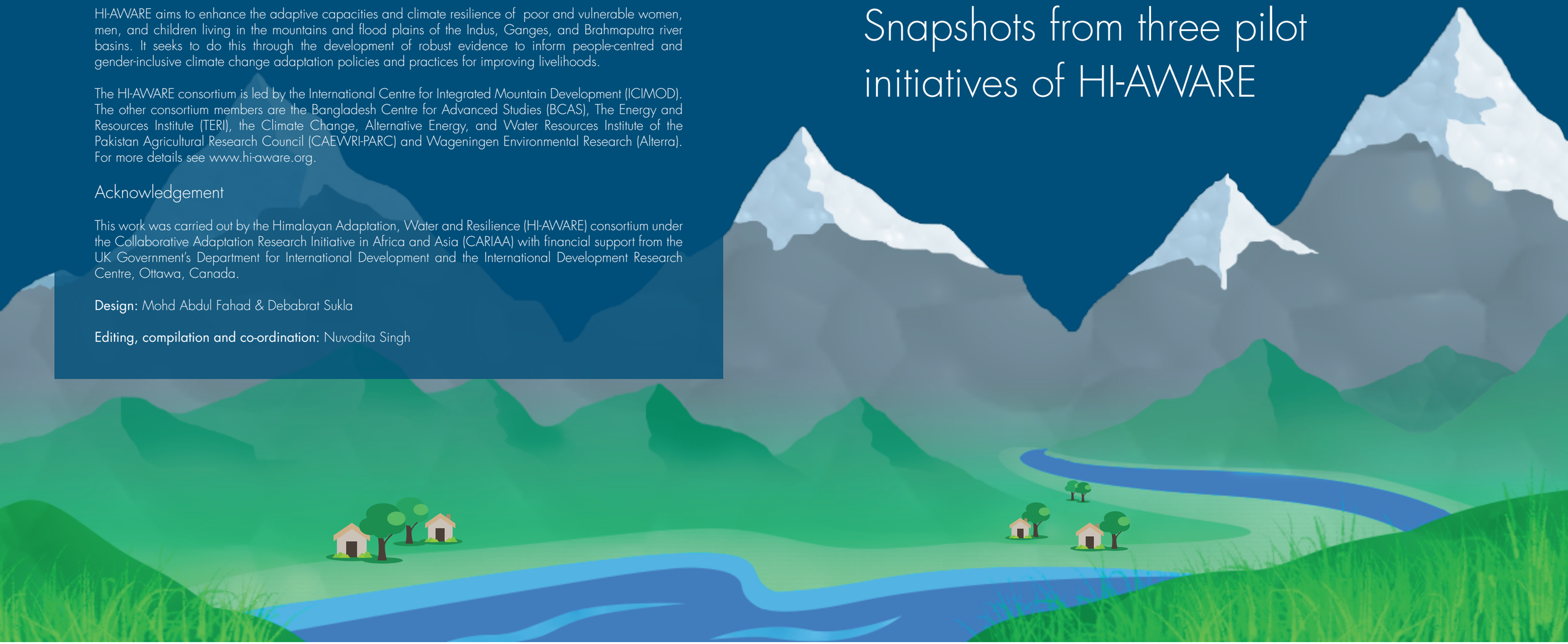
Experimenting with Adaptation Solutions

Snapshots from three pilot initiatives of HI-AWARE



About Us

Himalayan Adaptation, Water and Resilience Research (HI-AWARE) is a consortium under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with financial support from the UK Government's Department for International Development and the International Development Research Centre, Ottawa, Canada. CARIAA aims to build the resilience of vulnerable populations and their livelihoods in three climate change hot spots in Africa and Asia. The programme supports collaborative research to inform adaptation policy and practice.

HI-AWARE aims to enhance the adaptive capacities and climate resilience of poor and vulnerable women, men, and children living in the mountains and flood plains of the Indus, Ganges, and Brahmaputra river basins. It seeks to do this through the development of robust evidence to inform people-centred and gender-inclusive climate change adaptation policies and practices for improving livelihoods.

The HI-AWARE consortium is led by the International Centre for Integrated Mountain Development (ICIMOD). The other consortium members are the Bangladesh Centre for Advanced Studies (BCAS), The Energy and Resources Institute (TERI), the Climate Change, Alternative Energy, and Water Resources Institute of the Pakistan Agricultural Research Council (CAEWRI-PARC) and Wageningen Environmental Research (Alterra). For more details see www.hi-aware.org.

Acknowledgement

This work was carried out by the Himalayan Adaptation, Water and Resilience (HI-AWARE) consortium under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with financial support from the UK Government's Department for International Development and the International Development Research Centre, Ottawa, Canada.

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Pilots:

In addition to conducting research on water, energy, food security, human health, water-induced hazards and extreme events, HI-AWARE under Research Component (RC) 3 of the Knowledge Generation Work Package is also in the process of testing adaptation measures in these sites and designing adaptation pathways for out-scaling and up-scaling.

