

Reducing risks of extreme events and weather-related disasters
Institute for Social and Environmental Transition (ISET)

ISET is an international, non-profit institute with associates and advisors in both the North and the South. Individuals and organizations involved in ISET all share a commitment to environmentally sustainable development and poverty alleviation. Within this commitment, ISET's mission is twofold: *First*, we seek to improve understanding and elevate the level of dialogue as governments and civil society attempt to respond to natural resource, climate and environmental challenges in a rapidly changing global context. *Second*, we seek to serve as a framework for equal collaboration between individuals and organizations in the North and South on programs that address the first mission. This mission enables us to bring to the program a combination of professional expertise *and* extensive networks of existing partnerships and activities.

ISET is engaged in a number of North – South collaborative projects, only some of which are highlighted below:

1. *Asian Cities Climate Change Resilience Network (ACCCRN* – funded by the Rockefeller Foundation): ISET is working with a number of national level and city level partners in 10 cities in India, Vietnam, Indonesia and Thailand to help the cities identify current vulnerability and how that vulnerability might evolve under climate change. The outcomes of this project include: testing and demonstrating a range of climate resilient strategies; building a replicable knowledge base; building the climate resilience capacity of the cities to incorporate considerations of climate change in all aspects of city operation and management; fostering a network between the cities for sharing ideas, lessons and insights.
2. *Risk to Resilience in South Asia*: The goal of this programme is to systematically identify cost effective, equitable disaster risk reduction (DRR) strategies that are likely to be robust in the face of increasing weather and climate variability. Most investment decisions in South Asia concerning DRR tend to focus on hard prevention or structural measures for which data are more readily available and the costs and benefits more tangible, making them easier to quantify. Despite the dominance of hard structural approaches in DRR, a wide variety of softer “people-centred” measures are beginning to gain prominence. These include a range of interventions to support community capacity building, development of disaster management policies and planning, spreading risks through financial or other mechanisms and supporting adaptation.
3. *Adaptation to Climatic Variability and Change*: This programme researched the access to, understanding of and perceptions of weather and climate change information in local contexts in South Asia to evaluate the gaps between climate science experts and communities on the ground, and how understanding shapes the courses of action individuals and households take.
4. *Adaptation and Livelihood Resilience*: This programme is examining the vulnerabilities of case communities and seeking to understand the local autonomous adaptation strategies individuals, households and communities take in response to weather-related hazards. The assessment of current responses provides a sense of what strategies people might take in the future in response to climate change and identifies entry points in which planned adaptation strategies can assist autonomous adaptation.

Lessons Learned

The role of disasters in building and maintaining the cycle of poverty and undermining development progress is increasingly recognized as a major global challenge. Approximately 70% of natural disasters are weather related and this proportion is likely to grow as climate change processes increase the variability, frequency and intensity of weather events. As a result, cost-effective strategies for reducing disaster risk are central *both* to meeting development goals *and* responding to the challenges climate change will present to all actors in society, particularly the poor, women and other vulnerable groups.

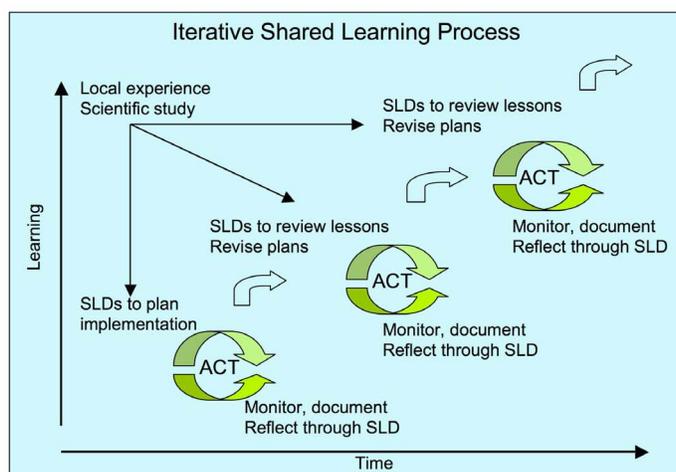
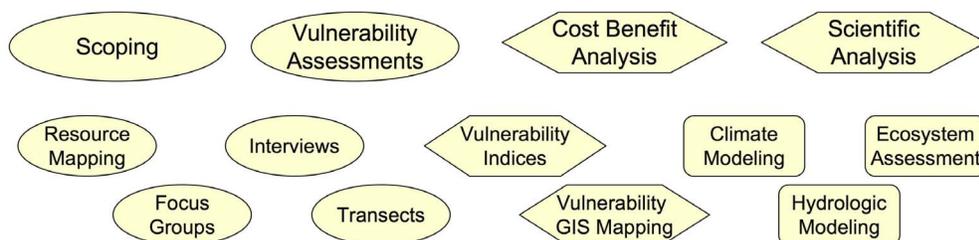
Through the above projects, ISET and its partners have learned that:

- People-centred DRR strategies are more *cost-effective* and can be more equitable than large-scale structural measures in reducing weather and climate related disaster risk.

