

Innovative farmers adapting to climate change in Asia



Climate change poses countless challenges for smallholder farmers, pastoralists, fishers, forest dwellers and others who depend on natural resources for their livelihoods. Poor rural communities, especially women, bear the biggest brunt of such climate-related disasters. Yet, the creative initiatives of these very communities to respond to change offer entry points to sustainable processes of climate change adaptation.

PROLINNOVA is an international network that supports and promotes local innovation in ecologically oriented agriculture and natural resource management. It recognises the “grassroots” initiatives of affected communities in dealing with climate change to sustain their livelihoods. Such adaptations build on local creativity and are often cheaper, suit the specific circumstances better, make optimal use of available resources and are often more sustainable than large-scale interventions.

Three countries in the PROLINNOVA network – Cambodia, India and Nepal – carried out a three-year (2012 -2014) regional project to identify and support local innovation of climate-vulnerable communities, especially women, to adapt to climate change. The project titled *Local Innovation and Experimentation for Climate Change Adaptation* (LINEX-CCA) was financially supported by Misereor, Germany. The project was led by CEDAC (Centre d’Etude et de Developpement Agricole Cambodgien) in Cambodia, whilst the work in India and Nepal was coordinated by INHERE (Institute of Himalayan Environmental Research and Education) and LI-BIRD (Local Initiatives in Biodiversity Research and Development) respectively. ETC Foundation in the Netherlands provided technical support to the partners and ensured sharing and learning within and beyond the PROLINNOVA network.

PROLINNOVA partners in the three countries assessed how communities perceived climate change and its effects in their own localities and identified what they were doing to adapt to these changes. They used these local innovations as entry points for initiating participatory innovation development (PID) or farmer-led joint experimentation – a process in which they encouraged scientists and development agents in the area to join with farmers to further develop, adapt and test these local ideas and initiatives, integrating local and scientific knowledge. Several innovations from the three countries involved in this project have been highlighted in this brief.





Air drying potato seed to improve germination in wet soil

Smallholder farmers in the mountains of Uttarakhand grow potatoes as a food and cash crop. Traditionally, potatoes are sown, once a year, in the drier months of September and October. Potatoes are cut into small pieces retaining the eye buds. Immediately after cutting, these pieces are sown, randomly, in flat fields prepared for cultivation. In recent years, the rainfall patterns have been changing due to climate change. Monsoon rains extending into the potato sowing time has meant that the soil stays wet and causes the seed potato to rot. Farmers have been grappling with crop losses due to this problem.

Pratap Singh, an innovative farmer from Jaintha village, found a simple yet effective way to improve germination of potato seed in these increasingly wet soils. He made two changes to the traditional sowing method used by most farmers in the area. Firstly, he cut the potatoes into pieces with eye buds for use as seed and left these pieces to dry in the shade for one to two days before sowing. Secondly, instead of sowing the seed potato randomly in flat fields, he prepared soil ridges on which he planted the seed potato in lines. These changes allowed for better air flow in the soil and faster removal of soil moisture leading to germination rates of nearly 100 percent. Pratap Singh is delighted – not only because he can continue getting a good crop of potato, but also because other farmers can benefit from this simple innovation.

Despite being a recent discovery, 20 farmers in his village and 25 farmers from neighbouring villages have already taken up this innovative practice of potato seed sowing with success. Pratap Singh has shared his innovation and experiences with other farmers and development practitioners at meetings and workshops organized by INHERE and the Agriculture Department of the Block Development Office. It won't be long before many more farmers take on this practice and benefit from it.



Using *akarkara* to control white grub damage in vegetables

In recent years, smallholder farmers in Uttarakhand, report increasing occurrence of the white grub – a major pest of field crops - which they attribute to the changing climate. White grub causes extensive damage to vegetable crops, directly affecting farm yields and household income. Dharam Pal Singh, a curious farmer from Basora village, observed that *akarkara*, a weed with medicinal properties, repelled the white grub. He found no white grub damage on vegetables that were located close to *akarkara* weeds. Thus, he began planting *akarkara* around his vegetable plots to control the white grub.

Laxmi Devi, from Naugaon Beria village, heard about this innovation from Pal Singh, when they met at a training workshop organised by INHERE. They discussed the challenges posed by climate change on their farming and ways of dealing with them. On her return home, she started her own experimentation with *akarkara*, supported by the field staff of INHERE. She selected several fields damaged by white grub attacks. In one plot, she planted *akarkara* along the borders. In another, she used it as an intercrop, planting alternating lines of cabbage and *akarkara*. She compared these plots with similar plots without the treatment. She found that white grub damage was less in the plot with *akarkara* planted on the borders and almost negligible in the plot with *akarkara* as an intercrop. Laxmi Devi says that *akarkara* has not only kept the white grub away but also termites and ants. She is now using *akarkara* more extensively to control crop pests. She is also raising *akarkara* seedlings and sharing seeds and seedlings with other farmers.