It is critical to test, verify, and evaluate the viability, efficiency, and effectiveness of a particular development intervention at a small scale before taking it to a larger scale. This testing and evaluating process is known as piloting. HI-AWARE uses piloting for testing technologies, approaches, options and innovations in close interaction with communities at smaller scales so that the processes can be evaluated for optimal out-scaling and up-scaling. In this way, replication at larger scales have greater likelihood of success and policy influence.

Rudraprayag, Upper Ganga Basin, Uttarakhand, India

To tackle the rising issue of livelihood insecurity in the higher Himalayan regions of Uttarakhand, which is being driven through various climatic and non-climatic factors, The Energy and Resources Institute (TERI), in partnership with the Society for Himalayan Agriculture and Rural Development (SHARD), are experimenting with land consolidation and crop diversification to help substantiate livelihoods while taking advantage of certain long term changes in weather that have been witnessed.

New Delhi, Extended Upper Ganga Basin, India

The Energy and Resources Institute (TERI) and Wageningen UR (WUR) in partnership with ReMaterials and Mahila Housing Sewa Trust (MHST) are testing a unique roofing for low income neighbourhoods with an aim to reduce indoor temperatures. This intervention is seeing light in Savda Ghevra, an eastern suburb, in the sprawling metropolis of New Delhi – a part of the Ganga Basin.

Kaunia, Teesta Basin Rangpur, Bangladesh

Bangladesh Centre for Advanced Studies (BCAS) is conducting action research to pilot Climate and Flood Resilience (CFR) housing options in the lower Teesta basin in northwestern Bangladesh. A participatory and multi-disciplinary sequential approach has been adopted in the this pilot that brings together housing technology expertise and community knowledge and needs.

Expected Outcome: Upscaling this pilot can can provide livelihood security and habitat security including access to basic amenities like water, sanitation, storing grains, etc. to the affected residents during floods and inundation.

Pashchim Champaran Gandaki Basin, Bihar, India

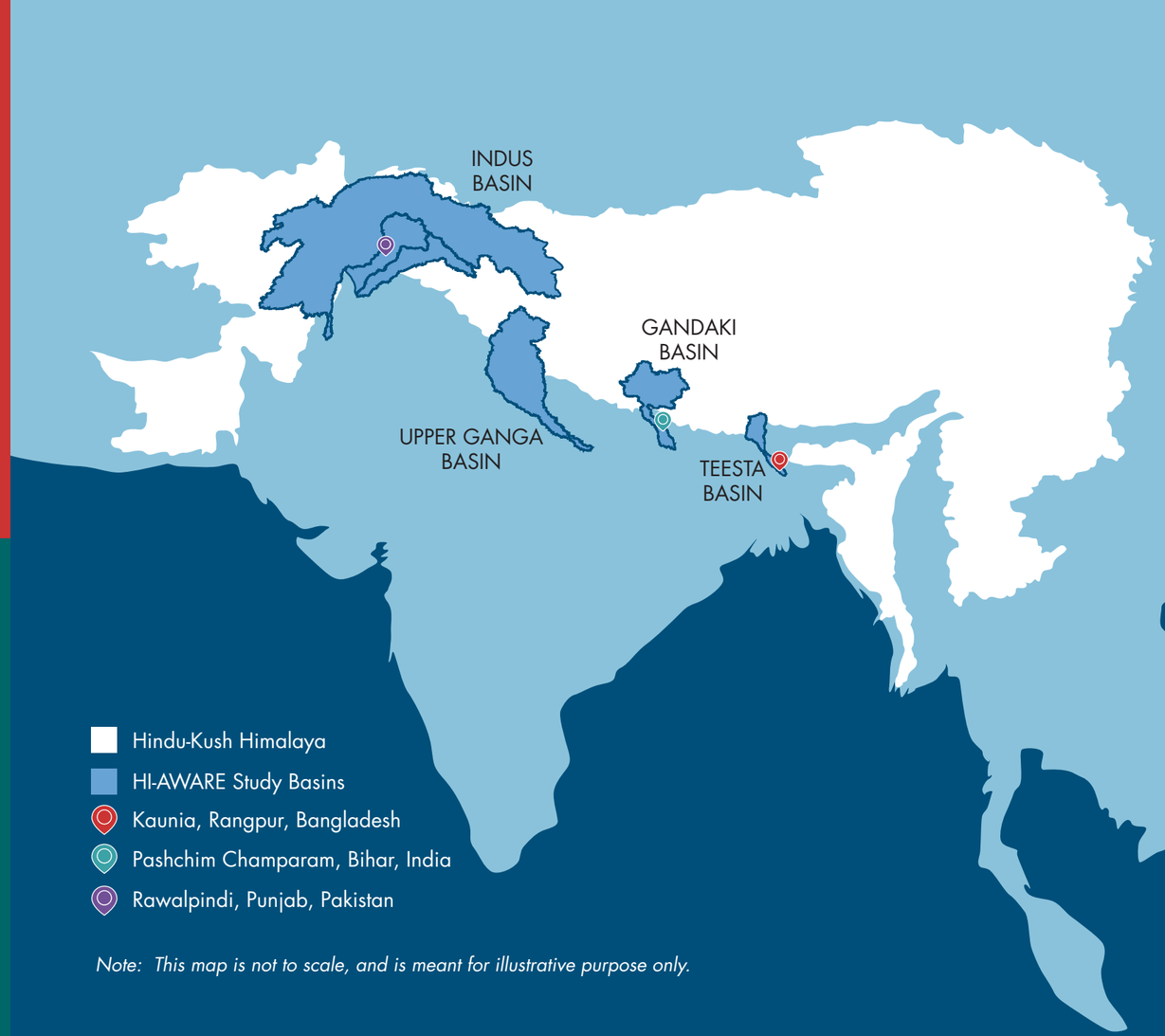
International Centre for Integrated Mountain Development (ICIMOD) in partnership with Megh Pyne Abhiyan (MPA) and Water Action (WA), are piloting Flood Resilient Sanitation in Naya Tola Bhishambharpur village in West Champaran District of Bihar. Implementation of the Eco-San Toilet or the '*Phaydemand Shauchalay*' (beneficial toilet), as it is locally known, addresses the sanitation problem resulting from floods in the area, and follows a participatory process to localize the concept.

