BRIDGING THE GAPS IN UNDERSTANDINGS OF UNCERTAINTY AND CLIMATE CHANGE

Round Table Reports

Photo: Shibaji Bose.

August 2018

Experience Learning Series 74

Bridging The Gaps in Understandings of Uncertainty and Climate Change

Round Table Reports

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Title: Bridging The Gaps in Understandings of Uncertainty and Climate Change: Round Table Reports

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ABBREVIATIONS

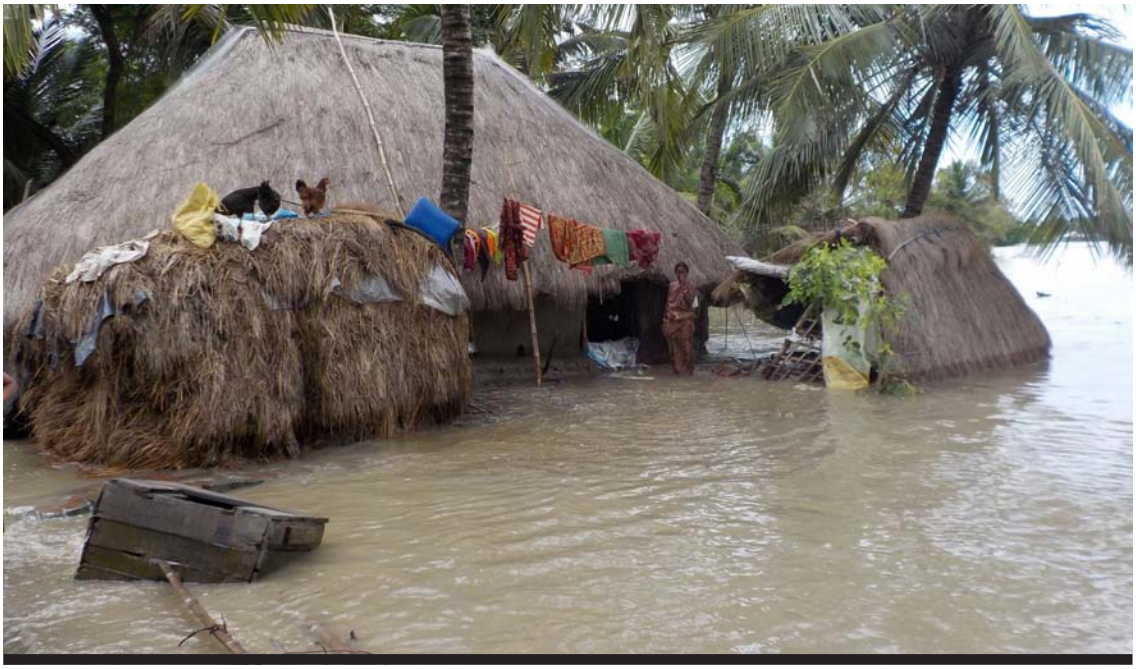
AIDMI	All India Disaster Mitigation Institute
CBOs	Community Based Organisations
CICERO	Centre for International Climate and Environmental Research
CTARA	Centre for Technology Alternatives for Rural Areas
DSS	Decision Support System
EIA	Environmental Impact Assessment
GIDM	Gujarat Institute of Disaster Management
IDS	Institute of Development Studies
IIHMR	Indian Institute of Health Management Research
IIT	Indian Institute of Technology
NGOs	Non-Governmental Organisations
NIVA	Norwegian Institute for Water Research
NMBU	Norwegian University of Life Sciences
RCN	Research Council of Norway
SIA	Social Impact Assessment
TISS	Tata Institute of Social Sciences

1

OVERVIEW

By Lyla Mehta

In India, local people, planners and policy makers regularly confront climatic shocks and stressors such as cyclones, floods, droughts, changing rainfall patterns and extreme temperatures. Yet, the knowledge about the scale and impacts of these changes remain deeply uncertain. This is particularly true at the local level, where climate related uncertainties combined with unregulated capitalist growth trajectories often exacerbate social and political inequities and the vulnerabilities of marginalised communities. While the uncertainty associated with climate change is often considered to be a 'super wicked problem' by scientists and policy makers, climate experts (policy makers and scientists) continue to draw on quantitative assessments, models and scenario building to understand and capture this uncertainty. These efforts, however, rarely take into account how local people – particularly those living at the margins – make sense of and cope with uncertainty. Often there is a wide gap between how uncertainty is understood and experienced from 'below' by the lived experiences of local people, how it is conceptualised and represented from 'above' by climate scientists and experts and how the 'middle' – civil society, NGOs, academics – can potentially function as brokers between the 'below' and 'above'. The Research Council of Norway funded



Mousuni island, Indian Sundarbans, 1995 floods.
Photo: Shibaji Bose.

project *'Climate Change, Uncertainty and Transformation'*[1] sought to bridge the diverse perspectives between the below, middle and above by organising three round tables in Gandhinagar, Mumbai and Kolkata in January 2018, bringing together perspectives and experiences of government officials, academics, practitioners and activists. These built on an earlier round table organised in Oslo in August 2017. The aim was to understand the way climate change and uncertainty are experienced and understood by diverse stakeholders in order to explore ways to foster transformative, socially just and inclusive development to cope with the challenges of climate change uncertainty.

All the round tables were rooted in the context of their specific sites and were organized by the project team together with the All India Disaster Management Institute (AIDMI), Ahmedabad and different local partners and in some cases, co-hosts, e.g. Norwegian Institute for Water Research (NIVA) in Oslo and the Gujarat Institute for Disaster Management, Gandhinagar. The Oslo meeting addressed overarching contextual issues concerning uncertainty and interdisciplinarity whereas the other sessions built on the challenges and contexts of the specific sites. All the round tables began with a powerful photovoice presentation highlighting the precariousness of ordinary people to climate change related uncertainties (e.g. erosion of lands in the Sundarbans due to sea level rise or the changing nature of rainfall and droughts and their impacts on livelihoods in Kachchh) and how they make sense of, live with and adapt to them. These uncertainties are further compounded by wider socio economic changes (e.g. port development in Uran/ Mumbai) which often destroy key ecological resources such as mangroves that both protect the vulnerable coastline and are also key to the livelihoods and wellbeing of the local communities.

All the round tables ended up being quite distinct and different in orientation and scope. This is due to the different locations (university, government institute or neutral seminar venue) and the role played by the local partners and co-hosts. In Oslo, we largely had researchers from different disciplinary backgrounds and two policy makers. The Gujarat meeting, perhaps due to the location in the state capital, was dominated by government officials and policy makers from different departments, who welcomed the opportunity to engage with each other's work,

1 https://www.ids.ac.uk/project/climate-change-uncertainty-and-tranformation

alongside many researchers and NGOs. In Mumbai, the audience at Indian Institute of Technology (IIT) Bombay largely comprised of natural and social scientists, with some NGOs and a local fisher activist. In Kolkata, the meeting had a good mix of different scientists, researchers, NGOs as well as government officials.

The following key lessons emerged from the round tables:

- Uncertainty is understood differently at different levels (above, middle and below) and multi-sectoral and interdisciplinary ways are required to understand its impacts and manifestations. It is important to challenge the dominant positivist understanding of uncertainty that dominates science and policy making. Social science aspects concerning socio–political pathways, gender dynamics and site specific vulnerabilities of different social groups and how these interact with climate related uncertainties need to be included in mainstream debates.
- Policy makers need to move towards embracing uncertainty in decision making. While they feel this might paralyse decision making, it is important to find optimal ways to communicate uncertainty across the above, middle and below in order to promote pro-poor adaptation and long–term development planning. Better training and education on the limits and opportunities with models can improve decision making
- There are still significant data gaps in understanding climate change impacts across the sites. Data gaps also exist regarding local people's coping strategies and understandings. Official responses to climate change have not built on local level knowledges and experiences sufficiently. There is no 'one size fits all' solution and further research is required to understand ground level realities. Advances in attribution science will be important to improve disaster management.
- Environmental and social impact assessments that feed into decision making processes need to become more participatory and less exclusionary. Transparency and accountability to all stakeholders, especially marginalised people who lack voice, are key. Currently, these processes are often closed and opaque.
- So called 'smart' approaches need to pay more attention to long term ecological issues (e.g. flood proofing in Mumbai) and incorporate climate risk assessments. They also need

to put the needs and interests of marginalised citizens upfront, rather than exclude them.

- Despite significant advance in state level climate change policies and action plans, much more could be done to improve pro-poor adaptation and strengthen local ecosystems and biodiversity. Various knowledges and experiences, including scientific, technical, administrative, and every day practices need to come together to plan for alternatives. The state should facilitate dialogues between policymakers across scales and sectors, academics, NGOs, CBOs as well as local communities.
- More support is also required to enhance the resilience of local communities to disasters and climatic events such as heatwaves and floods. Interventions need to focus on strengthening livelihoods, local experimentation with accessible technologies (in housing and shelter, water, energy), resource conservation and community empowerment.
- A clear pathway for transformation based on knowing the 'certainty of uncertainty' needs to be charted and shared with diverse stakeholders
- Bridging asymmetries of power and stakeholders, policy makers, and citizens is a prime concern. Good case studies of successes and failures can be deployed to develop better transformation strategies.

