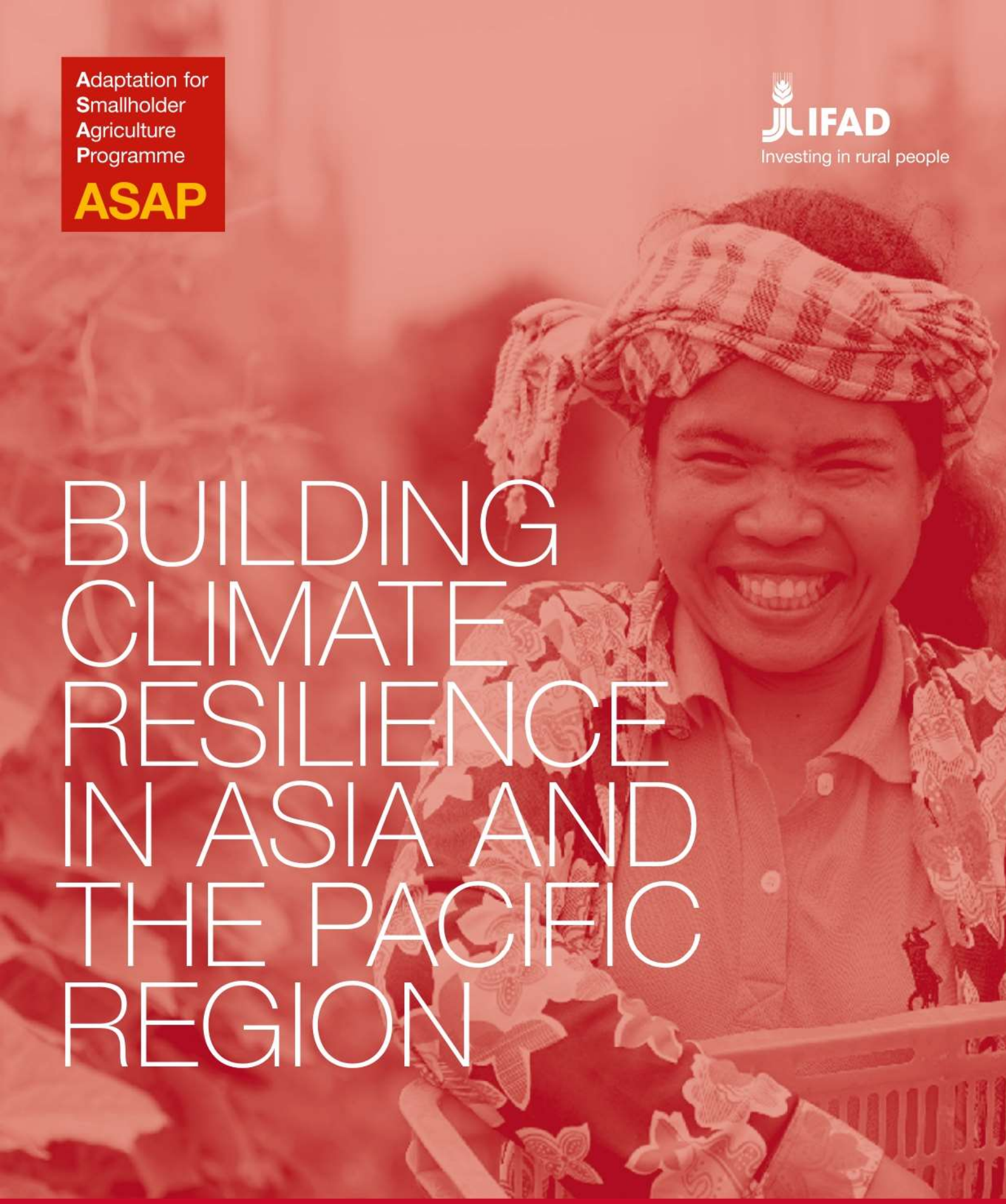
Adaptation for Smallholder Agriculture Programme

ASAP

IFAD

Investing in rural people



BUILDING CLIMATE RESILIENCE IN ASIA AND THE PACIFIC REGION

ASAP TECHNICAL SERIES

Key results and lessons learned
from IFAD Adaptation for Smallholder
Agriculture Program (ASAP)

TECHNICAL PAPER

BUILDING CLIMATE RESILIENCE IN ASIA AND THE PACIFIC REGION

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Abbreviations

AMD	Adaptation to Climate Change in the Mekong Delta
ASAP	Adaptation for Smallholder Agriculture Programme
ASHA	Adaptation for Smallholders in Hilly Areas
ASPIRE	Agricultural Services Programme for Innovation, Resilience and Extension
BWDB	Bangladesh Water Development Board
CALIP	Climate Adaptation and Livelihood Protection
CARLEP	Commercial Agriculture and Resilient Livelihoods Enhancement Programme
CBFM	community-based forest management
CSA	climate-smart agriculture
CSV	climate-smart village
FFEWS	Flash Flood Early Warning System
FNML	Food and Nutrition Security and Market Linkages Programme
GESI	gender equality and social inclusion
GIS	geographic information system
HILIP	Haor Infrastructure and Livelihoods Improvement Project
LAPA	local adaptation plan for action
NAPA	national adaptation programme of action
NRM	natural resource management
SACCC	Smallholder Adaptation for Climate Change Component

Executive summary

IFAD's ASAP projects in Asia and the Pacific region offer a host of valuable lessons that can beapplied in the design and implementation of other climate change adaptation projects targeting smallholder farmers and rural communities around the world.

This study examines six projects, in three principal ecosystems of the region: a mountainous region, wetlands and a river delta. It derived four main recommendations for improving the design and effectiveness of adaptation projects both in the region and elsewhere.

1. **Act fast, use technology to speed assessment of climate change risks and impacts, and draw upon the experience, knowledge and creativity of local people**

Climate change is undermining livelihoods and many rural communities who urgently need help to adapt. Individual smallholder farmers in Asia and the Pacific region have developed a variety of successful adaptation techniques, but these need to be identified, refined and rolled out more widely, backed by finance to underpin their adoption. Digital mapping and other technologies can be combined with local knowledge to provide additional information that can help identify climate-vulnerable hotspots and focus adaptation support on those most in need.

2. **Use public-private partnerships to add value to and speed uptake of solutions invented by local people**

Effective projects invariably combine public sector initiatives with action by private sector players. Lead farmers who act as role models and agents of change can also supply inputs and advice about how best to use them. Private sector partners can develop technology solutions that collect and share information about climate change and adaptations. Private sector suppliers and buyers also supply the materials and new inputs needed by smallholder farmers as they adopt new crops and cultivation techniques, and connect them with markets for new, more profitable kinds of produce.

3. **Successful adaptations will be spontaneously adopted in rural communities – provided constraints are removed and finance is available**

Smallholder farmers are quick to grasp the advantages of innovations that increase yields or incomes. IFAD's experience in the Mekong Delta showed that word of successful adaptations spread quickly beyond the project area and other farmers spontaneously adopted those most relevant to their holdings. But for farmers to continue to adapt to ongoing climate change, projects need to ensure public institutions and the private sector continue to provide finance and advice once the project ends, and that supportive policy frameworks are in place.

4. **Information and communication technology platforms introduced to support climate-resilient initiatives also protect against other adverse events, including pandemic disruption**

IFAD's ASPIRE project in Cambodia set up business clusters bringing together suppliers, producers, buyers and other stakeholders, together with an online platform to facilitate their exchanges. During lockdowns triggered by the COVID-19 pandemic, the platform enabled all involved in this food chain to maintain their transactions, insulating them against disruption caused by this external shock. Now, the

platform is expected to help attract young people into the food and farming sector, speeding development of the rural economy as well as building resilience against the effects of climate change.

Introduction

IFAD's Adaptation for Smallholder Agriculture Programme (ASAP) has made significant progress in Asia and the Pacific region. With a portfolio of projects totalling US$424.6 million in investments, including ASAP contributions of US$67 million, six diverse projects in six countries are helping more than 510,000 smallholder farmer households adapt to climate change.

Bangladesh	Haor Infrastructure and Livelihoods Improvement Project / Climate Adaptation and Livelihood Protection (HILIP/CALIP)	2012-2022
Bhutan	Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)	2015-2025
Cambodia	Agricultural Services Programme for Innovation, Resilience and Extension (ASPIRE)	2015-2022
Lao People's Democratic Republic	Smallholder Adaptation for Climate Change Component / Southern Laos Food and Nutrition Security and Market Linkages Programme (SACCC/FNML)	2013-2020
Nepal	Adaptation for Smallholders in Hilly Areas (ASHA)	2015-2022
Viet Nam	Adaptation to Climate Change in the Mekong Delta (AMD)	2014-2020

The projects, implementation teams and beneficiaries have developed diverse and effective approaches to addressing climate risks and impacts affecting various ecosystems and socio-economic systems in Asia and the Pacific region. Significant progress has been achieved. But climate-related challenges for smallholders are expected to worsen, so IFAD and its partners will need to continue and expand their interventions. Further, the global COVID-19 pandemic threatens to reverse many years of sustained reductions in poverty in the region.

Looking closely at five of the six projects Asia and the Pacific region, this report therefore aims to identify resilience-building innovations developed and lessons learned by analysing project case studies. Its aim is to highlight approaches and actions that can be scaled up within the region and beyond.

These innovations can inform and inspire all involved in building climate resilience in farming communities and will feed into ASAP+, the new phase of ASAP to expand activities related to smallholder adaptation and resilience building. ASAP+ aims to raise US$500 million to enhance the climate resilience of 10 million vulnerable people, particularly women and youth.

Climate risks and ecosystems in IFAD's regional portfolio

The patterns of climate-related hazards in Asia and the Pacific region are changing, and they are becoming more intense. This makes it harder to design adaptation measures. The climate trends and hazards that make ecosystems and communities vulnerable vary widely from one place to another.

The six ASAP projects in the region are being implemented in three distinct ecosystems: the Hindu Kush Himalaya, the Haor Basin and the Lower Mekong Basin. These areas are major hotspots for climate hazards in Asia and the Pacific region, in which economically vulnerable communities depend upon fragile ecosystems for their livelihoods.

According to the United Nations Economic and Social Commission for Asia and the Pacific Disaster Report 2021, climate, weather and geophysical hazards cost the region an estimated US$780 billion a year. The COVID-19 pandemic compounded these challenges. It found that climate change is slowing poverty reduction: the people hardest hit, it said, were those living in poor-quality accommodation on marginal land. The majority of the population in South and South East Asia are rural and depend on rainfed agriculture for their livelihoods. Climate resilience and adaptation for smallholder farmers is an urgent need.

Climate risks and impacts in the region are as diverse as its ecosystems. The Hindu Kush Himalaya is the source of Asia's largest rivers, enriching the lives of 2 billion people as a source of water, energy, and agricultural land. But its hill and mountain ecosystems are fragile, exposed to many climate hazards, and are inaccessible. Communities living in these areas are isolated, with limited physical and human resources. Climate change is accentuated at high altitudes, exacerbating vulnerabilities, and is already being felt through worsening floods, droughts, landslides and wildfires. Future projections indicate that precipitation and droughts will become more frequent and intense, increasing risks of flooding and other water-related hazards.

The Haor Basin in Bangladesh is a unique wetland ecosystem located in north-east part of the country, comprising many haors – shallow tectonic depressions in the shape of a bowl, similar to backswamps. It is the main drainage outlet for the Meghalaya mountain range in India and is inundated by up to 8 meters of water for half of the year. Densely inhabited villages are built on artificial platforms of earth, which become islands during the monsoon. Livelihoods depend on fishing in the wet season and agriculture in the dry season, and contribute 16 per cent of national rice production. However, untimely flash floods have become a common occurrence, and earlier monsoons coincide with the rice-harvesting season. The early monsoon of 2017 flooded croplands and damaged 90 per cent of the crops, harming farmer livelihoods and national food security.

The Lower Mekong Basin is also experiencing more intense climate hazards, hitting food security in the region. The Mekong River is the 12th-longest river in the world, and the Lower Mekong is rich in biodiversity. But its climate and hydrology are changing fast. Across the Lower Mekong Basin, climate change is evident in rising temperatures, changing rainfall patterns, and rising sea levels and salinity in the delta. There are significant changes in vegetation cover, forests and biodiversity, particularly in the northern and mountainous areas of the region. Intensifying floods alternating with prolonged droughts have emerged as major hazards, exposing vulnerable communities to a high risk of disaster. The

persistent droughts of 2018-2019 reduced river flow, disrupted harvests, and prompted many Governments to mobilize post-disaster relief mechanisms to supply emergency food.

