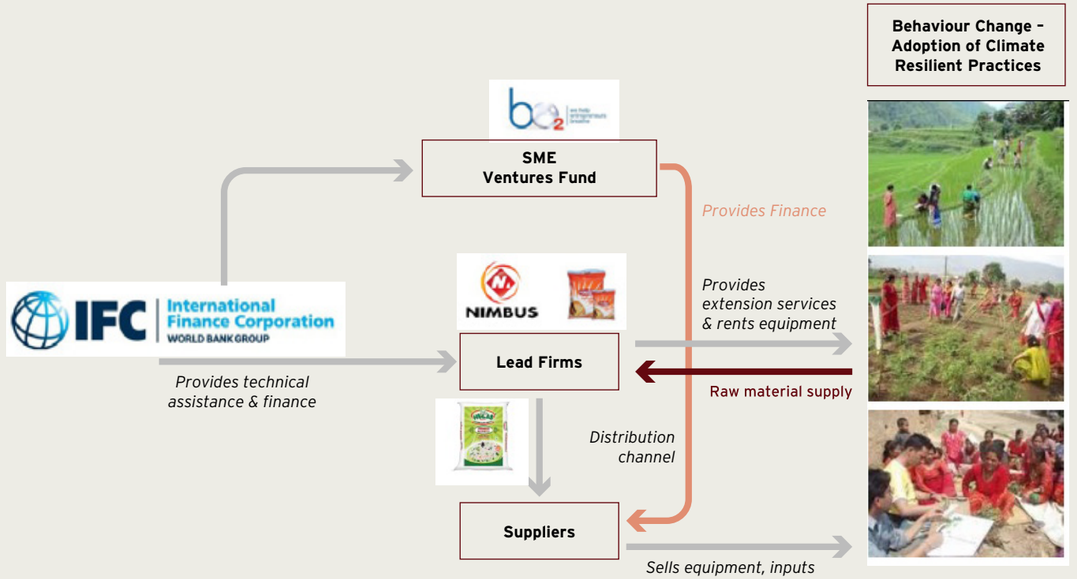
3 Nepal is ranked as the eleventh most earthquake-prone country in the world (United Nations Office for Disaster Risk Reduction (UNISDR): Global Report on Disaster Risk Reduction 2015)

4 PricewaterhouseCoopers Pvt. Ltd (PwC) and the Centre for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED) (2012): Scoping Study on Climate Resilient Agriculture and Food Security, PPCR-Nepal. PwC, London, United Kingdom.

5 PWC and CEAPRED (2012) revealed that only 20 percent of farm households surveyed receive loans from formal financial institutions. High transaction costs to reach farming households and limited awareness among farmers about financial products constrain growth in delivery of financial services to farmers.

6 Trabacchi and Stadelmann (2013: i) note that "private sector decisions and behaviours… have the potential to lock countries into vulnerability profiles for a long time, or to set them on a more resilient path".

BOX 1 **PROJECT DESIGN AND DELIVERY MODEL**



Source: IFC project team

INTERVENTION AND KEY DELIVERY CHALLENGES

The Promoting Climate Resilient Agriculture Project was designed to address these barriers through two components: advisory and investment. The advisory component was envisioned to i) build capacity of farmers to adopt improved seeds and climate adaptive practices and technologies, ii) facilitate awareness and adoption of efficient and improved irrigation technologies for efficient water usage, iii) develop ICT-based products to disseminate climate information specific to farming operations through a Short Message Services (SMS)-based pilot project, and iv) develop innovative financial products for farmers and other agricultural supply chain members in association with commercial banks.

The investment component was designed to work through intermediary banks to facilitate access to finance across the agricultural supply chain to meet investment requirements for adaptive capacity.

Nearing the end of its implementation at the time of this writing, the project aims to reach farmers through agribusiness firms, positioning agribusiness firms to directly help farmers adapt to climate change. It involves three types of stakeholders: i) private companies, namely lead agribusiness firms and commercial banks; ii) farmers; and iii) government officials, particularly from the Nepal Agriculture Research Council (NARC) and the District Agriculture Development Office (DADO), who are invited frequently to observe and monitor

trainings and demonstration plots. Suggestions and feedback from each stakeholder group on further localizing the practices has been carefully incorporated. Implementation also involves a technical service provider, Practical Action Consulting (PAC); a monitoring and evaluation (M&E) services provider, Solutions Consulting, and a knowledge partner, Climate Change Agriculture and Food Security[7]. Project design and delivery model illustration is available in **Box 1**

The project has faced three key delivery challenges:

1. Using a standardized approach for diverse commodities
2. Lack of well-defined support, in terms of knowledge and inputs
3. Non-optimal solutions in some work streams

The following sections detail the genesis and characteristics of these delivery challenges, how they were managed, in terms of agreeing on and executing adjustments and the extent to which these changes allowed the project to overcome the challenges and move forward toward achieving its objectives.

This analysis is based on a desk review of available project documents, field visits and interviews conducted with a range of stakeholders involved in the project design and implementation. Annex D contains a complete bibliography and Annex B lists all interview participants. ■