The different reports that follow focus on the specific discussions and lessons from the four round tables. To conclude, it is worth reflecting briefly on the round table as a methodology to bridge the divide. For some the round table was a new experience and they appreciated the opportunity to engage with and learn from diverse perspectives. For others, the round table rehearsed well known diverse views and brought to the fore a plurality of perspectives that were difficult to reconcile. In some cases, the two hours was not enough for everybody to express their views and concerns. Whether these succeeded in bridging the divide depends on further follow up and action since the round tables could only begin to scratch on the surface of different possibilities and issues. It was also suggested that rather than bridges, which tend to lead to numerous roads and pathways, we need to think in terms of crossroads or junctions that suggest more of a meeting point or confluence. But here too the importance of bringing to the fore hidden and alternative perspectives, ways of valuation and epistemic diversity is key, alongside being aware of how power shapes who gets to be on the junction, road or bridge.

2

Round Table on Uncertainty and Climate Change in Oslo

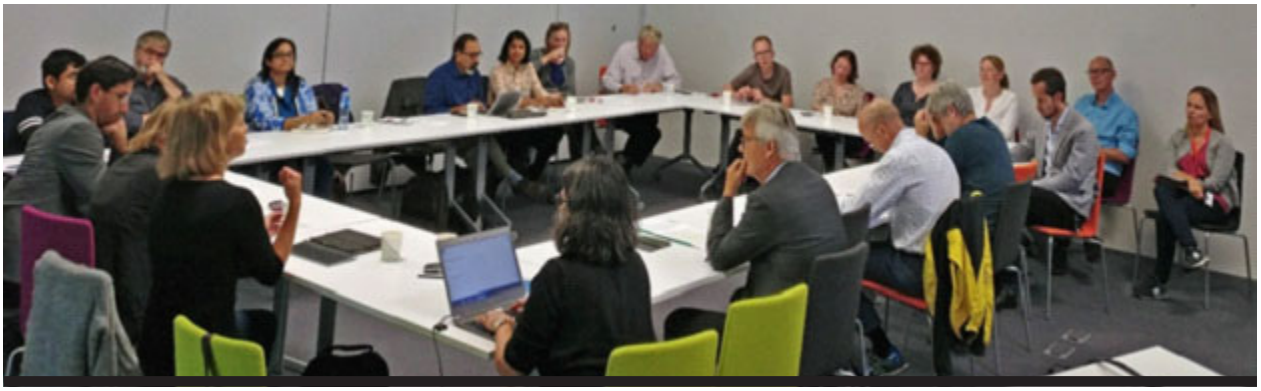
By Synne Movik, Catherine Wilson, and Shibaji Bose

2.1 Introduction

On August 24, 2017, the project team organised a round table in Oslo to bring together researchers, policymakers and funders to discuss uncertainty and climate change. Over twenty participants attended this event *(see appendix 1)*. This was the first in a series of round tables, where the subsequent sessions would focus more on the context and challenges of the specific sites. The first round table in the series, however, addressed the overarching notion of 'uncertainty' as it permeates the project work throughout, and is a concept that is perceived in very different ways depending on people's vantage point. It was co-hosted with the Norwegian Institute of Water Research (NIVA).

The session was introduced by a powerful photovoice documentary that demonstrated the precariousness of the island dwellers in the Sundarbans, which is facing sea level rise and natural hazards such as cyclones. How do the 'below' – local women and men – deal with the uncertainties they are confronted with, and what are the responses from the 'middle' and 'above'? How can we build bridges between the experiential and the technical/scientific knowledge to come up with sustainable solutions for the Sundarbans, and for the other sites under study?

Participants represented a diverse mix of people, including funders, policymakers, modellers, social scientists, economists and natural scientists.



Oslo workshop deliberations.
Photo: Shibaji Bose.

2.2 Plural Uncertainties and the Need for Social Science Perspectives

The session began by members of the project team highlighting the importance and relevance of social science perspectives to challenge the dominant positivist framings of climate science. One needs different perspectives to understand the problem – on the face of it, sea level rise is the main challenge for the people of the Sundarbans, while floods is a major issue in Bombay, but it gets more complex once you start to untangle the social and political dimensions of these challenges. In dryland Kuchchh, while a concern is the frequency and intensity of droughts, challenges also revolve around encroachment of land through industrial development. There are multiple different dynamics at work that, when taken together, serves to exacerbate uncertainty, and that is why the social science perspective is so important to understand how these processes work in order to gain more in-depth and nuanced understanding of what is going on and how people are coping in different contexts. The project team seeks to engage with the different understandings and interpretations of the round table participants in the belief that it will help to enrich understanding and shed light on the plurality of existing perspectives.

One of the team members illustrated the usefulness of drawing on social science perspectives to understand uncertainty through giving a more in-depth description of the dynamics at work in the islands of the Sundarbans. It is a case that clearly demonstrates how the ecological uncertainties are interlinked with other cascading uncertainties and the age-long social-political marginalisation. Sea level rise, increasing surface temperatures, increasing frequencies of climatic events like floods and cyclones are the manifestations that strongly impact people's livelihoods. Taking into account the history of the Sundarbans, the region has a long track record of being socio–politically marginalised, which helps to explain people's sense of vulnerability and the intensity of uncertainty they are currently experiencing. From the very beginning of inhabitation, during the colonial period, the people came there, struggling to eke out a living based on the natural resources in the region. They were mainly agriculturalists and fisher folk. Climate change, salinity increases, floods and embankments breaching has depleted their traditional livelihoods of agriculture and fishing. As a response, the menfolk are seasonally migrating in search of alternative livelihoods, mainly as

wage labourers. The women, trapped within patriarchal social norms, cannot move out, as they have to take care of the children and elderly and support their husbands. They have few alternatives for other forms of labour or income-generating activities. While there are a number of NGOs working in the area, but they have a focus on disaster risk response, and after short periods will terminate their projects, leaving local organisations to fend for themselves as best they can. It's a patchwork of donor-driven intervention, nothing long-term. But policymakers are saying the situation is very complex and uncertain. This is where uncertainty becomes very political - uncertainty is sometimes an argument to do nothing. The state essentially withdraws and points to the uncertainty of the situation. What is needed is an empowerment of the community to express what uncertainty actually means to them and how certain decisions and responses can meet their interests and concerns, rather than pointing to uncertain models and scenarios. A narrow natural-science focus on climate change would have missed out on all these dimensions, and so would not have been able to generate a broad understanding of what generates uncertainty – which is why social science perspectives are vital in researching uncertainty in the context of climate change.

2.3 Modelling Uncertainty and the Significance of Scale

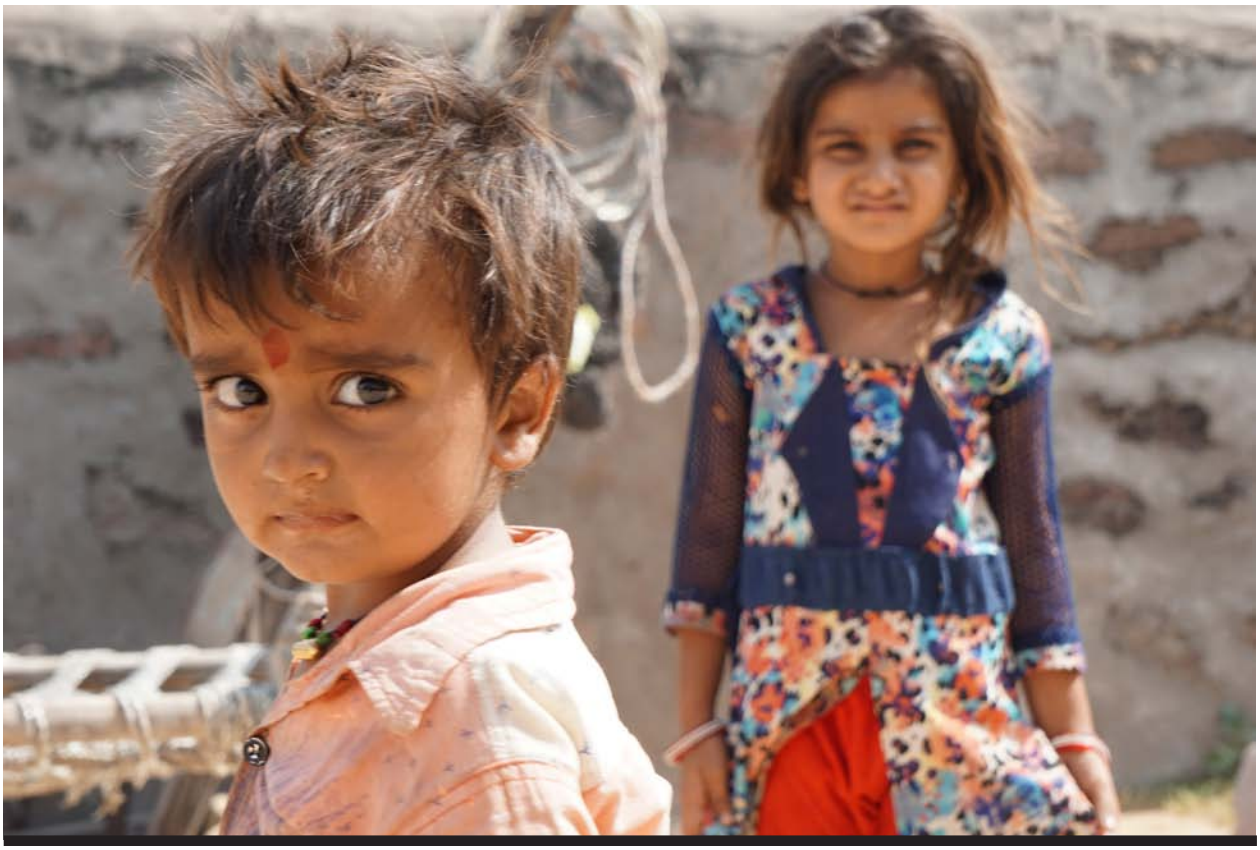
Having established the importance of social science perspectives, participants went on to discuss various dimensions and elements of uncertainty. Themes that kept recurring during the course of conversations included those of scale, and modelling. Concerning scale, both temporal and spatial scales are important. The project studies people at different levels – below, middle and above – and what emerges is that while local people are more interested and concerned with what is happening in the here and now, or maybe a 5 – 7 year span, the scientists are mostly interested in the past and the future, in the scenarios. While laypeople talk about weather, climatologists talk about climate. One of the participants, a modeller, emphasised the importance of communicating uncertainties, as it is inherent in all climate science-based models and services. We need to understand what sort of uncertainties these are. For example, in weather forecasting, we talk about the 'butterfly effect', small disturbances that may have huge impacts, but which might not be caught by the model, so we try to find different means of reducing such sources of