Expected Outcome: Upscaling of Eco-San toilets in Bihar can vastly improve health and hygiene outcomes in the state, and other flood prone areas in the HKH region.

Rawalpindi, Indus Basin Punjab, Pakistan

Pakistan Agricultural Research Council (PARC) is piloting 'Solar Pumping Irrigation System with Climate Smart Technology/Package' in order to combat food and water scarcity, sporadic rainfall, and the ever-increasing demands of a growing population on the agricultural systems of Potohar region in Rawalpindi district. This has been categorised as a Developmental On-farm Research Pilot (DO-FRP).

Expected Outcome: Upscaling this pilot will improve integrated water resource management practices resulting in food security and improved livelihoods in dry and arid situations in Pakistan.



Note: This map is not to scale, and is meant for illustrative purpose only.

Himalayan Adaptation, Water and Resilience Research (HI-AWARE) is implementing its three work packages - knowledge generation, research into use, and strengthening expertise - in 12 study areas across the Indus, Upper Ganga, Gandaki, and Teesta River Basins.

HI-AWARE

WEST CHAMPARAN
GANDAKI
RIVER BASIN
INDIA

FLOOD RESILIENT SANITATION

ICIMOD along with its partners Megh Pyne Abhiyan (MPA) and Water Action (WA), is piloting Eco-San Toilet, or *Phaydemand Shauchalaya* (Beneficial Toilet) as it is locally known, in *Naya Tola Bhishambharpur* (NTB) village, *Nautan* Block in *Pashchim* (West) Champaran district of Bihar.

Expected Outcome: Upscaling of Eco-San Toilets in Bihar can vastly improve health and hygiene outcomes in the state, and other flood prone areas in the HKH region.

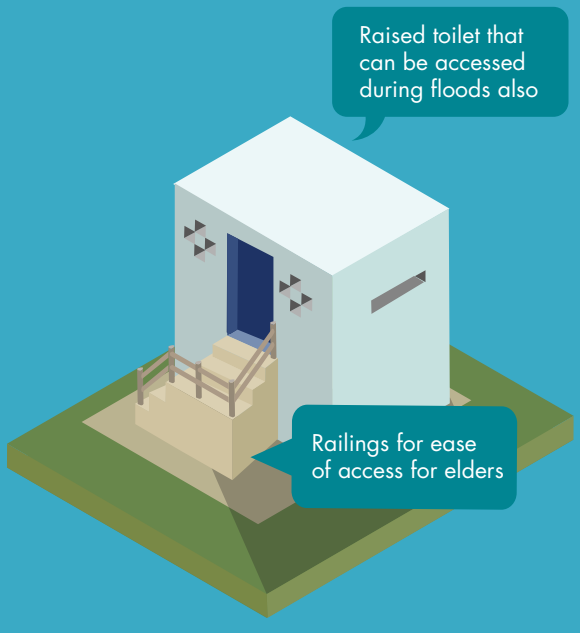
WHY?

2007
2010

In Pashchim Champaran, the year 2007 saw the most number of blocks (16) getting affected by floods. In 2010, this number was 12.

Settlements near the river course are most vulnerable to floods. Around 0.2 million people across 223 villages were affected in 2007.

The flood-prone nature of the landscape prevents its recognition as 'flood impacted'. This ensures inaccessibility to basic services and post disaster recovery assistance.



WHAT?