7 Annex C provides a stakeholder map.

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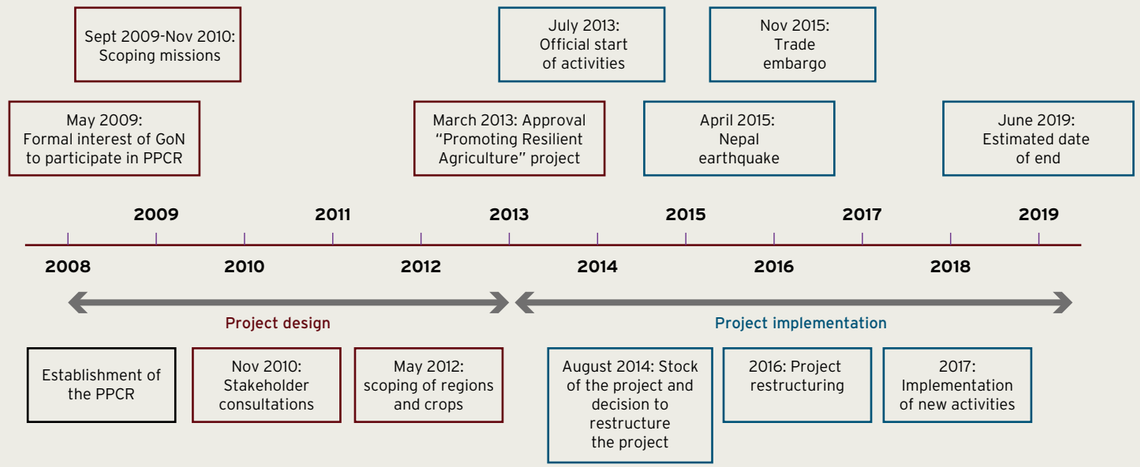
Tracing the implementation process

As illustrated in **Diagram 1,** the design of the Promoting Climate Resilient Agriculture Project took shape as Nepal developed its SPCR under the PPCR beginning in 2009. Project implementation began in 2013 and is expected to end in 2019. Annex A contains a more detailed project timeline, complete with stakeholder roles.

PROJECT DESIGN

The governing bodies of the CIF established PPCR in 2008 and invited an initial group of eligible countries and regions, including Nepal, to pilot the program. In May 2009 the Government of Nepal (GoN) formally expressed interest in joining PPCR. The first phase of the PPCR process involves a country developing a SPCR to mainstream climate considerations into development planning and prioritize climate resilience investments. Nepal undertook this work with support from the World Bank and Asian Development Bank (ADB), two of the multilateral development banks (MDBs) that implement PPCR funding. It involved three scoping missions between September 2009 and November 2010 and a consultation workshop in November 2010, which gathered input from a wide range of stakeholders, including the private sector.

DIAGRAM 1 **IMPLEMENTATION TIMELINE OF THE PROMOTING CLIMATE RESILIENT AGRICULTURE PROJECT**



Source: Figure by author, based on information provided by interviewees and desk review

DIAGRAM 2 **FOUR INTERLINKING AREAS OF INTERVENTION UNDER NEPAL'S SPCR**

In June 2011, the governing bodies of the CIF endorsed Nepal's SPCR, which included four key areas of intervention: i) watershed management in mountain eco-regions; ii) climate-related hazards, mainly related to climate information services; iii) mainstreaming climate change risk management in development; and iv) private sector participation[8]. Importantly, the areas were interlinked, as shown in **Diagram 2**. In particular, the fourth area on private sector engagement was to receive inputs from the second on weather and climate information and, in turn, provide inputs to the third on lessons that could be mainstreamed into managing development program and/or projects.

IFC oversees and implements the Building Climate Change Resilient Communities through Private Sector Participation Program under which the Promoting Climate Resilient Agriculture Project falls.

To prepare this project following the approval of Nepal's SPCR, in May 2012, IFC hired PricewaterhouseCoopers Pvt. Ltd (PwC) and the Centre for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED) to conduct a scoping study on climate resilient agriculture and food security in Nepal. This study sought to provide a "diagnostic review of the agriculture sector to identify opportunities for private sector investment in climate resilient agriculture practices and finalization of a project design document for further implementation"[9]. In particular, it was meant to inform the selection of the project's target area and crops.

The study assessed six locations representing different types of terrain in Nepal: mountain, hill, and plain or terai[10]. The study also considered nine crops and two livestock products[11]. These sectors were selected based on their contribution to the Nepal's GDP. Crop simulation models were used to ascertain the crops' vulnerability to climate change. A value chain analysis was undertaken to identify critical gaps in tackling the effects of climate change. The study also surveyed value chain actors, such as farm input suppliers/agrovets, irrigation equipment suppliers, feed suppliers, and traders.

On the basis of the original SPCR and in the light of the findings of the study, which considered recently approved national climate change planning frameworks[12], five districts in the Terai region, Nepal's agricultural hub, were selected as the focus of the project[13]. In terms of crops, sugarcane, maize, and rice were selected based on a weighted average score of critical factors, such as vulnerability to climate change, contribution to food security, importance to the economy, farmer involvement (estimated reach to number of farmers), growth potential, level of commercialization, level of interest among private sector actors to undertake support services, and ease of partnership with respective producers. The study categorized the analyzed crops in three categories of climate vulnerability: highly vulnerable (maize, vegetables, sugarcane, and rice), vulnerable (mustard and wheat) and less vulnerable (lentil). It also assessed the crops' importance to Nepal's economy in terms of both food security (rice and maize) and industrial raw materials (sugarcane and maize).

Based on this scoping study, IFC refined the results framework and developed a full project document in the second half of 2012. Project activities focused on i) preparing and distributing Climate-Smart Agronomic Packages of Practices (PoPs) for farmer trainings tailored to the region's conditions (one PoP per crop); ii) conducting training for trainers to build capacity of project staff and lead firm extension teams; iii) developing climates smart demonstration plots (one for each lead firm and 60 lead farmers—early adopters of the new techniques), including support to mechanization; and iv) providing follow-up training and in situ mentoring and farmer-friendly guidebooks for climate resilient farming (training 15,000 farmers or 5,000 famers per crop).

The full project document was approved by IFC in March 2013 and funding was in place. In late 2012 the PPCR had approved a USD 8.7 million grant and the IFC had set aside USD 70 million in concessional financing to support the private sector projects under Nepal's SPCR, including the Promoting Climate Resilient Agriculture Project.

IFC started to look for private firms in Nepal to join the project. Interviews with implementers and technical advisors suggest that this process was not easy and involved a great deal of negotiation. In some sectors, such as sugarcane, the number of private companies is limited. Other sectors, such as rice, have many active private companies, but very few large enough to meet the project requirement of training 5,000 farmers. Companies had to go

8 The fifth component on endangered species, as noted in a SPCR presentation by the GoN in March 2012, was later dropped.