uncertainty through running models multiple times with small perturbations in variables, and, through defining 'probability spaces', basically transforming uncertainties into probabilities. It is potentially fruitful to talk about probabilities, because uncertainty conveys a message that you do not know, but we do actually know quite a lot when it comes to predating the weather – but communicating the concept of probability to laypeople is quite challenging. Concerning the climate system more generally, it is such a complex affair, and of course, there are many things we do not understand, there is uncertainty at different levels. It is important to invest in strengthening monitoring infrastructures, especially in developing countries, to have large and complex datasets, and improve the quality and access to prediction and services. This will help in disaster risk reduction, more timely and effective planning and decision-making and greater realisation of socio- economic potential worldwide.

Another participant, with experience from the IPCC, argued that there are a lot of scientists who think we should just ban the word uncertainty altogether, and instead talk about 'how certain are you'? There is a complete mismatch between what people think uncertainty means and what scientists think uncertainty means, so if we could talk about certainty instead it would help a lot. The climate models are made to look at effects of emissions or scenarios, and those changes or these differences only come into play after about 30 years, so every uncertainty before that is not really dealt with. Such models should be used only for things that are relevant at that kind of time scale, for instance, should we build a dam in this site or that. Going to the local level, where people are uncertain about some things, the models do not help. There is a fundamental misconception that those climate models can do anything on the here and now, locally.

2.4 Challenging the Dominance of Positivist Science in Climate Change Research

A participant from one of the major funding bodies talked about the predominance of a positivist view of science, the view that science lightens up dark corners of ignorance, where everything can be quantified, probabilities and risks can be calculated. But research has shown how even the best educated amongst us, are pretty bad at interpreting numbers. This is partly because we lack sufficient insights into the psychological mechanisms of human beings related to climate change. It is interesting to contrast the obsession with confronting and fighting



Looking at an uncertain future? Children of a pastoral (maldhari) family, Kachchh, Gujarat.
Photo: Shibaji Bose.

uncertainties in climate change research, when you compare that to security studies, fighting against terrorism. We often represent research on climate change as a flower, with the climate system and changes in the climate system, in the middle. Then the next circle is about impacts on nature and society, and then there are the petals of the flower, where we get into more sectoral research – adaptation and mitigation in transport, adaptation and mitigation in agriculture, things like that. There is a danger that this view leads to climate research being a bit like a drunken man who has lost his keys – he will look under the light of a lamppost, because that is where he can see something, but it is not necessarily where the keys are. In the same way, climate science can say something about probabilities of extreme rainfall, average temperatures, and so on, but that may not necessarily be what matters to people. Social science perspectives are important to challenge the positivist framings of climate science, and to offer insights on how climate change uncertainty is compounded by a multiplicity of other uncertainties, brought about for example, by processes of rapid urbanisation and industrialisation.

2.5 Implications for Policy

Another challenge is the gap between researchers and policymakers. Social science researchers often highlight complexity and uncertainty and sometimes this is used as an excuse by policymakers to do nothing. Another issue highlighted by a participating economist, is that decision–makers think about risks in a very different way from scientists. To a decision-maker, or at least from an economist's viewpoint, the question would be 'what can I do to limit losses in case my expectations fail?', so that is the financial risk, that is the risk of poor women in India as well, and there is no correspondence between these two ways of understanding risk. Because, to a decision-maker you cannot separate risk from decisions, meaning also that risk cannot be expressed in terms of one measure. It is a question of how are you controlling, who are you asking, and what is the objective of that person. It matters who makes the decision – an investor would usually think about how financial markets are affected, and financial markets are subjected to, in most cases, global market developments. So whether there is a catastrophe in a river somewhere and they think about investing there, or to invest in the roads in another country, that can switch from one week to the next or one hour to the next. Another participant, a policy-maker, highlighted the need to translate research findings into something politicians actually can use. The importance of having people who can function as effective switchboards between researchers and policymakers was stressed. Response times were highlighted too, decision-makers often have to respond very quickly, and you have to come up with a response that you are reasonably confident with in a very short timeframe, and that timeframe is only getting shorter and shorter.

We should talk about who is uncertain, how, and about what in order to be able to build bridges between local people and experts, you need to be as concrete as possible. Photovoice is an important tool in this regard, but a problem is that when the message is conveyed upwards, to those, there is a fragmented institutional landscape along sectoral lines riddled with internal power dynamics. So to build bridges between the below and above, one must also build bridge in the middle, to transcend departmental and sectoral divisions, to foster more holistic and inclusive planning to deal with the challenges of uncertainty faced by people in marginal areas.

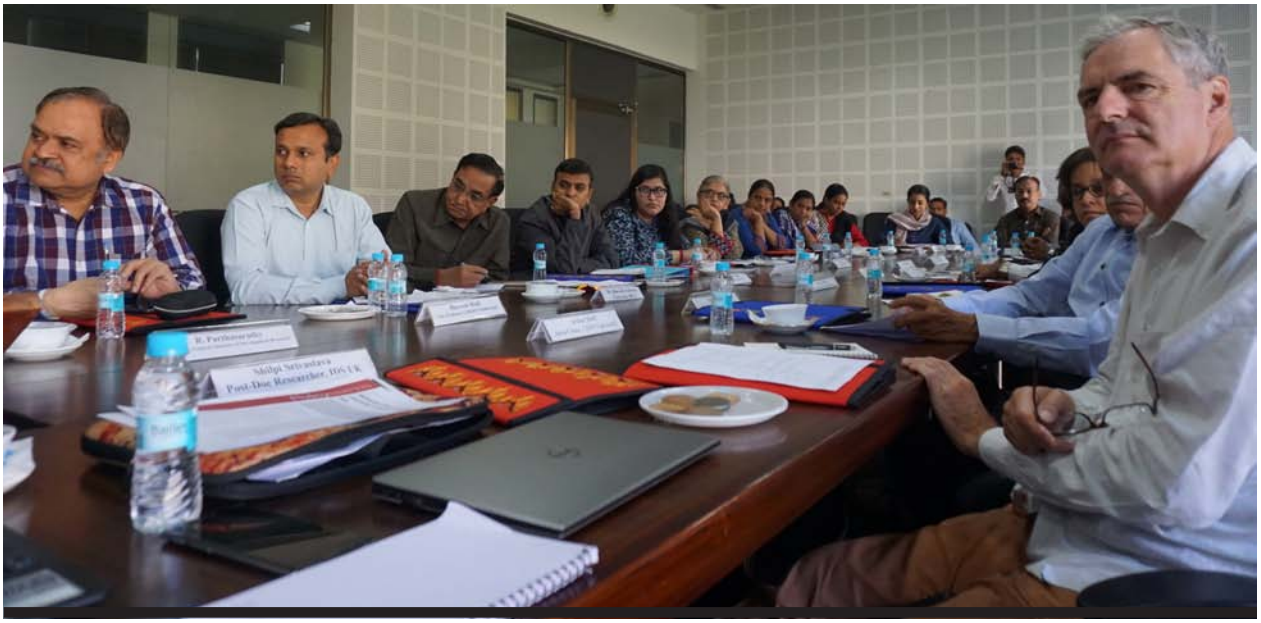
3

Round Table on Bridging the Divide on Disaster Risk, Climate Change and Uncertainty: Engaging with Transdisciplinary Perspectives at Gujarat

By Shilpi Srivastava, Lyla Mehta, Vishal Pathak, and Lars Otto Naess

3.1 Introduction

Climate Change is one of the major development challenges in present times. With clear links with the SDGs on water, health and energy, climate change is at the centre of development thinking and policy. India is one of the most vulnerable countries when it comes to climate change, and it is projected that the impacts are likely to become more intense as extreme weather events (floods, droughts, heatwaves) become more frequent. For policy makers, addressing climate change requires revisiting old paradigms of policy and decision-making, but for the local people who live with climate stressors on an everyday basis, these impacts are experienced in various ways that are usually not captured in climate and development policy. As the effects of climate change increase and become pronounced, there is an urgent need to bridge the divide between these varied perspectives and understandings of climate related uncertainties.



Participants during the IDS presentation in Gandhinagar round table.
Photo: Shibaji Bose.

After the round table. Gandhinagar, Gujarat, January 19, 2018.
Photo: AIDMI.

On January 19, 2018, Gujarat Institute of Disaster Management (GIDM), All India Disaster Management Institute (AIDMI) and the Institute of Development Studies (IDS) organised a round table on *Bridging the Divide on Disaster Risk, Climate Change and Uncertainty: Engaging with Transdisciplinary Perspectives.* The round table brought together Gujarat based academics, policymakers and practitioners *(see appendix 2)*. It provided an interactive forum to discuss their perspectives and experiences especially in the context of the growing threats that Gujarat state faces from extreme climatic events such as flooding, heat waves, droughts and other such disasters. For the round table, the starting premise was that scientific projections of uncertainty (the above) often overlook the lived realities of people who deal and live with this uncertainty on a daily basis (below). In this round table, we explored how diverse perspectives from the above and below can be bridged to inform socially just pathways to change.