The 'Ecological Sanitation' (Eco-San) toilet is an innovative sanitation technology that:

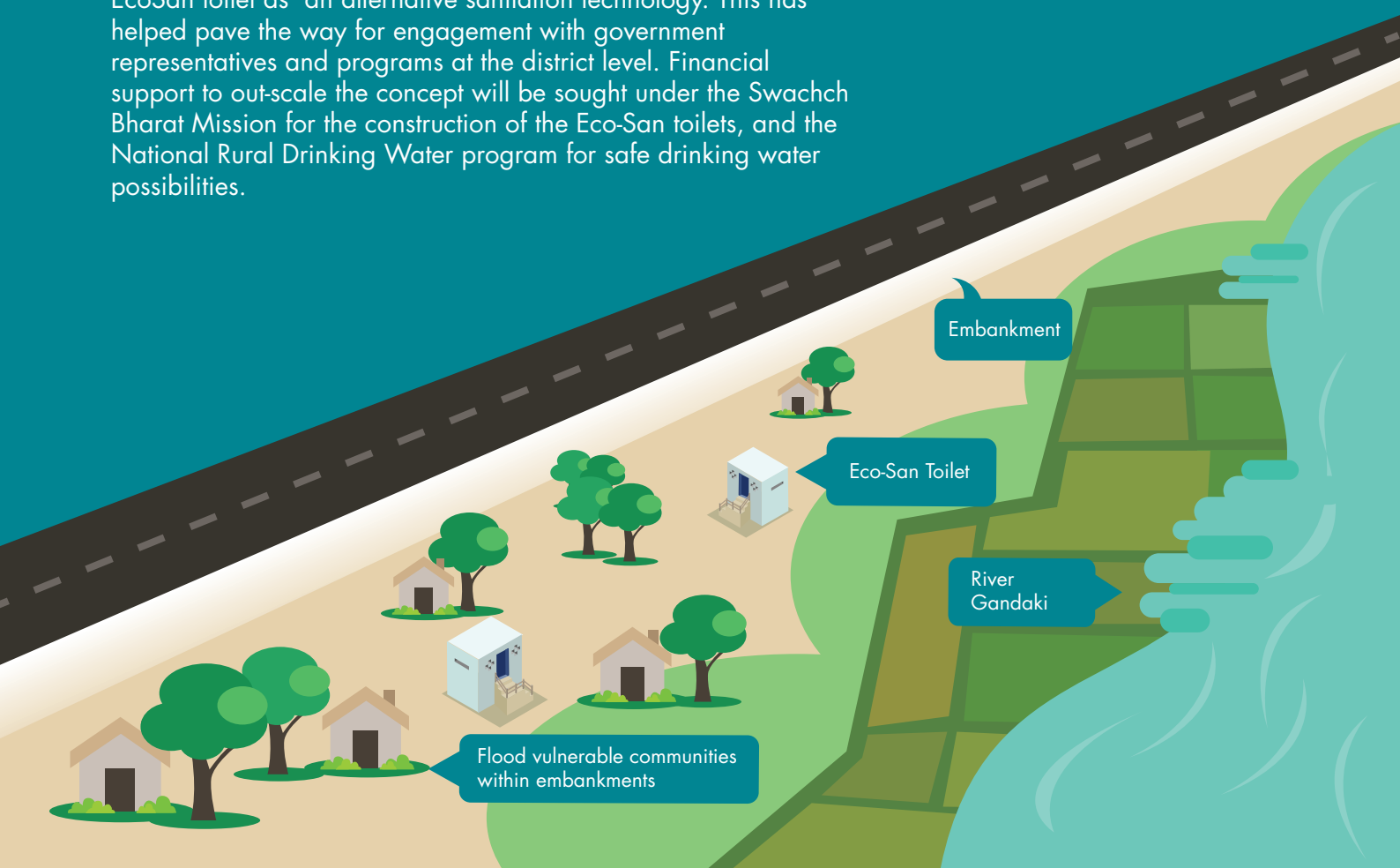
- Is flood resilient and odorless
- Is a double chambered toilet that converts human waste to 'humanure' which is used as fertilizer in agricultural fields and kitchen gardens
- Separately collects urine which can be used as a substitute for Urea in the crop fields or vegetable gardens after mixing with water in the ratio 1:7 (Litres)
- Does not require flushing and hence, saves water.
- Collects waste above the ground and so prevents groundwater from being contaminated.
- Provides the community, especially women, girls and the elderly, a secure and clean enclosure for defecation even during floods.

HOW?

The pilot implementation entails:

- A participatory process where all recipients take ownership by localizing the relevance, design, construction and maintenance of critical utilities. This aids in bringing about behavioural change.
- Integrating local and external perspectives and knowledge on ecologically sensitive, climate responsive, and disaster resilient community.
- Identifying and building capacities of local masons to construct the toilets;
- Constructing toilets in batches so as to gradually introduce the structure in the community for building concensus towards its use, maintenance and benefits;
- Monitoring use and evaluating utility of the facility which is not just a toilet but also a resource. This will positively enhance ownership among community members.

The Central Government (Govt.) and Govt. of Bihar recognize the EcoSan toilet as an alternative sanitation technology. This has helped pave the way for engagement with government representatives and programs at the district level. Financial support to out-scale the concept will be sought under the Swachch Bharat Mission for the construction of the Eco-San toilets, and the National Rural Drinking Water program for safe drinking water possibilities.