9 See page 12, PwC and CEAPRED, 2012: Scoping Study on Climate Resilient Agriculture and Food Security, PPCR-Nepal.

10 In particular, the selected districts were Dolakha, representing mountain and high hill; Ramechhap, Lamjung, and Dailekha, representing mid-hills; and Chitwan and Saptari, representing terai.

11 The crops were rice, maize and wheat in cereal, tomato, potato, and cole crops (cabbage and cauliflower) in the vegetables, rapeseed in oilseed and lentil in legume. The livestock products were dairy and poultry.

12 In 2010, Nepal approved its National Adaptation Programme of Action (NAPA) to Climate Change, focusing on the most urgent and immediate needs of adaptation. Following this, in 2011, it approved its Climate Change Policy. In parallel, Nepal was adopting a National Framework on Local Adaptation Plans for Action (LAPA) to ensure integration of adaptation and resilience into local to national planning processes.

13 More specifically, the project selected the districts of Bara, Parsa, Morang, Sunsari and Rautahat.

TABLE 1 **DELIVERY CHALLENGES OF THE PROMOTING CLIMATE RESILIENT AGRICULTURE PROJECT**

	Delivery challenge	Key issues
1	Using a standardized approach for diverse commodities	Selection of crops did not consistently support private sector development
		Seasonal crop cycles interrupted project activities
2	Lack of well defined support, in terms of knowledge and inputs	Support provided was not comprehensive enough, with knowledge and input barriers not fully addressed, affecting continuity and impact of farmer training and private sector collaboration
3	Non-optimal solutions in some work streams	ICT-based early-warning system products did not meet demand and IFC was supposed to develop them.
		Access to finance component of project compromised by Nepali banks' reluctance to take credit guarantees, provide any kind of concessionality, or lend to individual farmers
		Limited government ownership hindered coordination

through the IFC due diligence process, further reducing the number of eligible candidates. For example, sugarcane companies that produce alcohol were deemed ineligible. Moreover, Nepal's private sector was not fully aware of and concerned by climate change. IFC managed to convince one firm for each crop to take on the challenge and project activities started officially in July 2013.

KEY DELIVERY CHALLENGES

As implementation began, three key challenges emerged, as illustrated in **Table 1**.

First delivery challenge "Using a standardized approach for diverse commodities"

The **first delivery challenge** focuses more specifically on the Promoting Climate Resilient Agriculture Project, particularly its advisory component. The project used a standardized approach for promoting climate resilience amongst farmers of all commodities, when the nature of supply chain varies widely and affects the nature of delivery on the ground. The selection of crops did not consistently support private sector development. Each crop supply chain has particular specificities, offering different degrees of private sector development potential, which should have been taken into account in the project design.

The standardized approach used for all three-commodity value-chains (sugarcane, maize and rice) focused on "private-sector extension efforts for transferring information and knowledge to smallholders and related capacity building". This standardized approach was more suitable for some commodities than for others. For example, in the rice supply chain, there is no direct contact between processing firms and farmers, so the firms did not have much interest to invest resources in building up an extension network. In commodities with shorter supply-chains, such as sugarcane, the firms directly source from farmers and thus had reasons to build their extension teams for farmer training and capacity building. The project was useful to collect robust evidence from the field that private-sector led extension efforts to promote climate resilience amongst smallholders would work well in shorter commodity value-chains. This is a lesson learned, which may be used for developing downstream engagements. Also, the fact that this approach of private-sector led extension worked for the sugarcane supply chain, showed that there is merit in engaging with the private sector for reaching out to smallholders in their value-chain, and there are business benefits thereof.

Rice is the most widely grown staple crop of Nepal, and was a required commodity from the project design. According to interviews with the rice firm, implementers, and technical advisors, most farmers (70 percent), but especially the poor, grow local varieties of rice in very small plots for personal consumption, as a strategy for poverty reduction and food security. They only sell when they need cash, and then, to no particular buyer. The value chain is loose, with many producers and many small to medium-sized mills (about 100 in the target region) and no continuous link between farmers and private companies. Firms are not certain which farmers will sell to them and farmers are not certain which firms will buy from them. The project found it could increase rice production, reduce poverty, and increase food security, but the challenge it encountered was that it was difficult to benefit the participating private firm. The project could not guarantee increased quality inputs from farmers, as they could easily sell increased production to any other buyer.

While a staple crop in the hills, maize is a new cash crop in the plains, where the project is working. In comparison to rice farmers, maize farmers are better off and typically sell their harvest. There are six maize mills in the target region, each building their supply chain with maize from India. While the project found it would have a less substantive impact on poverty reduction and food security, it could contribute to private sector development by structuring the value chain and helping mills get more quality inputs from farmers.

Sugarcane presents a third dynamic. It is a cash crop that has been produced for years in the target region, and it has an extremely tight supply chain. Weight and transport costs are considerable, which means mills cannot import from abroad and rely on close-by producers [14]. There is only one sugarcane mill in the target region[15]. A mill typically buys from the same farmers, who typically sell to the same mill. The producers and the buyers, the farmers and the mills share the same objective, and work together for long periods of time. Despite recurring, including some recent issues with payments, there is relatively high trust and loyalty. Moreover, sugarcane mills have extension services in place.

Furthermore, the different cropping cycles made it challenging to use the same approach. While sugarcane is a year-long crop, rice and maize are one season crops (the rice season is from May to October and the maize season is from December to April). Interviews revealed this represented a challenge as project activities were interrupted off-season for rice and maize. This compromised coordination, farmer training, and the link between farmers and companies, which sought to be a single point for farmers throughout the year.