Seeing these positive results, 20 farmers in her own village and 12 farmers from neighbouring villages have started using and adapting the technique to suit their needs. Altogether, through INHERE's interventions, nearly 80 farmers in eight villages have been experimenting with this innovative white grub control method. INHERE staff have shared these experiences with the scientists at the Agricultural Research Station in Almora who have been engaged in research for many years to find ways to combat the white grub.



Growing vegetables on elevated beds to prevent flood damage

Many smallholder farmers in Cambodia, especially women, grow vegetables as a means of generating household income. Most of them have small plots which are located around or close to their homes. Generally vegetables are grown in the dry season and the crops are hand watered. As the climate changes, many farmers face the challenge of unexpected heavy rainfall in the dry season. For vegetable growers, this often means flooding of their plots and loss of crops and income. One of the ways in which farmers have adapted to this situation is by growing their vegetables on elevated beds. Elevating the beds has helped to prevent the crops from being submerged in water.

This is an innovation that was identified by extension workers of CEDAC and PROLINNOVA partners who supported the farmers to further improve it through a process of joint experimentation. They spread the word among other vegetable growers and quickly many more farmers were trying out and adapting this method. In the process, many modifications have been made to the way in which the beds are constructed. Farmers started by using bamboo and wood for the structures but have now moved on to more durable cement molds. The heights of the structures and the depth of the soil in the beds has been adjusted through experimentation. Some farmers have installed temporary covers from cheap material that can be drawn over the vegetable beds to prevent heavy rain or the scorching sun from damaging sensitive crops such as salads. Yet others have tried out different varieties of vegetables to select those that perform the best on these beds. The farmer sharing workshops and events organised by CEDAC and PROLINNOVA partners have helped to spread the news quickly and more and more farmers are taking up this method of growing vegetables. According to CEDAC's data, more than 200 farmers in the project villages are now growing vegetables using elevated beds and generating a good income as there is a ready market for their produce.



Using bioslurry, compost and biochar to retain soil moisture

Longer dry seasons with increased temperatures is a key climate-related change that is noted by smallholder farmers in Cambodia. For smallholder farmers who grow rice and vegetables, this means more irrigation and more labour inputs to prevent the soil and the crops from drying out.

Thus, they have begun to find creative ways to condition the soil and increase its capacity to retain moisture. Farmers, independently from each other, have been trying out various soil additives to condition the soil. These different innovations have been brought together by CEDAC and PROLINNOVA partners who are supporting farmers to experiment with various proportions of bioslurry, compost and biochar in order to find the best mix for their crops.

Several interesting social innovations have arisen during this process. For instance, farmers who do not have bioslurry are giving their rice straw to neighbours and getting bioslurry in exchange. Similarly, farmers who have larger quantities of biochar are exchanging it with others for compost. In short, farmers are finding creative means of finding the material they need to create a good mix to improve their soils. With the support of extension agents, farmers are improving their experiments and are able to ascertain which mix brings the best results in terms of costs and benefits.

This information is being shared with many other farmers, through various exchange events and meetings. CEDAC has also published case studies in its monthly farmer magazine and prepared a video for further dissemination. Currently, more than 200 farmers in the project villages are involved in experiments related to soil conditioning and are finding that their soils are able to stay moist longer even in the scorching sun.





Bagging pomegranate fruits to ward off fruit flies

Pomegranate is a drought tolerant plant that is valued for its fruit in Nepal. Ramechhap, a mid-hill district in Nepal, is categorised as one of the most vulnerable to climate change in the country. Here, the droughts are becoming longer and more severe, resulting in diminishing water resources. Smallholder farmers are turning to crops that are drought tolerant such as pomegranate. Heera Lal Acharaya is one such farmer who pioneered pomegranate growing in Ramechhap. But he and other pomegranate farmers have been battling with the pomegranate fly that causes extensive damage to the fruit. Thus, Heera Lal was determined to find a way to combat the fruit fly.

Initially, he approached agricultural professionals who advised him to cover the trees with a mosquito net. He did accordingly but was not happy with the result. The flies managed to get through the net. Then, he used his own creativity to find other ways of dealing with the pest. He tried covering the fruits in small jute bags. This was successful but costly as he had to buy the jute bags. He then used polythene bags to cover the fruits. This restricted the flies from getting to and laying their eggs in the fruit. But the quality of the fruit was not good. He then resorted to bagging the fruits using local newspaper which was cheap and freely available. And this was successful – the flies were kept off, the fruits developed and ripened well. He also noticed that newspaper bags kept other insects and birds away. The innovator has been using this method successfully for several years which has prevented crop losses and given him a steady income.