IFAD's ASAP projects have therefore been designed and developed based on a thorough understanding of local conditions, diverse ecosystems and climate risk analysis of each project area that assesses both the historical and the projected climate trends, to enhance livelihoods and build the resilience of both ecosystem and communities. The case studies highlight innovative climate-resilient approaches and activities within the ASAP portfolio in Asia and the Pacific region, and show how they successfully address the adaptation needs of smallholders in diverse social economic and ecological situations. Though the geographical situations are particular to the region, many of the lessons from the design and implementation of the projects are relevant elsewhere. The projects are developed in close collaboration and consultation with poor rural people, to help them thrive despite climate change. As the twenty-first century enters its third decade, that is a challenge in rural areas everywhere.

The projects

HILIP/CALIP, Bangladesh

Introducing integrated flood risk reduction in the Haor Basin

Combining flood protection infrastructure with an early warning system to build climate-resilient communities and ecosystems

Bangladesh is among the countries that are most vulnerable to the effects of climate change. The Haor Basin, a wetland ecosystem in the north-east of Bangladesh, is especially vulnerable. The basin is a rainfall catchment area surrounded by the eastern Himalayan mountain range, and experiences one of the highest precipitation rates in the world, fuelled by the South Asian summer monsoon. Between May and November, seasonal flooding turns villages into islands, and many are accessible only by boat. But with climate change, these monsoon rains are projected to increase significantly and become more erratic, leading to flash floods and unseasonal flooding.

In addition, large-scale deforestation across this region has stripped away natural barriers that historically dampened wave action during the flood period. Combined with rising water surface temperatures and consequent increases in wind velocity, wave action is expected to become more intense, affecting the densely populated villages that are home to around 20 million people, many of them ultra-poor.

Primary livelihood activities in the Haor Basin include farming and fisheries, enabled by the alternating wet and dry conditions that characterize the region. But the increasingly frequent flash floods, whose timing is unpredictable, can cause farmers in the region to suffer catastrophic harvest and livestock losses and significant damage to assets. In some years, up to 90 per cent of the crops have been destroyed by extreme weather events. This has national consequences, because the region provides 16 per cent of rice produced by the Boro system in Bangladesh.

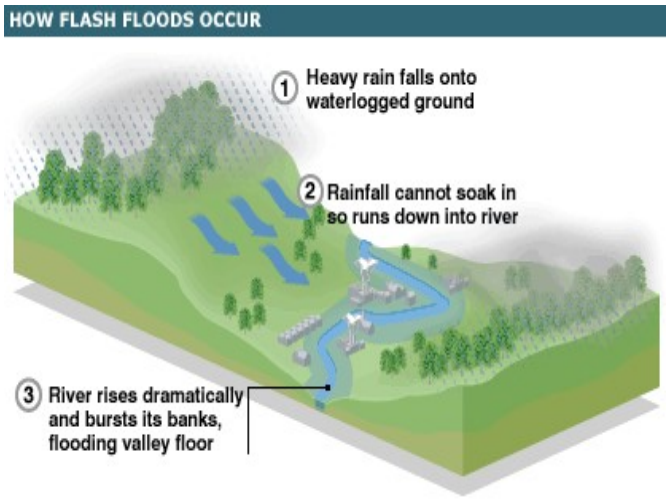

Figure 1: How flash floods occur

The goal of the Haor Infrastructure and Livelihoods Improvement Project/Climate Adaptation and Livelihood Protection (HILIP/CALIP) is to enhance livelihood opportunities in the Haor Basin and make poor people less vulnerable by increasing their resilience. Implemented in five target districts, it aims to improve transport links, reduce output losses and enhance protection against extreme weather events, while teaching participants how to become more resilient.

Project approach

The HILIP/CALIP project embraces multiple climate adaptation initiatives. A Flash Flood Early Warning System (FFEWS) has been developed to predict pre-monsoon flash floods. This aims to enhance risk management and resilience, especially in reducing crop losses, particularly for Boro rice, which has an especially seasonal cultivation cycle and which is an important crop in the basin. The FFEWS forecasts the weather, predicts its hydrological and hydraulic consequences, and generates and disseminates early warnings.

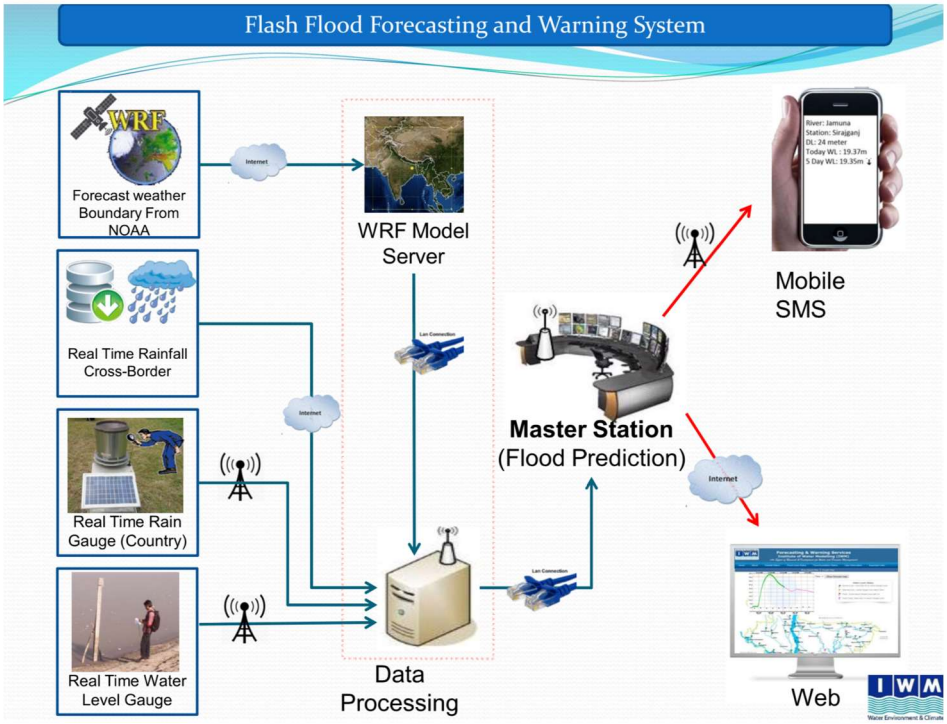

Figure 2: Flash flood forecasting and warning system

Data collected at 25 upstream stations is processed by a hydrological model, and the results fed into a forecasting model which produces accurate forecasts of water levels for the next ten days. The early warnings have proved highly useful for farmers, who now have time to organise labour to harvesting crops and transport them to safety, move cattle and protect other assets – reducing their flood losses significantly.

Flood warnings are sent out in two ways. Using the first, the Bangladesh Water Development Board (BWDB) continues to alert district administrators, its own staff and agricultural officers, who in turn alert farming communities. Now, simultaneously, alerts are sent via a mobile phone-based App developed by BWDB that can be downloaded by anyone with a smartphone.

The flood warning system complements climate-resilient infrastructure built to protect villages, roads and markets against damaging wave action. Locally available materials are used so that this infrastructure can easily be extended and repaired by the community. This infrastructure is backed by bio-engineering: vetiver grass is planted to stabilize slopes and reduce erosion and sediment runoff. Meantime, reforestation recreates natural wave barriers.

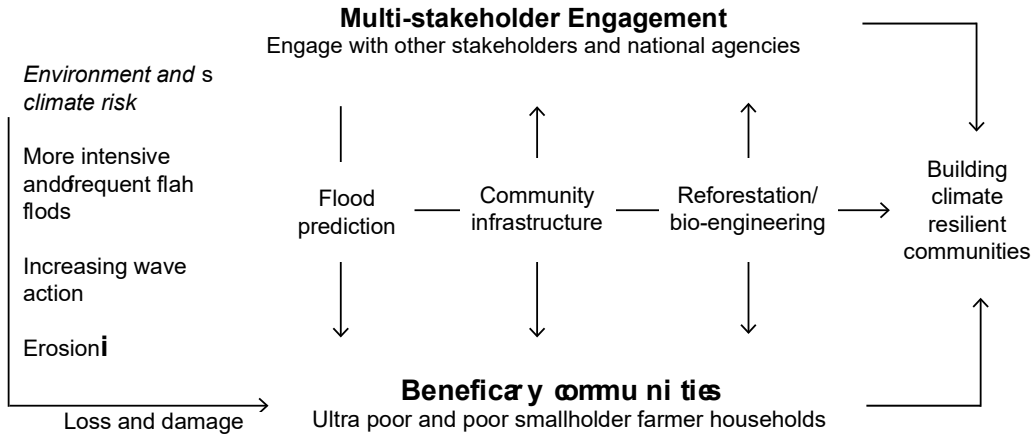

Figure 3: HILIP/CALIP multi-stakeholder engagement

Outcomes

The project has benefited over 344,000 households through its interventions, more than half of them being women. More than 180,000 poor smallholder households have been trained to adapt to the effects of climate change. Under the livelihood protection component, the project has provided vocational training to 8,701 people. Moreover, the project has formed 434 community water resource user groups. Their 11,316 members manage the beels (swamp lakes) to increase fish production and biodiversity. Infrastructure to protect against flash floods and wave action has been built in 140 villages.

As a result of the project's participatory rural appraisal and pro-poor targeting strategy, beneficiaries have been closely involved and highly committed. Vocational training was specifically targeted at young people. Together, these factors have broadened the project's transformative impact.

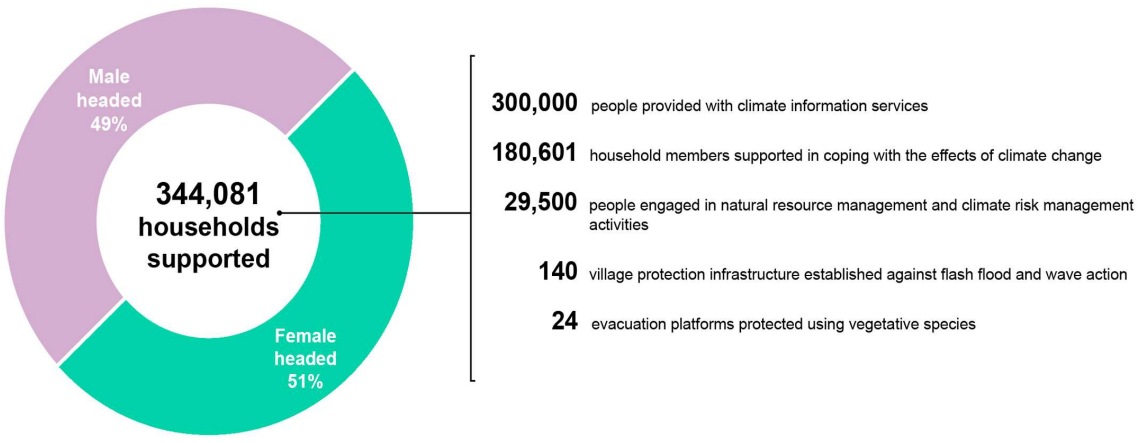

Figure 4: HILIP/CALIP targeted households

Stories from the field

Climate service and improved infrastructure building resilience in Haor communities

"Life in the Haor regions has always been unpredictable. My village was unprotected and exposed to waves and water"

Anjuli,
Duck farmer from Haor

Anjuli Rani Das, 50, and her family live in the Haor region in the north-east of Bangladesh – an area marked by seasonal flooding and, in recent years, increasingly frequent flash floods that threaten the lives, produce and assets of the region's inhabitants. Memories of a devastating flash flood in 2017 are still fresh in Anjuli's mind. Then, 90 per cent of the Boro rice harvest is estimated to have been destroyed, and 1.3 million livestock and 3.2 million ducks and poultry were washed away along with over 200 tonnes of farmed fish.

Like many other villagers, Anjuli earned a living rearing ducks. All she had worked for during many years disappeared in a day as the sudden flood swept away most of her farm and stock. Her husband, an agricultural wage labourer, lost his work during what would have been the harvest season: there was nothing left to be harvested.

