HI-AWARE Internal Report

Conference Proceedings

3rd Climate Change Adaptation Policy and Science (CCAPS) Conference

6 February 2017, Dhaka, Bangladesh

About HI-AWARE

The Himalayan Adaptation, Water and Resilience (HI-AWARE) Research Consortium conducts research and pilot interventions, capacity building and policy engagement to enhance the climate resilience and adaptive capacity of poor and vulnerable people living in the mountains, hills and flood plains of the Indus, Upper Ganga, Gandaki and Teesta river basins in Pakistan, India, Nepal and Bangladesh.

HI-AWARE aims to influence policy and practice to aid the climate resilience and adaptation of poor and vulnerable populations in the region by generating evidence based knowledge on geophysical, socioeconomic, gender and governance drivers and conditions leading to climate vulnerability, as well as monitoring and assessing adaptation measures. It focuses on identifying 'critical moments' when communities are most vulnerable to climate risks, 'adaptation turning points' when existing adaptation strategies no longer work, and "adaptation pathways", sequences of policy actions that address both short-term responses to climate change and longer term planning. It looks at strengthening the expertise of researchers, students and science-practice-policy networks to conduct as well as use research on climate/social vulnerabilities, resilience, and adaptation.

HI-AWARE comprises of five consortium members: The International Centre for Integrated Mountain Development (ICIMOD), the Bangladesh Centre for Advanced Studies (BCAS), Pakistan Agricultural Research Council (PARC), The Energy and Resources Institute (TERI)-India, and Alterra-Wageningen University and Research Centre (Alterra-WUR).

HI-AWARE is one of the four research consortia under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) supported by the UK's Department for International Development (DFID) and Canada's International Development Research Centre (IDRC).

Acknowledgement

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3rd Climate Change Adaptation Policy and Science (CCAPS) Conference

6 February 2017, Dhaka, Bangladesh

Organised by

Bangladesh Centre for Advanced Studies (BCAS), Dhaka, Bangladesh

Himalayan Adaptation, Water and Resilience (HI-AWARE) Research
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Acronyms

ASSAR	Adaptation at Scale in Semi-Arid Regions
BCAS	Bangladesh Centre for Advanced Studies
BUET	Bangladesh University of Engineering and Technology
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CAS	Climate Adaptation Services
CBA	Community Based Adaptation
CCA	Climate Change Adaptation
CCAPS	Climate Change Adaptation Policy and Science
CEDAR	Centre for Ecology, Development, and Research
CFRH	Climate and Flood Resilient Housing
CMIP5	Coupled Model Intercomparison Project Phase 5
DECCMA	Deltas, Vulnerability and Climate Change: Migration and Adaptation
DFID	Department for International Development
DRR	Disaster Risk Reduction

ETref	Reference Evapotranspiration
GCM	Global climate model
GDP	Gross Domestic Product
HI-AWARE	Himalayan Adaptation, Water, and Resilience
HICAP	Himalayan Climate Change Adaptation Programme
HKH	Hindu Kush Himalayas
ICIMOD	International Centre for Integrated Mountain Development
IDRC	International Development Research Centre
IGB	Indus, Ganges, and Brahmaputra
IIED	International Institute for Environment and Development
INDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
KMC	Knowledge Management Centre
M&E	Monitoring and Evaluation
MPA	Megh Pyne Abhiyan
NGO	Non-government Organization
P	Precipitation
PAR	Participatory Action Research
PARC	Pakistan Agricultural Research Council
RCPs	Representative Concentration Pathways
RiU	Research into Use
SDGs	Sustainable Development Goals
Tavg	Average Temperature
Tmax	Maximum Temperature
Tmin	Minimum Temperature
TERI	The Energy and Resources Institute
TRACKS	Transforming Climate Knowledge with and for Society
TMI	The Mountain Institute
WUR	Wageningen University and Research Centre

Acknowledgements

The conference organizers from the HI-AWARE consortium express their sincere gratitude to the delegates from Bangladesh and other countries for their participation and contribution to the conference with their valuable opinions. The HI-AWARE consortium would like to extend their sincere gratitude to session chairs, keynote speakers, panellists, facilitators, and rapporteurs for their contributions throughout the conference. The Consortium highly appreciates the whole-hearted efforts of the professionals and supporting staff of the Bangladesh Centre for Advanced Studies (BCAS). Finally, the Consortium gratefully acknowledges the support of the UK's Department for International Development (DFID) and Canada's International Development Research Centre (IDRC).

Background

The Himalayan Adaptation, Water, and Resilience (HI-AWARE) Research on Glacier and Snowpack Dependent River-basins for Improving Livelihoods is one of the four consortia of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA). HI-AWARE conducts research, pilot interventions, and capacity building, and encourages policy engagement with climate resilience and adaptation in the mountains and flood plains of the Indus, Ganges, and Brahmaputra river-basins. The HI-AWARE Consortium is led by the International Centre for Integrated Mountain Development (ICIMOD). The other members are the Bangladesh Centre for Advanced Studies (BCAS), The Energy and Resources Institute (TERI) in India, the Climate Change, Alternative Energy, and Water Resources Institute of the Pakistan Agricultural Research Council (CAEWRI-PARC), and the Alterra-Wageningen University and Research Centre (Alterra-WUR). HI-AWARE is supported by the UK's Department for International Development (DFID) and Canada's International Development Research Centre (IDRC).

HI-AWARE organizes an annual Climate Change Adaptation Policy and Science (CCAPS) conference on a rotational basis in the four HI-AWARE participating countries, to build a platform for adaption and resilience research in the region, and to create synergies with actions currently conducted or proposed by other actors. CCAPS conferences bring together researchers, policy-makers, and stakeholders working on climate change adaptation, and facilitate the exchange of results and ideas.

The first CCAPS conference was merged with the International Conference on Mountain People 'Adapting to Change: Solutions Beyond Boundaries Bridging Science, Policy, and Practice' (http://www.icimod.org/adapthkh), held in November 2014 in Kathmandu, Nepal. The second CCAPS conference was organized from 24-25 February 2016 in New Delhi, India.

In continuation of this series, BCAS, in collaboration with other partners of the HI-AWARE Consortium, organized the third CCAPS conference in Bangladesh. The one-day event was held on 6 February 2017 in Dhaka. It brought together ninety six participants representing the HI-AWARE research team from Bangladesh, India, Nepal, Pakistan, and The Netherlands, and government agencies, private sector, research institutes, and NGOs working in Bangladesh.

Executive Statement

The 3rd Climate Change Adaptation Policy and Science (CCAPS) conference was held on 6 February 2017 in Dhaka, Bangladesh, organized under the Himalayan Adaptation, Water, and Resilience (HI-AWARE) research programme. HI-AWARE is one of four consortia of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) supported jointly by Canada's International Development Research Centre (IDRC) and UK's Department for International Development (DFID). The conference comprised five sessions: the inaugural and concluding sessions, and in-between three technical sessions on: (i) climate change adaptation (CCA) science and practices in the Hindu Kush Himalayan (HKH) region; (ii) CCA policy in water-related livelihoods; and (iii) scaling-up innovative CCA practices in the HKH region.

Dr Atiq Rahman, Executive Director of the Bangladesh Centre for Advanced Studies (BCAS), welcomed all participants in the conference. He mentioned the linkages of HI-AWARE with CARIAA and global issues like the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015-2030.

Then Dr. Philippus Wester, Principal Investigator of HI-AWARE based at the International Centre for Integrated Mountain Development (ICIMOD) in Kathmandu, gave an overview and progress so far of HI-AWARE research in the Indus, Upper Ganga, Gandaki and Teesta river-basins. He mentioned headline activities and highlighted achievements of HI-AWARE, which are listed in the inaugural session details.

Dr Kallur S. Murali, Senior Programme Officer of IDRC, gave an overview of CARIAA. He pointed out that CARIAA is a new concept to work together at regional and even global level in similar hotspot regions that are most vulnerable to climate change. Currently, CARIAA is supporting four consortia in deltas, semi-arid lands, and glacier and snowpack-dependent river-basins in Africa and Asia. In Bangladesh, two consortia are operating: HI-AWARE in river-basins by Bangladesh Centre for Advanced Studies (BCAS), and Deltas, vulnerability and Climate Change: Migration and Adaptation (DECCMA) in the delta region by Bangladesh University of Engineering and Technology (BUET) mainly.

Dr Tasneem Siddiqui, Chair of the Refugee and Migratory Movements Research Unit (RMMRU) and Professor of Dhaka University, gave special remarks and shared her thoughts on migration under DECCMA. She mentioned that migration is multi-causal and may happen in a certain period in any particular region, but migration should be taken as a positive adaptation to climate change. She emphasized the need to incorporate migration issues in national adaptation policies.

Lastly, Dr Rahman observed that it is not a matter for scientists and researchers to push for a certain policy; rather, policy-makers should first understand scientific outputs. So, it is our duty to make them understand.

Technical session-1 (TS1) on adaptation science and practices in the HKH region was chaired by Dr Eddy Moors, Professor of Wageningen University and Research Centre (WUR) in The Netherlands and Steering Committee member of HI-AWARE research. He talked of an urgent need for science-based action for climate change adaptation.

Dr Dwijen Mallick, Fellow and Director of

BCAS, presented the keynote paper on adaptation science and practices in the HKH region and South Asia for which he identified gaps in scientific knowledge regarding the extent and rate of climate change at regional and local scales. Scientific research should take into account local and experimental as well as indigenous knowledge in understanding climate change trends, local impacts, and vulnerability. In HI-AWARE research, current coping and adaptation practices and options with climatic stresses have been explored in key impacted areas including agriculture, water, health, infrastructure, livelihoods, energy, and habitats in four river-basins. For instance, in the lower Teesta floodplains in Bangladesh some short duration and drought tolerant crops such as rice, maize, potato, and pumpkin are now grown instead of traditional paddy.

Dr Mallick closed with some questions to the audience for reflection.

In the panel discussion of TS1 were three panellists: Dr Arun B. Shrestha of ICIMOD, Ms Suruchi Bhadwal of TERI, and Prof. Umme Kulsum Navera of BUET. They had been asked with specific questions to answer on contemporary, climate-change adaptation science and practices in the HKH region.

Dr Shrestha talked about the big picture of the HKH region in the context of climate change impacts and implications for adaptation. He suggested that this region should be studied as one hotspot of climate change impacts in different sectors and corresponding adaptations. In the whole HKH region the most important phenomenon is that dry areas are getting drier and wet areas wetter due to changing rainfall variability. The cryosphere is likely to reduce dramatically in the future, when this reduction could be somewhere 20% in the Indus basin and 70% in eastern basins. On the other hand, the monsoon intensity may be more in future, so the reduction in overall water availability may not be as much as we thought it would reduce 5 to 10 years earlier. Now this phenomenon is revealed, and we need more scientific evidence to understand all such phenomena and the changes likely to happen. When we can understand these changes, challenges could be turned into opportunities.