HI-AWARE

KAUNIA UPAZILA
TEESTA
RIVER BASIN
BANGLADESH

CLIMATE AND FLOOD RESILIENT HOUSING

BCAS along with its partner C4RE Services Ltd. is conducting action research on Climate and Flood Resilient (CFR) housing in four clusters in two villages namely Char Dhushmara and Char Haibat Kha in Kaunia *upazila* (sub-district) of Rangpur district in Bangladesh.

Expected Outcome: Upscaling this pilot can bring relief from inundation and livelihood insecurity to the flood affected residents, and provide habitat security including access to basic amenities, water, sanitation, etc. even during floods and inundation.

WHY?

Kaunia upazila is a downstream floodplain where there are vulnerable *chars* (sand dunes formed due to river flow) inside and near the Teesta river regularly affected by seasonal floods, riverbank erosion, thunderstorms, drought, heat and cold waves.

With floods becoming more extreme and frequent owing to the changing climate and anthropogenic activities, it is important to create robust evidence on the effectiveness and applicability of potential adaptation practices.

Similar to many other areas of Bangladesh, the selected two villages are affected by seasonal floods each year which is similar to many other areas of Bangladesh. Char Dhushmara village is situated at the left bank of Teesta River while Char Haibat Kha is on the right bank of the river. Both villages are situated at a few kilometers downstream of the Teesta bridge at Kaunia.

WHAT?

Four cluster houses have been selected, in two villages where seasonal floods occur: Char Dhushmara and Char Haibat Kha, where 12 houses will be retrofitted on a raised platform

- Houses will be elevated on raised plinths with facilities for sanitation, safe drinking water, and small household livelihoods of poultry, livestock, and homestead garden.
- Various grass species and fruit trees have been planted at the slope and boundary of the raised area as a natural barrier against soil erosion.
- Improved cooking stove (ICS), and solar panels are additional features to cater to energy needs.
- Skill development training on homestead gardening, poultry rearing, and handicrafts are provided as part of implementation
- A manual on developing climate and flood resilient construction materials and technologies is being developed

HOW?

Community members engaged in the design, demonstration and documentation process so that they feel ownership both of the process and outcomes.

A baseline household survey has been conducted to collect general information on households and their resources. Based on this information a total of 12 households in four clusters have been selected for pilot demonstration of CFR houses in two villages. The four household clusters have been selected from three income groups: ultra-poor (2 clusters), poor (1 cluster), and middle income (1 cluster).

- Participatory performance monitoring of the CFR houses is being done through regular visits by project staff to consult with members of participating households on the performance of the houses through focused group discussions and in-depth interviews.
- An end-line evaluation survey, involving members of participating households andcommunity leaders will be carried out to monitor the impact of CFR housing in the community as a whole.
- The evaluation will focus on response to and acceptance of the houses in the community, any changes in the socio-cultural dynamic as a result thereof, replication taking place (if any), entrepreneurship on CFR houses developed, etc.
- Also, community level responses and acceptance of the houses, replication taking place (if any), and entrepreneurship on CFR houses will be developed.

HI-AWARE

CHAKRI
SOAN
RIVER BASIN
PAKISTAN

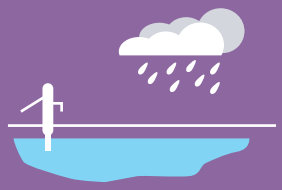
SOLAR PUMPING IRRIGATION SYSTEM AND CLIMATE SMART AGRICULTURE PACKAGES

PARC is piloting 'Solar Pumping Irrigation Systems coupled with Climate Smart Agriculture Packages' in Chakri in Rawalpindi district of Punjab. This piloting site is in the rain-fed Soan River Basin of the Potohar region, where various climate smart interventions to improve farm productivity and enhance resilience are being practiced and piloted with farmers' participation

Expected Outcome: Upscaling this pilot will improve integrated water resource management practices resulting in food security and improved livelihoods in dry and arid situations in Pakistan

WHY?

Agriculture in the Soan Basin, which is located in the midstream of the Indus River basin, is heavily dependent on rainfall and ground water resource.



Factors such as underutilized potential of water sources due to undulating terrain, and erratic rainfall of varying intensity impacts crop productivity.

Lack of diversity in crops means mono-cropping is the dominant pattern of agriculture and farmers' well-being remains at the mercy of the rains.

Such communities are especially vulnerable to the impacts of climate change that will only bring more unpredictability in the time to come.