"Life in the Haor region has always been unpredictable," Anjuli says. "I grew up watching houses being washed away each year. My village was unprotected and exposed to waves and water." Villagers battled in vain. "Every year, we collected money to try to protect the villages. Obviously, everyone wants to contribute, but with few income opportunities during the monsoon season, these donations are a financial burden for most families." Every year the Haor region remains inundated during the monsoon season and unemployment surges as transport is disrupted, hampering trade and the sale of farm products.

The HILIP/CALIP project helps the region's inhabitants to adapt better to climate change and builds resilience. People in Anjuli's village are now warned about increased risk of flash floods a week in advance. This gives them time to protect their assets from floods. "We set aside crops for our own consumption and sell the fish, even though they have not yet reached full size. Otherwise, it is hard for us to survive." Better roads now enable Anjuli's children to attend school safely all year. People can move easily from village to village, and homes suffer less damage during the flooding season.

Smallholders such as Anjuli and her family remain exposed to extreme weather events, which are expected to intensify with climatic changes. But with better year-round access to services, and better information and protection, Anjuli and others can adapt, protecting their investments, livelihoods and families.

Lessons and opportunities

Work closely with stakeholders to identify the best policies and share knowledge of the project and its benefits. The flash flood early warning system (FFEWS) under the HILIP/CALIP project was developed and run in collaboration with four national agencies: the Institute of Water and Flood Management/Bangladesh University of Engineering and Technology, the Institute of Water Modelling, the Meteorological Department and the Bangladesh Water Development Board (BWDB). As a result of the partnership, BWDB is set to adopt the FFEWS forecasting models that have been developed more widely to provide warnings in other Haor areas. Further collaboration with BWDB is planned to ensure the quality of warnings is continuously improved, and that they are sent in Bengali to smallholder farmers and other residents of the Haor area. Workshops about the early warning system spread awareness and aid adoption of climate adaptation initiatives. Best practice is documented to aid decision-making and policy formulation.

Sharing data is the key to producing accurate information. Making data available across the region proved essential to collecting enough accurate data to produce accurate forecasts of flash floods. Automatic measuring systems can be added to improve forecasts. Regional collaboration is vital, since rivers cross borders.

Projects provide valuable data for academic research. The project's FFEWS research and application components proved a valuable source of data for academic research – and may now be included in undergraduate courses. This would encourage wider use of the models in institutions and policy formulation.

Involving beneficiaries helps in reaching the poorest and most vulnerable. To encourage sustainable and inclusive rural transformation, it is vital to create a sense of ownership among beneficiaries. The project's targeting of beneficiaries presents a successful approach in reaching the most vulnerable in the region. A pro-poor adaptation pathways framework was drawn up, including gender factors, and this guided the selection of target *upazilas* (administrative region in Bangladesh). Focusing on the needs of the poorest households provided wider benefits, because upgraded rural infrastructure benefited everyone. The tie-up with government agencies that work to improve incomes helped ensure that the rural transformation continues even after the project has ended.

CARLEP, Bhutan

Creating climate-smart mountain villages

Developing community-wide climate-resilient agricultural production systems

Climate risks and impacts in Bhutan vary widely. Topography is highly variable, exposing rural communities to differing intensities and timings of climate hazards including floods, droughts, landslides, windstorms, forest fires and waves of cold. Vulnerability is compounded by the uneven distribution of physical, human and financial assets between and within communities. Landholdings within the same community reportedly range from 0.14 hectares to 12.1 hectares. Some villages or households are therefore more or differently vulnerable to climate risk than others, making it more difficult to plan and implement adaptation measures.

To foster resilience that takes into account each household's adaptation needs, CARLEP therefore adopts an innovative climate-smart village (CSV) approach. By involving farmers in its conception and design, this seeks to equip an entire community with climate-smart agriculture (CSA) practices and technologies.

Project approach

Developing a climate-smart village begins by getting local people involved in assessing vulnerabilities and planning adaptation measures. This involves ranking household wellbeing, mapping community resources, ranking hazards, assessing seasonal factors, identifying stakeholders, and prioritizing adaptation interventions. Critical scientific knowledge and information, such as localized climate projections, maps, CSA innovations, and market analysis are shared with communities to form the basis for evidence-based decision-making. The participation of beneficiaries, including women and youth, is vital to ensure the project benefits from local knowledge, and that each CSV plan is tailored to traditional practices and farming systems, and particular village resources and resilience building needs.

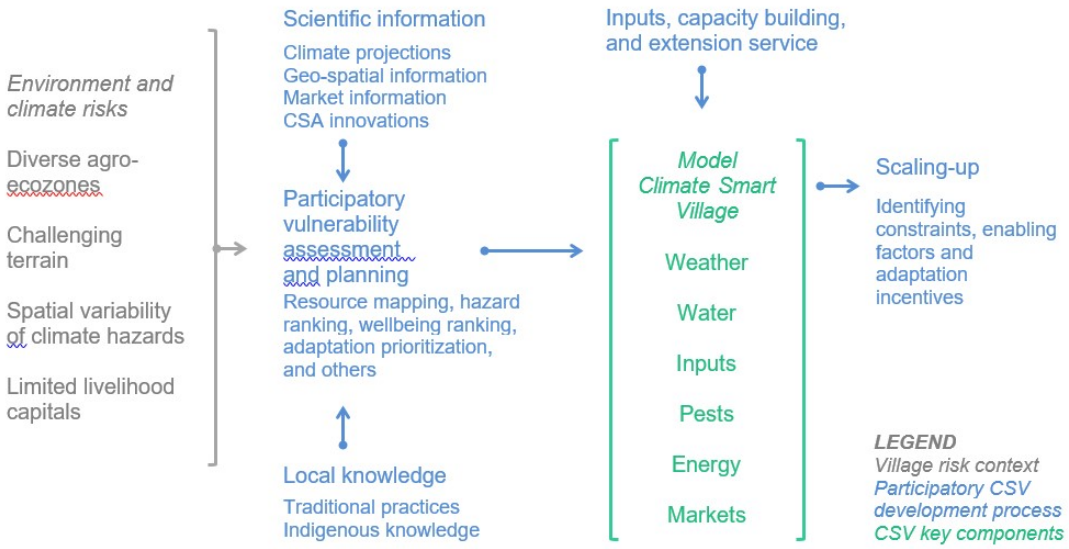

Figure 5: Developing a climate-smart village representation

Working together, projected beneficiaries and project designers select integrated CSA practices and technologies that best suit the local context. Six key areas for adaptation measures are identified so that the full range of climate impacts on smallholder farmer communities are addressed, making the entire village"climate-smart".

These are:

- Weather: adoption of weather-informed cropping and harvesting practices
- Water: adoption of indigenous and improved heat-tolerant crops (upland maize, rice), mulching and cover crops (groundnut, soybeans), water-efficient irrigation systems (drip), spring water irrigation, and rainwater harvesting ponds
- Nutrients: adoption of integrated nutrient management, including organic compost, biochar, bio-slurry, and efficient fertilizer application
- Pests: integrated pest management is introduced, including bio-pesticides and soil solarization
- Energy: alternative and renewable energy technologies are proposed, including biogas, solar irrigation pumps, greenhouse solar dryers
- Markets: adoption of market driven farm production diversification (honey, fruits, spices, quinoa, buckwheat, mushroom)

Beneficiaries are supported through supply of inputs, capacity-building and extension services for the adoption of various CSA practices and technologies. Beneficiaries' experiences with the adaptation measures are closely monitored and assessed so that any unexpected constraints are addressed, mechanisms for scaling up CSA practices can be developed, and incentives proposed.

Outcomes

CSV projects were initially piloted in six villages nominated by each district as being the most vulnerable. This helped generate evidence of effectiveness for the adoption of various CSA technologies across different agroecological zones and in varying socio-economic contexts. Drawing upon lessons from the pilot models, CSVs actions have been scaled up to 12 villages, directly benefiting a total of 321 households.

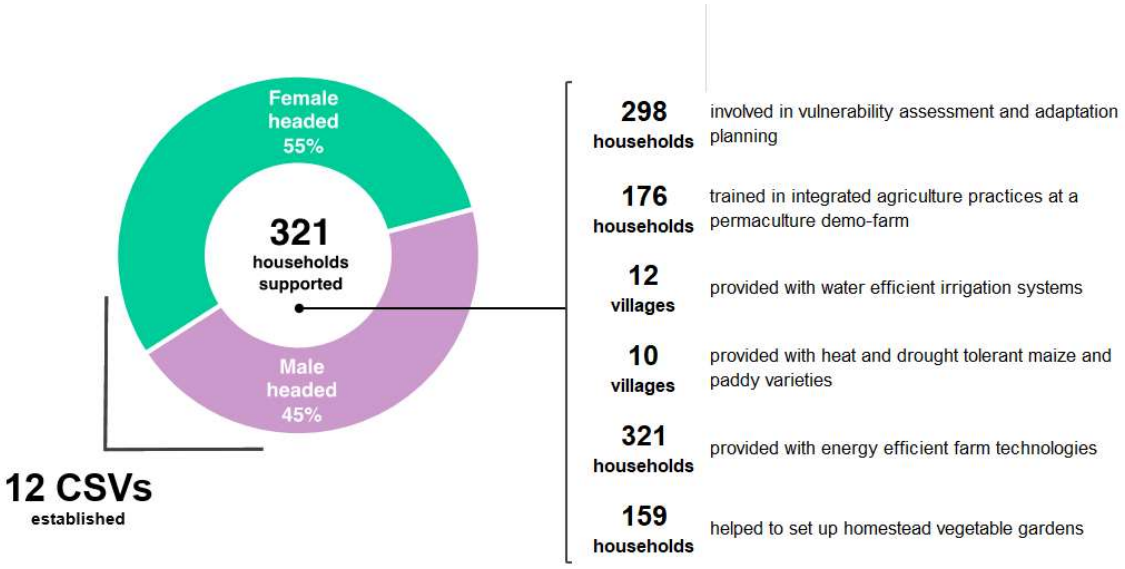

Figure 6: CARLEP targeted households

Stories from the field

Biogas is a double win for dairy farmers

"In the beginning, I thought biogas would be difficult and laborious to manage. But now, I see it is simple and has made life much easier."

Kuenzang, Ngarpongtang Village

"Since we no longer have to spend time collecting firewood we can focus on growing vegetables, processing cheese and butter, and many other things," says Tshering, describing how the adoption of biogas for cooking has enabled him to invest more time in improving returns from farming.

As a dairy farmer in Ngarpongtang, a model climate-smart village (CSV) in Bhutan's Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP), Tshering received help to install a biogas plant. CARLEP's CSV is an innovative programme to equip an entire community or village with climate-smart agriculture (CSA) practices and technologies to foster inclusive resilience against shocks and sustainable rural development.

Because Ngarpongtang is close to a consumer market, biogas emerged as a particularly effective technology for dairy farmers. While providing clean energy for cooking from abundant livestock waste, biogas plants also create bio-slurry that can underpin production of vegetables for sale in the local market. Tshering says the use of bio-slurry in his home garden has enabled him to nearly double his vegetable production. “In addition to having nutritious and healthy vegetables for my family, I am really glad to have surplus vegetables for selling in the local market. I sold more than 25kg of vegetables and earned Nu 2,000 (US$27) from my first harvest,” says Tshering.

Tshering’s neighbour, Kuenzang, also received support through CARLEP to adopt biogas, and has had a similar experience. “We had to travel almost four hours to refill our cooking gas cylinders. Adding to that the cost of refill and transportation, we spent around Nu 1,500 (US$20) each time!” she says. Using biogas for cooking enables Kuenzang and her family to invest the time and money saved in increasing their vegetable and dairy production, earning up to Nu 5,000 (US$68) each month from the sale of vegetables and dairy products. Kuenzang and her children also benefit from cleaner air and a safer environment.

Following the successful introduction of biogas in the CSVs, CARLEP is now working with the Bhutan Biogas Programme to install 1,400 biogas units in six eastern districts.

“In the beginning, I thought Biogas would be difficult and laborious to manage,” says Kuenzang. “But now I see it is simple and has made life much easier. I have recommended all my friends to embrace it.”