Ms Bhadwal dealt with prioritizing adaptation options based on her experience in India. She emphasized the importance of stakeholders' engagement for the most appropriate adaptation options for the community by letting stakeholders at different levels prioritize themselves. A multi-criteria analysis has been applied successfully in some areas in India, particularly at HI-AWARE study sites. It may be a good method for prioritizing adaptation options. There are differences in views of different stakeholders, e.g., NGOs and community-based organizations rely mostly on soft measures, while government agencies are more inclined to structural measures. Then again, academic persons are keen to choose ecologically sound options for implementation. The fact is different stakeholders have different priorities and this gives us directions for future adaptation needs.

Prof. Navera elaborated on the major climate change challenges in Bangladesh with respect to water management and livelihoods. She stressed on the integration of the three groups - scientists, policy makers, and local people. The communication of scientific results should be much easier for the non-scientific community. A lack of coordination or communication among scientists working on similar issues is also an issue. Water is the key to all life, so we all need to understand properly the water cycle as a whole and the impact of climate change on it. In the long run, we need to make the ecosystem healthy; otherwise sustainability cannot be maintained anymore.

Ts2 on CCA policy in water and livelihoods in the HKH region was chaired by Dr Ajay Mathur, Executive Director of TERI and Steering

Committee member of HI-AWARE, Dr Abu Syed, Fellow and Co-Principal Investigator of HI-AWARE research at BCAS, presented the keynote paper titled 'Climate Change Adaptation Policy in Water and Livelihoods in the HKH Region'. He mentioned that the HI-AWARE team had been attempting to understand the water cycle in changing climate scenarios, multi-level transboundary water governance structures, and mechanisms of regional cooperation. Changed temporal and spatial patterns of rainfall have consequences for runoff, surface, and groundwater storage as well as river flow regimes. There is also a greater likelihood of extremes - droughts and floods in the Indus, Ganges, and Brahmaputra basins. These influence water availability and cause stresses in agriculture, livelihoods, human settlement patterns and movement, water supplies, sanitation, and irrigation. All this will lead to changes in human health, food and water security, and wealth. A holistic approach to climate change considering basin level river management should be taken into consideration to save lives and livelihoods in the regional level. He also pointed out the importance of small to medium infrastructures with soft solutions along with larger interventions referred to above, which could be planned at larger river basin level.

In the panel discussion of TS2 were four panellists: Mr Khandaker Mainuddin of BCAS, Dr Arabinda Mishra of ICIMOD, Ms Farah Kabir of Action Aid Bangladesh, and Prof. Rezaur Rahman of BUET. They had been asked with specific questions to answer on the current CCA policy on water and livelihoods in the HKH region.

Mr Mainuddin took up the question of the major CCA policies in Bangladesh and how these policies may be implemented better. He observed that Bangladesh has many policies related to CCA, but, as a third world country, it depends mainly on the availability of resources for their implementation. There are three pillars of sustainable development - social, economic, and environmental. The question is whether they have equal weight. We have degraded the environment and it is no longer sustainable. Maladaptation is a serious issue and it may become harmful for people and the environment. We have to implement the policies very carefully so that, in the long run, the implemented CCA would be a fruitful one.

Dr Mishra was asked about the CCA policy framework in South Asian context - whether there is any difference between top-down and bottom-up issues. He stated that, except India and Pakistan, all INDC countries follow adaptation framing policies. A bottom-up approach should be taken into consideration in the planning of CCA measures at local level. Yet, this bottom-up tool may sometimes not be effective because of political narratives. So, here is a paradox: adaptation should be done at local level, but political statements on adaptation are absent from public policies. That is why a top-down approach comes first in drawing up a climate-related scenario.

Ms Kabir was asked about key CCA issues from a gender perspective. She first pointed out that we are still discussing a land-centric adaptation process, whereas we need to move to a water-centric adaptation process. Policies are not gender neutral. Besides, an adaptation policy should consider norms and practices. Many adaptation policies originally were not gender sensitive, neither are the monitoring and evaluation of projects. Awareness of such 'soft' areas has brought about sensitization. This will ultimately get us to the desired results.

Prof. Rahman was asked how we can plan for CCA, when future impacts are still unclear. He outlined three types of uncertainty that are notable in this connection: biophysical, socio-economic, and commitment to funding what are basically 'uncertainties'. Given all these, the best option is to invest in 'no-regret options' with the available funds. One good example is

reforestation in the coastal areas of Bangladesh, while polders built are seen as maladaptation there.

Ts2 ended with a short question and answer exchange in which the audience engaged actively.

The TS3 on scaling-up innovative CCA practices in the HKH region was moderated by Dr Anjal Prakash of ICIMOD. Dr Kallur S. Murali presented the keynote where he mentioned that IDRC seeks to enhance the well-being of large number of people through these investments accelerating development research to create big impacts with innovative action research and their scaling-up. He showed a documentary of two success stories from the IDRC on scaling-up innovations in Peru and Guatemala.

After the keynote, the audience was divided into five groups according to five pilot action research projects under HI-AWARE research. Participants were busy like people at market places equipped with posters and preparing presentations. The groups rotated after 10 minutes at each market places. In the end, there was a plenary session with five presenters for a short question and answer exchange.

The five action research pilots included: (i) climate and flood resilient housing in Rangpur, Bangladesh by BCAS with technical support from C4RE Foundation; (ii) flood-resilient eco-san toilets in Bihar, India, by Megh Pyne Abhiyan, a strategic partner of HI-AWARE; (iii) spring and watershed management in Sikkim, India, by TERI; (iv) heat stress monitoring in 3 cities in Pakistan, India, and Bangladesh by Alterra-WUR; and (v) use of the 'Touch Table' for research into use by Climate Adaptation Services (CAS), a strategic partner of HI-AWARE as well. The piloting of climate-smart agriculture by Pakistan Agricultural Research Council (PARC) could not be presented as the Pakistani colleagues could not attend the conference.

In the concluding session Dr Philippus Wester thanked all participants and hoped the next CCAPS would be a success in Pakistan. Dr Chanda Gurung of ICIMOD in her concluding remarks observed that the evidence found in hotspots would be beneficial to communities there. As people or communities are differently vulnerable in different landscapes and ecosystems, it is very difficult to cover all dimensions in adaptation. Therefore, science, policy, and practice should be integrated or interact with each other more frequently than has been happening so far. Dr Atiq Rahman concluded the conference saying that if we can give the community some services, that would be great. After 30 years in the field of adaptation, his feeling was that only peer reviewed publications cannot help vulnerable people to adapt. Such publications are only a documentation of work done well. We should do more for poor people that should include a policy change based on scientific findings with an implementation in the field to change the world actually. But that is exactly the whole process of development: when you have money, you can do whatever you want to. The session ended with a vote of thanks by Ms Zakia Naznin of BCAS.

Inaugural Session

The 3rd CCAPS conference began with a welcome address by Dr Atiq Rahman, Executive Director of BCAS. . He discussed the linkages of HI-AWARE with CARIAA and other global processes. In that context, the Monsoon is the real Finance Minister of South Asia

> Monsoon is the real Finance Minister of South Asia
> – Atiq Rahman, BCAS

Atiq Rahman, BCAS noted that CARIAA is now in the 4th year of its 6-year project period. In the last couple of years the whole world has experienced some big changes, especially in the policy arena. One of them is the adoption of 17 Sustainable Development Goals (SDGs) by UN member countries in September 2015. This is important global policy incorporates climate change as an integral part. Another process is the Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030, which all governments have agreed to work with. These processes are integrated with each other and also with the CARIAA programme in different research projects. Dr Rahman observed that science, policy, and practice are in a triangular relation.

Overview of HI-AWARE by Philippus Wester

> HI-AWARE is developing robust evidence to inform people-centred and gender-inclusive climate change adaptation policies and practices for improving livelihoods.
> - Philippus Wester, ICIMOD

Dr. Wester began by thanking BCAS for hosting this 3rd CCAPS conference in Dhaka, before talking about HI-AWARE.

HI-AWARE is funded by IDRC under the CARIAA programme, which may be the largest funded adaptation-research project in the world at this moment. HI-AWARE is conducting research on climate change adaptation in four study basins. These are the Indus, Upper Ganga, Gandaki, and Teesta.

HI-AWARE works in a consortium with partners from 5 countries, namely Bangladesh, India, Nepal, The Netherlands, and Pakistan. The consortium members are:

- Alterra-Wageningen University and Research Centre (Alterra-WUR), The Netherlands
- Bangladesh Centre for Advanced Studies (BCAS)
- International Centre for Integrated Mountain Development (ICIMOD), Nepal
- Pakistan Agricultural Research Council (PARC)
- The Energy and Resources Institute (TERI), India

HI-AWARE has five strategic partners, namely:

- Centre for Ecology, Development, and Research (CEDAR) – India
- Future Water – The Netherlands
- LEAD Pakistan
- Megh Pyne Abhiyan (MPA) – India
- Practical Action – Nepal
- The Mountain Institute (TMI) – India

HI-AWARE is working with nine universities in the region. Currently, 6 Ph.D. and 12 Masters' students are doing their thesis research in HI-AWARE projects. The universities are:

- Free University Amsterdam, The Netherlands
- Karakoram International University, Pakistan
- National University of Sciences and Technology (NUST), Pakistan
- Sikkim University, India
- TERI University, India
- Tribhuvan University, Nepal
- University of Arizona, USA
- University of Rajshahi, Bangladesh
- Wageningen University, The Netherlands

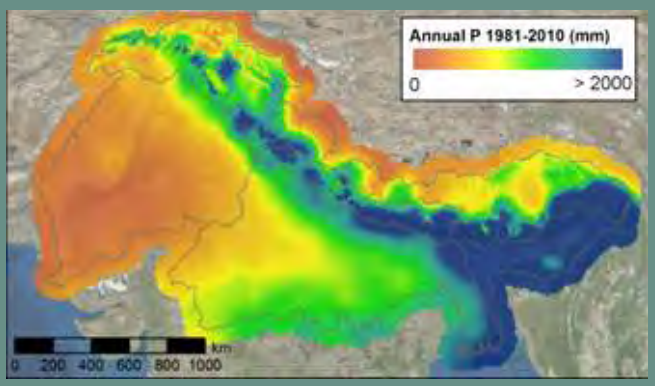
Dr Wester mentioned some headline activities:

- July 2015: HI-AWARE working group meeting and field training on participatory assessment drivers and conditions leading to vulnerability and critical moments in Chitwan
- November 2015: Presentation on HI-AWARE to European Parliament South Asia Delegation
- February 2016: TERI organized 2nd CCAPS Conference and HI-AWARE Academy in New Delhi
- November 2016: HI-AWARE had mid-term learning review at Kathmandu, followed by a HI-AWARE Academy
- September 2016: HI-AWARE scientists represented in the 'International Conference 1.5 Degrees: Meeting the challenges of the Paris Agreement' at University of Oxford and CARIAA 1.5 Degree Meeting in Oxford, the UK

Further, he highlighted some achievements of the initiative so far:

- Strong collaboration and partnership developed among partner institutions
- Situational Analysis in 12 study areas
- External Knowledge Management Centre (KMC) Strategy
- Data Management Policy
- 6 fully supported PhDs (3 women, 3 men)
- 4 partially supported PhDs, out of which 2 have been completed