14 Interviews with implementers, services providers and private firms in April 2018.

15 Interviews with private firms in April 2018.

Second delivery challenge "Lack of well defined support, in terms of knowledge and inputs"

The **second delivery challenge** focuses on the fact that the project did not clearly define the support to be provided. As such, support services did not comprehensively address the barriers that prevent Nepali farmers from making significant progress on climate change adaptation. These barriers to make progress on climate change adaptation are limited access to knowledge and to high quality inputs.

Regarding knowledge barriers, the project initially focused on providing a short, three-day theoretical training session to a high number of people (i.e., 15,000 farmers). Lead farmers, who can pass on knowledge to their communities, were not clearly informed about why they should work to disseminate information and knowledge to other smallholders in their communities. The project also did not use demonstration plots to showcase results as it had intended or employ continuous extension services to ensure proper adoption of the practices and technologies being taught. Training also involved three modules: land preparation, crop management, and harvesting. According to a crop manager in the field, different people from the same family would come to different modules, compromising training continuity and impact. In this sense, the project was ambitious in terms of the number of farmers to train, but not ambitious in the changes it was trying to promote.

Knowledge-sharing challenges emerged in sugarcane as mechanisms are already in place to provide extension services. Interviews highlight that there was appetite for the global experiences and practices that the project sought to provide through the technical support provider, PAC. The additional manpower from PAC was provided to the lead firms to complement their extension efforts as an incentive since private sector-led extension support was the cornerstone of the project. PAC's work was a complement to the extension efforts of private sector firms, since most of the private sector firms did not have adequate extension workers, or the quality they provided was not sufficient, and thus the external manpower was necessary.

Moreover, the roles of IFC, the lead sugarcane, rice, and maize firms, and the technical service provider in the field (PAC) were not clear. According to a technical advisor, the field person at each lead firm did not always have the authority, technical knowledge, and/or time to provide support. Lead firms were to provide agriculture inputs, but they were not aware of this. PAC's contract focused on the farm level, but the project also specified support to lead firms. PAC's role was minimal on this.

Furthermore, interviews with technical advisors reveal that it was difficult to provide training, as village development committees would not authorize it without written approval from the government, in particular, the District Agriculture Development Office (DADO), which, in turn, is dependent on the Ministry of Agriculture. IFC's only contact in the government was the Ministry of Environment. Despite the clear technical expertise of the Ministry of Agriculture, IFC had no link with it, apart from the participation of some government staff in training, which had its own challenges[16].

Moreover, in the early phases of project implementation, services were not provided to improve access to inputs, such as agro-meteorological information, improved seeds, mechanization, irrigation, transportation[17], storage, recovery[18], and finance. A comprehensive and integrated approach, working simultaneously in several aspects, was also important for maize[19].

Third delivery challenge "Non-optimal solutions in some workstreams"

The **third delivery challenge** focuses on the limited adequacy of some solutions addressed by the project work streams.

In the original project design, IFC was responsible for developing an ICT platform and apps linked to climate resilience to smallholders. However, it was evident that IFC was not the right institution to develop an ICT platform and apps. Instead, IFC's role should be to find good talent in ICT entrepreneurs and solutions and help to scale them up commercially.

An additional challenge was that there was no effort made to actually understand what the demand for ICT and related services by smallholders was. The project proposal presumed that there was a demand for ICT services by farmers for becoming more climate resilient, but this was not proven.

Indeed, during the implementation, it was evident that the demand from farmers for the type of information on climate change and early warning systems was non-existent in Nepal, and a number of farmer oriented ICT tools have failed.

Also, the project planned to support small and medium enterprises (SMEs) through a commercial bank, but here too, implementation proved difficult, if not impossible. According to those interviewed, banks in Nepal are often reluctant to take credit guarantees or provide any kind of concessionality. They are not willing to lend to individual farmers, preferring to base their lending on assets, which in the agricultural sector is limited to agricultural inputs, sugar mills, or transportation (few of which the farmers who participated in the PPCR project had)[20]. IFC was able to sign a memorandum of understanding with one Nepalese commercial bank to support SMEs, but it did not come to fruition. Interviews also revealed that SMEs struggled with this aspect of the project, worrying that they could lose collateral if loans were not repaid.

These challenges were compounded by a tight project timeframe. The project implementation was delayed by the fact that it was difficult to find people with the required skills to implement the project, which was testing new approaches. Procuring some inputs, especially maize seeds, was also a lengthy process. Overall, the project was ambitious, seeking to change long-engrained farming practices. The timeframe was too short to test practices, demonstrate successful approaches, and implement them.

16 Daily subsistence allowance (DSA) in the government and the private sector are different. If you there is a workshop involving both, each one would receive a different amount, which is complicated to manage. For this reason, at some point the program had to hold separate meetings, which is counter-productive: a key value of trainings resides not on the content of the presentations, but on the exchange and networking among participants.

17 In maize, smallholder farmers dominate with a very small production with respect to the volume maize companies need. There are high transaction costs. Aggregation models are needed so that groups can gather at least 16 tonnes of maize, the load of a truck.

18 In sugarcane, this is the amount of sugar that is produced per amount of sugarcane. Currently the mills in Nepal get 9 kg of sugar out of 100 kg of sugarcane. Studies indicate that this should be at least 12 kg. This would increase the productivity of the firm and the payment for farmers.

19 This included post-harvesting given that between 18 and 25 per cent of maize harvest is lost after harvesting in Nepal.

20 In the case of sugarcane, mills can back up farmers (all the money goes through them) and buy everything that farmers produce. For instance, they could buy a machine and the lease it out to other farmers. The enabling environment is more fruitful in 2018. The government has a subsidized interest rate for registered farmers and banks must allocate, by law, a percentage of their loans to agriculture. However, some banks still prefer to pay the penalty than invest in agriculture. The mill that worked with the IFC project gained access to a USD 1.5 million loan in 2018 for farmers.

Delivery was also affected by external factors. On April 25, 2015 the country experienced a devastating 7.6 magnitude earthquake, causing 9,000 casualties, over 22,000 injuries, and widespread infrastructure damage. Project activities stopped for a month or more.