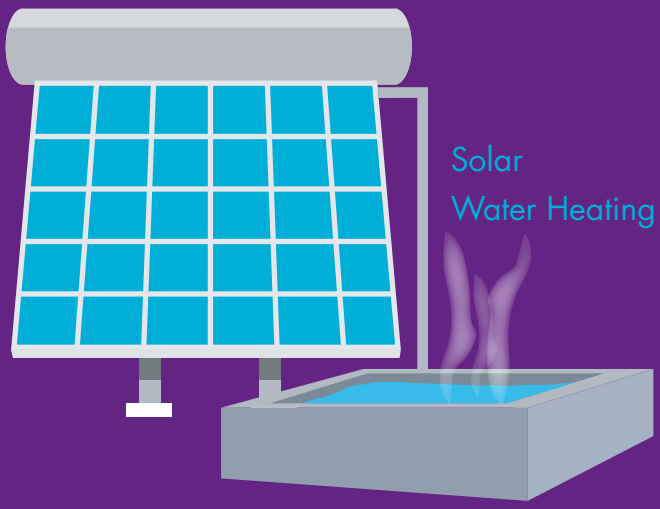
The pilot is being tested to address water management, to improve livelihoods, and to improve farmers' resilience to potential climate change impacts.

WHAT

These packages will include:

- Fixed Solar Irrigation Systems
- Portable Solar Irrigation Systems
- Agriculture Diversification
- Integrated Water Resource Management
- Alternate Energy Application

High Value
Fruit Orchards



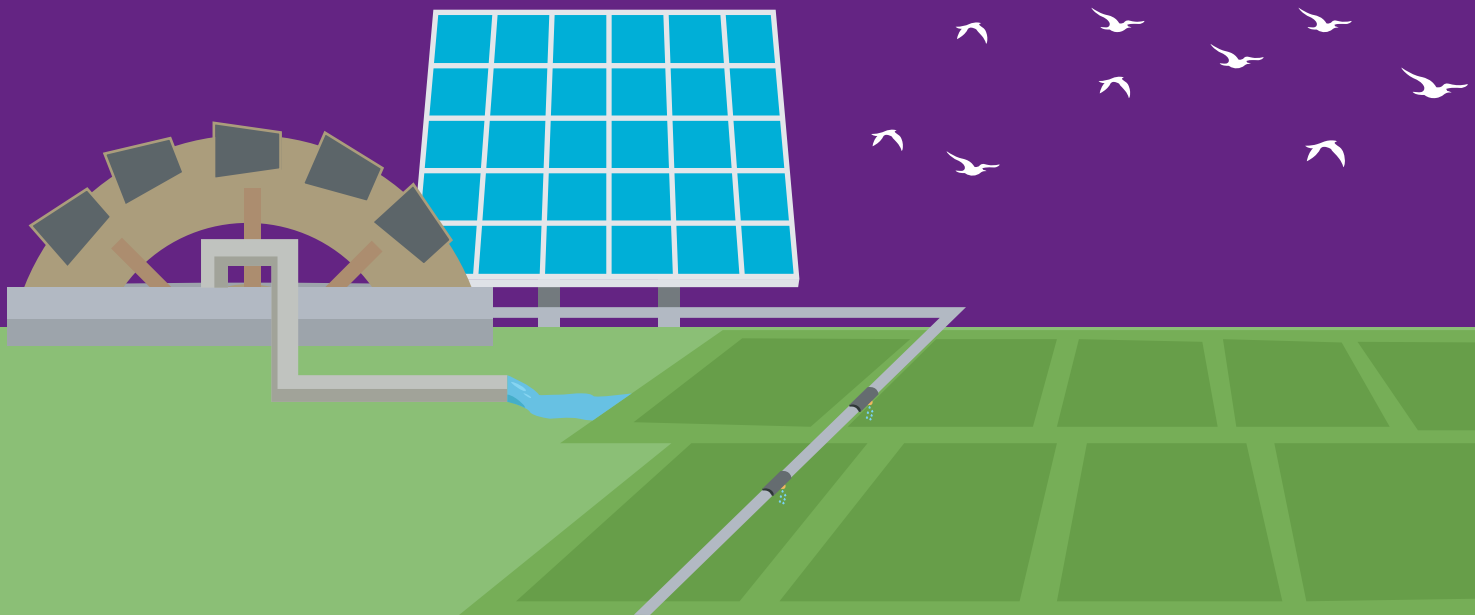
Solar
Water Heating

HOW?

Based on the situational analysis and discussions with local farmers in Chakri, a medium sized farm up to 15 acres that is distributed on both sides of the Soan river has been selected. This was based on the farmer's willingness to accept the intro duction of new technology and agriculture production practices on his farm. He is willing to collect data in partnership with the project team, make investments in innovative farm practices (i.e., tunnel farming, sprinkler system, drip irrigation etc) and use the pilot farm as a training site for other farmers in the nearby village for practitioners, researchers, and media to see.

Since the pilot is being implemented on a single farm, it can be categorized as a "Developmental On-farm Research Pilot (DOFRP)". The piloting will also include training for farmers, professionals, and students and demonstrations/ visits by the media.

Knowledge dissemination via local consortium partners and communication through print and electronic media is a continuous process throughout the piloting.