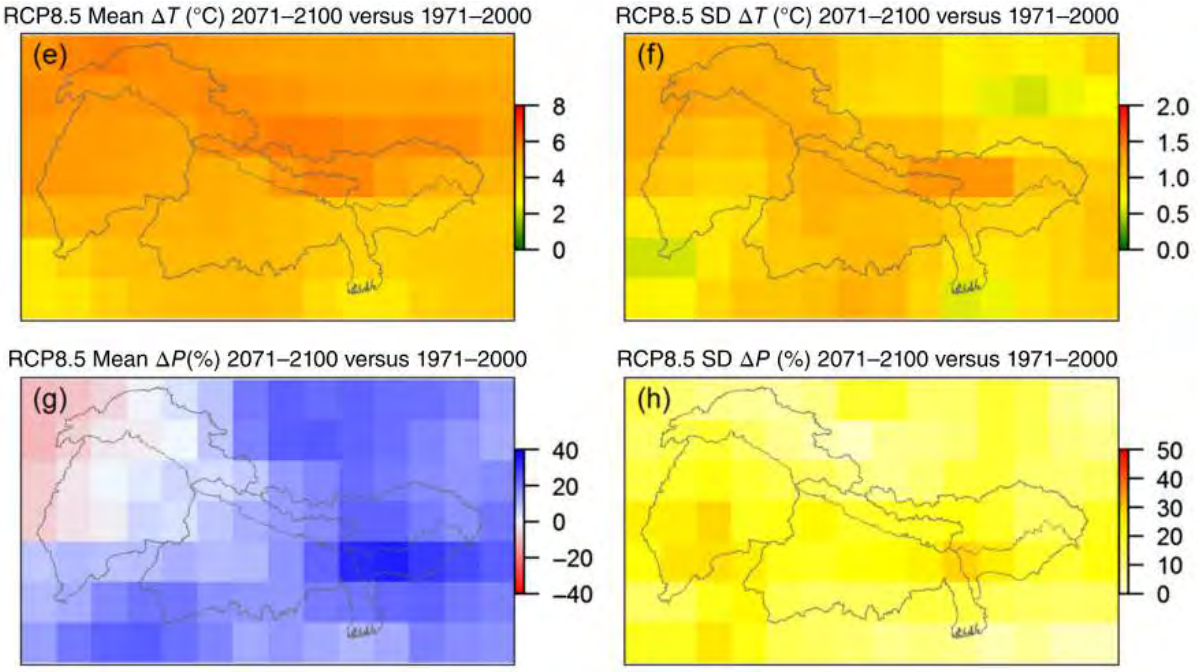
- 24 M.Sc. students (13 women, 11 men)
- 13 peer reviewed journal articles
- 6 Working Papers published; 5 in pipeline
- 63 stakeholder engagement events
- 52 blogs, posters, and infographics
- Research into Use (RiU) Strategy
- Use of Touch Tables in RiU



HI-AWARE completed a high-resolution, historical climate dataset for impact assessment studies, which is a remarkable achievement in this region. A corrected precipitation dataset is calibrated with observed data.

The dataset contains daily precipitation (P), average temperature (Tavg), maximum temperature (Tmax), minimum temperature (Tmin), and reference evapotranspiration (ETref) from 1981 to 2010 with a daily time step. It covers the entire Indus, Ganges, and Brahmaputra basin area (IGB) with a 10x10 km spatial resolution. Additionally, the upstream parts of the basins are covered with a 5x5 km spatial resolution to account for the larger variability in mountainous terrain.

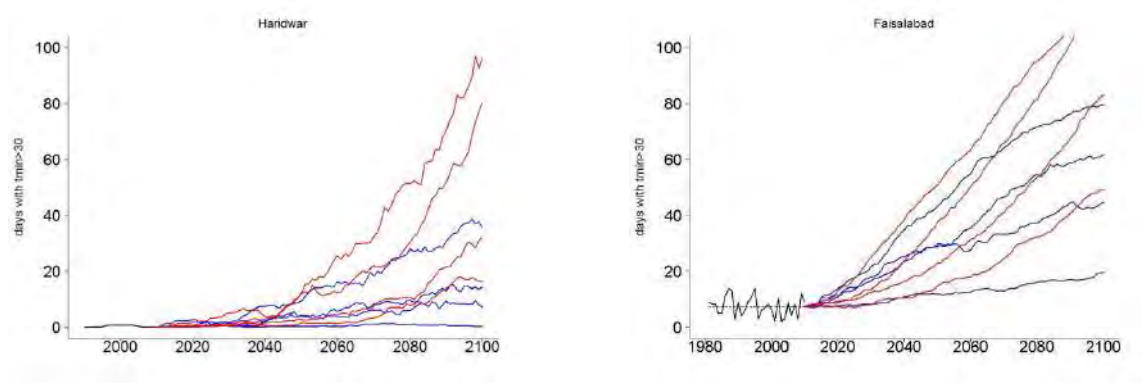
HI-AWARE has also developed high-resolution, future climate scenarios for the IGB up to 2100. The variables are the same as for the historical dataset, viz. P, Tavg, Tmax, Tmin, ETref with a daily temporal resolution. The spatial resolutions are also the same as in the historical dataset: 5x5 km for upstream and 10x10 km for the basins entirely. It was found already that the average temperature will increase by 1.7-3.5oC during 2071-2100 compared to 1971-2000 for RCP 4.5, and by 3.6-6.3oC for RCP 8.5.[1] The



temperature will increase more in the mountains than the plains.

The December 2015 Paris Agreement included an 'aim to limit the (global) temperature increase to 1.5°C' by 2100. The Intergovernmental Panel on Climate Change (IPCC) will publish a special report on the 1.5 °C increase in 2018. It had identified a lack of scientific evidence on the impacts of 1.5 °C and 2 °C. HI-AWARE studies the impacts of 1.5 °C vs. 2 °C for main climatic indicators in the Indus, Ganga, and Brahmaputra river-basins. Coupled Model Intercomparison Project Phase 5 (CMIP5) projections of General Circulation Models (GCMs) show that a 1.5 °C global average temperature increase implies a 2.0°C increase for the three study basins.

Dr Wester provided an example how climate scenarios may be tailored (generation of location, time, and purpose-specific data) with the number of hot nights (minimum temperature above 30°C) per year in different climate scenarios. He showed two examples from Haridwar, India, and Faisalabad, Pakistan. The increase of the number of hot nights will be a big concern for the region in the coming years.



HI-AWARE is integrating science, policy, and practice in this region with scientists, policy-makers, and practitioners; something BCAS has been doing for the last 30 years.

Overview of CARIAA by Kallur Subrammanyam Murali

Dr Murali thanked everyone at the start and continued, noting that carbon emissions are now at a crucial stage. IDRC, DFID, and other donors had agreed to fund research on climate change adaptation.

CARIAA is a new concept to work together at regional or even global level for similar hotspot regions that are most vulnerable to climate change. Currently, CARIAA is supporting four consortia in deltas, semi-arid lands, and glacier and snowpack-dependent river-basins in Africa and Asia. HI-AWARE is one of the 4 consortia under CARIAA.

> CARIAA uses the hot spot as a lens for research on common challenges across different contexts.
> - K. S Murali

[1]RCP stands for Representative Concentration Pathway. RCPs are four greenhouse gas concentration (not emissions) trajectories adopted by the Intergovernmental Panel on Climate Change (IPCC) for its Fifth Assessment Report (AR5) in 2014. It supersedes the Special Report on Emissions Scenarios (SRES) projections published in 2000.

In Bangladesh two research consortia are operating: HI-AWARE and DECCMA (in the delta region). DECCMA is conducted by the Bangladesh University of Engineering and Technology (BUET). The others are ASSAR and PRISE. ASSAR is working on barriers, enablers, and limits to effective, sustained, and widespread adaptation in semi-arid regions. PRISE is working with key policy and economy decision-makers to identify choices needed to be made for investment and development options.

Dr Murali felt that with all such research going on, we shall ultimately find some robust evidence that we could incorporate into the policies of hotspot countries. One new thing is that parliamentarians may also be included in our researches to upscale the findings to national policy levels.

Special remarks by Tasneem Siddiqui

Dr Siddiqui shared her experience with working on migration issues. She stressed that climate change is a complex thing that impacts society. In the complex of changing climate, migration is also a very complex phenomenon. In this process, people, science, and policy are linked with one another. In the bargain, it is not easy to connect policy-makers and people.

Migration is multi-causal, it does not occur due to a single cause. It may happen in a certain period in any particular region. It may happen during any kind of disaster. However, in some other context, migration may be really positive, if people can adapt to their new living environment.

> Through timely and appropriate intervention, migration can be turned into a major development enhancing process.
> - Tasneem Siddiqui, RMMRU

Dr Siddiqui shared some findings from her research under the DECCMA consortium. Her research team found 55 hotspot villages where every household had people who had migrated. In each household 1 or 2 persons had migrated to earn some income. Of these around 20% were international migrants, the rest were domestic. The international migrants would earn much foreign currency, but were not supported by related government agencies and service providers at different scales. At local level in many cases a large-scale adaptations strategy and programme do not work well for migrant people. Family members of international migrants left behind in Bangladesh also migrate to nearby cities. Thus cities are growing in unplanned ways. Therefore, urban growth centres should be decentralized with improved services to accommodate migrants in different areas.

Dr Siddiqui emphasized the need to form a national adaptation policy, where migration issues would also be addressed. She mentioned that people living in the Teesta or Brahmaputra basin are mostly short-term migrants. Hence, new policy interventions are needed, so that this would not be a harmful situation.

Dr Atiq Rahman commented that it is not a matter for scientists and researchers to push for a certain policy; rather, policy-makers should first need to understand science outputs. So, it is our job to make them understand. For example, mitigation is now a matter of negotiation. If we cannot mitigate, we have to adapt more, mainly with respect to vulnerable groups. Therefore, vulnerability increases, if we cannot mitigate. If governments cannot realize the plight of vulnerable people, the situation will even be worse.

Technical Session

1 Adaptation Science and Practices in th HKH Region

Keynote Speaker	Dwijen Mallick, BCAS
Panellists	Arun B. Shrestha, ICIMOD; Suruchi Bhadwal, TERI; Umme Kulsum Navera, Bangladesh University of Engineering and Technology (BUET)
Session Chair	Eddy Moors, Alterra-WUR

Integration between science, policy, and practice and engagement of different actors in discussions and actions related to climate-change adaptation are crucial. The HKH region provides livelihoods to more than 210 million people. Given the vulnerability to climate change, there is an urgent need for science-based action for climate change adaptation. This session aimed to break down boundaries between science and practices of adaptation to climate change in the river-basins of the HKH, and to foster a rich discussion between policy-makers, researchers, and practitioners. It also provided further opportunities for engagement and integration of efforts of various actors.