SOLUTIONS TO KEY DELIVERY CHALLENGES

By 2014, the project was working to address delivery challenges, with PAC taking a lead on improving the comprehensiveness of technical support to farmers and lead firms. A more substantive restructuring was carried out in 2016/2017 to overcome challenges still impeding project objectives. It was informed by a study conducted by PAC in 2014, informal requests from the lead firms, and the analysis and experience of IFC staff. Interviews indicate that project monitoring documents, such as the crop-specific mid-line reports delivered by Solutions Consulting in January 2016, did not significantly inform restructuring.

The negotiation of the project restructuring was complex. IFC oversaw the effort with a high level of vision and forward thinking to solve problems, assess opportunities, and convince other players. Interviews indicate that the three levels of project management participated actively[21]. Lead firms also participated in changes related to their specific crop. The World Bank Group was involved, as, given the value of the project, the contract was through the WBG and not directly through IFC, with implied additional transaction costs.

Interviews also point out a significant amount of project funds had already been spent, and new funding was needed to restructure the project (eventually mobilized from the Canada Climate Change Program). As a result of this complexity, the negotiation process took about two years, from 2015 to 2017, with the new activities beginning in early 2017[22].

Table 2 lists the solutions that early intervention by PAC and full project restructuring introduced to resolve the key delivery challenges of the project, followed by a more detailed explanation.

1. Designing crop-specific approaches

To overcome the obstacles of using a standardized approach for all commodity supply chains , the project team identified solutions specifically targeted for each crop and its particular characteristics. Sugarcane is a perennial crop, while rice and maize are seasonal. In order to avoid the off-season interruption for rice and maize, and also to increase the duration of engagement with farmers, the project introduced soy as a rotation crop in maize farming. Including soy as a rotation crop with maize would also strengthen farmer livelihoods all year round (maize is a winter crop, planted for a period of 3 to 4 months, and soy is a summer crop). Also, maize and soy are both required as raw materials by the poultry-feed industry, thus allowing the same set of farmers to develop year long engagement with poultry feed mills for supply of raw materials. Furthermore, given that the focus of the project was to develop business models for private-sector engagement with smallholders, introduction of soy as a rotation crop to maize allowed the extension teams to deepen their engagement with farmers and build relationships. Actually, learning for developing round the year engagement between extension workers and farmers came from IFC's work in sugarcane in Nepal and other countries. The project also prepared a new climate resilient agronomy guidebook for soy cultivation in Nepal. Overall, adding soy as a rotation crop to maize would help achieve a greater footprint with farmers, resulting in greater trust building by supporting farmers to adopt climate resilient practices.

TABLE 2 **SOLUTIONS TO DELIVERY CHALLENGES OF THE PROMOTING CLIMATE RESILIENT AGRICULTURE PROJECT**

	Delivery challenge	Key issues	Solutions
1	Using a standardized approach for diverse commodities	Selection of crops did not consistently support private sector development	
		Different cropping cycles compromised continuity and long-term engagement with seasonal crop farmers. Seasonal crop cycles interrupted project activities	Additional crops were introduced to seasonal crop rotation. Soy introduced to complement maize growing cycle
2	Lack of well defined support, in terms of knowledge and inputs	Support provided was not comprehensive enough, with knowledge and input barriers not fully addressed, affecting continuity and impact of farmer training and private sector collaboration	Demonstration plots introduced, along with more flexibility in farmer training schedule Needs assessment conducted to expand service and inputs provision across wider portion of the sugarcane and maize value chains Communication and collaboration strengthened with sugarcane firm's extension workers
3	Non-optimal of solutions in some work streams	ICT-based early-warning system products did not meet demand and IFC was supposed to develop them.	Survey was conducted to understand demand. IFC partnered with entrepreneurs to develop ICT platforms and apps
		Access to finance component of the project compromised by Nepali banks' reluctance to take credit guarantees, provide any kind of concessionality, or lend to individual farmers	Financial products channelled through an equity fund to increase SME access to concessional funding

2. Re-thinking the support-provision strategy

Aware of the lack of comprehensiveness of the support provided, in 2014, PAC carried out an in-depth participatory market system analysis, mapping all relevant stakeholders along the value chains of the three crops in the target area, with the active participation of the lead firms. According to interviews, mapping included seed providers, machinery companies, financial institutions, sub-traders and traders, and storage facilities. The exercise was finalized in December 2014. Based on this study, in 2016, the project expanded support to seeds, machinery, insurance, and financial aspects in maize.

21 In terms of management, the project is governed at three levels: i) the PPCR Sub-Committee , composed of six recipient countries and six contributor countries that approve PPCR funding; ii) the Steering Committee, composed only of IFC members, involving the country, regional program managers, and the strategic climate change team at IFC headquarters in Washington D. C.; and iii) three executive committees, one for each of the three target crops, given their uniqueness. IFC, the corresponding lead firm, and the technical manager (PAC) participate in these crop-based executive committees.

22 PAC's new contract was ready in January 2017.

In 2015, adjustments were made to improve communication and collaboration between PAC and the sugarcane lead firm's extension team. Working with the firm's management, trust and understanding was built. The role of the project and PAC in strengthening the firm's extension team was better explained and the firm's team was given project targets to encourage their participation in project activities. Regular meetings were also held between the firm and PAC. Firm extension workers also started to realize the benefits of PAC's technical support. Overall, communication and collaboration was strengthened with sugarcane firm's extension workers.

To overcome the lack of continuity on training, PAC and the sugarcane lead firm strengthened the awareness about this issue. To facilitate continuity in training, the number of modules was reduced from three to two to make it easier for farmers to attend all sessions. Also, continuity in training was supported through capacity building of the extension staff and management team of the lead firms. In some cases, as the project neared its completion date, the lead firms hired the trainers from PAC to continue with the training efforts. This was considered an innovative approach, as the project was one of the pioneers in Nepal that focused on building private-sector led extension for capacity building of farmers.