Currently, he is running his own nursery producing 3000-5000 pomegranate saplings a year. Heera Lal has been sharing his experiences in pomegranate growing with many farmers and development agents within and beyond the district. Through the support of LI-BIRD, Heera Lal's innovation has been broadcast through radio and reached an even wider audience. Nearly 200 farmers in Ramechhap and 300 farmers in other districts have started growing pomegranate and are seeking Heera Lal's advice, which has led him to set up a National Pomegranate Association.



Setting up a low-cost method to drip irrigate fields

Ramechhap district in Nepal is becoming increasingly drought prone. Limited water for irrigation has increased uncertainty in crop production. In coping with these changes, Amrit Shrestha, a farmer from Rampur village, developed a low-cost system to cultivate vegetables using less water.

He had first seen a modern drip irrigation system at the District Agricultural Centre. He found it a smart way to irrigate his crops using less water, but the costs were too high. So he began to think of cheaper ways to get the same effect. He bought a cheap drum and several lengths of pipe. He placed the drum in an elevated place, connected the pipes to the drum, made holes along the pipes and laid out the pipes across his vegetable garden. He used a simple filter to remove particles of dirt entering the drum and clogging the holes and pipes.



The experiment was a success. He and his wife could water the vegetable garden using less water, saving time and labour. This is because the system uses the pipes to deliver small quantities of water directly to the plant root, reducing wastage due to run off and evaporation. Most importantly, they have been able to continue vegetable cultivation which supplies the family with food and income. At least 25 households have learnt from Shrestha and are experimenting with the method on their farms. This method appears to have great appeal among women farmers as it reduces labour for hauling water and allows them to continue vegetable growing even in very dry conditions.

LI-BIRD and its local partners are sharing these experiences with farming households within and outside the district. Moreover, they are stimulating farmers to continue adapting the method to suit their specific needs.



More than
15 local
innovations
identified

Farmer to Farmer KNOWLEDGE SHARING

COMMUNITY GROUPS

involved in joint experimentation
for climate change adaptation

550 personnel

from CSOs and local
government trained in
PID and climate change
adaptation



Women
farmers'
participation
increased



Knowledge exchanged
among farmers, researchers
and development agents

INCREASED
RECOGNITION OF
FARMERS'
KNOWLEDGE



2.000

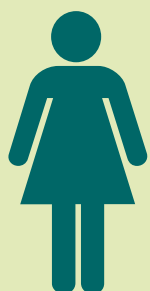
Farmers trained in PID
and climate change
adaptation



25 CASE STUDIES PUBLISHED
in Cambodian farmer magazine



EXPERIENCES SHARED
through weekly radio
programme in Nepal



51%



49%

350 farmers
reached at **International
Farmer Innovation Day**
organised in India



Supporting local innovation through PID enhances community resilience



The project has brought hope and enthusiasm to smallholder farmers in Asia struggling with uncertain weather conditions and often loss of their produce. Local innovation and participatory innovation development has been an empowering process to the farmers. It focuses on the positive – on farmer's strengths and creativity; it gives non-farmer partners such as scientists and extension workers a greater appreciation of local capacities; it builds mutual respect among all partners in joint research; it stimulates farmers to value their own knowledge, ideas and skills; it provides solutions that are less costly and more site-appropriate in comparison with most conventional agricultural research and it enhances the confidence of farmers and gives them greater control over their own development. All of these attributes contribute to the core of the approach most valued by PROLINNOVA partners: building the adaptive capacities of farmers and their communities to deal with change.

Smallholder farmers – women and men - involved in this process have become more proactive, are better able to analyze their situation have learned to pool their energies and knowledge, and are better linked with other actors with whom they can continue to design and implement adaptive actions to address emerging problems. They thus have become more resilient to shocks and stresses in a constantly changing environment and are able to adapt accordingly. This has empowered communities to be resilient and develop sustainably in the face of climate change in Cambodia, India and Nepal.



PROMoting Local INNOVation in ecologically oriented agriculture and natural resource management is a community of practice involving partners in several countries in Africa, Asia and Latin America. Initiated by NGOs, this Global Partnership Programme under the umbrella of the Global Forum on Agricultural Research (GFAR) embraces both state and non-state organisations. It promotes recognition of local innovation by women and men farmers as an entry point to farmer-led participatory research and development. The ultimate aim is to integrate this approach into institutions of agricultural research, extension and education. Funding has come mainly from the Netherlands and French Governments, Rockefeller Foundation, GFAR, MISEREOR and partners' own contributions.

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