Key Note by Dr Dwijen Mallick, Fellow of BCAS

Climate change impacts are high in the Hindu Kush Himalayan (HKH) region and South Asia on the whole. People of the region are facing differentiated vulnerabilities due to biophysical stresses and socio-economic drivers and conditions. There is clearly a demand for scientific knowledge to keep up with the rapid pace of climatic change and to support adaptation strategies. While greater attention has been paid to knowledge creation in the region in the last decade, climate science is still weak. There are gaps in scientific knowledge regarding the extent and rate of climate change at regional and local levels. Research and scientific inputs are needed to improve understanding of current and future trends of climate change, and its impacts, multiple risks, and people's vulnerability. Various sciences have to guide and manage research as well as produce and communicate knowledge to policy-makers and people affected.

While, in some cases, scientific knowledge gives support to policy formulation, people are not engaged in the science-policy discourse in general. We promote the science-policy and people-practice interface as critical input into sustainable development. An early effort in this regard was the organization of a Climate Change Science-Policy Dialogue in Dhaka in 2010. A series of conferences on Community-Based Adaptation (CBA) jointly organized by the International Institute for Environment and Development (IIED) and BCAS would be a great example in this respect as well. The first international CBA conference was held in Dhaka in 2005. It not only discussed the approach of CBA but also focused on a science-policy and adaptation practice interface.

The HI-AWARE project has widened the discourse on the science-policy and practice interface. It has also tried to influence adaptation policy and practices in the HKH region through a series of CCAPS conferences.

The application of social science methods and tools such as survey, macro and micro-economic analysis, participatory action research (PAR), ethnographic location-related research, and vulnerability and capacity assessment can guide the development of appropriate adaptation responses at local and community levels. ICIMOD has developed a Scientific Framework on Adaptation, linking science and practice with policy implementation. Scientific research should take into account local and experimental as well as indigenous knowledge in understanding climate change trends, local impacts, and vulnerability. A key example may be found in the Transforming Climate Knowledge with and for Society (TRACKS) project in Northeast Bangladesh, which aims to enhance the interface between modern science and local knowledge systems. The TRACKS project brings science and society together in an interacting platform to co-produce high quality knowledge on adaptation and livelihoods.

Societies have a wealth of indigenous knowledge of their environment, which often enables them to adapt to the changes they are experiencing. Scientific knowledge, resources support, and technological innovation may make the adaptation process more effective and result-oriented in terms of reducing risks, maintaining livelihoods, and achieving better development outcomes. Adaptation has become

embedded in some planning processes with more limited implementation. Engineered and technological options are commonly implemented as adaptive responses, often integrated within existing programmes in integrated water management, agricultural development, and disaster risk reduction in the developing world, including South Asia.

Adaptation measures are suggested in relation to:

- Increased riverine, coastal, and urban floods leading to widespread damage to infrastructure and habitat, and livelihood and economic losses
- Increased risk of drought and heat stress in water and food storage causing malnutrition
- Disaster preparedness for and early warning on floods, cyclones, and drought

In HI-AWARE, we have conducted participatory studies in the four river-basins in high mountains, mid-hills, and floodplains to gain a comprehensive understanding of local conditions and vulnerabilities as well as adaptation needs and practices. Current coping practices with climate stresses as well as adaptation practices and options have been explored in key impacted areas including agriculture, water, health, infrastructure, livelihoods, energy, and habitats.

In the lower Teesta floodplains key climate factors are frequent floods, river bank erosion, erratic rainfall, drought, heat and cold wave. Farmers are changing their framing and cropping patterns in the context of increasing impacts of flood and drought. Short duration and drought tolerant crops such as maize, potato, and pumpkin (winter and dry season crops) are grown instead of traditional paddy. Technological improvement and innovation are introduced in irrigation, and drought and water management.

> Co-production is increasingly prevalent in climate change adaptation literature, though the concept is employed differently across fields of science and practice.
>
> - Dwijen Mallick, BCAS

The inclusion of social dimensions and people's perspectives in research, particularly in risk and vulnerability assessment and planning adaptation, remains a big challenge. Some other challenges are the co-production of knowledge and effective dissemination through research into use (RiU) and meaningful science-policy and practice interfaces.

Dr. Mallick threw some questions to the audience for reflection. They were:

How do we ensure adaptation planning along with effective engagement of communities, practitioners, and policy makers?

How do we link vulnerability with gender responsive adaptation and resilience for long-term development outcomes?

How to ensure the determinants and effectiveness of adaptation?

What socio-economic and institutional factors contribute most to adaptive capacity building?

How to establish links between SDGs and climate actions?

What are the likely barriers and limits of adaptation? Knowledge gaps?

How to measure the process and outcomes of effective adaptation?

Arun B. Shrestha, ICIMOD

What is the big picture emerging in the HKH with respect to climate change impacts and its implications for adaptation?

The post-Paris world is talking about coping with the impacts of +2°C global warming, possibly at least +1.5°C. There is a serious debate whether we can limit global warming to +1.5 or not and in the current global political situation we do not know the trajectory of climate developments in the future. In HICAP, HI-AWARE, and other initiatives of ICIMOD and partners people have been working to provide information and evidence on the impacts and consequences of +1.5° C global warming.

1.5 °C of global warming could imply an average of 0.3 to 0.7°C more in the HKH region. And in some places in the mountains it could increase to 2.2 to 2.5°C , when it reaches 1.5°C global warming.

> 1.5°C increase of global temperature implies 2°C for Indus, Ganges and Brahmaputra basins
> - Arun B. Shrestha, ICIMOD

Hence, in the global context, the whole HKH region is actually a hotspot of climate change and within the region, there are localized diversities. There is a global phenomenon called 'elevation-dependent warming'. We can see that higher elevations are warming more rapidly than the plains and that is happening in this region as well. We will see progressive warming trends as we go higher. So, the mountain ranges are experiencing more warming than the plains. These are the regions, which are actually hosting the cryosphere, the main water tower of the region and supply water to the major river-basins. Therefore the high altitude areas may be considered hotspots in larger snowpack-dependent river-basin hotspots.

Another phenomenon in the region is that dryer areas are getting drier and wetter areas wetter due to changing rainfall variability. And we know which areas are drier (arid and semi-arid) in the region, whereas some other areas are experiencing strong monsoon influences. Areas that are regularly flooded are likely to get more floods and naturally arid or semi-arid areas will go through drier episodes. In this way, those areas may also be termed hotspots.

There are many things we really need to look into for the future. There might be some blessings within these changes also, if we can capitalize on some of the changes that might happen. Challenges may be turned into opportunities. Cryospheres are likely to reduce dramatically in the future. This reduction could be somewhere around 20% in the Indus basin and 70% in eastern basins. On the other hand, the monsoon intensity may be more in future, so that the reduction in overall water availability is not as much as we thought it would reduce 5 to 10 years ago.

These kinds of phenomena are revealing, but we need more scientific evidence to understand all of them and the changes likely to happen.

There are local effects as well: some areas are not cryosphere dependent, while other areas are heavily cryosphere dependent. Changes in cryosphere dependent areas might be important. The average amount of water availability is not going to change that seriously, for in some areas there may be more water. Therefore, if we can understand these changes, challenges could be turned into opportunities.

Suruchi Bhadwal, TERI

What are your views on prioritizing adaptation options from your experiences in India? What would be promising tools to use?

Since climate change is evident and likely to continue over the next decades, identification and adaptation practices have become difficult. Moreover, a better degree of understanding of risk at local level is required to be able to plan for adaptation. When we talk about adaptation and what measures to take at local level, we should be aware of particular risks that are prominent in a particular region, their frequency and intensity, and how they are likely to change in the near future given the changes in climate.

> It is very important to involve stakeholders from multiple levels as each level corresponds with different priorities in adaptation options.
>
> - Suruchi Bhadwal, TERI

There are many ways to adapt to a particular risk; there are many measures we can take. But, practically speaking, we cannot actually go ahead and implement all those options. So we need methods to be able to decide how to take forward some interventions on the ground and how we may actually prioritize what should be taken forward. One of the main reasons why we need to prioritize is because, at the end of the day, the investments in the world for implementing those adaptation options are immense. We would choose options we think would make a greater impact for the moment and would help in adapting risks in the future as well, because they would benefit the people that are affected by these particular stresses.

Multi-criteria analysis has been a special tool we have applied successfully in some of our studies in the past as well as in the context of HI-AWARE. We are using it for discussions with various stakeholders to see how different adaptation options could be prioritized.

In the Upper Ganga basin we had a stakeholder consultation where we used this tool very effectively in terms of identification of certain options and their prioritization. Very interestingly, we observed in this exercise in the basin that, first and foremost, there is a mix of measures that have been prioritized and granted by stakeholders. These included hard and soft measures that have been identified as structural and non-structural measures. It gives us a sense of direction that ther?e are various options that actually count in the context of a particular risk. In this case it was exposure to extreme floods and heavy precipitation, when stakeholders felt measures should be taken forward for implementation.

Soft measures include outreach and capacity building and raising public awareness on related issues. On the other hand, structural measures refer to retrofitting of current infrastructure, building shelter belts in case of floods people are exposed to, setting up of early warning systems, etc.

There are differences in views of different stakeholders. For example, NGOs and community-based organizations opt mostly for soft measures to be considered, while the government is more inclined to take structural measures and measures concerned with cost effectiveness. In that case, finance is important. Government people are more tuned to look at structural measures in terms of policy and planning and embedding them accordingly. Academic persons are basically seen to choose

ecologically sound options for implementation. The fact that different stakeholders have different priorities gives us directions for future adaptation needs. This also gives us a chance to mark the most important option for all stakeholders.

Umme Kulsum Navera, BUET

What are the major climate change challenges in Bangladesh with respect to water management and livelihoods?

We have to realize that climate change is really happening. Everybody understands that, but translations between the scientific community, policy makers, and people, are weak in our country. We need a better understanding between these three groups. Much scientific research is going on, but we need translators who can make it understandable to policy-makers. And it is not only a matter of keeping some scientific journals in place.

Policy-makers also have to realize that some changes are really going on. Climate change may be called a Delta x parameter. Hence, any new thing will be X plus Delta x. Policy-makers need to take this Delta x factor very seriously. When it comes to people, they do not understand X plus or minus Delta x, they only understand how to adapt themselves to a particular change.

There should be simpler ways to carry research findings back and forth. The harder we make them, the less they reach to people. These things should be made much easier.

Another challenge is the lack of coordination between the most advanced researchers: someone is doing something extraordinary and nobody knows about it, while almost 40% of the researchers are doing the same thing again and again.

As for climate change in Bangladesh, we should pay attention to one more thing and that is population, the hardest driver. One projection says the population will be around 180 million by 2025 and the country will have more urban population than rural. It is predicted that more than 60% population will live in urban areas in 2050. That will have a tremendous effect on socio-cultural and water management issues in urban areas. What will be the effects together with climate change and increasing urban population? We should take care of climate change issues more seriously considering other socio-economic drivers and conditions.

We still do not know what would be the consequences if more people start living in urban areas. That would be another management issue to deal with. There is also climate change in coastal areas where there is salinity intrusion, and we have to think about a salinity-based management system over there. As for migration, what would be its effect on coastal areas, what would be the livelihood for people in those changing scenarios?

> There is a lack of coordination even among the researchers in Bangladesh
>
> - Umme Kulsum Navera, BUET

Further, what would be the water resources and hydrological system in a 1.5°C global, average

temperature change? What would be the total volume of water resources? What would be the spatial-temporal distribution of water in different seasons?