3.2 Gujarat and Climate Change

Gujarat is one of the frontline states of development in the country. It is one of the most urbanised states in India. Though it is also one of the first states to set up a Climate Change Department, the focus has largely been on mitigation related activities. Until a few decades ago, droughts and cyclones were some of the major environmental challenges in the state but in recent times, it is the increased climate variability in terms of extreme weather events (floods and heatwaves) that is adding to Gujarat's environmental vulnerabilities. A long coastline also exposes the state to stressors such as cyclones, sea level rise and salinity ingress that is creating problems for resource use and distribution. Like several other states, Gujarat also has a varied agro-climatic profile with different

micro-climates in different regions, which require targeted adaptation and mitigation strategies.

Under the ongoing project, *Climate Change, Uncertainty and Transformation* funded by the Research Council of Norway, we are looking at the varied perspectives and experiences of the above and below regarding climate change uncertainties, with special reference to Kachchh. The semi-arid district in north-western Gujarat faces several climate related challenges such as droughts, high temperatures, erratic rainfall patterns, and sea level rise. These have compounded effects on the lives of the local population whose livelihoods (agriculture, livestock, and fishing) are substantially affected due to these changes. Changes in hydrological cycles, both due to ecological stressors and overuse, have affected the predominant livelihoods in this region. Due to rapid groundwater depletion and poor rainfall, salinity ingress has emerged as a major challenge for agriculture and animal husbandry. In addition, resource allocation and grabbing due to sporadic industrial development in some of the most eco-sensitive zones has affected resource dependent livelihoods. This has led to a

Climate change is like an elephant in the story, and while people see different things (ear, tail, trunk), we need to look at it as one whole animal.

(paraphrased from representative, UHCRC)

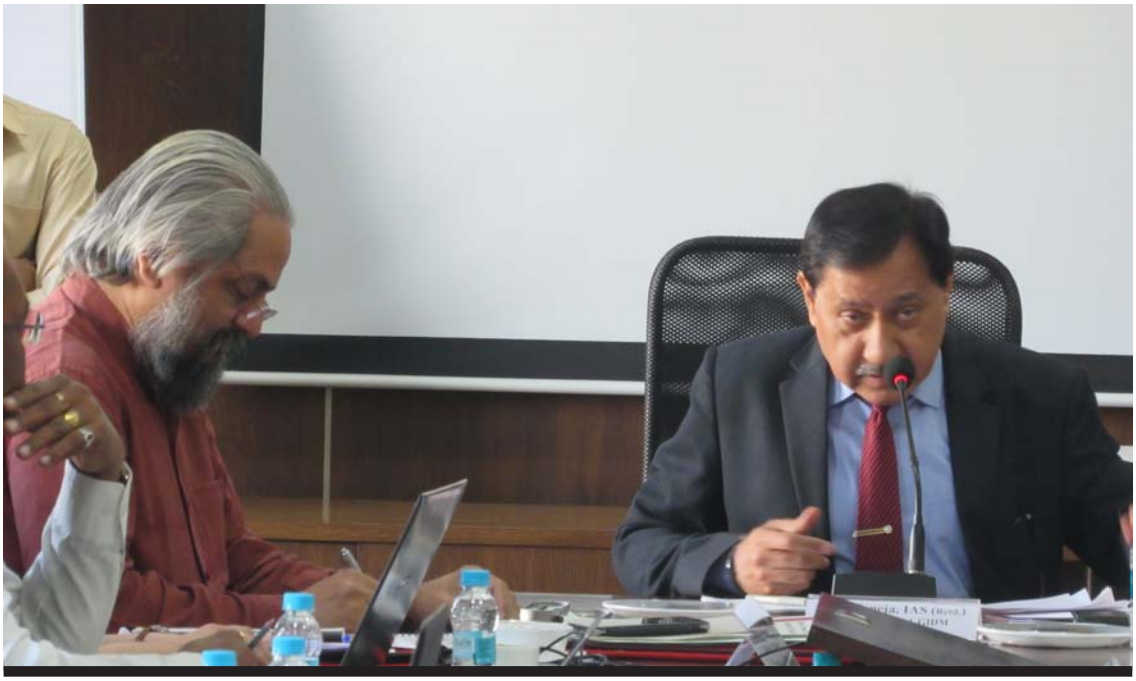
Photovoice research participants in village in Eastern Kachchh, Gujarat.
Photo: Shibaji Bose.

cascade of uncertainties for local people as their livelihoods become increasingly precarious. Though people in Kachchh have lived with ecological uncertainties for decades, droughts being a part of the ecological rhythm, local people are struggling to cope with these changes as they are intensified and exacerbated by other social and economic challenges. The round table started with a focus on these local and lived experiences of uncertainty and explored how a dialogue can be established between the above and the below to address climate related uncertainties. Some of the insights are discussed below.

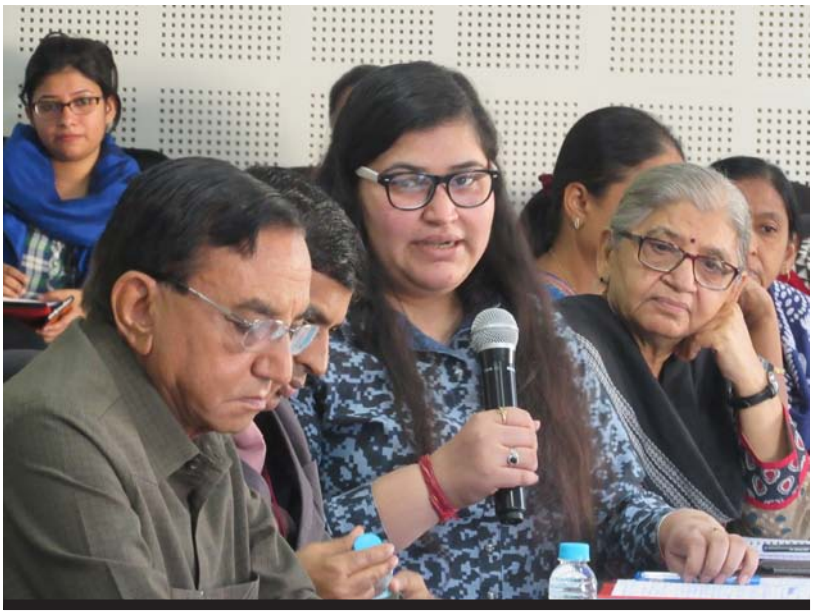
3.3 Key Insights

1. Climate Change Uncertainty and Policy Making

Different participants had different entry points in this discussion and looked at climate change through the lens of their particular sector/ departments or epistemological positions. For the scientists in Gujarat, climate change is real and certain and is measured through key variables such as temperature, rainfall, sea level rise and concentration of GHGs in the atmosphere. They concurred that what is uncertain is the impact of climate change at the local and regional levels. The scientist from IMD referred to a recent study in the journal of Current Science that suggests that there would be drastic changes in the summer and winter



Spelling out the essences from the round table, Gandhinagar, Gujarat, January, 2018.
Photo: AIDMI.



Perceptions from the civil society, Gandhinagar, Gujarat, January, 2018.
Photo: AIDMI.

temperatures in Gujarat and this would have significant impacts on agriculture, livestock and water resources.

However, for the policy makers, the term uncertainty can create a policy paralysis. For instance, a senior bureaucrat stated that – *Policy makers usually like to be certain about the course of action and they can work with likely scenarios but not with something that is highly uncertain. We need to justify our decisions* [paraphrased]. Uncertainty creates policy chaos, and a decision cannot be taken if the range of uncertainty is too high. Policy makers usually rely on scientific expertise to understand climate change but do not favour the use of uncertainty in policy making and action. Towards the end of the discussion, he also made a suggestion to understand uncertainty in two ways: a) situations where one can address uncertainty through improving information and communication [epistemological] i.e. manage or reduce uncertainty; and b) where one cannot fix uncertainty [ontological]. Policy makers may be able to address the first level of uncertainty.

It was interesting that the policy makers considered themselves as the 'middle' in bridging the divide between the scientists and local people. *We can act as a bridge, we understand below and top and thus can help bridge.*

2. The 'Missing' Voices of The Below

The participants acknowledged that climate change impacts are most vigorously felt at the local level especially in terms of the

changes in water supply and resources, health, livelihoods, forest and biodiversity. However, for policymakers, local level seemed to be like a black box. Uncertainty at the local level is not articulated very clearly. They concurred that the everyday practices of people in terms of living and coping with climate change has very limited documentation, and that these are possibly discredited at the policy level as anecdotal evidence. Some participants were quite dismissive of the local understandings of climate change and that *they [policy makers] cannot give credence to local people because they cannot verify the facts.* Inputs of the local people are welcome however. This reiterated the standard top-down understanding of policy making and implementation where local people are framed as beneficiaries rather than equal partners. Others largely believed that there is value in incorporating their experience and inputs but there was limited discussion on how to mainstream local understandings into policy. GEER Foundation gave the example

Spelling out the need for localised weather predictions.
Photo: AIDMI.