HI-AWARE

NEW DELHI
EXTENDED UPPER
GANGA BASIN
INDIA

MODIFIED ROOFS

as an adaptation measure for indoor heat exposure in low-income neighborhoods

TERI and Wageningen UR, in collaboration with ReMaterials and Mahila Housing Sewa Trust (MHST) are experimenting Modified Roofs (ModRoofs) - an innovative solution to reduce indoor heat, in Savda Ghevra – a suburb in the sprawling metropolis of New Delhi.

Expected outcome: This measure can help build capacities of low-income neighbourhoods and communities, who do not have access to/cannot afford active cooling, in coping with/adapting to increasing temperature trends.

WHY?

Increasing temperature trends and more frequent heat waves are being witnessed

Recent heatwaves in South Asia have affected millions of people, and this number is likely to increase

Passive cooling solutions will have co-benefits for both adaptation and mitigation of climate change

WHAT?

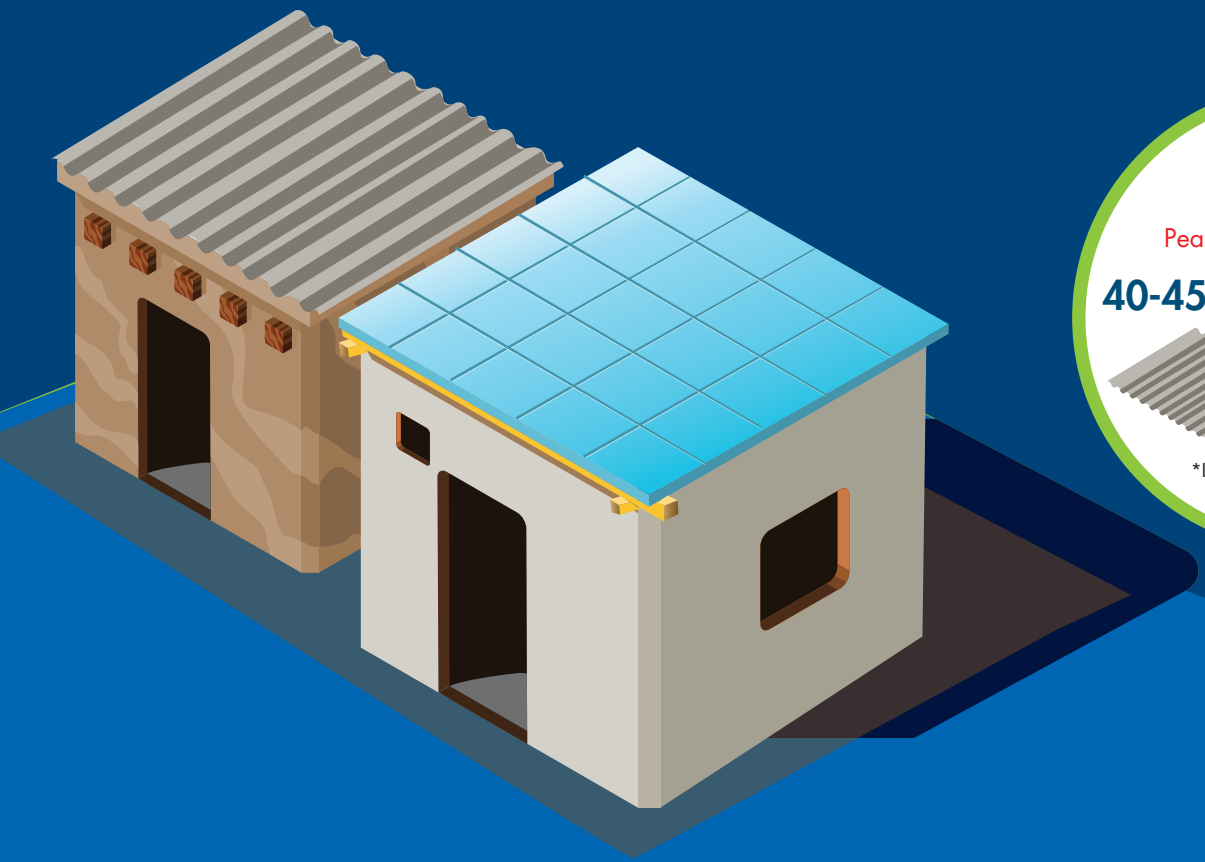
The Modified Roofs, or simply ModRoofs, is an innovative solution that:

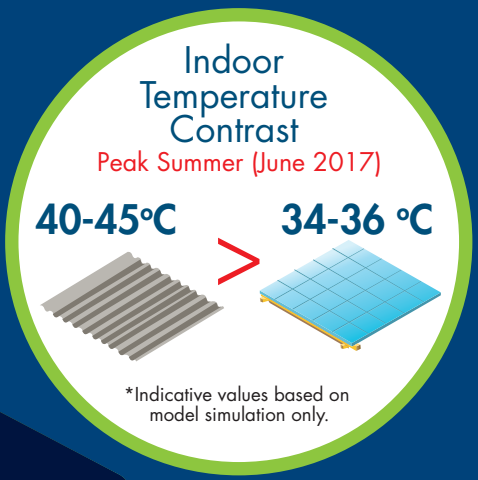
- is a modular roofing system for low-income neighborhoods
- have a low thermal conductivity value, translating to reduced indoor temperatures
- are easy to install, fire proof, movable and sustainable
- are also rainproof and soundproof against heavy showers in the monsoon
-

HOW?