- People-centred DRR strategies that enhance access to and understanding of information and promote livelihood diversification are more likely to be robust against a number of stresses, not just weather-related hazards.
- When accompanied by a mix of people-centred strategies, traditional weather-related, structural DRR measures such as embankments or barrages can form a package of complementary interventions that reduce risk and vulnerability.
- A combination of quantitative, including cost benefit analysis, and qualitative methodologies, used to inform an iterative series of shared learning dialogues with communities and other key actors, is necessary to:
 - Identify the broad cost and benefit areas of different combinations of DRR strategies
 - Identify social preferences and the distributional impacts of certain strategies, recognizing that some strategies will favor some more than others
 - Identify the robustness of such strategies in the face of uncertain and highly variable climate, in which the frequencies and intensities of flood, drought and other extreme weather events are likely to change in uncertain ways.
 - Identify the synergies between social, environmental and climate change.
 - Work with communities to develop acceptable DRR strategies.
- In much of India and Nepal, there is a single word *mausam*, used to describe weather and climate. The cultural mindscape does not distinguish between the two, leading to a disconnect between global climate science and local perceptions of change.
- Weather and climate change information and policy are frequently distant and divorced from the daily realities that shape lives, livelihoods and the responses of ordinary to people to climate variability and ultimately, change. Partial information and partial understanding interweave to shape the perceptions, decisions and courses of action at different levels, from households on up to the national government.

Impacts and Outcomes of ISET's Work:

Based on experience, ISET and ISET's partners now utilize a combination of methodologies in each project to assess the cost effectiveness, ethics, and robustness of various DRR strategies.



Lower Bagmati Basin: Nepal Terai and North Bihar, India

Flooding is quite common in the northern Ganga plains, which encompasses the Bagmati River Basin, and contributes to the endemic poverty of the area. The majority of flood control measures in the basin have been government-funded construction of embankments and spurs, the relative costs and benefits of which have never been systematically evaluated. A full, quantitative CBA was not possible in this basin due to lack of data, however a qualitative CBA allowed ISET and its partners to begin investigating the efficiency, ethics and sustainability of various DRR measures in the basin. Evaluation of various DRR flood strategies revealed stark distributional differences between the benefits and costs of traditional flood control measures. Some communities, particularly those closest to the embankments, do enjoy short-term benefits from the embankments. However, communities located downstream of the embankments, or trapped between the embankments and the river, experience disproportionate flooding and waterlogging. Even communities protected on a short-term basis by the embankments are negatively impacted in the long run because the rivers carry high sediment loads and the embankments block sediment deposition. As a result, sediment deposition occurs in the river beds and tributaries, raising their level above the surrounding land and weakening the embankment, which eventually leads to catastrophic breaching such as with the Kosi embankment breach of August 2008 that negatively impacted some 3 million people.

Local, people-centred strategies revealed that soft DRR strategies could not only be used to increase resilience to flooding, but often serve to improve livelihoods and enhance income diversification in non-flood periods. Such soft measures include strategies such as improving communications and transportation networks, constructing raised, multi-purpose flood shelters, raised houses of stronger construction and flat roofs to allow sheltering-in-place and storage of livestock and assets. Analysis revealed that reliance upon structural measures alone caused their associated costs to exceed their benefits. Ill-conceived structural measures have greater costs to those outside the protected areas and can promote an illusion of protection, encouraging settlement and investment in 'protected' areas. Furthermore, hazard-specific structural measures must be maintained in the absence of sustained public demand and do not serve multiple, immediate purposes, like improved communications or transportation networks that simultaneously improve livelihoods and provide business opportunities. However, when accompanied by a mix of people-centred strategies, traditional weather-related, hard DRR measures can form a package of complementary interventions that reduce risk and vulnerability.