Transforming rural livelihoods through spring water irrigation

“With irrigation, I have plans to cultivate a variety of vegetables in my kitchen garden, and I also want to establish an orchard to diversify my income sources”

Chungku, Ngarpongtang Village

An acute shortage of water for both drinking and irrigation has long been a major constraint upon livelihoods in Ngarpongtang Village. “We barely get 41 days of rainfall every year,” says Lhuendup, the village leader.

“We were unable to produce vegetables for ourselves in the village, so we had to travel to other villages to exchange pine wood for vegetables,” adds Wangdi, a local farmer.

However, after the construction of a spring water community irrigation system under the Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP), livelihoods in Ngarpongtang have been transformed. As part of CARLEP's climate-smart village (CSV) approach for building the resilience of an entire community, the irrigation system was designed and constructed with community participation and labour, and provides equitable access to all households. Designed as a closed system to ensure water efficiency, the community water storage tank is linked to sprinklers using high quality underground pipes.

The improved availability of water has enabled community members to establish kitchen gardens and grow vegetables for the first time, producing a surplus for sale in the local market. With ample water for drinking and irrigation, farmers are now planning to expand their cultivation area and diversify into commercial fruit and vegetables to improve their earnings.

"Together, we harvested a surplus of about 0.825 MT of vegetables the first time, and earned Nu 7,000 (US$96)," says Chungku, another local farmer. "With irrigation, I have plans to grow various vegetables in my kitchen garden, and I also want to establish an orchard to diversify my income sources."

Lessons and opportunities

CSVs are platforms for identifying adaptation opportunities in diverse situations. The participation of beneficiary households has been critical in aligning CSA measures to local needs, knowledge and practices, particularly for women and youth. It has helped identify important constraints, enabling factors for the successful adoption of CSA technologies such as adaptation finance, land access and trust, helpful incentives, and mechanisms for scaling up successful ideas. The small size of Bhutanese rural communities allows all members to be included in a CSV, and facilitates monitoring their adaptation experiences. This makes it easier to identify the adaptation incentives needed in the different situations of those within a community – lessons that can be used to strengthen support for large-scale replication.

Improving access to land for young people. The distribution of assets, particularly land, within rural communities is highly uneven. This severely limits the ability of some smallholders to take advantage of available livelihood opportunities. But project reports also note a significant area of fallow land in rural communities, explained by a shortage of farm labour. The project is therefore currently developing a large-scale strategy for identifying and allocating fallow land to enterprising youth farmer groups under secure leasing agreements. This solution arose from CARLEP's dairy value chain intensification activities, which sponsored a youth group was supported to take over 2.83 hectares of fallow public land to establish a commercial dairy farm in 2017, providing financial and technical support. Today the youth group produces 1,080 litres of milk a month, and provides collection and marketing services to nearby dairy groups, helping other farmer groups earn on average Nu 46,680 (US$640) every month.

Building trust in climate-smart village innovations through farmer-to-farmer knowledge sharing. Smallholders' lack of exposure to new technologies, combined with uncertainty about future income, can create some resistance to CSA innovations. This has been particularly true for renewable energy technologies such as biogas. But once they see the success of early adopters, people understand better the potential of CSA options for building climate resilience and enhancing productivity and incomes. Farmer-to-farmer information sharing is especially effective in building trust. This has accelerated CSA adoption even in neighbouring villages, highlighting opportunities for farmer-to-farmer knowledge exchange through demonstration farms, exposure visits and farmer field schools. After introducing biogas integrated

with livestock and vegetable farming in the CSVs, CARLEP is now working with the Bhutan Biogas Programme to install 1,400 biogas units.

Using lead farmers in mountain communities where public extension services are not available. The successful introduction of CSA innovations and technologies requires consistent extension support to rural smallholders. But Bhutan's rugged mountain terrain often makes it hard to access public extension services. In response, the project has introduced a lead farmer extension model, whereby progressive farmers within the village provide sustained access to farm inputs and technical guidance to their neighbours. The project has trained 128 lead farmers and community animal health workers, who have proven effective in extending the outreach of extension and advisory services. Lead farmers who sell farm inputs proved especially well-informed and effective in providing extension services.

In mountain micro-climates, local weather stations are necessary to improve forecasting. Inaccurate weather forecasts have proven the weakest element of climate-information services in CSVs, preventing the timely anticipation of important climate events and hazards. Local climate data is critical to achieving a weather-smart CSV in mountain ecosystems. All communities are therefore setting up weather stations in 2021. These will be linked to the national weather-forecasting system for farmer bulletins and early warnings.

ASPIRE, Cambodia

Extending climate-resilient practices through the private sector

Linking smallholder agribusinesses to private input suppliers to promote demand-driven adoption of climate-resilient technologies and technical guidance

Trade liberalization and greatly improved transport systems have linked Cambodian farmers to regional as well as international markets, creating significant potential for growth in agriculture. However, Cambodia has been experiencing an increasing number of extreme climate events in recent decades, such as floods, storms and droughts, resulting in frequent losses in productivity and quality, and discouraging farm investment. Smallholders face significant constraints to adaptation. They have limited understanding of and access to climate-resilient agriculture techniques and technologies. But the public agriculture extension system has very limited resources and lacks outreach and the technical skills to help smallholder farmers adapt and meet market demand.

To help smallholders establish agribusinesses that are both profitable and climate-resilient, ASPIRE has developed an effective model of agriculture extension that moves away from a centralized system to a demand-driven approach, using the private sector to deliver services.

Project approach

While giving the public extension system the ability to address climate risks and impacts, ASPIRE also facilitates climate-resilient agriculture extension through the private sector. Guided by climate-sensitive policies, the public sector retains the key role of regulating extension services and empowers private agricultural input suppliers to provide smallholders with the technology, knowledge and skills they seek.

To facilitate links between farmers and the private sector, the programme aids the formation of business clusters comprising smallholder farmers, input suppliers, produce buyers and government representatives. The clusters act as multi-stakeholder platforms to discuss key issues and jointly develop actions plans. Climate adaptation is a major priority to achieve both the quality and the quantity of crops to meet market demand, while also ensuring profitability. The action plans enable smallholders to acquire adaptation technologies and extension support from input suppliers, while buyers provide the market access farmers need to ensure a profitable return on adaptation investments.

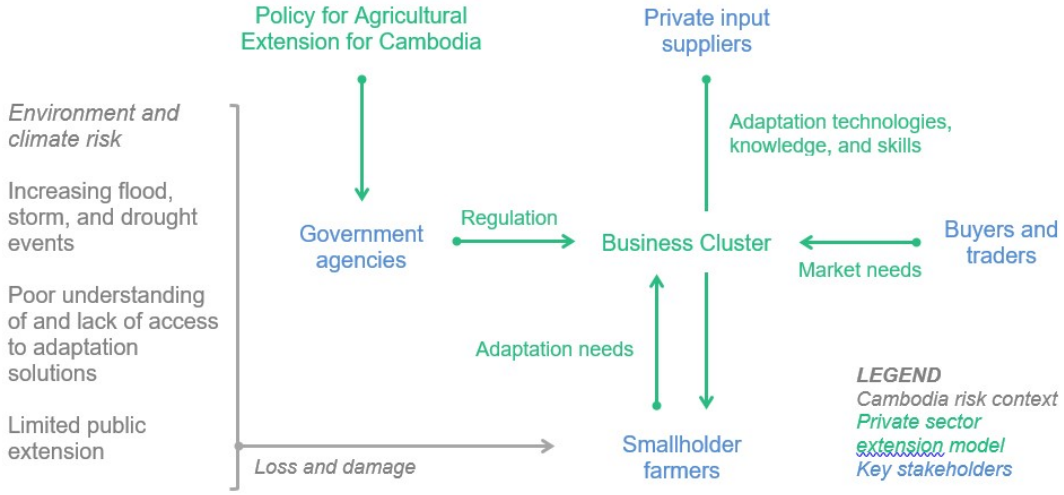

Figure 7: ASPIRE formation of business clusters process

Outcomes

At least 122,000 households with around 244,000 members have been supported through the programme, including 146,000 women. The programme has been successful in promoting women leaders: 1,880 decision-making roles in 1,920 business clusters are filled by women. Private sector input suppliers have emerged as a highly-effective instrument for extension, providing the climate-resilient technologies farmers seek along with the technical guidance required for effective application. At least 32,723 households say they have adopted climate-resilient technologies and practices promoted by the programme. The value of farm production has risen 16 per cent while that of household assets has surged by 30 per cent.

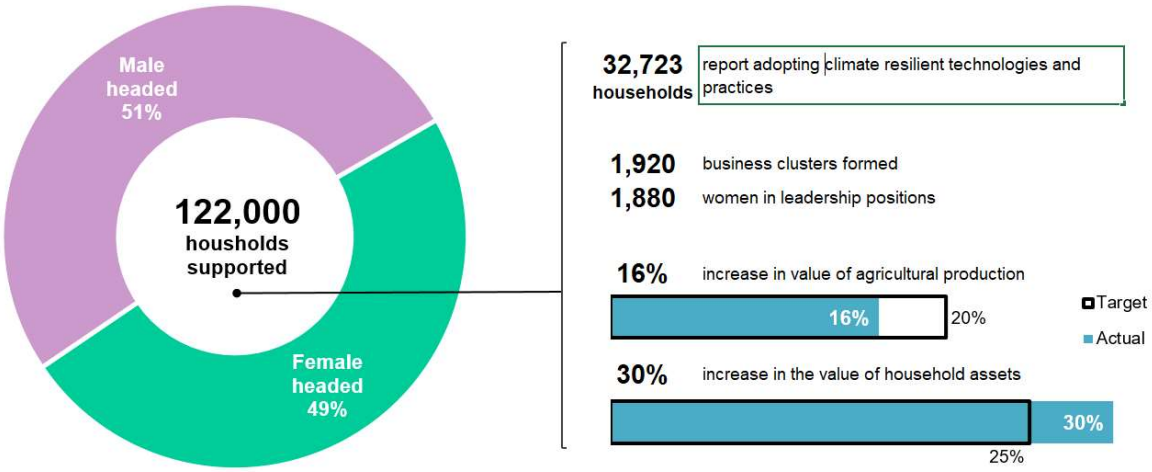

Figure 8: ASPIRE targeted households

Stories from the field

Helping smallholder families develop climate resilience and conquer new markets

"We have grown from having just a bicycle to having new motorbikes, expanding our lands, and even building a bigger house!"

Sokha Lang, Chreng Village

A resident of Chreng Village in Kandiend District, 24-year-old Sokha Lang has been growing vegetables and rice on her family's farm since she was a girl. "I grew up farming vegetables. I learned to grow vegetables from my parents, and this is my main occupation," says Sokha.

But she also remembers the limitations of traditional practices, and how tough their lives were. "We could only plant rice once a year. With low yields, farming was not very profitable. We could barely make ends meet," she says.

Today, however, Sokha and her family run a lucrative vegetable agribusiness. On just 0.15 hectares, they grow a variety of vegetables that are in demand in the local market at different seasons, including cucumbers, cauliflower, salad greens, bitter gourds and winter melons. During the three-month cucumber season they produce up to a tonne of cucumbers earning around KHR 3 million (US$750).

This transformation has come through the support of the Agricultural Services Programme for Innovation, Resilience and Extension (ASPIRE). Improved extension services have shown Sokha how to adopt climate-resilient farming practices, including sustainable land management, use of organic pesticide and compost, and how to manage water better.

In addition, Sokha and other smallholders have been organized into business clusters that also comprise local input suppliers and produce buyers. The business clusters plan action on key issues such as collective storage, marketing and climate adaptation. Sokha is among 40 members of the vegetable business cluster

in the Chreng Village. This has enabled her to obtain technologies such as water sprinklers and agriculture nets from input suppliers, along with technical guidance to use them effectively.

“Farming technologies and selling practices have changed dramatically,”says Sokha. Poor quality used to result in poor prices. But by applying new technologies and approaches to production and marketing, Sokha and her family increased both the quantity and the quality of their yields. Benefiting from links with buyers in the business cluster, Sokha now sells regularly to wholesalers and retailers in local markets, contributing to high profits.

“Before receiving support from ASPIRE, my family’s living condition was basic,”she says. “Today, we have grown from having just a bicycle to having new motorbikes, expanding our lands and even building a bigger house!”