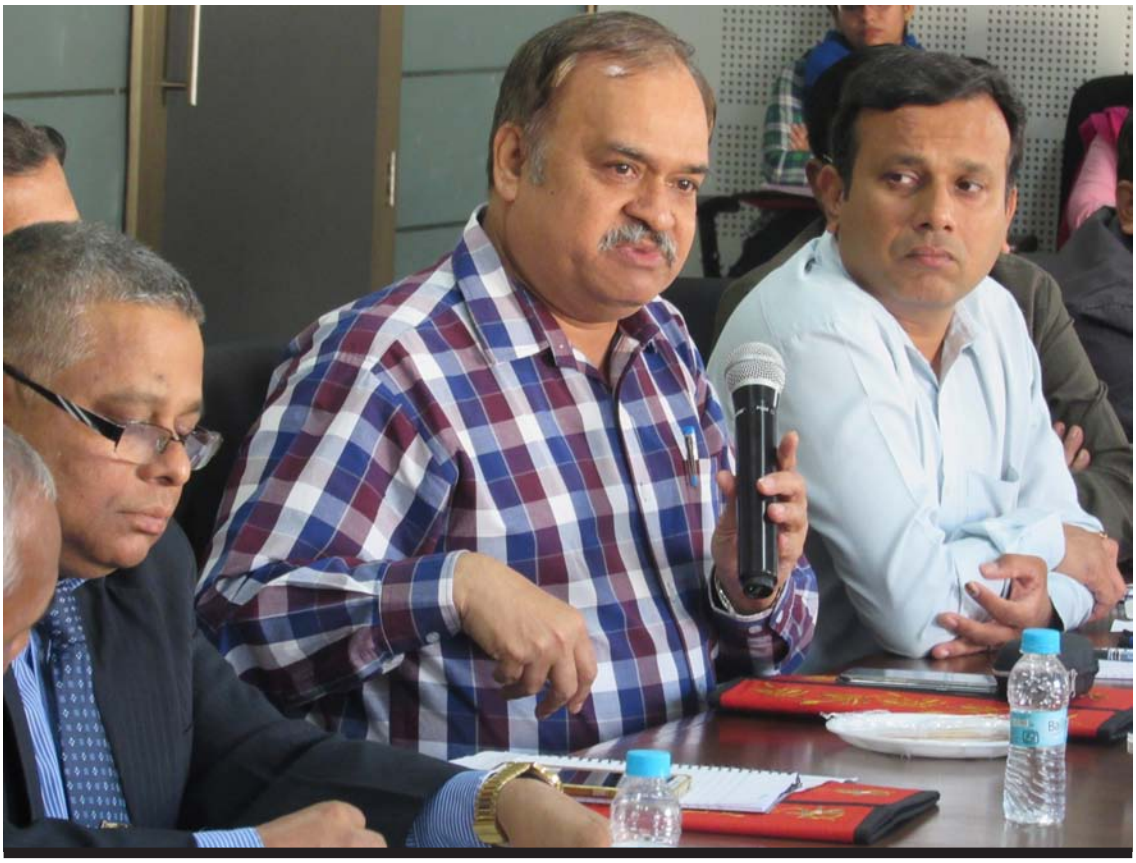
from their projects where local community consultations are being organised on water, livelihood and ecosystem restoration. They agreed that more efforts are required to work on stakeholder perceptions related to climate change and uncertainty, especially at the local level.

The reasons for this gap between the above and below were often attributed to lack of data and capacity building amongst the community members. The discussion also covered related aspects to disaster preparedness such as housing and shelter, water, climate resilient farming, early warning systems. An academic from the CEPT University talked about vernacular architecture to understand ways of dealing with uncertainty (how people live, eat, sleep, experience and recover from trauma). AIDMI suggested that children are also an important stakeholder when it comes to uncertainty, and projects with a decided focus on children on uncertainty can be very useful.

Health emerged as another interesting intersection for uncertainty. Representative from the UHCRC mentioned how climate and humidity, as variables for climate change, may not make a lot of sense to policy makers but impacts on health are more tangible, and can gain policy traction. She mentioned that policy practitioners are still trying to understand the impacts of new diseases, and how adaptation to climate change requires behaviour change, which is quite complex. She also discussed an example from Surat city where people are adapting to climate change by 'living with it' to secure their livelihoods. In many instances, community does observe changes but is 'helpless' to proactively do anything about the situation because more direct interventions are required. And in this 'wait and watch' situation, the impacts are likely to intensify and solutions more expensive.

3. Communicating Uncertainty

Lack of or poor communication increases uncertainty. Several participants agreed that there exists an information gap between the above and below. This manifests itself in poor communication between departments, between local people and the policy makers, and between scientists and policy makers. Given that Gujarat has a separate climate change department, a suggestion was made regarding mainstreaming climate change in all departments which would facilitate greater coordination and strategic action on climate change action in the state. In addition, it was observed that more local and vernacular representations of climate change are required.



Participants putting forth views on climate uncertainty.
Photo: AIDMI.

Several academics and civil society actors agreed that community does have a wealth of information and that there is a need to have a local decentralised information centre, which could act as the connecting point between the micro [below] and macro [above]. Therefore, it was suggested that capacity building is not just required at the level of the community but also at the level of decision makers who are sensitised to the local understanding and lived experiences of climate change, and understand the multiple interconnections of climate uncertainty at the local level. Several participants working in field stations also argued that there tends to be an elitist bias in climate change discussions which are usually conducted in English. Therefore, policy makers and scientists need to understand the 'local' languages or representations of climate change. This facilitated a lively discussion between representatives of various departments who provided information on various climate change related interventions in the state.

4. Tackling Climate Change through Research and Development

Lack of reliable information and poor data sharing was cited as one of the major reasons for uncertainty in policy making. Participants [especially bureaucrats] agreed that there is sufficient dearth of local level insights on climate change, and thus most of them underlined the need for micro data whereby changes at both the district and block level could be observed and assessed. Majority of the participants acknowledged that more research is required to examine the impact of climate change at the grassroots in order to mitigate the effects of scarce and missing data and minimise risk for the local populations. Some of the suggestions included: decentralised data gathering and monitoring approaches; capacity building of local institutions; and using digital technology for crowd sourcing and data sharing to address the information gaps. All aspects of data – data gathering, sharing and how to use data – need to be factored into data management. Another civil society participant suggested that we need more studies on long term perspectives on uncertainty to understand how people live and cope with these changes, and water could be a central issue in framing such research studies. Similar suggestions were made regarding the alternative energy options such as the use of solar pumps [an example discussed by SEWA].

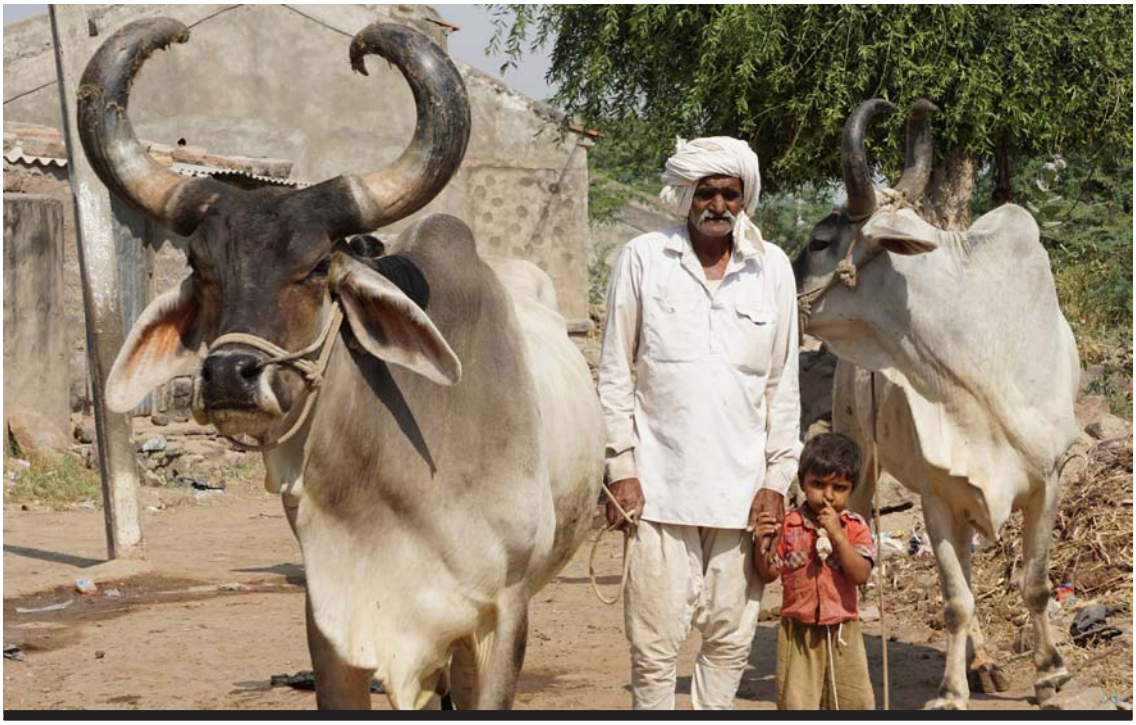
3.4 Takeaway Messages

- Uncertainty is an important dimension in climate change and its understanding needs to be improved at all levels (above, middle and below). Multisectoral and interdisciplinary ways are required to understand impacts on various sectors.
- Policy makers find it uncomfortable to work with high degrees of uncertainty since it paralyses decision-making. There is a need to factor in uncertainty in decision-making as much as possible. Doing what is possible/can be reasonably 'managed'.
- A lot of uncertainty exists because of gaps in communication; policy is either oblivious of ground realities or recommendations do not work in tandem. These can be addressed with better communication between the above, middle and below and across the above (various departments).
- There is ambiguity of information about local level conditions and impacts, and more research is required to

understand ground level realities. Better and effective ways need to be devised to mainstream them into decision making. Policies should also be communicated to the local level and more innovative ways of data gathering and sharing should be used.