Government Structural Strategy	“Benefits”	“Costs”
Embankments along the rivers	Villages (buildings, livestock) protected that are not trapped between embankment & river Financial losses minimal if flood damage is minimal Theoretically government funded and maintained	Houses between embankment and river flooded, waterlogging of fields
Bairgania ring embankment		Bank cutting, raising of river bed due to siltation
Bagmati, Chandi and Gandak irrigation canal		Loss of land fertility with silt trapped behind embankment
Spurs		
Bagmati barrage headworks		Catastrophic flooding when breached Increased disease incidence with waterlogging
Interventions – Current and Planned	“Benefits” – Emerging Outcomes	“Costs”
Raised houses	Food and fodder, enhanced ecosystem services & products Sheltering in place during floods, with ability to move livestock & assets on roofs Multiuse flood shelters as schools, computer centres, VICs or schools, seed storage Infrastructure damage minimized, less expensive to replace Boats can be used for transportation, goods/ services even in non-flood periods Multi-function communication system Improved health and wellbeing	Often not government funded, costs frequently borne by household
Reinforced, flat roofs		Some relocation necessary, land rights or ability to purchase land limited
Flexible bridges		
Forest buffer zones along river banks		Annual repair and maintenance burdens borne by communities
Raised platforms and multi-use flood shelters		
Basic services: water, sanitation, health		
Boats		
Early warning systems using cell phone and radio		
Radio dramas to educate about climate change		

Pilot Interventions in Gujarat, India

An iterative series of shared learning dialogues were conducted in the villages of Katpar, Sartanpar and Tarasara in the state of Gujarat, field sites where the NGO Utthan, with help from ISET, has been supporting pilot projects to increase resilience to climate change. The focus of these SLDs was to capture the diverse perceptions of the communities in these villages about climate variability and change. The process included carrying out resource mapping of each village, vulnerability mapping in the context of floods and cyclones through focus group discussions, and Participatory Rural Appraisal (PRA). Additionally, the process included performing situational analysis, as well as, in order to uncover possible adaptation alternatives. These processes were carried out at different levels, including the government and other agencies.

The dialogues revealed complex processes of social and environmental change, coupled with climate variability, that are impacting livelihoods in the area. According to a number of villagers, approximately 40 years ago the coastal area was rich with trees and greenery and high-quality freshwater was easily available. In the last 25 years, the availability of high-quality freshwater has deteriorated due to overdraft of groundwater and increased salinity, making it more difficult to get water for drinking and irrigation. There have been changes in the agriculture patterns in the coastal area, as well, largely due to market preferences. Food crops have been replaced by high water intensive crops like ground nuts, onion and cotton, which is exacerbating the groundwater overdraft situation. Traditional fruit trees such as, mango and guava, have been replaced by chickoo fruit trees that fetch more money. New crop diseases are emerging, although it is unclear as to the causes. People are perceiving increased weather variability, namely an increase in the duration and intensity of the monsoon system and more cyclones, leading to higher incidences of flooding. During the iterative dialogues, villagers identified the following areas to begin reducing their vulnerability to current hazards.

Intervention – Current and Planned	Preliminary Outcomes
<ul style="list-style-type: none"> • <u>Institutionalising gender and people-centric mechanisms that would proactively respond to the needs of the communities, especially the most vulnerable.</u> This will enable sensitisation, capacity building, awareness creation, inclusive participation, linkages and implementation of pilots, extract learning and sharing at various levels for policy, behavioral change, etc. Above all, it would develop practices of good governance and ownership that would sustain the process. • <u>The development of early warning communication systems.</u> These would help to reduce existing storm and flood risks for portions of the community engaged in agriculture and fishing. Improvements in such systems were viewed as particularly important if the occurrence of extreme events increases. In addition to technologies, participants emphasized the need to establish linkages with relevant government officials, particularly the District Collector, Mamtladar, dam site authorities and port authorities. They also emphasized the need to establish effective communication systems in the village so that individuals and households can strengthen their preparedness measures. • <u>Improvement of sanitation and safe drinking water facilities that can continue to function during extreme events, as well as construction of houses for temporary shelter.</u> Access to shelter, sanitation and drinking water is currently a major problem during storms and floods at present and is likely to be exacerbated as climate change proceeds. • <u>Livelihood security and development of livelihood activities consistent with sea level rises and increases in salinity ingress due to coastal storms.</u> Although communities did not observe any changes in sea level, salinity ingress in the region is a major concern during storms. As a result, they identified lobster fattening (using cages to bring small lobsters up to the size required for marketing) as a new livelihood activity that could be tested and would be consistent with potential climate change impacts. Community members also suggested placing increased emphasis on the plantation of salt tolerant crop varieties in the coastal saline region as a related strategy. Additionally, this would reduce soil erosion along the riverbanks. 	