Tackling climate impacts through water-efficient technologies

“I am very grateful for the opportunity to learn new production techniques and technologies that have helped to increase my production and income.”

Chy Pisit,
Kampong Chhlang Village

Chy Pisit is a 25-year-old vegetable farmer from Kampong Chhlang Village in Sangkae District. “Extreme weather and late monsoon rains used to affect my production a lot. I didn’t know how to deal with the changing climate, and it really affected my family income,” says Chy. Water management, pests and monsoon land preparation were among his biggest problems, and his output was falling sharply. As the head of the household taking care of eight siblings, he was worried.

However, through training sessions on climate-resilient agriculture technologies organized by ASPIRE, he has learned how to run a profitable agribusiness. Chy is among 3,228 farmers in his district who learned climate-resilient ways of preparing their land, conserving water and growing vegetables.

“I learned how to build and manage drip irrigation systems, how to prepare land during the rainy season, seed selection, integrated pest management, and efficient fertilizer application,” Says Chy. Through input suppliers in his business cluster, Chy was able to acquire drip irrigation systems and extension support, and has been impressed by their effectiveness. According to Chy, this has saved him considerable time and water, and reduced his dependence on rainwater. He has also improved his yields.

"The new production technologies are really simple to use," he says.

Chy has invested the saved time in diversifying his farm output. He grows cucumbers, long beans, corn, pumpkins and bitter gourds, as well as traditional crops. Producing more high value crops has enabled him to double his income.

"I am very grateful for the opportunity to learn new production techniques and technologies," he says. "I hope to learn even more to further improve our livelihoods."

Lessons and opportunities

Strong government commitment helps underpin climate-resilient and pro-poor policies. A key factor of success in enabling climate-resilient extension services through the private sector has been the integration of smallholder adaptation within the government's Policy on Agriculture Extension for Cambodia. Policy recommendations based on the innovations and lessons of ASPIRE have been reviewed and accepted by the government, and amendments are expected in 2021. The government and policymakers are clearly committed to reforming Cambodia's agriculture extension system to better serve the needs of smallholder farmers. Climate change adaptation priorities have been integrated into agriculture policies from the national to the commune levels, including into the Agricultural Sector Master Plan, Provincial Agriculture Sector Development Plans, and District Development Plans in project areas.

Business clusters can develop mutually beneficial relationships between smallholder farmers and the private sector. Initially, smallholders lacked trust in the private sector. But business clusters have emerged as highly effective multi-stakeholder platforms for ongoing discussion and networking between value chain stakeholders. Each member of the business cluster plays a role in balancing the quality, quantity and costs of production to meet the needs of both producers and buyers, aiding the development of mutually beneficial relationships between farmers and the private sector. Government regulation and supervision of business clusters gives farmers a sense of security. Private input suppliers are encouraged to provide smallholder farmers with the most relevant adaptation solutions for preventing losses and improving productivity and quality to meet market demands. Once established, the farmer-private sector relationships have become self-sustaining, even in the absence of programme support.

Resource-poor subsistence farms can be transformed into climate-resilient agribusinesses by integrating farming systems. Smallholder farmers in Cambodia are intrinsically resilient. They persevere with traditional farming practices to earn their living despite a severe lack of resources and extreme weather events. In order to overcome increasingly frequent and intense climate hazards, smallholders need support to change their strategies from simply "building back" to "building back better." Establishing integrated farming systems has proven highly effective in overcoming the constraint of small farm sizes. Integrated production of crops, livestock and forest products on the same land has helped farmers create diverse, productive and sustainable farming systems that provide higher incomes.

ICT-based extension and marketing have been vital during the COVID-19 pandemic. During the COVID-19 pandemic that began in early 2020, ICT innovations have proven immensely valuable, enabling communication that has kept the programme operational. The Chamka app developed by ASPIRE has operated as a mobile phone multi-stakeholder platform for exchanging information between the business cluster members. Designed for delivering technical services and as an online market platform, it enabled smallholders to obtain extension support and market their produce even during lockdowns. Recognizing this success, IFAD's Rural Poor Stimulus Facility has approved IFAD's Rapid Upscaling for Smallholder Households through Information Technology (RUSH-IT) project for implementation through the Chamka app. The project, implemented through ASPIRE, will provide production support grants support to poor households adversely affected by the pandemic.

Online diaries provide a trove of information and make it easier to monitor farm resilience. The ASPIRE monitoring and evaluation and management information systems integrate core IFAD and ASAP indicators to monitor progress in terms of outputs and outcomes, enabling resilience to be tracked through household assets. Farmers' diaries have also been a critical source of data for assessing farm performance to guide investment and adaptation decisions. Farmers' diaries are currently written on paper, making it hard to monitor them in a timely way. Now the programme is working to simplify and digitize farm-level data collection by transferring it to the Chamka app that farmers already use frequently. Making all this farm-level data on production and sales instantly available would greatly enhance monitoring of farm resilience and allow extension support to be refined.

The pandemic may make it easier to draw young migrant workers into agricultural business clusters. The programme has been very successful in targeting smallholder farmers, especially women, but has reached only 8 per cent of the 11,520 young farmers targeted. The pandemic caused many young migrant workers to return from Thailand. This provides an opportunity to engage them in business clusters and show them the many profitable and climate-resilient agribusinesses that are introducing modern production techniques and marketing practices.

ASHA, Nepal

Targeting the most vulnerable households

Using a robust gender equality and social inclusion (GESI) strategy and geographic information systems (GIS), combined with people on the ground, to plan and implement inclusive adaptation

Despite notable progress in recent decades, there are still significant inequalities between men and women, and different ethnic groups in rural Nepal. This renders poor female-headed and ethnic minority households more vulnerable to climate change than others. They often lack the resources, services and systems needed to adapt. Poor and vulnerable households often live in hazard prone areas that others avoid, exacerbating their climate risks. The drastic altitude variations in the Himalayas make climate hazards very local: households living close to a river may be exposed to floods, while others living closer to the hills may be exposed to landslides, giving rise to hotspots of climate risk.

ASHA's targeting approach is a conscious effort to extend project adaptation support to the most vulnerable households, including women, minority groups and people with disabilities, using technology and approaches designed to enhance inclusion in local adaptation planning.

Project approach

Nepal's national framework for the development of local adaptation plans for action (LAPAs) is highly participatory. ASHA takes this to the next level by integrating novel approaches for enhancing inclusion into both the LAPA preparation and implementation processes.

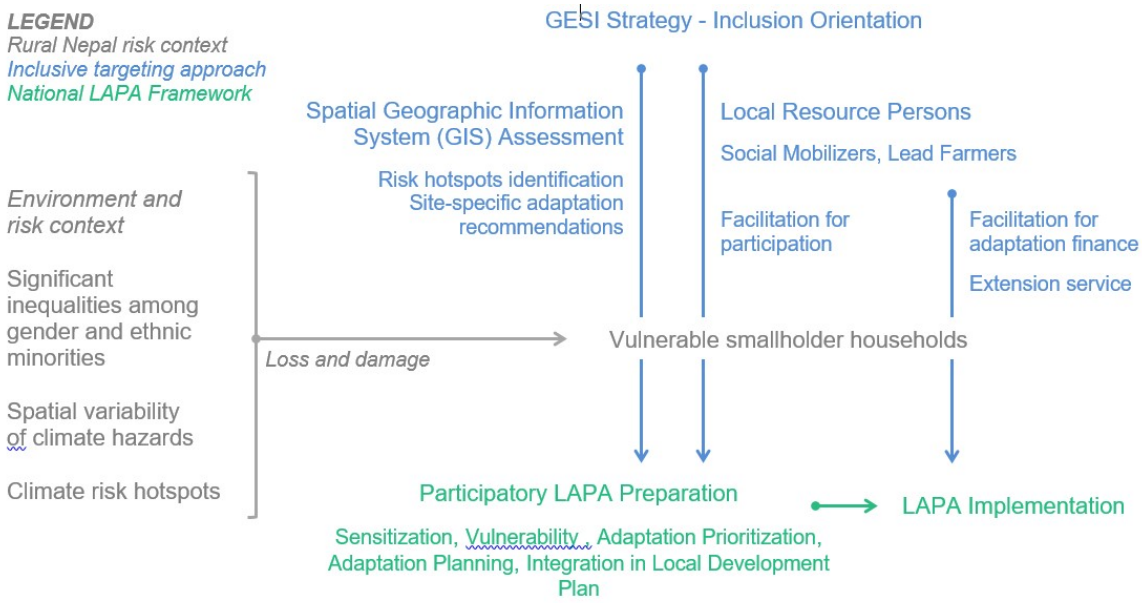

Figure 9: LAPA preparation and implementation processes

A strong GESI strategy: A robust gender equality and social inclusion (GESI) strategy is developed and integrated into each project activity. Project staff are trained and organized to ensure they facilitate inclusive adaptation planning and implementation. The most vulnerable households in the community, including women, minority groups and people with disabilities, are encouraged to participate in the LAPA preparation process, and are prioritized for adaptation financing.

Drawing upon spatial assessment: Remote sensing and geographic information system (GIS) tools are used to identify hotspots where climate hazards intersect with the most vulnerable households and ecosystems. Assessing biophysical conditions such as topography and land cover helps to pinpoint households and livelihood assets exposed to specific hazards, such as landslides and flooding. The project draws on this information to target resources and recommend site-specific adaptation measures such as land stabilization or flood protection.

Local resource persons lead: Field-level project teams, especially social mobilizers and lead farmers, play a significant role in facilitating the LAPA preparation and implementation processes. Women and people from ethnic minorities are often chosen as social mobilizers and lead farmers. This helps create an enabling environment for female-headed households and minority groups to voice their adaptation needs.

Supported by the spatial assessment and inclusion-oriented local resource persons, communities are given help to assess each household's vulnerability and decide which most urgently need help to adopt climate-resilient farming practices and better community infrastructure. The project helps the most vulnerable households access adaptation finance and provides advice about appropriate adaptation technologies, such as solar water pumps and improved cooking stoves, keeping gender issues in mind.

Outcomes

The success of ASHA's targeting approach is clearly reflected both in the gender, ethnic and vulnerability ranking of households participating in the LAPA preparation process, and in those benefiting from project adaptation financing. Of the 85,651 households given adaptation financing, 38 per cent are female-headed households, while 40 per cent belong to ethnic minority groups, including Dalits and Janajatis. ASHA has also benefited 501 people with disabilities. The selection of women and members of ethnic minority groups as social mobilizers and lead farmers has been vital to this success.