- Needs assessment related to training and capacity building can be useful at macro and micro (above, middle and below).
- Though local people are adapting to climate change but more support is required for disasters, and climate events such as heatwaves and floods. Interventions should focus on strengthening livelihoods, local experimentation with accessible technologies (in housing and shelter, water, energy), resource conservation and community empowerment.
- For building community resilience, multi-disciplinary approaches need to be promoted across different levels, ranging from local people to civil society to authorities.
- Differentiated impacts of climate change on different socio-economic sections need to be factored while engaging with communities (through schools or investigate the role of social capital).

In search of greener pastures, Kachchh, Gujarat.
Photo: Shibaji Bose.



4

Round Table on Bridging the Divide on Uncertainty: Engaging with Interdisciplinary Perspectives from the Above, Middle and Below

By Hans Nicolai Adam, D. Parthasarathy, and NC Narayanan

4.1 Introduction

Urbanisation is one of the defining development themes for the 21st century. In scale and pace, the shift of people from rural to urban areas is unprecedented. Urban megacities in developing countries (like India) especially, provide a complex matrix of opportunities, threats and challenges. Dynamic, innovative and economically integrated they make up connecting nodes of a modern, global economy. However, as the case of the Indian megacity of Mumbai illustrates, manifold challenges and uncertainties pose threats to governance, existing well-being and urban sustainability. Formulating effective and inclusive response strategies has proven to be complicated, and contentious. A range of interests and visions (co)exist, often competing, and underpinned by different worldviews, approaches and power asymmetries. In this scenario, it is all the more important to engage a variety of stakeholders and their voices to deliberate alternatives and better solutions to pressing issues. As part of this process, the Research Council of Norway funded project 'Climate Change, Uncertainty and Transformation' organized a round table (RT) discussion and shared preliminary research findings. Scientists, practitioners and activists from Mumbai were invited for discussions around the theme *'Bridging the divide on climate change and uncertainty – engaging with diverse perspectives from the above, middle and below'* at IIT Bombay in January 2018 *(see appendix 3)*.

4.2 The City of Mumbai

The coastal megacity of Mumbai is one of the largest and most densely populated cities in India, with a population of around 20 million people. It is home to a burgeoning service and manufacturing sector, as well as the financial heart of India's economy. However, despite economic successes and continuous modernisation, it is also a city marred by social inequalities and ecological problems. A large part of its residents remain excluded from the formal economy, reside in unregulated settlements and

Deliberations: Round table participants at IIT Mumbai.
Photo: Shibaji Bose.

don't have secure access to water, healthcare or other forms of social support. They are also more prone to suffer from natural hazards (e.g. floods) and cyclic economic swings' all of which are compounded by increasing pollution, accelerating climatic changes and lack of institutional capacities. For instance, the World Bank (2013) describes Mumbai as one of the world's most risk prone cities to flooding. Infrastructure facilities and services (e.g. storm water drains, transport) are strained to breaking point and struggle to meet even existing requirements, let alone those from future growth projections. Increasing inequalities find form and place in exclusionary urban planning approaches. Natural resource dependent communities, such as fishermen, are pushed out from the inner city habitats and legally sanctioned commons, and their livelihood base is eroding. Expansive growth also increasingly envelops Mumbai's peri-urban areas, where people are being displaced, land appropriated and sensitive ecosystems (mangroves, wetlands, coastal zones) threatened.

A number of uncertainties exist with respect to governing and addressing these socio-economic, ecological and economic challenges at different scales. What views did the RT participants hold and what solutions do they offer?

4.3 Key Insights

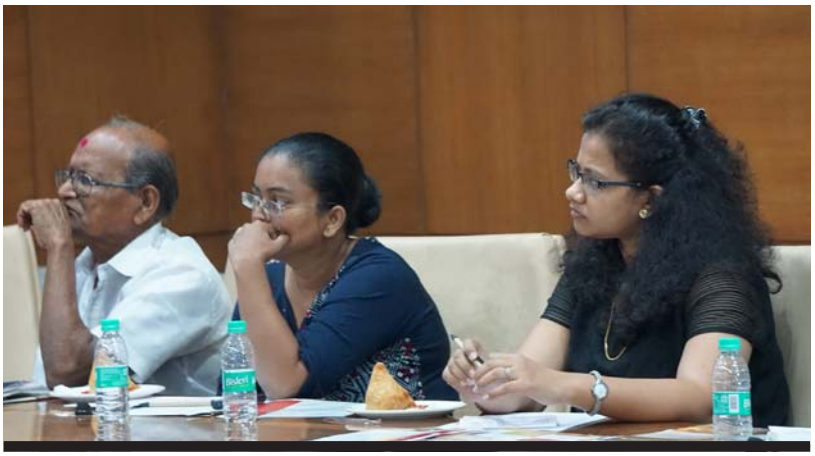
1. Urban Expansion, Uran and Mangroves

In 2015, the National Green Tribunal passed a landmark judgement that instructed the Jawaharlal Nehru Port Trust (JNPT)[2]

2 The largest port in India.

and associated agencies to compensate fishers in the Uran area for livelihood losses and ecological damages incurred. It also re-affirmed and recognised their traditional livelihood rights. *Ramdas Koli,* a community representative and leader of the campaign by the fishers to protect their environments and livelihoods, came down heavily on what he labelled as undue process that allowed the port development to take place to being with. It was not participatory in taking into considerations concerns and views of the Koli community. Impacts from the port's development have been devastating for this natural resource dependent community. Pollution, changed tidal wave patterns, loss of mangroves and decreased access to traditional fishing grounds have severely dented their income earning opportunities. They feel excluded, treated unjustly by the state and feel that the Environmental Impact Assessment(s) (EIA's) drawn up to evaluate the port were faulty.

The community leader also pointed out that there appears to be a substantive lack of (traditional) ecological knowledge on the part of policymakers. Standardized, short-term assessments are not capable to capture it (due to disciplinary divides and epistemic issues). Collective action, documentation of changes and strategic efforts allowed the Koli fishers to win the case at the National Green Tribunal (NGT) for compensation, but not reverse the port's establishment. The community representative graphically described the victorious legal fight of the Koli community against combined might of state and business interests. However, the political economy of development swung the balance of power against them and ensured that the benefits of their legal victory do not reached them. A researcher from IIT Bombay noted that EIAs – their process and premise – need to come under greater scrutiny.



Round table participants at IIT Mumbai.
Photo: Shibaji Bose.

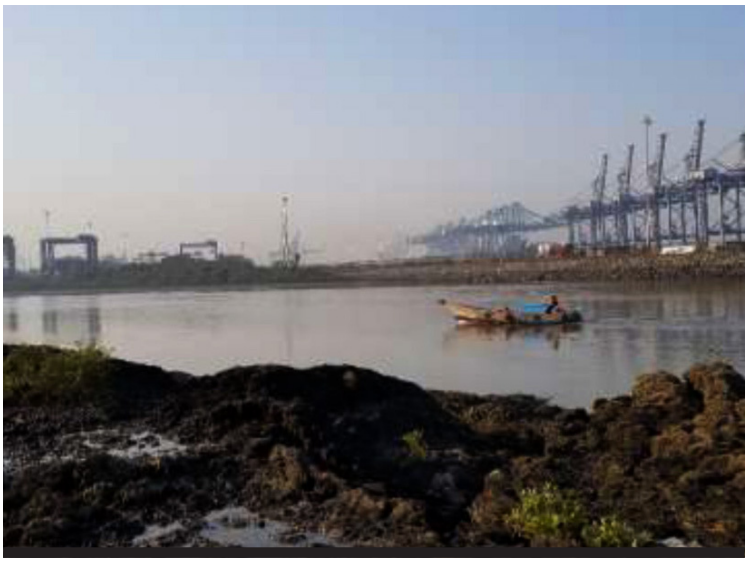
The assessments are very limited in scope in that they do not capture dynamic changes and exclude people without legal documentation. Similarly, the impartiality of the investigators and contributors is doubtful given strong business interests. It is important that Social and Environmental Impact Assessments should be carried out together and impartiality of investigators assured – a difficult exercise as investment proponents finance the assessments. A commentator from AIDMI, observed that the divergence in 'values', (e.g. in the port development case) in terms of what importance is given to livelihood issues vs. that of development needs probing. Who decides, and how can decisions be taken regarding valuation? What are the temporal tradeoffs here? Given the emerging green agenda that is being pushed, can't one look at 'Green ports' that seek to better balance development, livelihood and ecological needs and values.

A researcher from TISS mentioned that, the case of Mangroves and fisheries provides a peculiar case of natural resource management that has fallen between the cracks of various government departments. In Uran, fishing dominantly takes place in mangrove areas during low tide. However, the land in question is dominantly under the purview of the forest/revenue department. The fisheries department has little influence as its primary responsibility lies beyond the shoreline. This problematic interphase between land and sea areas in the inter-tidal zone has created uncertainty that complicates governance efforts and institutional support of traditional fishers. The round table clearly brought out the possible benefits of collaboration between researchers and fishers by consistent knowledge generation to back up their legal and other struggles, which was a major objective of this initiative from the project side.

4.4 Flooding and Uncertainty in Mumbai

Questions on the role of mangroves link to one of the major natural hazards that the city faces – flooding. Bombay 61, an NGO, working on the interphase between architecture and urban planning, held the view that regardless of climate change, Mumbai is built in an estuary and flooding is a given. However, the poor and informal status of many settlements within the city complicates the situation, for instance, by the release of solid waste that chokes up drainage channels. In addition, portions of municipal waste are tangled up in Mangroves and add to pollution. Reclamation and infrastructure projects (Bandra

reclamation, Versova, Bandra-Worli sea link) have changed tidal flows and affected mangrove density – with triple impacts on reducing fish stocks, beach areas and aggravated flooding. The political economy – especially – land mafia plays a dubious role and takes advantage of the land pressure in central Mumbai. What can be done to improve the situation? Interventions to alleviate flood related problems focus on campaigns at the local level i.e. Versova beach cleaning and waste water management. However, it was noted, there oftentimes appears to be a lack of interest from middle class residents to participate in these efforts. Moreover, the middle class view of the environment is restricted to 'cleanliness' without a broader understanding of livelihood-environment and risk reduction nexus.