This research driven approach entailed a two-stepped process, of understanding patterns of indoor heat stress in selected neighbourhoods of Delhi, and testing adaptation measures for reducing indoor heat exposure. In the initial phase of the research, during the period of April-September 2016, 63 indoor temperature loggers were placed inside houses spread across six localities in New Delhi's South and East Delhi, representing the diverse housing structures in the city to understand heat stress patterns in these localities. Post this phase, a literature review combined with stakeholder interactions aided in narrowing down on prospective adaptation options for reducing indoor temperatures. New and emerging technologies/options were given importance and ModRoofs were chosen for implementation in Delhi.

5 ModRoofs were installed (in July 2017) in the largely low-income suburb to understand the effectiveness of the roofing structure in reducing both day-time and night-time temperatures. Indoor temperature loggers have been placed inside these houses to continuously monitor the temperature trends. This is being contrasted with a control of 10 houses having corrugated cement sheet roofs to understand the overall effectiveness of the measure in real time. We are triangulating these measurements through model simulations that we are carrying out.





HI-AWARE

RUDRAPRAYAG
UPPER GANGA BASIN
INDIA

WEATHER APPROPRIATE

SUSTAINABLE AGRICULTURE PRACTICES

TERI, in collaboration with the Society for Himalayan Agriculture and Rural Development (SHARD) is experimenting weather appropriate sustainable agricultural practices in Huddu village of Rudraprayag District of Uttarakhand. The village is located at a height of around 1900 metres above mean sea level, in the Upper Ganga Basin. The locals in the region are being trained in a series of on-farm and off-farm sustainable agricultural practices given the long-term changes in climate.

Expected outcome: The experimentation can lead to improving land utilization patterns on one hand, and on the other, ensure livelihood augmentation through demonstration of agricultural practices

WHY?

Agriculture is predominantly rain-fed. As a result, this primary livelihood source is extremely risk prone

Fragmented and scattered land holdings is making agriculture non-appeasing

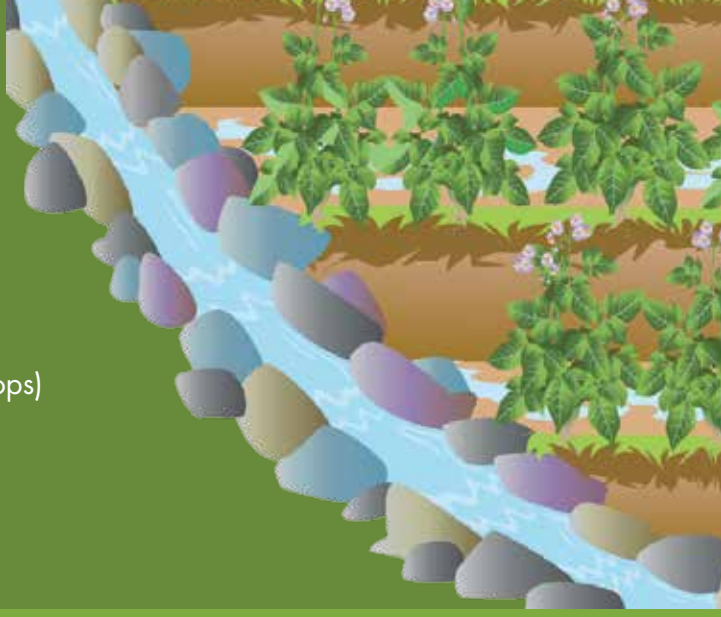
Reduced snowfall overtime might prove to be a boon for winter crops.

Out-migration from the region is on a rise owing to reduced agricultural productivity

WHAT?

The expected outcome is being met through a basket of approaches which are:

- Consolidating lands
- Alternative crops (high value; horticultural; and cash crops)
- Improved farm practices
- Protection of lands from wildlife encroachment
- Identifying market linkages



HOW?

Through a consultative and a participative dialogue with the locals, the experiment was designed to improve the farming practices in the Mandakini catchement. Using aspects of co-learning, a continuous process of learning is being followed through the experimentation phase to ensure a problem oriented implementation.

Effecting change through livelihood interventions can be a slow but fruitful and often sustained practice. In our intervention, multiple stages of implementation are ongoing. The initial phase involved land consolidation. Land under 48 households were consolidated, with the value of bulk production of crops being conveyed to the farmers. This was succeeded by a capacity building and crop experimentation phase where the villagers are being trained in agricultural practices that they weren't exposed to earlier; and crops (a combination of horticultural, traditional and cash crops) that weren't explored at scale in the region are being experimented with; and an environment to sustain livelihoods in the village is being created with a range of on-farm and off-farm management and training being inculcated to the locals.