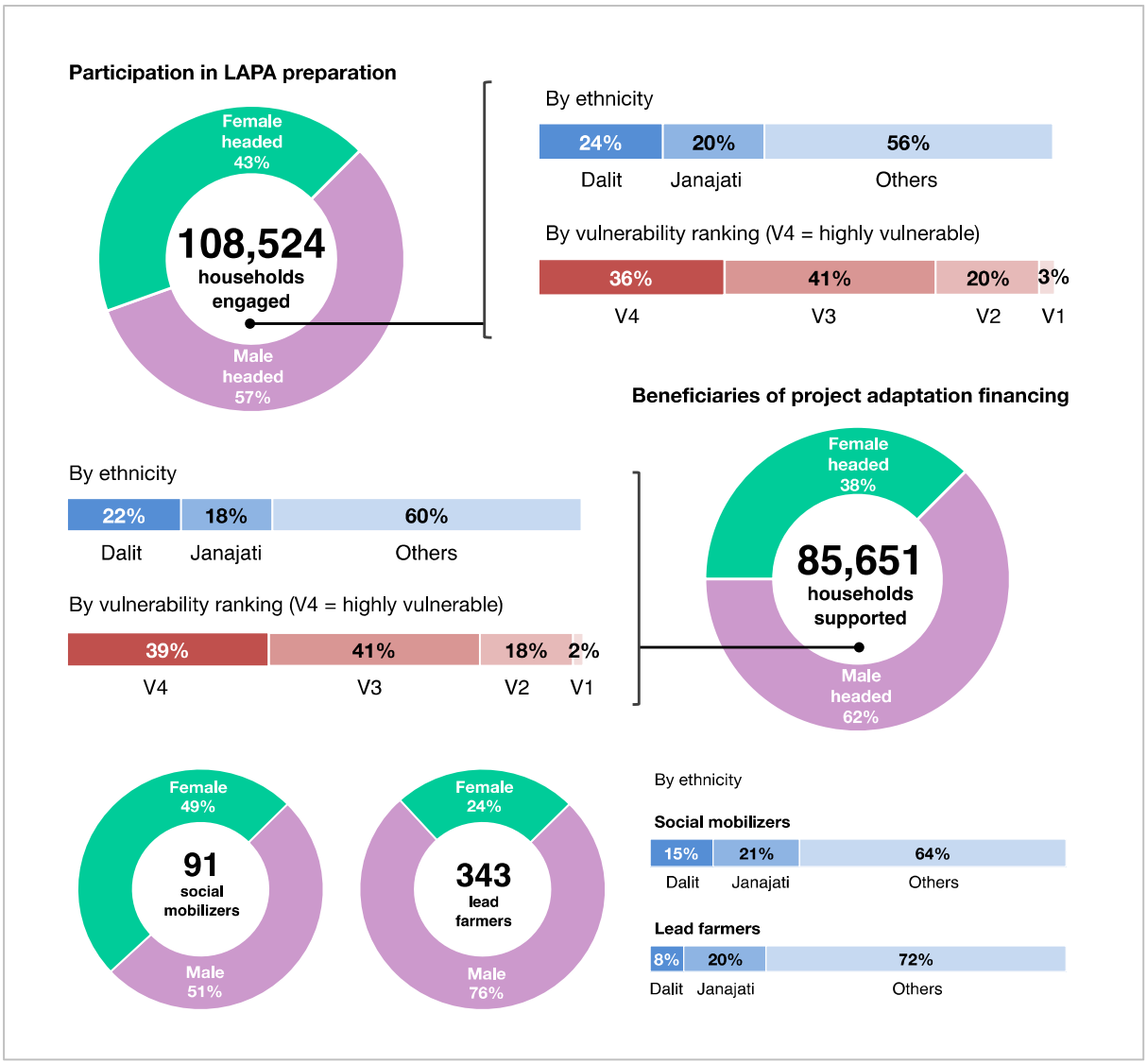

Figure 10: ASHA targeted households

Stories from the field

Empowering women to lead the fight against climate change

> **"I haven't done anything great. I just share the knowledge and skills that have helped me, thinking that what helps me might help others as well"**
>
> ***Pushpa Thapa, Barshina Village***

A resident of Barshina Village in Dailekh District, Pushpa Thapa has become a role model in her community and a catalyst for climate resilience. Pushpa's family and friends have seen her grow into a capable leader of community development and adaptation, influencing not just her own village members, but people in neighbouring villages as well.

"I haven't done anything great," says Pushpa. "I just share the knowledge and skills that have helped me, thinking that what helps me might help others as well." She credits the Adaptation for Smallholders in Hilly Areas (ASHA) Project for enhancing her capacity and dynamism: "ASHA has helped to bring a lot of good changes within us,she says.

Through ASHA's conscious effort to ensure resilience building is inclusive, Pushpa has been trained in leadership skills such as group management and public speaking, and adaptation measures such as integrated crop and livestock farming, and improved farm waste management. Since her first engagement with ASHA in the women's leadership training in 2015, she has come a long way.

As the chairperson of Deuti Bajhai Animal Husbandry Group, Pushpa has applied her new knowledge and skills to make her group pro-active, innovative and well-organized. The group has applied various climate-resilient farm practices, aided by technical support and inputs from ASHA. It meets each month to discuss savings and credit, and new adaptation opportunities and to share experiences. Pushpa considers this among her most valuable achievements.

However, Pushpa also influences the wider community. Now a skilled communicator, Pushpa stays in touch with the Dailekh project team government representatives and other local stakeholders in climate adaptation to learn about new livelihood and adaptation opportunities.

She believes strongly in sharing knowledge to achieve community progress. Laxmi Thapa, who lives in a neighbouring village, says: “Pushpa shares information not only with her group, but with us as well. Whenever we meet her, we learn about many different schemes and opportunities for improving our livelihoods.”

Ensuring opportunities for the disabled

“Disability does not mean ‘needy’ or ‘helpless.’ If given the opportunity, we can be equally independent and resilient”

Krishna Bahadur Buda,
Tarma Village

Krishna Bahadur Buda is blind. But he has not allowed this to prevent him from being a productive member of his community in Tarma Village, Salyan District. At 39 years of age, Krishna considers himself a social worker. He is the chairperson of Kalyankari Apanga Sewa Sang, a local group working to spread awareness in the community and support persons with disability.

Krishna and his wife also have a farm. “We are self-sufficient,” he says. “We grow our own rice, beans and vegetables. We even make our own oil. The only things I need to buy from the market are salt, clothes and medicine in times of need.”

But with two young children to care for, Krishna is aware of his family’s economic needs, and hopes to improve his household income. As a social worker, he does not have a regular salary. Depending solely on their farm, the family earns around NRs 14,500 each month (US$125). Because Krishna is unable to undertake some tasks, his wife does most of the farm work, and they sometimes need to hire extra labour, adding costs.

Krishna’s family, and many similar rural households that rely on subsistence farming, are highly vulnerable. A single disastrous event, including the COVID-19 pandemic, could push them into poverty. To reduce the vulnerability of rural communities, the Adaptation for Smallholders in Hilly Areas (ASHA) Project helps smallholders establish climate-resilient production systems and community infrastructure. Through ASHA’s conscious effort to aid the most vulnerable households, especially during the pandemic, ASHA helped

Krishna form the Majhagaun Fishery Group. To support farm diversification for improved climate resilience, the 17-strong group, chaired by Krishna, received a grant of NRs 100,000 (US$860) to construct a small fishpond in October 2020. They continue to receive technical guidance on developing an integrated, climate-resilient, livestock and fish farming system.

The group has now introduced fish spry to the pond and, Krishna expects group earnings of around NRs 80,000 (US$690) in the first year. Krishna, says this is just a first step. “We wanted to start small with the fish pond. Later, with the earnings, we plan to diversify into other commodities – maybe rearing chicken,” he says. “It is perfect for people with disabilities!”

He wants to engage many more people with disabilities. “There is tremendous potential in our villages to repair kitchen utensils, to repair televisions,” he says. “If we can just provide the training to people with disabilities to fulfil society’s demands, we can improve everyone’s livelihood.” He plans to work with ASHA to further improve the inclusion of people with disabilities by encouraging discussion, training, and a shift in perceptions.

“Our communities have still not been able to understand this,” he says. “Disability does not mean ‘needy’ or ‘helpless.’ Given the opportunity, we can be equally independent and resilient.”

Lessons and opportunities

Participatory planning is vital to leveraging local adaptation, cofinancing and sustainability. Participatory local development planning is a long-established and successful practice in Nepal, and is integrated into the national framework for LAPA development. Recognizing the need for participatory planning and targeting poor households, ASHA’s LAPA preparation process engaged smallholder farmers and other key stakeholders, ranging from local government executives and elected political representatives to police officers and schoolteachers. Involved in every step of the adaptation sensitization and planning process, the stakeholders took ownership of the LAPAs and have played a crucial role, directing the allocation of village funds for adaptation. Together, beneficiary households, community organizations and local government have contributed around Nrs. 307 million (US$2.64 million) for LAPA implementation.

Leaders from minority groups can help make a project more inclusive. Guided by a robust GESI strategy, ASHA has made significant efforts to take on local people from disadvantaged groups to support implementation, and this has been a crucial success factor. While more can be done to further improve the gender and ethnic composition of lead farmers (24 per cent female, 28 per cent ethnic minority), ASHA has achieved a creditable balance with social mobilizers (49 per cent female, 36 per cent ethnic minority). As a result, ASHA has made remarkable progress in promoting gender equality and women’s empowerment: women hold 56 per cent of the key decision-making positions within LAPA groups, and female-headed households are 38 per cent of project beneficiaries. ASHA’s targeting of people with disabilities is greatly appreciated by development stakeholders, and is the subject of an IFAD case study.

Mapping technologies can help Identify locations most at risk from climate change. Informed by ASHA’s GIS-based spatial approach to local adaptation planning, the national government made geo-spatial assessments a key instrument in its 2019 the update of the national LAPA framework, so as to enhance targeted adaptation support. As local governments in Nepal make LAPAs part of their development process, ASHA has been developing and sharing tools to spot where the biggest climate hazards are, and the households and assets exposed, helping wider adoption of these techniques. But much more can be done. Detailed and accurate socio-economic, biophysical and hydrological data is vital to optimize adaptation planning to local needs.

Making lead farmers private extension agents builds trust and enhances access to technical support. ASHA has trained and supported 350 lead farmers who have become community role models for CSA practices, and who have provided extension support to 19,160 farmers. Extension through lead farmers builds upon trusted local relationships to ensure consistent and accessible technical support for vulnerable households. Lead farmers are proving particularly effective in mitigating a scarcity of public services currently arising during a shift in powers from central government to federal states. Providing on-demand extension services harbours great potential. ASHA has facilitated the enrolling lead farmers to provide agricultural services in local municipalities. Now, policymakers are seeking to institutionalize their role as private extension agents within their communities.

AMD, Viet Nam

Scaling up adaptation innovations in the Mekong Delta

Adaptive research for scaling pro-poor climate-resilient farm innovations and models

The Mekong Delta is a major source of Vietnamese agricultural exports. But the area has been experiencing more frequent and intense droughts, causing saltwater intrusion, which substantially reduces harvests, cuts incomes and threatens food supplies. According to government reports, around 210,000 households lacked access to fresh water during the 2016 droughts. Droughts in 2019-2020 lasted for six months, and salinity intrusion reached record levels. Many crops and fisheries, including rice, fruit and shrimp, were seriously affected, and some completely destroyed.

Traditional farming practices are no longer suitable: farmers need to adapt

To help smallholders adapt to changing agroecological conditions, the Adaptation in the Mekong Delta (AMD) project has successfully set up a programme to research pro-poor climate-resilient farm innovations and develop models that can be readily replicated.

Project approach

The AMD focuses upon the problems peculiar to the Mekong Delta arising from its local conditions and the problems of droughts and salinity intrusion. The project tests the effectiveness of various agriculture innovations across saline, brackish and freshwater agroecological zones.

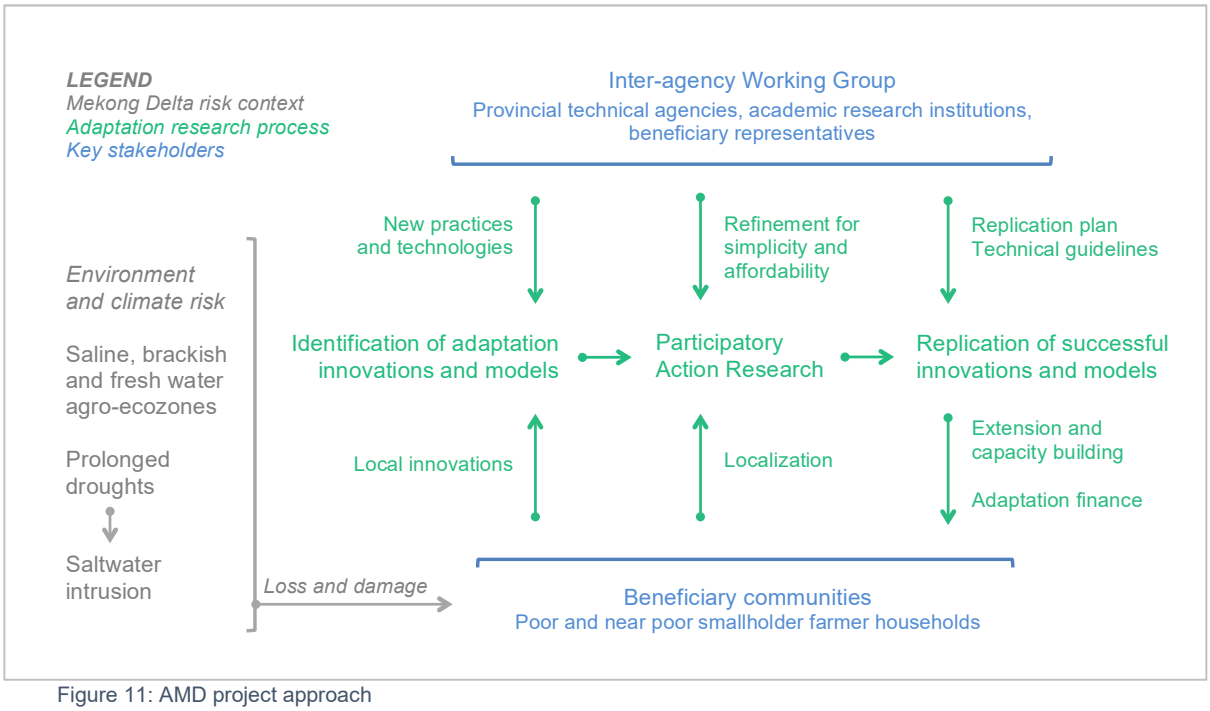

Figure 11: AMD project approach

The project works with provincial technical agencies, research institutions and universities, and beneficiary communities, to identify farming systems, practices and technologies that can help overcome the problems arising from climate change faced by Delta farmers. It focuses upon adaptation innovations developed by some local farmers, but also draws upon new climate-resilient technologies. Its participatory action research process engages poor and near-poor households, and tests localizes and simplifies effective innovations to make them affordable and suitable for large-scale adoption. The results are classified according to which agroecological zones they suit, and technical guidelines are developed for the innovations and models that are most effective.