The scientific community has to guide policy-makers on these issues and specific policies should be designed for these scenarios. Otherwise a wrong management will come and people will say things like the policies are not right.

Agriculture is another sector we need to pay attention to. How will climate change affect it, as more people are going to live in urban areas? Another triggering factor is that the lifestyle of people, food habits, and agricultural pattern will change. Also, the water resources system will change according to those triggering factors. Forestry is growing at 7-17% during the last 10 years. We have to make the ecosystem very healthy, otherwise livelihood and the lives of people will be in peril.

Discussions

Fair share issue of trans-boundary water

Ms Bhadwal: River-basins become very important when talking about trans-boundary impacts and the implications on society and natural systems. How we define fair share is actually part of the critical components of the discussion among countries where waters are being shared. Also, of course, the discussion is held at political level. It is also important to have a better understanding of these issues.

In India, the government had launched programmes on the interlinking of rivers many years ago. Interlinking refers here to something not across countries but within one country. India is trying to see where there is a surplus and to transfer it to basins with a deficit in terms of water resources, to address deficit issues in certain parts of the country. This has been a topic of discussion within the country for years. It has proved challenging to define what to consider surplus in a particular area to transfer to other areas to replenish deficit.

If there would be such discussions across countries, it would be far more difficult to take things forward. However, some area of intervention is required, where countries could come together to share water and come to agreements that basically benefit societies at large.

Dr. Navera: A river is a natural system that goes through different countries, and nobody governs it. If there is equity, this water should be for the people who live beside the river. If there is equity and respect for the law for rivers, something good should come out of it all.

Dr. Moors: It is important that scientists also help to work on what is equity on the basis of data that is not so readily available, you have to go through a difficult process. All over the globe, we have been able to settle some agreements on the sharing of water. As climate change is there, it is good to look at those agreements, they are still the same. For equity reasons, we should change our behaviour towards water considering climate change impacts.

Dr. Rahman: Water can be shared between two or more countries. Let us take the simple case of two countries. When there are three flows, one has to consider a flow between one country, a flow between another country and a flow of the river itself. The river has a right to flow. The river also has a definitional

issue - how much minimum water is required for it to flow easily. This strict ratio has to be taken into consideration. The points of equity and agreement, all these are part of the process. But the principle has to be equitable share, and these are principles now globally accepted.

I am thinking of the situation we experience between our countries with respect to the Ganges. There has been an agreement on the Indus between Pakistan and India, while we are talking about a potential agreement on the Teesta.

There are a number of critical issues, but sharing of a river has to be considered on the basis of above mentioned three major water needs, and this often gets hampered. Out of a need for extraction of more water, we destroy the river in the bargain.

Technical Session

2 Adaptation Policy in Water and Livelihoods

Keynote Speaker	Md Abu Syed, BCAS
Panellists	Khandaker Mainuddin, BCAS; Arabinda Mishra, ICIMOD; Farah Kabir, Action Aid Bangladesh; Mohammad Rezaur Rahman, BUET
Session Chair	Ajay Mathur, TERI

People are facing differentiated vulnerabilities in the HKH region due to biophysical stresses and socio-economic drivers and conditions. Sciences are emerging in the region to understand the current and future trends of climate change, impacts, multiple risks, and vulnerability. Translating science into good policies is important. Scientific information on impacts and level of vulnerability is needed to support national policy, adaptation planning, implementation, and monitoring the outcomes of adaptation. Better outcomes of science can be achieved by including policy makers in research at the outset to identify their needs and priorities, tailoring information specifically to different audiences, and improving scientists' understanding of the policy-making process and local action.

Keynote presentation by Md Abu Syed, BCAS

There is a changing hydrology pattern, which affects the lives and livelihood of the local people in the three river- basins where HI-AWARE is working.

The HI-AWARE team attempted to:

- Understand water resources in changing climate scenarios, their linkages with peoples' lives and livelihoods
- Study multi-level transboundary governance structures and mechanisms for regional cooperation
- Review over a hundred papers and policies
- Evaluate eight treaties on rivers in the HKH
- Review adaptation practices in consultation with communities
- Pilot adaptation options with potential of sustainability

We try to understand what adaptation practices are going on and what are the adaptation options with a potential of long-term sustainability. In HI-AWARE we are working on adaptation options in practice in three basins that can be replicated or taken to other basins with similar ecosystems. When an adaptation parctice works well in Bangladesh, it may be replicated in Pakistan, India, and Nepal, or vice versa.

Climate change is altering the hydrological cycle in many ways. The temperature is rising, so the monsoon is getting affected. The changed temporal and spatial patterns of rainfall have consequences in runoff, surface, and groundwater storage as also river flow regimes. There is also a greater likelihood of extremes - droughts and floods in the Indus, Ganges, and Brahmaputra basins.

These influence water avaiablity and cause stresses. Agriculture, livelihoods,human settlement patterns and movement, water supplies, sanitation, and irrigation will all be affected, and in the end will lead to changes in human health, wealth, and security.

When irrigation gets affected, agriculture production is affected. There are not only agricultural impacts, people are also being displaced due to flood and river bank erosion. Recurrent floods and riverbank erosion make millions homeless every year. The poor living in the floodplains and chars (sandbars in the river as a 'by-product' of hydro-morphological dynamics) build houses, which are less resilient to hazards. During floods these houses get inundated and households lose their assets, such as food, safe water, poultry, livestock, fodder,and homestead vegetable garden. These drive them out of their livelihoods and shelter. To cope, entire households, or more often male household members, migrate temporarily to a different village or nearby city in search of work. Most of the people living close to river or in the Chars have to shift their houses over twenty times in their lifetime. If the whole family migrates, they are likely to have to live in poor conditions or without livelihoods. This causes social, cultural, and psychological stresses on people particularly women, children, the elderly, and the disabled.

Further, much sedimentation takes place because of flash floods and seasonal floods, and sand casting (layer of sand deposited on paddy land) is taking place there, so a farmer cannot cultivate these fields. Sometimes sand could go beyond 1-2 metres and then poor farmers cannot afford to remove it and farm the land.

In the HKH region the upstream use of trans-boundary rivers affects the availability of water in the downstream region. River flows do not follow political borders. It may be noted that river bank erosion and sedimentation or braiding of the river is a basin-level geomorphological issue. Hence, it requires a solution at basin-level. In the Teesta floodplain, for example, the river channel had shifted. The river bed is braiding, it has now sand crusts where 5 years ago water used to flow. Dr Syed presented a map showing the channel migration of the Teesta in the period 1975-2016. To illustrate the influence on human settlement of the changing Teesta river pattern he gave the example of Mr Ramjan Ali who had to change his home 11 times in the last 15 years.

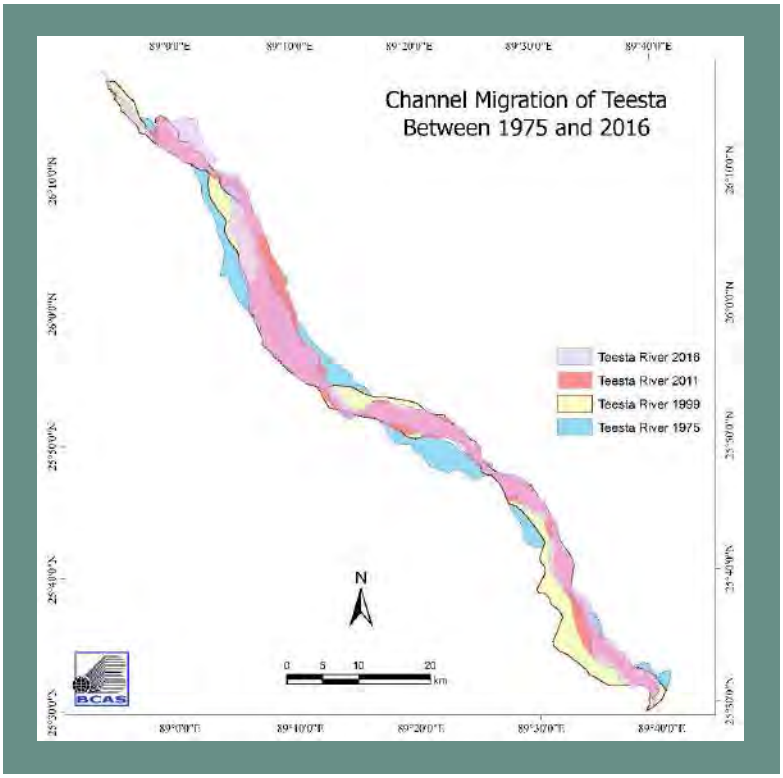
The principal objective of water resources management in the HKH region should be to develop and manage trans-boundary water resources efficiently and sustainably with respect to both ecosystems and human lives. The policy reviewed should follow bilateral and multilateral treaties for worthy alliances. But the ideal of trans-

> It is noteworthy that riverbank protection need not always be with a large infrastructure.
>
> – Abu Syed, BCAS

boundary water governance is as yet far away. For example, the politics and governance water distribution in India are decentralized, and state governments can express their demand. This type of governance complication creates a water crisis. So, highly populated downstream areas of rivers (as in Bangladesh) should be taken into consideration along with less populated upstream areas of the rivers (such as in Nepal and India).

If basin-level river management issues are not addressed in a holistic approach in Bangladesh with regional (basin sharing countries) programmes, river training, capital dredging or other river management works, there would be no sustainable solution.

The governance of water issues in India is fragmented and decentralized. So is the governance of India's rivers, because the states, rather than the central government, have primary jurisdiction over the management of water within state borders. For this reason the governments of Nepal, Bhutan, and Bangladesh have to negotiate (that is, hold formal and informal discussions on mutual interests) with Indian states in addition to the central government. This adds an extra layer of politics, bureaucracy and difficulty to trans-boundary water governance in the region.



The National Water Policy 2012 (NWP) of India accepted the principle of basin as a unit of development and advocated international agreements with neighbouring countries on a bilateral basis. It also made provisions for hydrological data exchange with respect to international rivers on near real-time basis considering practicability and feasibility of easy implementation. On the other hand, the NWP 2012 may hinder basin-level river management, because it involves more than two countries, at the same time suggesting to negotiate the sharing and management of water from international rivers on a bilateral basis.

As riverine countries we have to build our capacity to negotiate at different political levels by demanding our mutual benefit. Without an optimal level of cooperation and shared resources it will be futile to attempt an holistic approach to climate change in the future to resolve conflicts of water allocation and consider the river-basin as a unit of planning and management of water-related issues. Only decentralized capital, dredging in different parts of river-basins, or river bank management downstream cannot solve the problem. Involving regional bodies like the South Asian Association for Regional Cooperation (SAARC) and the Bangladesh, Bhutan, India, Nepal (BBIN) Initiatives may be explored in this connection.