Full project restructuring introduced a more comprehensive approach to addressing the knowledge barrier. Demonstration plots were planted to showcase and demonstrate the added value of climate-smart farming techniques and increase the demand for farmer training. According to interviews, PAC provided training any time farmers arranged a group of 25 people. Also, the project introduced a needs assessment, which was conducted to expand service and input provision across wider portion of the sugarcane and maize value chains.

Moreover, the project introduced a more comprehensive approach to the value chain, increasing access to much-needed inputs. In sugarcane, mechanization was introduced in 2017. In maize, the project promoted an aggregation model that called on farmers to combine their harvests for transport to the lead maize firm for processing. To that end, the project organized a workshop that brought together lead farmers interested in becoming aggregators with logistics representatives (for transport, firm procurement, taxes, and finance) to build capacity and networks. Training on post-harvest practices informed farmers on how much and what quality of maize would be accepted at what price[23].

As mentioned above, the project also introduced soybeans as a complement to maize to ensure a continuous relationship between the firm and farmers throughout the year. Farmer training on climate-smart practices in maize was extended to soybean.

3. Finding more suitable solutions in some work streams

To overcome the non-optimal solutions in some work streams, several changes were introduced. IFC addressed the constraints related to the development of ICT climate-smart solutions by taking the following initiatives:

- IFC decided to not develop an ICT platform and apps on its own, but rather to partner with young entrepreneurs and developers operating in this space in Nepal (or elsewhere) and support solutions that have been tried and have a potential to scale-up in Nepal. This resulted in the partnership with the firms Midas and mPower from Bangladesh.
- The demand for ICT services for smallholders was assessed through diagnostic assessments conducted by the firms Midas and mPower and stakeholder consultations conducted by IFC.

In addition, the project modified the access to finance component, with resources channelled through an equity fund rather than Nepali banks. In particular, the project invested USD 3.6 million in SME Ventures, a fund in which IFC had already invested USD 7 million. Fund manager Business Oxygen (BO2) was also brought on board in July 2017 to transfer funds to SMEs. Project restructuring also provided capacity building for BO2. This was indeed an innovation that the project brought, as there are very few private-equity funds operating in Nepal that focus on climate-resilient equity investments in SMEs[24]. IFC and other organizations had already tried to work with financial institutions such as banks in a number of projects. However, working with a private-equity in Nepal to promote SME access to risk capital for expanding businesses that are climate-smart and climate-resilient was new to Nepal, and thus more exciting and challenging for the project team.

According to interviews, this innovative approach marked the first time IFC had used an equity fund for climate financing. Results were uncertain, but the restructuring was backed by solid arguments. The equity fund allowed the project to circumvent the barriers posed by banks' reluctance to lend to farmers, while following the principles of the original plan. As it shares SMEs' risks, an equity fund can be considered concessional financing to SMEs. Moreover, in contrast with bank financing based on current assets, an equity fund's lending decisions are based on the vision, performance record, and business potential of an initiative. This allows a greater number and variety of SMEs to access capital and collateral is not at risk should an initiative fail. ■

23 Interviews in April 2018.

24 In order to enhance the understanding of climate resilience of fund managers, the project built the fund managers' capacity on climate resilience through a training program in Oxford, UK

Contributions and limits of the restructuring

The project restructuring helped overcome some of the delivery challenges. Interviews suggest that more comprehensive approaches to overcoming the knowledge barrier and increasing access to inputs along the value chain has greatly improved delivery. According to technical advisors, demonstration plots have increased demand for training. Arguably, they also have increased adoption of climate-smart agricultural practices, thereby contributing to building the climate resilience of smallholder farmers.

In maize, the introduction of soybeans has allowed for more continuous project involvement of farmers and the lead firm. Project changes in maize and sugarcane have improved the link between private firms and farmers, thereby improving farming output resilience. Changes to ICT tasks and the investment component have unblocked action, and adjustments in stakeholder and service provider roles have improved management. The time extension has allowed these improvements to be felt and has supported delivery.

It is worth noting that some of the changes introduced by the restructuring not only addressed delivery challenges, but also exploited opportunities. According to one stakeholder, the response to the delivery challenge of unfeasible banking was also the result of a happy accident. Managers of the PPCR and SME Ventures happened to share an office for a period of time at IFC Nepal. Through conversation both parties realized a mutually beneficial funding arrangement could be arranged[25].

Interviews also indicate that the introduction of soybean also refers largely to exploiting an opportunity. Maize works well with other crops, allowing for intercropping. Maize farmers had nothing to lose (and income to gain) in trying to raise soybeans, and the company recognized a business opportunity. It could buy two crops from the same farmer and build a relationship rather than purchase from another unknown grower.

The capacity to fix project delivery challenges was constrained. A great deal of time and project budget had already been expended by the time the restructuring was carried out. Although the project end was extended and new financial resources mobilized, the time and resources left were limited. Restructuring injected some flexibility, but the project still had to stick to the original approved design and the broader SPCR. Many items, such as the crops selected for inclusion in the project, could not be changed.

On rice, the restructuring process determined changes were not possible, so project activities were not extended any further than what was planned in the project design, given the lack of time and resources to pursue other feasible options. Given that the project had already met the original targets, the other crops were prioritized.

In maize, despite all efforts, including the addition of soybeans, there were some limitations to achieve success, such as the favourable conditions of some firms to import maize from India and Latin America given the price differential, rather than buying locally grown. Although these limitations are outside of the project scope, the project showed that whenever the price of imported maize was at par with locally grown maize, lead firms sourced from local Nepali farmers. Considering that this was the first time that the private-sector led extension tried to engage with farmers in a systematic way, this was an encouraging beginning.

The ability to introduce a more systemic approach to value chain inputs also has been limited. To reduce post-harvest losses in maize, the project was able to introduce training.