Contesting perceptions: The JNPT port in Uran.
Photo: Hans Adam.

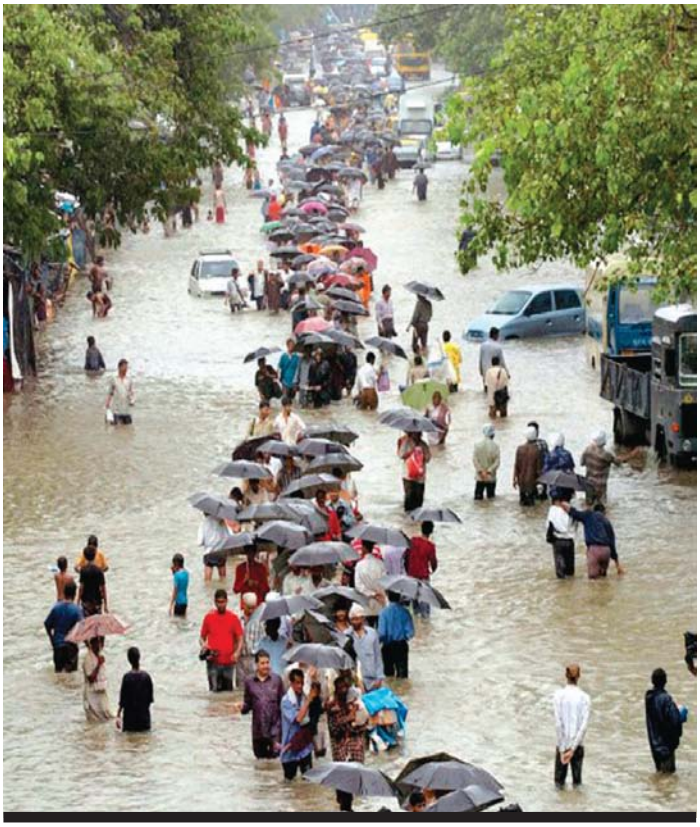
AIDMI pointed out that the city needs to be understood as a fluid space, rather than a static entity. Urban planning needs to assign more priority in theory and practice to coastal protection. A professor from IIT Bombay mentioned that small-scale enterprises in the informal sector suffer most from flooding. They keep limited stocks of inventory, and obstruction in supply chains and production facilities have immediate cascading effects that dent income and employment opportunities. In the absence of baseline data it is difficult to make accurate assessments of costs, damages and vulnerabilities. Insurance coverage is not available to cover losses for these small units. Informality and uncertainty are closely linked. In the formal sector, on the other hand, losses from natural disasters are often covered – displaying an unequal adaptive capacity and recovery. 5000 crore INR alone was paid as compensation to entities in the Bandra-Kurla Complex in the aftermath of flooding in 2005.

An atmospheric and climate scientist substantiated that when it comes to ecosystem services such as mangroves, continuous evaluation is needed, even though quantitative monitoring remains difficult. In terms of economic cost-benefit calculations, the value of the Bandra-Worli sea link is far greater than (ecological) losses. In response, a sociologist from IDS Sussex, stated that this may be true but raises questions of the 'politics of valuation'; shouldn't one look

at alternatives to monetization? There exist unaccountable tradeoffs and the long-term sustainability of the sea link can be questioned.

4.5 Climate Change, Modelling and Uncertainty

How can modelling help with respect to climate change, flooding and uncertainty? Is it possible to incorporate social perspectives? According to a citizen scientist, it is a question of 'what skills can tolerate other skills', and models require re-examination with respect to incorporating feedback. Nascent efforts already take place e.g. people mark places of local importance/ vulnerability (curves, ditches etc.) not captured in other modelling exercises through smart phone apps or other means that subsequently feed into models and projections. Uncertainties remain high at the local level nevertheless, particularly with respect to rainfall. Communication of uncertainty is of key importance and the interphases between climate events/communications need to be developed. In addition, it is important to determine data needs both from social and natural sciences to construct useful models according to a representative from AIDMI. Time spans have to be looked at as well when planning (future) smart cities (short term, medium and long term). Even though touted as 'smart' a majority of them (67%) remain prone to flooding. Flood proofing is not high on the agenda or included in planning documents.



A survivors shot of the Mumbai floods, July 26, 2005.
Photo courtesy: www.foclore.org

According to a scientist (IIT-B), attribution science (i.e. can extreme weather events be scientifically related to climate change) is not very advanced and suffers from serious limitations. However, policymakers are not concerned about whether a phenomenon can be attributable or not to climate change. What matters to them is response, not cause. Limited knowledge on dynamics of various systems, as well as sensitivity of certain information (LIDAR), prevents the creation of more confident projections and creates uncertainty. Bridging the gap and connected local level field information is challenging, and might not be a viable option. Interdisciplinary research is important though in connecting various dots:

scientific findings and models across fields (climate/hydrology/..), sociological perspectives and policy action can learn from each other. Information sharing is key in mediating this process and training exercises for bureaucrats/policymakers can lead to better interpretation of information, and more efficient decision-making.

Communication of early warning messages also relates to trust. The public has limited experience in interpreting weather related information. According to an IIT researcher, the public does not pay much heed to early warning messages (for rainfall/ flooding) as they did not find them accurate and reliable in the past.

4.6 Questions on Urban Development – Values, Process and Transformation

The round table also discussed larger issues within urban development that relate to aspects of temporality, scale and value systems. Even today, everyday hazards such as fire pose great stresses on city authorities, pollution has contributed to declining life expectancy, and poverty remains rampant. Where should priorities lie when planning development interventions? What values drive projects and how do they account for a diverse set of people and landscapes? Discussants highlighted that replicable models for city planning, i.e. in that one size fits all, doesn't exist, and geographic context needs to acknowledged (desert, mountain, estuary). In addition, the local administration's primary task should be to protect and prioritize local livelihoods and acknowledge ground realities. Cultural values, anchored in livelihood practices, exist but do not find their way into standardized assessments (e.g. EIA). Framed by a political economic system (corporate actors, contractors, state), these assessment are not geared towards acknowledging uncertainties, diverging values, livelihoods or long-term ecosystem dynamics. Traditional / hybrid forms of knowledge can be of importance in efforts to achieve more balanced and sustainable development, yet is usually ignored.

It is important to look at past disaster response mechanisms with respect to flooding and what scope for learning exists, incorporating a wide range of perspectives including that of the general public. Attribution becomes an important question when seeking to comprehend causality to risk and vulnerability. Policymakers, disaster mitigation officials, and politicians have a tendency to blame 'outside forces', thereby deflecting responsibility

and accountability. It is important to use good science to disprove 'myths'. Case studies of small victories exist. Peoples movements, as the case of Uran has shown, as well as the judiciary are important checks and balances that can outline pathways for a larger transformative agenda.

4.7 Takeaway Messages

1. Understanding the city as an integrated urban space, paying attention to its geography and multiple constituents is important
2. Disciplinary divides are palpable at every stage of project planning and execution. The framing of Environmental Impact Assessment (EIA)/Social Impact Assessment (SIA) needs to become more participatory and less exclusionary in its epistemic basis. The major challenge is bringing in transparency to mandatory exercises like public hearings in EIA, which take place as closed and opaque exercises.
3. Modelling should be opened up for feedback mechanisms through ordinary people to become relevant at the local level.
4. Policymakers want actionable information. Better training and education on limits/opportunities with models that can improve decision making
5. Smart city projects need to pay more attention to flood proofing and incorporate climate risk assessments
6. Advances in attribution science will be important for better natural disaster management.
7. Uncertainties will continue to be there in modelling but can be managed better through (interdisciplinary) information sharing
8. Critical valuation exercises of economic, ecological, and social impacts of climate change, extreme events and uncertainty are necessary to avoid the pitfalls of simplistic neo-classical models often used to justify environment-unfriendly urban projects
9. A clear pathway for transformation based on knowing the 'certainty of uncertainty' needs to be charted and shared with diverse stakeholders
10. Bridging asymmetries of power and stakeholders, policy makers, and citizens is a prime need. Good case studies of successes and failures to develop better transformation strategies can help as templates.