A replication plan is then drawn up for smallholders to be trained and provided with extension support and adaptation financing to adopt recommended adaptation innovations and models. Details of the research and solutions, including technical guidelines, are published and shared widely with stakeholders and extension networks at district and commune levels so that they can be shared and copied within and beyond the project area.

Outcomes

With over 130 climate-resilient farm innovations and models tested and replicated by more than 52,192 households, the project has exceeded expectations. Within the project area, 21,262 households adopted recommended practices and technologies. Scaling up was extended to another 26,930 households outside the project area. The project's success is demonstrated by large-scale investment by beneficiaries, and the spontaneous adoption of recommended climate-resilient innovations and models by over 4,000 non-beneficiary households, who reported a 10 per cent increase in productivity and a 9 per cent income improvement.

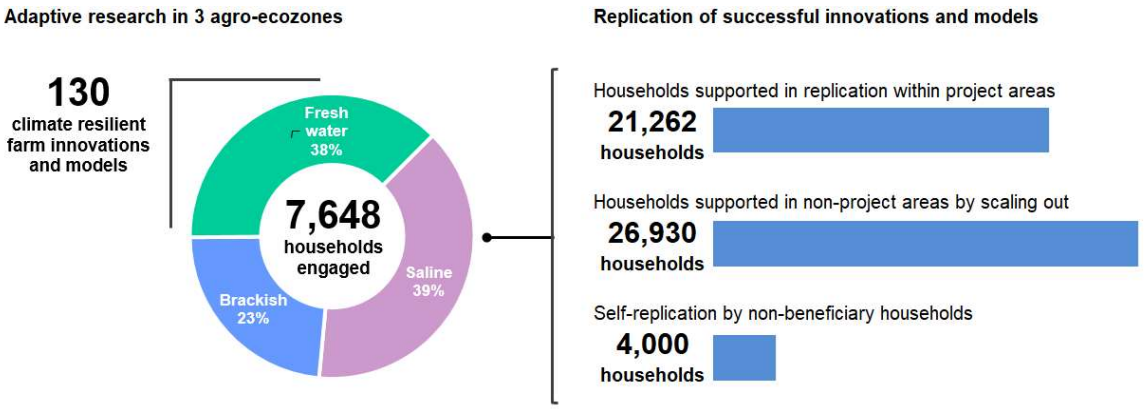

Figure 12: AMD targeted households classification

Stories from the field

Creating optimistic futures in times of climate uncertainties

"With the sprinkler irrigation system, I have saved a lot of time and labour – and the yield has also increased!"

Thach Thi Hong Tuoi, Hao Loi Commune

Thach Thi Hong Tuoi is a young farmer of Khmer descent living in Hao Loi Commune of Tra Vinh Province. Tuoi and her husband have 0.28 hectares of land where they used to cultivate rice and some vegetables.

In 2016, they were hard hit by drought and salinity intrusion. Government reports show that droughts and salinity intrusions have caused substantial loss of harvests and reduced income for more than 100,000 smallholder households, largely impacting rice, fruit and shrimp farms. "Even though we are in a freshwater region, we were badly affected by the salinity intrusion,says Tuoi. She lost around half of her rice crops.

Tuoi and her husband adapted by shifting their entire production to vegetables, ending rice cultivation. They began growing five different vegetables in rotation, and were able to earn around VND 6 million (US$260). But as their dependence on vegetable production increased, farm water management emerged as a significant challenge. Without irrigation, Tuoi and her husband were spending a lot of time and energy watering their crops, and were struggling to maintain productivity.

However, after setting up an irrigation system with support from the Adaptation to Climate Change in the Mekong Delta (AMD) Project, Tuoi has saved significant time and energy. By pooling her personal resources with VND 12 million (US$518) from AMD's Climate Change Adaptation Fund and VND 7.7 million (US$330) from AMD Women's Development Fund, Tuoi was able to build a sprinkler irrigation system covering more than 0.10 hectares. Sprinkler-irrigated vegetable cultivation is one of the climate-resilient farming models tested and recommended by AMD for smallholders. Besides adaptation financing, Tuoi received technical support and training in the effective use of sprinkler systems, and in climate-resilient vegetable farming practices that improve productivity.

"With the sprinkler irrigation system, I have saved a lot of time and labour – and the yield has also increased!" says Tuoi. She and her husband are now planning to buy more sprinkler nozzles to extend the irrigation system and double the area under vegetables. Despite the difficulties of recent years caused by recurring salinity intrusion, Tuoi is now optimistic about their farming future.

Big innovations from small farmers

"At first, people laughed at me. They said my idea was not going to take me anywhere. But slowly, I showed them the results"

Nguyen Van Them,
Thanh Thoi Commune

In early 2017, the Adaptation to Climate Changee in the Mekong Delta (AMD) Project began working with the farmers of Thanh Thoi Commune, in Ben Tre Province, to research a farming system that raised blue-clawed prawns in fields of salt-tolerant rice. This research was a part of AMD's larger adaptive research programme to verify pro-poor climate-resilient farm innovations that would help farmers overcome the recurrent droughts and salinity intrusions being experienced in the Mekong Delta.

To complement the prawn-rice model, smallholders in Thanh Thoi Commune received funds to raise earthworms as prawn feed. This inspired 70-year-old Nguyen Van Them to make his own innovative contribution – one that has benefited many poor households in his own commune, and beyond.

Nguyen used to raise cows, but struggled to make a good living. Making productive use of the livestock waste, Nguyen began growing earthworms in cattle manure to sell to farmers using the prawn-rice model. Reflecting upon AMD's research model, he had the idea of using the earthworms to raise frogs and prawns in his garden ditches.

"At first, people laughed at me. They said my idea was not going to take me anywhere," says Nguyen. says, "But I showed them the results." Despite the doubts of others, Nguyen was determined to improve his lot, and succeeded in creating an incredibly effective, climate-resilient, farming system. Using his self-devised model, he began selling frogs and prawns at the commune markets, commanding high prices because they were fresh. "Today, my family's income has increased significantly," says Nguyen.

His success spurred interest among other poor households in the commune, and a farmers group was formed, including Nguyen. With funding from AMD's Climate Change Adaptation Fund, which supports smallholder farmers to adopt climate-resilient farming practices and technologies, the group now produces 15,000 prawns and frogs a month, earning each member a net profit of VND 2.3 million (US$100) a month.

Tran Van Hung, Chair of the group, is very grateful to Nguyen. “Group members are from poor households, and getting poorer due to droughts and salinity intrusion,” he says. “But thanks to Nguyen and AMD’s support, we can now adapt and improve our lives little by little.”

Lessons and opportunities

Project selection needs to focus on innovations that are affordable and usable by the poorest farmers. The project’s participatory approach has been very effective in identifying local adaptation innovations developed spontaneously by poor farmers. These are already appropriate for the locality and well suited for adoption by many smallholders. But the project showed that not all of the most promising climate adaptation farm innovations and models are easily replicable. Some may be unaffordable for poor smallholder farmers; others too complex, requiring more financial and extension support – resulting in low rates of adoption. So to further improve the scalability and adoption rate of the innovations and models, specific pro-poor criteria are needed that prioritize not just climate resilience building, but also affordability, market potential, and the potential for enhancing productivity and income.

Reinforcing public extension services with private partners can help ensure solutions stay relevant. Recent climate events, and unexpectedly high salinity levels in freshwater zones during 2016 and 2019 called existing farming practices into question and suggest that many adaptation solutions recommended by the project may be inadequate in the future. So continued extension support is essential to identify and test farm innovations and models that adequately address future climate risks. Various government agencies have already allocated resources for continued technical extension to help smallholders introduce climate-resilient farming innovations and models. There is a clear opportunity to develop local extension partnerships, for example through lead farmers or private input suppliers, like those developed at ASHA Nepal and ASPIRE in Cambodia. Local extension partners could monitor the ongoing effectiveness of adaptation solutions and provide smallholders with continued technical guidance on adapting farm systems to evolving climatic conditions.

Microfinance can provide continuing access to finance for climate adaptation. To take advantage of climate adaptation and revenue-enhancing opportunities, poor and near-poor households need access to finance. Some climate-resilient innovations and models recommended by the project require relatively big on-farm investments, which may exceed the capacity of smallholder households. The project’s Climate Change Adaptation Fund funded many poor and near-poor smallholders to adopt climate-resilient farm innovations, but it also facilitated access to other sources of funding, including the Viet Nam Bank for Social Policies and commercial banks. To ensure smallholders are able to continue adapting as climates evolve, microfinance offers a powerful tool for building the resilience of local communities. Through the project’s Women’s Development Fund, more than 2,300 savings and credit groups were formed with total savings of approximately VND 24.9 billion (US$1.6 million), enabling low-income households, especially women-headed households, to invest in adaptation and livelihood enhancement opportunities. As a next step, the network of credit groups will be transformed into a microfinance institution during 2021.

Public-private partnerships can accelerate technology initiatives that aid adaptation. The project’s public-private partnership fund, co-investing in 40 sub-projects with 38 private enterprises through a competitive grant mechanism, has proved a great success. For example, a partnership with Rynan Company to pilot a water quality monitoring system has yielded excellent results. In 2018, automatic salinity monitoring buoys were installed in two districts of Tra Vinh Province, providing real-time salinity data to user-friendly software. Salinity monitoring during the 2019 drought then enabled smallholders in the pilot districts to modify their choice of crops, significantly reducing their losses compared to the 2016 droughts. This partnership is now testing a pest monitoring system.

Conclusions and recommendations

This study examined five of the six IFAD projects in Asia and the Pacific region that channel funding to adapt to climate change from the Fund's Adaptation for Smallholder Agriculture Programme to smallholder farmers. The project selection includes examples from three very different ecosystems: a mountainous region, wetlands, and a river delta. Each project takes place in three phases: evidence-based analysis of climate impact and risks, evaluation and testing of possible solutions, and scaling up of those that work best. The study therefore offers a large palette of experiences and lessons that governments, non-governmental organizations, private sector partners and others in the development community can draw upon when designing and implementing climate change adaptation projects

Principal lessons

Identifying needs

- Climate change is harming livelihoods and creating an urgent need for new crops and production systems (Viet Nam).
- A combination of geospatial risk mapping and risk and need ranking can help prioritize beneficiaries of project interventions (Nepal).
- Community participation is also extremely important in identifying the most vulnerable households and their most pressing needs (Bangladesh, Nepal).

Project design

- Wider economic factors can have a big influence on the viability of projects. In the Lao People's Democratic Republic, for example, improved transport links, combined with trade liberalization, have made climate change adaptation economically viable for smallholder farmers.
- Seeking out, testing and refining adaptations thought up by local farmers can be a highly effective path to identifying appropriate innovations for particular ecosystems (Viet Nam)
- Local weather-related data-gathering stations can play a critical role in providing warnings of severe climate events (Bangladesh, Bhutan, Viet Nam).
- Participation of beneficiaries can help ensure project solutions are relevant and reach those most in need (Bhutan, Cambodia, Nepal, Viet Nam).