In sugarcane, the project has introduced mechanization, in particular automatic harvesters, but it has not been able to address comprehensively the underlying barriers for mechanization, such as identifying machine providers, models, and business plans to make them available to farmers. In sugarcane, the project introduced another sugar mill to replicate the efforts. Timing was a critical factor. PAC's new contract was ready in January 2017, and although a feasibility study of new interventions made sense, it would have taken six to eight months to complete it. With the project set to close in March 2018, it left little time to implement recommendations of such a study. Timing was also an issue for soybeans. Interviews point out that official procurement of high-quality soybean seeds for commercial farming is lengthy, leaving little time for implementation[26].

Results have been mixed on project changes to streamline development of ICT-based products and to improve access to finance along the agricultural supply chain. E-learning packages and agro-meteorological information (covering DHM's lack of delivery) have not yet been delivered[27]. SME Ventures has had a positive impact on channelling concessional financing to SMEs, but overall impact is limited on private sector development in the agriculture sector. While a greater amount of funds has been mobilized in a more sustainable way, SME Ventures does not have a direct link with the targeted crops or their value chains or, more broadly, agribusinesses. The climate change component is still to be refined.

Furthermore, interviews suggest that the restructuring created tension between the contract managers and implementers in the field. While the latter understood the practical need to make changes, the former was concerned about management and the increased expenditure that the changes entailed. Looking ahead, sustainability of some project components may be an issue when the it ends. For example, it is unclear if the firms will continue with efforts piloted through the project for rice or maize. Nevertheless, sugar mills will and are continuing with the efforts promoted by the project, as the business rationale for sugar mills to engage with farmers is clearer as compared to maize and rice. In fact, IFC is in discussions with five to six sugar mills for a follow-on advisory project related to power co-generation with sugarcane bagasse.

The government has not been deeply involved in project activities, and work remains to create a more private sector-friendly enabling environment in agriculture to sustain gains made by this project.

Also, the project end date was extended from February 2017 to December 2017 for rice and to June 2018 for maize and sugarcane. The results framework was revised and the targets adjusted. ■

25 SME Ventures was based on a USD 14 million fund. IFC had invested USD 7 million and the fund manager had to raise another USD 7 million. These office mates determined PPCR could provide the money to SME Ventures, and SME Ventures could serve as the vehicle for PPCR. Without SME Venture, the project may not have been able to overcome the challenge it was facing and vice versa.

26 Orders have to be placed in the four government-owned nurseries at least four months before the season begins.

27 By the time this report goes to print.

Lessons learned

The following lessons can be drawn from the implementation of the Promoting Climate Resilient Agriculture Project in Nepal.

REFINE THE PROJECT SCOPE

This case study highlights the importance of understanding the barriers and drivers for different objectives—such as climate resilience, increased productivity and gender equality—and the complementarities and trade-offs between the strategies to address them. Climate resilience is still evolving and there is not many a wide array of pre-determined solutions to all issues, unlike climate change mitigation. Thus, it seems reasonable to avoid having too many objectives (such as climate resilience, poverty, gender, food security, private sector investments etc.) in a pilot project that is dealing with an evolving body of knowledge. Focusing on one or two key objectives in greater depth would be more suitable for this type of project.

This project shows the importance of understanding the specificities of different value chains. The design is unique, as it is the first time that a project focuses on offering a strong business case for the private sector to engage in climate resilience in Nepal. One of the solutions offered is to accommodate more crops in the cultivation rotation. Soybeans were introduced into the project to accompany maize, but the lead firm for maize works with protein crops, including maize, rice, and beans, among others. It may be better to select the firm first, then determine the focus crops.

Project design also should promote more systemic (comprehensive and integrated) approaches. Project design should consider the entire agricultural value chain. By the same token, it should address the different barriers to agricultural development, including knowledge barriers and limited access to inputs, such as agro-meteorological information, improved seeds, water, machinery, storage, finance, and insurance and markets.

Furthermore, project activities also should be feasible, integrated, and share a clear focus. If private sector firms have an internal mechanism to provide extension services, it is better to strengthen and supervise this than to create a parallel structure.

USE REALISTIC AND STRATEGIC TIMEFRAMES

The project highlights the importance of promoting adaptive management to allow for unexpected circumstances. In Nepal, an earthquake caused delays, but it could have been an extreme weather event, the frequency and intensity of which are predicted to increase. A phased approach to project design and implementation could reduce the impact of the unexpected. First, the design itself should be phased, with a more general concept note and a more detailed project document analysing specific sectors in specific geographical areas. This contributes to understanding trade-offs and refining the result framework. It also reduces the risk of locking the project into non- or low strategic targets, given that results frameworks are always difficult to change once a project is approved. Second, project design should promote phased implementation approaches when embarking on new innovations, such as linking climate-smart agriculture and private sector development. Phased implementation allows for testing and learning and makes it easier to restructure program or projects. It also provides flexibility to seize unexpected opportunities, such as channelling climate change resources through an equity fund.

IFC's own experience proves this. IFC is implementing a similar PPCR project in Bangladesh, which started after the Nepal project. Learning from Nepal, the design of the Bangladesh project favors a phased approach, with Phase 1 (2015-2017) testing several aspects and Phase 2 (2018-2020) drawing on Phase 1 lessons to scale up successful approaches. Given that a phased approach was envisioned from the beginning, the Bangladesh project anticipated restructuring and was able to respond with more agility and more project time and budget intact than the Nepal project[28].

DESIGN ADEQUATE ROLES FOR STAKEHOLDERS AND SERVICE PROVIDERS

The implementation of the project also demonstrates the importance of clearly defining the roles of stakeholders, including those in the field. Moreover, if a project focuses on the private sector, it should link with the government, including the official climate change focal point (e.g., Ministry of Environment) and the relevant line ministries (e.g., Ministry of Agriculture) at the national, regional, and local levels. Bringing the government more on board would facilitate not only implementation but also sustainability, as it has a role to play in creating an enabling environment for private sector development. ■

28 Bangladesh is a more dynamic market, with many firms bidding, which makes it easier to find firms. This also made the restructuring easier in Bangladesh.