River bank management need not always be in only large infrastructures. Small to medium infrastructures with soft solutions need to be explored. People may be engaged in a participatory way in small to medium-scale river bank management efforts. Such appropriate infrastructures with less spacing and participatory forestation along the river bank and chars may be an effective and sustainable option. A key intervention would be to diversify and institutionalize opportunities of livelihood for all communities involved, such as cash cropping, horticulture, poultry, dairy farming, livestock rearing, and nursery keeping.

Housing is a major issue in the Teesta flood plain mainly because of the frequent shifting people have to do. People were found to prefer a sustainable prefabricated housing solution with some level of livelihood there.

All these options require a strong political will and policy intervention from the highest policy- making bodies.

Khandaker Mainuddin

Could you outline the major policies related to climate change adaptation in Bangladesh? What could be done to implement them better?

> One should not look how food is cooked, if one likes to eat or how policy is made, if one wants to implement
>
> - Khandaker Mainuddin, BCAS

Scientist cannot convey their message to politicians, because politicians may convert their message badly and they may create their own science.

In the Bangladesh context there are many policies. We have the National Adaptation Plan of Action, and the Bangladesh Climate Change Strategy and Action Plan. There is a water policy, agriculture policy, and disaster management policy to incorporate climate change issues. And currently the 7th Five-Year Plan (7th FYP) is going to revise those policies. In this 7th FYP, vast areas of adaptation policies and options have already been identified. BCAS also evaluated this 7th FYP and found it comes out as more or less comprehensive.

However, in a third world country like ours the implementation of these policies depends on the availability of resources. Water used to be a common property resource but unfortunately it has become a commercial resource now.

There are three pillars of sustainable development, which are social, economic, and environmental. But the question is whether these have equal weight. We have degraded the environment and it is no longer sustainable.

The Gross Domestic Product (GDP) is the main indicator to measure a country's growth, but sometimes it can also act as the Gross Deceptive Product. To elaborate this, Mr Mainuddin mentioned maladaptation rather than adaptation in various respects. Maladaptation can be a serious issue, as it may become harmful rather than helpful for the people, society, and environment. Whether our adaptation approaches or initiatives are bringing in positive or negative values, is important to ponder. Therefore,

we have to implement the policies very carefully, so that in the long run the implemented CCA would be a fruitful one.

Arabinda Mishra, ICIMOD

What could be the adaptation policy framework for climate change in South Asia? Do you see a difference between top-down and bottom-up issues?

Firstly, we must ask: what are the drivers of adaptation policies in the South-Asia region? They are mainly global, climatic drivers. Except for India and Pakistan, all INDC (Intended Nationally Determined Contributions) countries follow adaptation framing policies.

Secondly, the established understanding is that adaptation should be measured in a localized manner. That is, any response will be effective only if it can be localized in a certain category, and many tools are being designed to that effect. Also, various planning tools have been established.

In addition, in Bangladesh community-based adaptation (CBA) should be given due consideration.

Thirdly, these tools are not effective sometimes because political narratives, which are behind public policy statements, act as barriers. So here is a paradox, that adaptation should be done at local level but political statements on adaptation are absent from public policies. Hence, a top-down approach comes first in drawing up a climate scenario. Most policy-makers have accepted the usefulness of adaptation and the need of a plan. However, to do that much, they are struggling to deal with probabilities. They find it difficult to look at the probabilistic information that is becoming available.

On the other hand, a bottom-up approach means basically a vulnerability assessment.

There is also a need for space for policy experimentation and the development of a formalized extension system to enable science-policy-practice linkages

- Arabinda Mishra, ICIMOD

So there are two distinct approaches: the top-down approach is scenario driven and the bottom-up one is vulnerability driven. It is a very interesting dichotomy of two approaches. But we are lacking in capacity (framework or instrument) to link these two. To resolve this paradox, further understanding of science and politics is necessary. But science is in need of granular scenarios to develop a better understanding of the local situation, and simultaneously address the uncertainties usually associated with such granular scenarios. In other words, to look down-scale as much as possible and rather not really look at regional scenarios. The trade-off is that the more granular it becomes, the less subtle (or workable), because its science is yet to be developed.

There is also a need for space for policy experimentation and the development of a formalized extension system to enable science-policy-practice linkages. Adaptation requires experimentation, but that is not happening much. What is to be done is known, but how it should be done is not known yet. Hence much piloting and many experimental projects need to be initiated. We do not really have good linkages with policies, though. We need to focus more on the science-policy-practice nexus.

The most unsecured part is that of the situation in practice. Though there is autonomous adaptation, people are adapting on their own and that is where we need a brief organization and a formalized extension system for adaptation practices.

Farah Kabir, Action Aid Bangladesh

What are the key adaptation issues from a gender perspective in Bangladesh?

We are still discussing a land-centric adaptation process but we need to move to a water-centric adaptation process. Water management is important to ensure the river has its own flow and character.

Policies are not gender neutral. An adaptation policy should consider norms and practices. Many adaptation policies originally were not gender sensitive. The differentiating impact on men and women of climate change etc., all these have a gender-based implication. In Bangladesh we are trying to push for the creation of gender sensitivity to water. We need more research in this area. For instance, the 'saline resilience crop practice' as an adaption option has a negative impact on women's reproductive health: it increases hypertension.

The recognition and valuation of women's contributions need to get first focus. Inter-ministerial coordination is absent in this regard. The Bangladesh government is keen to tackle this issue and provide social protection to women in situations of vulnerability. Thanks to the Sustainable Development Goals and the 7th Five-Year Plan of the Bangladesh Government policy-makers are finally trying to work on planning, and some intervention is going on.

Another important issue is whether monitoring and evaluation (M&E) of such projects are enough gender-sensitive or not. Is the M&E achieving enough what we aspire for? The awareness of such soft areas has raised sensitization. It will ultimately get us to the desired results, and we must ensure to include it in planning and budgeting.

Rezaur Rahman, BUET

The level of future impacts will depend on the magnitude of climate change and on socio-economic and environmental factors. How can we plan for adaptation, when future impacts are still unclear?

Three types of uncertainty are notable here. Firstly, biophysical uncertainty: how high will the temperature be, how high will the sea level rise maximally, and so on. Secondly, for developing countries there are socio-economic uncertainties. We in Bangladesh have been developing very fast and now we aspire to develop even more. There is money required for what we call mega projects. But the change of weather creates so much uncertainty.

Thirdly, developing countries face another kind of uncertainty, which we call commitment of funding. There have been funds in various ranges for long-term support. We are hopeful that after the Paris Agreement there will be 100 billion US dollars per year by 2020. In that case, uncertainty will reduce. Without funds climate-change adaptation processes are not possible.

Given all the uncertainties for developing countries the best option is to invest in 'no-regret options', which includes (new) crop cultivation technology and the construction and maintenance of cyclone shelters.

One of the most important infrastructures in which we have invested in our country is embankment construction and reinforcement. Since 1960 we have been constructing embankments and now we have already 10,000 km of it. People are now used to work with this system. But embankment performance has raised many questions with respect to the environment, especially regarding ecological resources and damaging water logging problems in coastal areas.

The 2007 cyclone Sidr and 2009 cyclone Aila created immediate demands for proper rehabilitation and embankment construction, which would ensure people's safety and security. For instance, if the sea level rises by 1 or 2 metres, these embankments will act as protectors.

Now, embankments have changed the landscape of the country and we are lost in development pathways, where we cannot overlook managing this 'maladaptation'.

There are some 'no-regret' options because of their co-benefit nature. One good example is forestation, which works well in coastal areas. Bangladesh, in fact, has been taken as a model country for costal forestation. It is a win-win situation, since it is an adaptation option. Also, the eco-friendly infrastructure of a forest is a very good example of how to ensure the safety and security of people and support livelihood.

Question to Mr. Mainuddin: The Bangladesh Climate Change Strategy and Action Plan has 7 pillars - food security, social protection, health, infrastructure, mitigation, knowledge, and capacity building. Could you please advise how we can materialize all these things in an integrated way and what are the weaknesses of this Plan?

Reply: There needs to be coordination between research and implementing organizations. For example, a research organization is developing rice varieties that are tolerant to flood or salinity, but at farmer level there should be coordination as well, which is often absent. All policies say there should be good coordination, but the reality is there is no coordination anywhere.

Question to Dr Mishra: Since people have their own ways of understanding, how may scientists benefit from their knowledge?

Reply: We are trying to see how science can be integrated with community knowledge. Scientists should mobilize all types of knowledge and assess their quality. Integration of scientific knowledge and community knowledge is important for effective adaptation planning.

Comments from a participant: In the context of this CCAPS, where is the focus on water and climate change? Two things must be done: one is eco-system based adaptation and the other is a trans-boundary approach. Eco-system based adaptation I did not see much here. In Bangladesh, the water policy explicitly mentions countries' engagement with adaptation. While reviewing the Indian water policy we see they also talk about trans-boundary water policies. In the UN Convention on International Water there is mention of three things: share of international waters, no harm to rivers, and ensure water for ecosystems

Question to Ms Kabir: Do you think sciences are also gender sensitive?

Reply: The science community is a boys' club. Women have to sacrifice their families to be a scientist. There is no acceptance for women in this science world. And women's contribution to society (from a family aspect) has no recognition and consideration yet, in Bangladesh likewise. Many women, for instance, who are engineers, do not take up challenges, because they cannot, either because of their in-laws or their husbands. Hence, climate-change adaptation policies have to be sensitive to gender-differentiated roles in society.

Technical Session

3 Scaling-up innovative adaptation practices in the HKH region

Keynote Speaker	Kallur Subrammanyam Murali, IDRC
Panellists	1. Climate and Flood Resilient Housing - Tanvir Hasan, BCAS 2. Flood- resilient Eco-san Toilet - Eklavya Prasad, MPA 3. Spring and Watershed Management – G. Mini, TERI 4. Heat Stress Study - Eddy Moors, Alterra 5. Use of 'Touch Table' for RiU – Hasse Goosen, CAS
Session Chair	Anjal Prakash, ICIMOD

Replicating and expanding programmes to reach more people in wider geographic areas typically requires that institutional and policy conditions beyond the local level be addressed through appropriate institutional and policy analysis, dialogue, and action. This session aimed to discuss effective pathways for successful scaling-up of different adaptation practices being piloted under HI-AWARE.

Keynote by Kallur Subrammanyam Murali, IDRC

IDRC supports the generation of knowledge and innovation for positive change. The Centre seeks to enhance the well-being of large numbers of people through these investments, accelerating development research to create a big impact. This will contribute to improvements in areas such as food security; maternal, newborn, and child health; employment for women and youth; and science and innovation.

IFAD defined scaling-up as 'expanding, replicating, adapting, and sustaining successful policies, programmes or projects in a geographic space and over time to reach a great number of people'. Generally, innovation will have multiple impacts but it has a long way to go before it can be scaled up. New ideas will have to be time tested through pilots and tested at different locations. By monitoring these processes we shall get to learn about the difficulties in implementation and after correcting those and incorporating new knowledge, up-scaling may be undertaken with multiple components:

- Forces, or 'drivers', are needed to push the scaling-up process forward along a certain pathway.
- Drivers: Ideas or models that work on a small scale, may emerge from research or practice. Attraction of these ideas or models drives diffusion. Ideally, spontaneous diffusion happens, but incentives may be required to enhance the rate of diffusion.
- Vision and leadership: A vision can recognize that scaling-up of an idea is necessary, desirable, and feasible. Visionary leaders or 'champions' often drive this diffusion process.
- External analyses: There could be barriers that hinder the diffusion process, which need to be identified and addressed. For instance, political space, capacity space, environment space, culture, partnership, and fiscal space may need to be carefully evaluated and addressed.