Project implementation

- Public-private partnerships can be a valuable tool for improving delivery of extension services and ensuring innovations endure (Bhutan, Cambodia). They can also be used to set up measuring stations to monitor the effects of climate change – for example salinity monitoring devices in Viet Nam.
- Piloting solutions with lead farmers helps build trust in project solutions and speeds adoption (Bhutan, Nepal and Viet Nam).
- Government participation and commitment may be needed, at all levels, to ensure the development of more relevant, demand-led extension services (Bhutan, Cambodia).

- Recruiting women and ethnic minorities as local representatives can help the projects reach those members of the community who are most in need and enhance the inclusiveness of projects (Nepal).

Scaling up

- Creation of business clusters that build supply chain linkages can enhance project effectiveness and sustainability, and smallholder resilience, even in the face of unforeseen disruptive shocks such as the COVID-19 pandemic (Cambodia and Bangladesh).
- Spontaneous adoption of project adaptation innovations by non-beneficiaries confirms the sustainability of interventions and is the ultimate proof of project success (Viet Nam).
- Climate change is an ongoing process, so adaptation also needs to be a process, not a one-off. To be sure adaptation continues, projects need to ensure smallholder farmers will continue to have access to finance once project funding dries up (Viet Nam).

Enhancing resilience in the face of the COVID-19 pandemic

- IFAD's ASAP project in Cambodia offers three valuable lessons that project designers can draw upon to help improve the resilience of both smallholder farmers and projects themselves against hard-to-predict external shocks such as the COVID-19 pandemic.
    1. User-friendly information and communication technology platforms (ICT) that help smallholder farmers, suppliers, customers and advisors exchange information can help ensure "business as usual" during lockdowns and other emergencies, protecting the activities and incomes of all concerned. They can also provide a platform for exchanging data to enhance the quality of advice and interventions by ensuring their relevance and timeliness.
    2. Business clusters create strong, enduring, direct links within food systems. These not only protect against shocks, but lay the foundation for autonomous post-project, post-pandemic collaboration.
    3. The pandemic prompted many young migrant workers to return to Cambodia from Thailand. This has provided a valuable opportunity to engage them in smallholder agriculture and rural supply chains – with the prospect of long-term benefits for rural communities.
- The climate-resilient infrastructure built under the HILIP/CALIP project also illustrates the multiple benefits that can be generated from implementing climate adaptation interventions. In fact, roads built under the project were raised to a level above the flood line. These roads were used to transport rice during the COVID-19 lockdown.
- We recommend those involved in designing and implementing climate adaptation projects for smallholder farmers and food systems draw upon these lessons to help make their projects better targeted, more effective and more sustainable. We believe that lessons from the region, in particular from those projects where non-beneficiaries spontaneously copied project innovations, can help lay the foundations for more effective support to smallholder farmers and rural communities worldwide to build resilience in the face of climate change.

Annex. Project overview and major results

BANGLADESH

Climate Adaptation and Livelihood Protection/Haor Infrastructure and Livelihoods Improvement Project (CALIP/HILIP)

CALIP is a supplementary project integrated within IFAD's Haor Infrastructure and Livelihoods Improvement Project (HILIP). The objective of HILIP-CALIP is to enhance livelihood opportunities and reduce vulnerability of the poor in the Haor region of Bangladesh. The project has been implemented in five Haor districts selected on the basis of their exposure to climate risks and poverty context, and has benefited a total of 223,860 smallholder households.

The key project components include:

1. Access to markets, livelihood opportunities and social services
2. Village mobility, reduction in production losses and protection against extreme weather events
3. Access to fishery resources and conservation of biodiversity
4. Production, diversification and marketing of crop and livestock produce
5. Capacity and knowledge development for building resilience.

As a sub-project within HILIP, CALIP introduces climate change adaption measures for diversifying livelihoods and income streams, securing rights to water resources, testing flood protection systems, and improving risk management based on access to information through a weather and flash flood forecasting system.

Key results on climate adaptation activities include:

- 180,601 household members helped to cope with the effects of climate change
- 300,000 people provided with climate information services
- 140 village infrastructure projects implemented to protect against flash floods and wave action
- 330 user groups provided secure access to beels (swamp lakes) for livelihood activities
- 3,464 smallholder groups trained in improved agro-forestry and pond fishery practices
- 378 smallholder groups provided with vocational training for livelihood diversification.

BHUTAN

Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)

CARLEP aims to facilitate the transformation of a subsistence-based rural agricultural economy into a sustainable and productive sector driven by markets and value chains by promoting climate-smart approaches in agriculture, engaging the private sector and strengthening the capacities of communities and local institutions. The programme covers six dzongkhags or districts in eastern Bhutan with high production and marketing potential, and has directly benefited 17,531 smallholder farmer households.

Key components of the programme include:

1. Market-led sustainable agricultural production
2. Value chain development and marketing
3. Institutional support and policy development.

CARLEP supports the development of climate-resilient value chains through the assessment of climate risks and exposure to hazards, by ensuring infrastructure is designed to withstand climate shocks, and by adoption of effective mitigation measures. To enhance smallholder climate resilience and farm productivity to facilitate engagement in value chains, CARLEP helps smallholder farmers adopt climate-smart agriculture (CSA). It promotes farm diversification and household nutrition, efficient water-use and irrigation systems, renewable energy technologies and integrated agriculture practices.

Key results of climate adaptation activities include:

- 5,715 households with improved access to water for farming
- 4,714 individuals engaged in natural resources management and climate risk management activities
- 776 hectares of land under climate-resilient practices
- 1,260 hectares now have high quality seeds and saplings, more resistant to climate change effects, to produce vegetables and fruit with resilient planting materials
- 12 climate-smart villages (CSVs) established
- 1 permaculture demonstration farm established.

CAMBODIA

Agricultural Services Programme for Innovation, Resilience and Extension (ASPIRE)

The aim of ASPIRE is to develop an effective model for agriculture extension services that can enable smallholder farmers to establish profitable and resilient farm businesses, and contribute to the nation's economic growth. ASPIRE aims to move extension from a centralized system to a demand-driven service approach, delivered across multiple channels, including public extension, community extension workers, farmers' organizations, local NGOs and the private sector. The programme has been successfully implemented in 11 provinces, which were chosen based on factors including their high level of unrealized agricultural potential, and the presence of productive poor and vulnerable smallholders. Having directly benefited 122,000 smallholder households, the programme is now being extended nationwide to all 24 provinces.

Key components of the programme include:

1. Knowledge-based policy
2. Capacity development for extension services
3. Improved extension services
4. Infrastructure supporting climate-resilient agriculture.

Driven by strong policies at the national, provincial and district levels, ASPIRE supports climate-resilient extension services by mainstreaming climate adaptation into extension education and training programmes, integrating vulnerability reduction analysis into the preparation of provincial agriculture strategic plans, testing and disseminating climate-resilient agriculture solutions, and using climate risk indicators to select programme investments.

Key results of climate adaptation activities include:

- 518,735 household members helped to cope with the effects of climate change
- 32,723 households report adoption of climate-resilient technologies and practices
- 75,493 hectares of farmland now have improved access to water, benefiting 109,658 households
- 2,937 households have adopted renewable energy technologies at the farm level for agricultural production
- 1,274 biogas digesters established, reducing animal waste CO2 emissions by 8,223 tons
- 32 districts now integrate climate-resilient strategies into district development plans.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

Smallholder Adaptation for Climate Change Component/Southern Laos Food and Nutrition Security and Market Linkages Programme (SACCC/FNML)

FNML aims to help poor smallholder farmers achieve sustainable food, nutrition and economic security. As a supplementary component within FNML, the focus of SACCC is to enhance the climate resilience of communities and institutions by building knowledge and methodologies for improving participatory planning and facilitating adaptive change through strategic cofinancing for a shift to climate-resilient livelihoods at household and community levels. The project covers five districts in south-eastern Laos, identified as having a high incidence of poverty by the National Growth and Poverty Eradication Strategy (2003). Total outreach to date is 14,175 households, exceeding the original target of 12,000 households.

SACCC has two key components:

1. Strengthening the enabling environment for climate change adaptation
2. Implementing community-based adaptation investment plans sustainably.

As a component within FNML, SACCC helps build expertise in climate risk reduction at the policy and planning levels, integrate participatory vulnerability risk assessments and geo-spatial tools as planning instruments and developing community-based adaptation investment plans. It provides smallholders with adaptation finance for small-scale water infrastructure, community-based forest management, and climate-resilient production systems to enhance food security and nutrition.

Key results of climate adaptation activities include:

- 175 local adaptation investment plans formulated with the participation of 8,925 households
- 11,108 households supported to produce vegetables, tree fruit, and other cash crops
- 5,551 households have adopted at least one new climate-resilient agriculture practice
- 4,855 hectares of land are now under climate-resilient practices
- 105 district and ministry staff received climate adaptation training
- 110 community-based forest management plans developed and supported
- 63 drinking water and 91 irrigation schemes constructed, benefiting more than 6,500 households.

NEPAL
Adaptation for Smallholders in Hilly Areas (ASHA)

ASHA aims to reduce the vulnerability of rural communities to climate risk by strengthening the institutional frameworks for local climate adaptation, and by supporting the establishment of climate-resilient production systems and community infrastructure. The project covers seven districts across two provinces in Western Nepal, selected based on vulnerability mapping by the National Adaptation Programme of Action. A total of 85,651 smallholder farmer households have directly benefited through the project's climate adaptation initiatives.

Key project components include:

1. Strengthened framework for local-level climate adaptation
2. Improved climate resilience of vulnerable smallholder farmers.

ASHA's strategy for enhancing smallholder climate resilience includes the development of local adaptation plans of sction (LAPA) with direct engagement of smallholders, aided by improved access to adaptation knowledge and endorsed by local governments. Based on the investment priorities of the LAPAs, ASHA helps smallholders establish climate-resilient production systems and community infrastructure, including activities related to diversifying livelihoods and income streams, adopting integrated farming techniques and sustainable land management practices, improving natural resource management, and adopting renewable energy technologies and small-scale irrigation systems. and other technologies.

Key results of climate adaptation activities include:

- 200 LAPAs developed with the participation of 108,524 households
- 21,774 households supported through climate-resilient community infrastructure, including 224 small-scale irrigation systems
- 18,047 households helped to adopt climate-resilient and profitable production systems
- 6,039 households supported in adopting renewable energy technologies
- 847 members of the ward-level agriculture, forest and environment sub-committees (AFECs) trained in climate adaptation measures
- 432 training-of-trainer events organized on climate adaptation, and gender and social inclusion at the district and ward level.

VIET NAM
Adaptation to Climate Change in the Mekong Delta (AMD)

The goal of AMD was to support sustainable livelihoods for the rural poor in a changing environment by strengthening the adaptive capacity of target communities and institutions to better contend with climate change. Closing on 31 December 2020, the project covered 60 communes in 15 districts of Ben Tre and Tra Vinh provinces, benefiting 46,070 households.

Key components of the project included:

1. Building adaptive capacity within a comprehensive agriculture sector climate adaptation framework
2. Investing in sustainable livelihoods: increased and inclusive financing for market-oriented, climate-smart agriculture and agribusinesses.

The project worked to enhance smallholder resilience by supporting direct engagement in village- and commune-level planning. This influenced provincial financial allocations, improved access to knowledge about climate adaptation, enhanced access to credit, diversified livelihood and income streams, improved natural resource and climate-smart agriculture, provided small-scale climate-resilient community infrastructure, encouraged membership in social networks such as common interest groups (CIGs), and encouraged public-private partnerships.

Key results of climate adaptation activities included:

- 60 communes in 15 districts supported in the development of climate-informed annual socio-economic development plans (SEDPs)
- 27,600 households adopted at least one new climate-resilient agriculture practice
- 15,000 hectares used for inefficient rice cultivation converted to productive aquaculture, fruit plantations, vegetables, or pasture for livestock
- 80 hydrometers established for monitoring salinity of rivers and canals
- 34 climate-resilient production models for fresh, saline, and brackish water zones tested and adopted by at least 7,648 households.

Key results and lessons learned from IFAD Adaptation for Smallholder Agriculture Program (ASAP)

BUILDING CLIMATE RESILIENCE IN ASIA AND THE PACIFIC REGION

TECHNICAL PAPER

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