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ANNEX A

Project implementation timeline

Date	Implementation event	Stakeholder(s)
2008	Establishment of PPCR	CIF
May-2009	Formal interest of GoN to participate in PPCR	GoN
Sept 2009 – Nov 2010	Three scoping missions	ADB, IFC, WB, GoN
Nov-2010	Stakeholder consultations of component concept notes	ADB, IFC, WB, GoN, and a series of stakeholders, including private sector
Jun 2011	Endorsement of private sector programme in PPCR	GoN, PPCR Board
May 2012	Scoping of regions and crops	Consultancy firm (PWC)
Sep 2012	Approval USD 8,7 million for the private sector component of the SPCR, including the Promoting Climate Resilient Agriculture Project	IFC, PPCR sub-committee
Dec 2012	Set aside USD 70 million in concessional funds for private sector projects	IFC, PPCR
Mar 2013	Approval "Promoting Resilient Agriculture" project	IFC
July 2013	Official start of activities	IFC
Aug 2014	Stocktaking of the project and decision to restructure the project: field activities; ICT component; investment component	IFC
2014	In depth participatory market system analysis	Consultancy firm (PAC)
April – May 2015	Nepal Earthquake – field activities stopped	
Nov - Dec 2015	Trade embargo (economic blockade) – no movement at all	
Dec 2015	Request for extension to complete project activities (initial estimated end date was 28 Feb 2017)	IFC
Jan 2016	Mid-line reports	Consultancy firm (Solutions consulting)
2016	Project restructuring	IFC, PPCR Board
Dec 2017	Finalization of activities on rice	
June 2018	Estimated end date	IFC PPCR

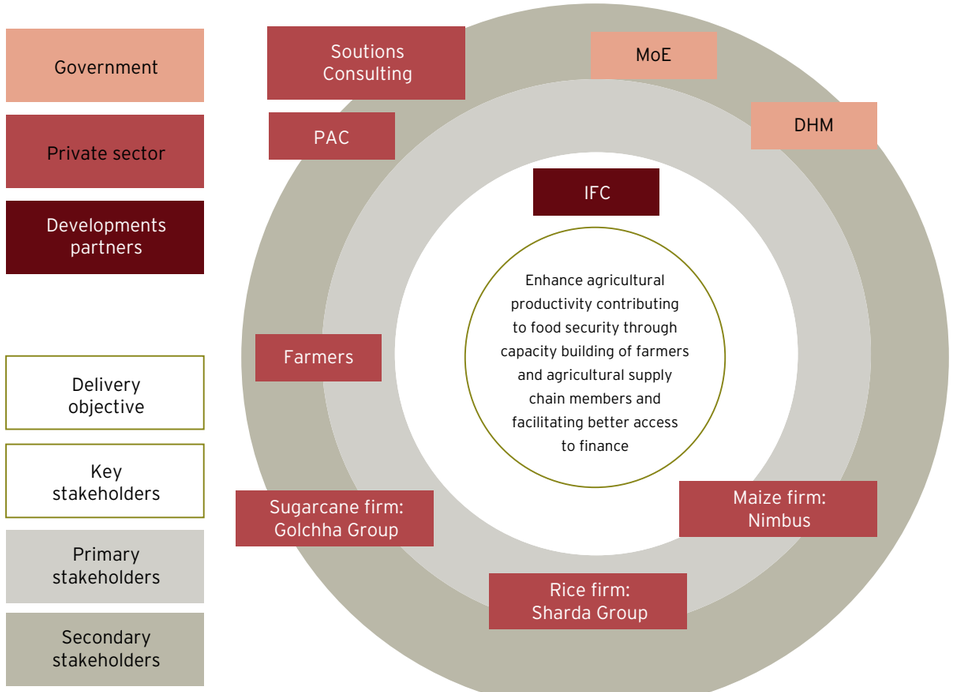
ANNEX B

People interviewed for case study

Name	Position	Institution	Type of stakeholder	Date	Location
Akira Dhakwa	Programme Manager	IFC Nepal	Implementer	Multiple exchanges	Online and Kathmandu
Harsh Vivek	Programme Manager	IFC South Asia			Online
Ernest Bethe	Principal Operations Officer	IFC		13/04/2018	Online
Deep Karki	Operations Office	IFC / SME Ventures Fund		13/04/2018	Kathmandu
Ritu Malla	Senior Investment Manager	IFC / Business Oxygen		13/04/2018	Kathmandu
Moushumi Shrestha	PSD Advisor	Practical Action Consulting (PAC)	Technical advisor	09/04/2018	Kathmandu
Milan Kumar Joshi	Program Manager			10/04/2018	Kathmandu
Ashish Shrestha	Director	Solutions Consulting		10/04/2018	Kathmandu
Hitesh Golchha	Chief Director	Golchha Group	Client - Private sector firm (sugarcane)	10/04/2018	Kathmandu
Suresh Mehta	Cane Manager			11/04/2018	Biratnagar - Terai region (project area)
Anand Bagaria	Managing Director	Probiotech Industries Pvt. Ltd. - Nimbus	Client - Private sector firm (maize)	12/04/2018	Kathmandu
Nischit Aryal	Technical person			13/04/2018	Kathmandu
Pradeep Sharda	Director	Nutri Food Pvt. Ltd., Sharda Group	Client - Private sector firm (rice)	11/04/2018	Biratnagar - Terai region (project area)
Archana Shrestha	Senior Divisional Meteorologist	Department of Hydrology and Meteorology	Government (in charge of a complementary component)	12/04/2018	Kathmandu

ANNEX C

Stakeholders' map



Source: Figure by author, based on information provided by interviewees and desk review

ANNEX D

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