- Incentives and accountability: Incentives are keys to driving the behaviour of actors and institutions for sustained scaling-up to be possible. These incentives may include rewards or a competition process.
- A political base is important for the creation of a facilitating environment.

For successful scaling-up, potential obstacles need to be removed and enabling conditions have to be created for interventions to grow. It is also called 'social enterprise', and is expected to bring behavioural change among people. Knowledge about what does and does not work in scaling up needs to be harnessed through monitoring and evaluation (M&E), knowledge sharing, and training. M&E should focus not only on the impact of an intervention, but should also assess the various factors that contribute to determining possible scaling-up pathways.

IFAD outlined seven key elements as a starting point in the main aspects of a scaling-up pathway:

- Scaling-up dimensions: Scaling-up pathways can simply expand services to more clients in a given geographical area. Alternatively they can also involve 'horizontal' replication of services from one geographic area to another 'functional' expansion of services by adding additional areas of engagement, and 'vertical' up-scaling, which involves moving from local to nation-wide engagement, often involving policy dialogue to help achieve the policy and institutional conditions needed for successful scaling up at national level.
- Defining desired scale: It is important to define up-front the ultimate scale to which an intervention should or could be taken, given the needs of the target population and the nature of the intervention.
- Defining intermediate results: Along the scaling-up pathway, it is important that the programme delivers intermediate results.
- Exploring drivers of envisaged pathway: It is important to identify and actively explore the key potential drivers and enabling conditions that will allow the initiative to grow beyond the experimental or pilot stage.
- Selecting operational modalities for scaling-up. Governments, development agencies, foundations, and others interested in large-scale change have various options for applying their operational modalities to support scaling-up pathways:
    - use their own resources for scaling up
    - finance investments
    - provide technical assistance
    - engage in policy dialogue
- Mobilizing right partners: Successful scaling-up generally requires the development of multi-stakeholder partnerships (partnerships between private, public, and civil society organizations).
- Putting in place monitoring and evaluation; M&E is the key component of a successful scaling-up strategy.

Standard guidelines caution practitioners to defer scaling-up interventions until they have at least reached the standard of good or best practice. As mentioned earlier, successful scaling-up generally requires the development of multi-stakeholder partnerships, especially on the continuum of potential partnerships between private, public, and civil society organizations. It is also required to establish how different financing models can help make them work.

The benefit of private partners is that they bring the discipline of the market to the table. Public agencies can provide capital financing and assure a level regulatory playing field and supportive policy environment. Civil society organizations can assure community engagement and make sure the perspective of 'bottom of the pyramid' consumers and beneficiaries is reflected.

Scaling-up plans also include an articulated theory of change, and methods or strategies (pathways) by which interventions reach a certain scale. These methods are grouped into three categories – expansion, replication, and collaboration. These three categories are distinguished by the role played by scale by the organization that managed the initial pilot or developed the original prototype.

Dr Murali showed a documentary of two success stories from the IDRC on scaling-up innovations in Peru and Guatemala. The first was about Mr Nicasio Unapilca, a 61-year old small farmer and innovator from Cusco, Peru, who had inherited from his father the ability to build farm machinery. Now he develops appropriate technological solutions for small farmers in Peru. The other was about Mr Fernando Mazariegos, a pharmacist from Guatemala. He had invented the Ecofilter, which is now used in 24 countries. He trains and advises rural innovators who want to serve people in Latin America. The Ecofilter eliminates bacteria and parasites from water. It also eliminates turbidity, bad odours, and bad taste. It has scientific backing from more than 10 universities and international laboratories and has won prestigious awards.

Piloting Climate and Flood Resilient Housing in the Teesta Floodplains, Bangladesh

People in the Indus, Ganges, and Brahmaputra (IGB) have been experiencing frequent floods in recent years. These affect their lives, livelihoods, assets, and infrastructures including houses. Climate scientists projected that flood intensity and severity (depth and duration of flood water) would increase in the near future due to climate change. Recurrent floods and associated riverbank erosion as well make millions homeless every year. The poor living in the floodplains build houses, which cannot withstand hazards. Climate and flood resilient (CFR) housing is an urgent need of the poor in the IGB region.

In HI-AWARE, robust evidences will be created on the effectiveness and applicability of adaptation practices on the basis of piloting and monitoring in food, health, housing, and energy sectors. They will target relevant adaptation approaches like climate-smart agriculture, resilient housing designs and smart energy grids. The piloting of CFR housing options follows a participatory and multi-disciplinary approach to ensure it is technologically sound and socio-culturally appropriate.

The action research adopted the following methods:

- Stakeholder consultation with GOs, NGOs
- Ensuring community participation at all stages of activities
- Consultation with communities for appropriate design and materials available for CFR houses
- Regular monitoring, to be conducted after construction of CFR houses
- Documentation using PRA tools and multimedia
- Dissemination through stakeholder workshops and face-to-face meetings with policy-makers

Figure 1: Photo shows house on a raised plinth with no protection measure

Figure 2: Reconstructed CFR House on a raised plinth with side protection layer of grass and saplings

Figure 3: CFR House is also having vegetable garden and important tree saplings

At least three types of houses will be demonstrated targeting ultra-poor, poor, and middle-income households. The designs of houses were finalized and they are ready to be constructed.

To finalize the designs of CFR the following criteria had been considered:

- Hazard-prone (that is, considering flood level, temperature), vulnerabilities, current coping/adaptation practices
- Locally low-cost materials/resources available
- Occupation and income level
- Gender aspects

Community's requirement for CFRH identified by participants:

- Safety and privacy
- Water
- Sanitation (including ventilation, in-house heat) and hygiene
- Kitchen and fuel

- Storage during hazards
- Homestead gardening
- Livestock and poultry

The study team sees the following challenges:

- Alternative raw materials that are practiced and available for construction
- Sandy soil washed away in each flood season; so, to maintain the elevated land is a major challenge
- Access to infrastructure (e.g., road, power, water, sanitation) may be challenging

The impact of piloting of CFR houses is based on how the flood affected people accept the designs and materials in any flood prone area. Details of the designs and support would be shared with key stakeholders in the flood affected areas, and would be made acceptable with their help in the area. Innovative materials by the House and Building Research Institute of Bangladesh would be used to lower the costs of the houses, which would find huge acceptance by the community.

Lessons learned from the demonstration, monitoring, and evaluation of CFR houses are being documented. Up-scaling of piloting will be done through workshops and face-to-face meetings with important stakeholders and policy-makers.

Flood-resilient Eco-San Toilet in Bihar

Bihar Flood is a major disaster that hits the Northern state of Bihar where hundreds of thousands get affected every year. One of the major impacts that frequent flood and flash flood have in this area of Bihar is on sanitation. Although mostly overlooked as an indirect effect with less attention from the state government, this issue has a long term impact on the livelihood of the people.

Generations have lived in Bihar without access to proper sanitation. For example the census of India (2011) shows that Bihar has only 18.6% sanitation coverage, thus ranking it with the bottom four among all the states in India, and the situation worsens when the floods arrive. Massive inundation forces the public to defecate openly in water, which is also used for drinking purposes, and this might lead to an epidemic. The Eco-san toilet has been introduced as an adaptive measure for providing resilience to climate change induced disasters such as floods and maintaining sanitation and hygiene.

The construction and use of the toilet involves the following steps:

1. Planning

- choose an area close to or even attached to the house / close to the kitchen garden
- decide a place exposed to direct sunlight to enhance decomposition of the

excreta

- see it is preferably elevated to protect from floods

2. Dimensions of the toilet

- The construction of chambers for urine and faeces should be either side by side or in a row The recommended volume of the two chambers should be 2,546 l (dimension per chamber of 100 x 119 x 107 cm)
- The gaps on the upper edge of the wall are for the pipe that drains anal wash water (left hole) and for the urine pipe (right hole)

3. Construction

A superstructure can be constructed using bricks and cement, which is more expensive but longer lasting, or with woven mats made of bamboo, ropes, and local grasses that can be plastered with mud. This is cheaper but needs to be replaced every second year and requires frequent plastering with mud.

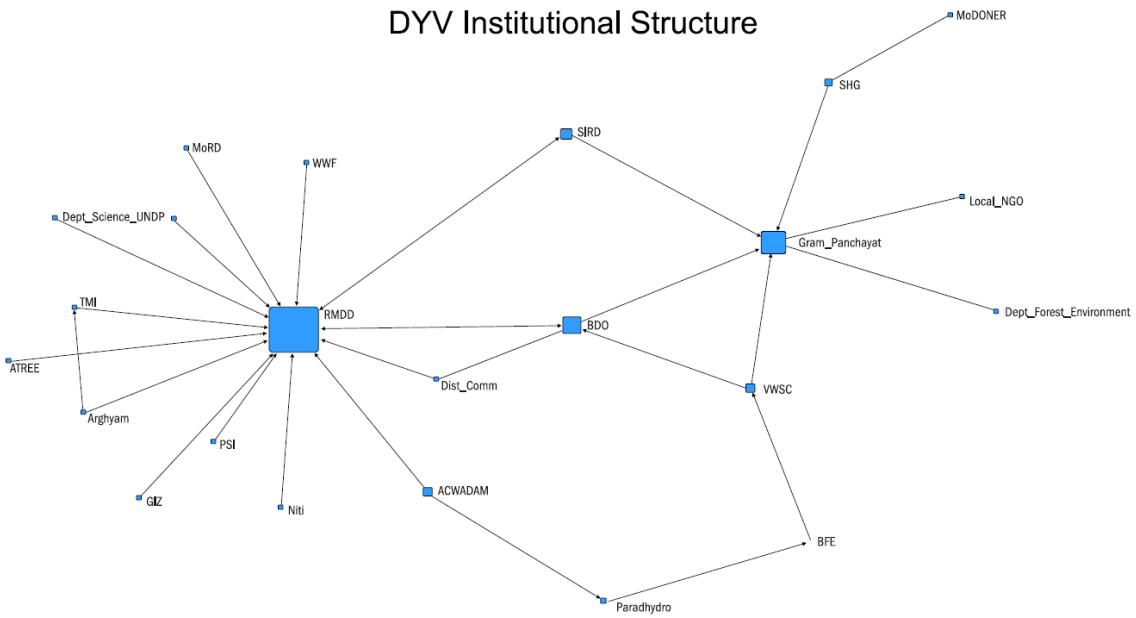
The Eco-san has the following impacts in the community

- Reduces open defecation (also during floods) and avoids associated problems such as restricted timing for defecation
- From a gendered perspective, women and adolescent girls can avoid physical and psychological harassment, which open defecation subjects them to
- The urine and the faeces can be used as fertilizers for crops in the fields as well as a small-scale home garden

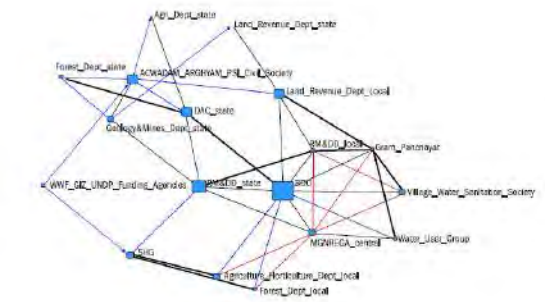
The eco-san toilet is an answer to the sanitation and hygiene issue, especially in flood-infested northern Bihar. Access to a functioning sanitation facility during flood on account of its technology and design has led to its acceptability. It has changed defecation behaviour and attitudes to human excreta and urine. Further, the productivity of various crops and vegetables has increased as a co-benefit of the eco-san. One of the major achievements of these toilets is the positive health impacts on the family, especially during the flooding season. Poor households are also gaining by selling the extra manure as additional income.

Spring and Watershed Management

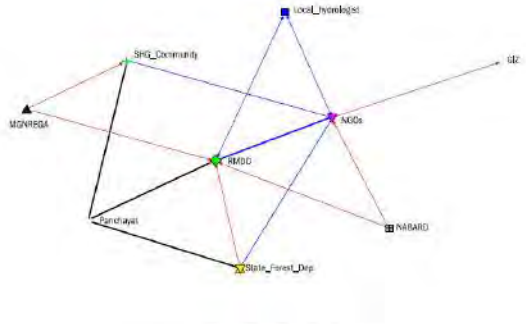
The Dhara Vikas Yojana (DVY) is a successful spring rejuvenation intervention in the state of Sikkim in the Teesta basin of India. Several springs have been recharged, and the water availability has been increased along with household incomes in mid-elevation areas there. Now it has also attracted the attention of several stakeholders as an adaptation option for future climate risks. But there is a need for more information on changes in spring discharge as also for better management for the sustainability of the hard and soft recharge infrastructures. Under the HI-AWARE initiative, TERI together with the TMI is conducting research on unpacking springshed management in the hills of the Teesta basin. The study found that a variety of local actors are important for DVY.



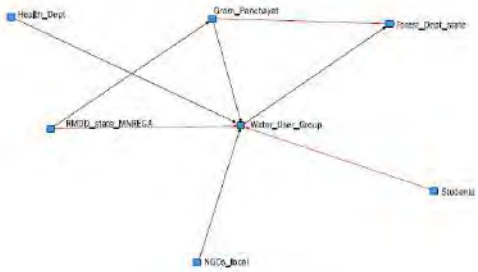
A multi-actor engagement workshop helped the research team in understanding different nuances of the issue of water availability in some of the mid-elevation areas in the Basin. The DVY springshed development programme by the Sikkim government was selected as the most suitable response mechanism. For sustainable management of recharge infrastructures we identified crucial actors and the current status of information flow. This will facilitate identification of change agents and provide insight for policy making and practice for springshed management in mid-elevation areas (hills) of the Teesta basin.



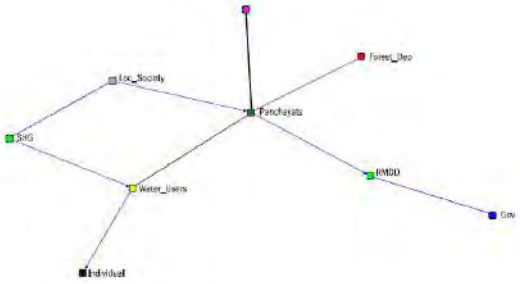
International Agency



Academia



Civil Society



Local Government

Methodology

- Social Network (SNA) provides insight on the relation between actors (individuals, social groups, institutions) instead of focusing only on one actor.
- SNA was used in two different ways : 1) mapping the intuitional structure of DVY through content analysis and interviews, and 2) mapping the networks of operationalizing DVY through actors' perspective in a workshop
- The following steps were taken:
  - Step1 : Identification of actors
  - Step2: Identification of relationship in terms of information flow, direction, and funds flow between actors
  - Step3 : The networks were analysed in UCINET for centrality, number of connections in a relation, and transitivity

Results were compared across the existing institutional structure and identified networks

Findings

- Although there is a Rural Management and Development Department (RMDD), a sub-national government institution, a variety of local actors ranging from panchayat, block development office staff to NGOs are perceived to play more prominent roles
- Information' is found to be the key dimension. It binds many actors and this is important for the operation of the DVY

- Local actors could see a centralized arrangement for information flow, while academia and international agencies found the existence of local information flows.

Impacts

- There is a plurality of influential actors and such pluralism needs more attention for public policy and practice. Apart from information generalization focus is required on forums for feedback from beneficiaries as also for deliberation across stakeholders
- More analysis is required for an understanding of the flow of information across actors involved in this DVY springshed management programme.

Heat Stress Study

The recent heat wave events in Pakistan (June 2015) and India (May 2015) took a toll of thousands of lives. Heat waves, resulting from a host of factors such as extreme temperatures, relative humidity, solar radiation, and wind speed, can claim lives even in regions where one would expect people to be used to the heat. Most studies which establish a relation between health outcomes and extreme heat rely on meteorological data from standardized weather stations outside city limits. These do not reflect well heat exposure in urban residential areas. A better understanding of heat variations related to the environment – both indoor and outdoor – is, therefore, needed to help design low-cost interventions in resource-poor countries, such as in South Asia. The HI-AWARE project is currently studying this extreme heat and ways to cope with it in three major cities in South Asia: Delhi in India, Faisalabad in Pakistan, and Dhaka in Bangladesh.

The HI-AWARE team led by Alterra-Wageningen University and Research Centre has conducted an elaborate indoor and outdoor heat measurement study in South Asia in 2016. To better reflect heat exposure and adaptation measures on a local urban scale, HI-AWARE designed its own 'mobile device' for measuring outdoor heat. Further, the study explored what kinds of low-cost houses can offer the best protection against heat to city dwellers.

As part of the measurement study, we had three urban weather stations installed, which are recording high temperatures in the three cities. We also installed small temperature sensors in more than 150 houses in low-income neighbourhoods, where indoor temperatures can be even higher than at outdoor locations, especially during the night. Continuous exposure to high temperatures can lead to serious health issues and lower productivity, as the human body cannot recuperate, but precise thresholds and related health impacts are still unknown and likely location-specific. Last but not least, we collected outdoor data with three mobile weather stations, mounted on cars, one in each city, to look at the impacts of canals, vegetation and building density on thermal comfort, for example.

A large variety of heat adaptation measures can be adopted at household and community levels in the short, medium, and long-run. The measures can be placed in three categories, namely:

- Active cooling (air conditioners, electric fans, dehumidifiers, and evaporative coolers)
- Passive cooling (cool roofs, night ventilation, closed windows, window design, insulation, thermal mass, and shading devices)
- Green infrastructure (green roofs, vertical greenery systems, and private gardens)

The optimal strategy is likely to be a mix of measures balancing the benefits and limitations that can be implemented during different time frames. A one-size-fits-all approach does not exist. The challenge of policymakers and city developers is to determine appropriate measures that improve thermal comfort, human health, socio-economic factors, and the environment within the specific conditions of a local community.

Use of 'Touch Table' for RiU

Due to climate change, the frequency and intensity of floods, droughts, and heat events is projected to further increase for the Indus, Ganges and Brahmaputra river-

basins. This affects the lives and livelihoods of 1.5 billion people. By combining findings from on-the-ground pilot interventions and simulation models, performing active policy engagement, and capacity building, HI-AWARE aims to contribute to better informed policy making leading to improved livelihoods of vulnerable communities in the river-basins.

Bringing research into use is a core interest in the HI-AWARE project. Climate Adaptation Services (CAS), as strategic partner of Wageningen University & Research, connects research with policy and practice with visualization and participation tools. One of the applied tools is the touch table.

It is an innovative tool that supports 1) co-creation of knowledge and 2) interactive design of policy options. The touch table can visualize climate modelling results, and stakeholders can interact with the research outputs by drawing and overlaying map information. In interactive workshops, it allows stakeholders to interact with HI-AWARE results.

The touch table was presented in August 2016 in Kathmandu at a national level policy maker workshop, organized by HI-AWARE. Representatives from various ministries and regional governments participated in the meeting. Delegates from the National Adaptation Process (NAPs) in Nepal were enthusiastic about the potential of the instrument for interaction with respect to the development of the NAP.

Visualizing the effects of climate change on touch tables can play an important role in adaptation planning. The touch table will be used (among other things) to involve stakeholders and to develop spatial policy strategies. It addresses policy makers and highlights areas where proposed investment policies may face future damage or opportunities due to climate change. Together, participants can design adaptation options based on the local impacts of climate change and garner political support for action.

Concluding Session

Philippus Wester

I would like to thank all participants as panellists, listeners, and people today in this Conference. I had never seen before the climate adaptation matrix and narratives that were there in the afternoon session (Technical Session 3). It was very good for me. I liked the comment of Atiq on the business aspect. It is very good that something can work well if efforts can be given wholeheartedly. We feel socially included. Learning took place on many things. But, it is not just talking, just not a conference, we have to take it further at grassroot level. We make a very serious commitment to Chanda and also for HI-AWARE in general to make sure the inclusion of gender sensitive equity or gender-blind issues takes place. I am hoping the next CCAPS will be in Pakistan and that the Conference will then include women as key note speakers and panellists.

Last point is to thank BCAS, and thanks to Abu, Atiq, and the team for the excellent job done in organizing this conference so successfully.

Chanda Gurung

To sum up, I would like to point out that the evidence found in hotspots would be beneficial to the communities there. As you know, people or communities are differently vulnerable. For them, it is very difficult to cover all dimensions. One dimension may be tackled, but all dimensions would be very difficult to get rid of. If you really want to get evidence, you need to focus at local or context level, that is, very much at grassroot level. So, the question is how can this be linked to national policy or country level. You have a pilot, then scaling up that pilot is very important in any action research.

People are impacted by the complexity of nature and human induced interactions, i.e., socio-economic and natural drivers leading to vulnerability. So, science, policy, and practice should be integrated or interact with each other. I think that is the key for any adaptation in this new environment of changing climate all over the world.

Atiq Rahman

I first was wondering how this meeting, this hotel would be managed. But the hotel people managed logistics well. Thanks to them. However, some of our colleagues could not manage to participate, especially our Pakistani friends.

In the morning I had mentioned science, policy, and practice. If we can give the community some services, that would be great. After 30 years in the field of adaptation, my feeling is that only peer reviewed publications cannot help vulnerable people to adapt. Such publications are only a documentation of work done well. We should do more for poor people that should include a policy change based on scientific findings with an implementation in the field to change the world actually. However, that is the whole process of development: when you have money, you can do whatever you

want to. But we have to prioritize and re-prioritize our work to where it is really necessary to eradicate poverty at grassroot level. Thank you everybody for joining us today and we hope to see some policy implications from this Conference and all HI-AWARE research.

The conference concluded with a Vote of Thanks from Zakia Naznin, Senior Research Officer of BCAS.

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