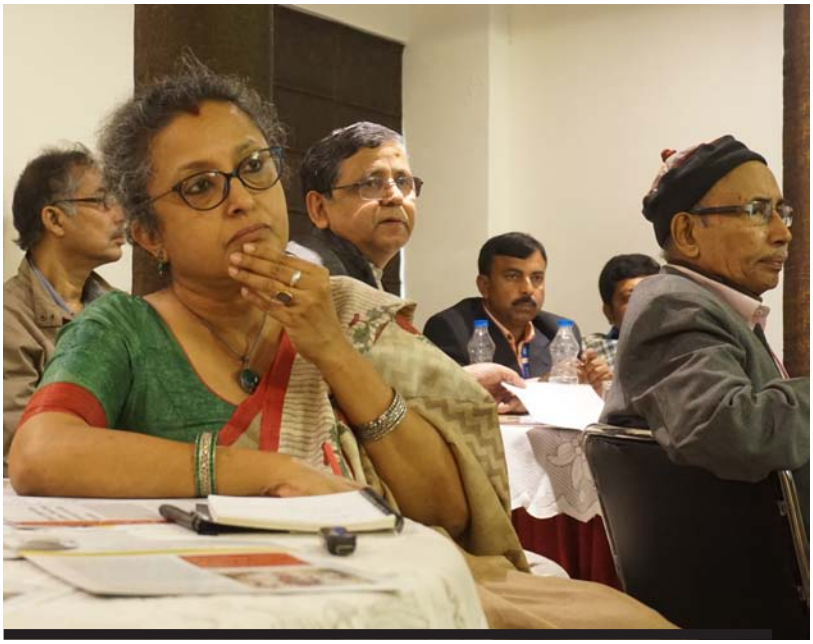
5

Round Table on Bridging the Gap on Climate Change, Uncertainty and Transformation in the Indian Sundarbans

By Upasona Ghosh and Shibaji Bose

5.1 Introduction

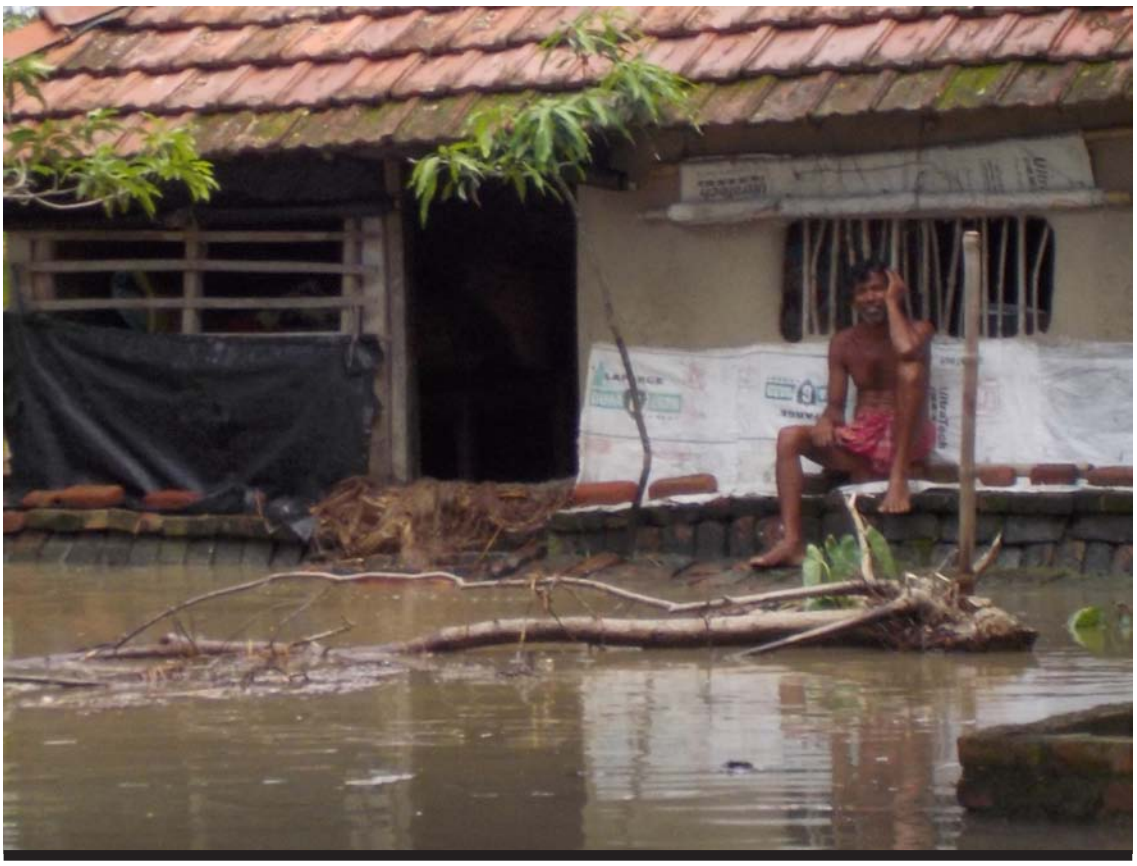
The majority of the five million people that live in the deltaic Indian Sundarbans face continuous challenges and uncertainty in relation to their shelter, livelihoods, health and overall development. Climate change is one of the key factors aggravating this situation. While scientific evidence documents climate change impacts in the Sundarbans, scientists and authorities often diverge about how the resulting challenges should be addressed. On the one hand, the communities in the Sundarbans are keenly aware of the changes that are taking place, hold considerable knowledge about the complex socio-ecological interactions and formulate autonomous response strategies accordingly. On the other hand, this knowledge is often bypassed in planning and policy processes. It is vital though that the knowledge of the different actors (communities', authorities and scientists) be brought together to improve climate change adaptation, and promote more socially just and sustainable outcomes in this vulnerable coastal region of India.



Kolkata round table on Climate Change, Uncertainty and Transformation.
Photo: Satyajit Mandal.

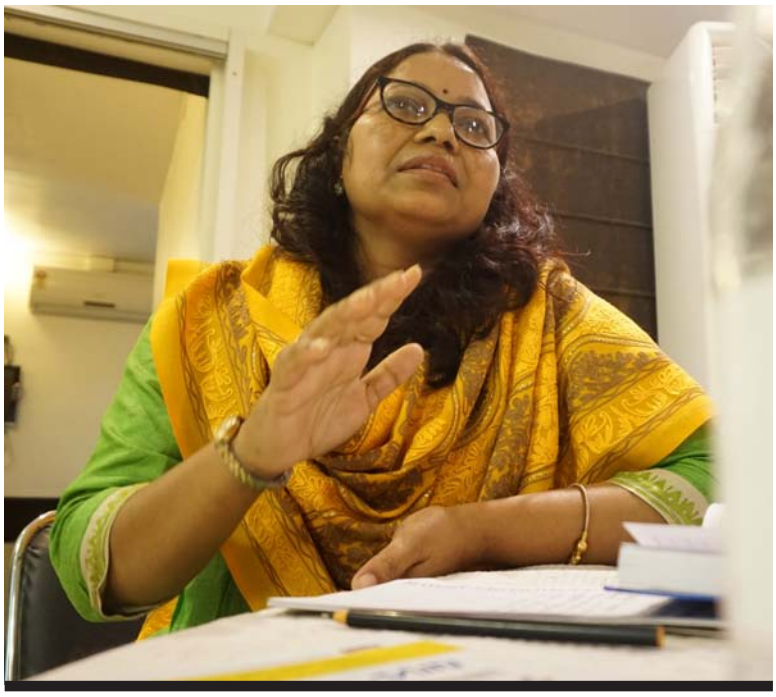
5.2 The Sundarbans Today

The Sundarbans comprise an area of approximately 40,000sq km that includes water bodies, forested islands, inhabited islands, cultivable land and parts of the mainland. Two types of inhabited islands can be categorized based on geographic location: 1) closer to the mainland, and 2) area at the fringes of the mangrove forest, reclaimed between 1900 and 1980. These two geographically distinct areas comprise the northern, western part and the southern part of the Sundarbans respectively. The north-east part sits at a higher elevation and is less vulnerable to storms and tidal inundations. This, more stable delta part, has fertile soil and boasts of a sweet water canal irrigation system. It is also closer to West Bengal's capital city of Kolkata compared to its southern counterpart. Islanders in the Sundarbans region have had to contend with shocks such as cyclones and floods, in addition to variations in its deltaic ecology as well as socio-economic marginalisation since the first settlements were established in the colonial period. In recent years, scientific evidence documented how



Portions of islands in Indian Sundarbans become inaccessible even during high tides.
Photo: Shibaji Bose.

climatic events (e.g. more intense rainfall, heat waves, and sea level rise) are becoming more frequent and pronounced. These manifestations of climate change have added to existing problems including frequent embankment breaching; loss of land, homesteads and other assets; and salinity ingress in agricultural land and sweet water ponds. All of these have led to the depletion of the traditional agro-fishing economy and strained the islanders' coping capacities. As a result, households are forced to constantly change their livelihood patterns, for instance, away from agro-fishing to wage labouring, or seasonal migration to other parts of West Bengal or other states in India.



A participant from civil society making a point.
Photo: Satyajit Mondal.

5.3 Issues and Recommendations Emerged at Round Table and Further One-to-One Follow-up with the Participants (Appendix 4)

1. Heterogeneous Sundarbans – complicating policy efforts

The Indian Sundarbans is a region that is not homogenous in terms of its socio-economic attributes, ecological characteristics and climate change impacts. A one fits-all solutions cannot, hence, solve the challenges of the Sundarbans according to a leading economist working in the health system of the Sundarbans. Similarly, climate change in Sundarbans cannot be separated from its geology, geomorphology and society. The social evolution in the Sundarbans is unique, and closely linked with its environment. The socio-political institutions have a crucial role to play in the present day social transition of the Sundarbans. Within this perplexing transition, researchers often pose the wrong research questions and end up with messy, uncertain answers. Policy making too, is a subject of these differentials, as noted by a retired bureaucrat of the State of West Bengal. A significant gap in knowledge exists amongst those who are making policy for Sundarbans regarding 'many Sundarbans' within the 'single Sundarbans'. These 'many Sundarbans' refer to various geographical locations-1) the costal pockets 2) the deltaic Sundarbans 3) the mainland part. Climate

AIDMI Director Mihir Bhatt and RCN project leader, Professor Lyla Mehta.
Photo: Shibaji Bose.

change impacts are highly localised, with a range of different manifestations and people are responding to them at a micro scale. This knowledge has to be incorporated in policy making according to a senior climate scientist from Jadavpur University.

2. Lack of Scientific Data pose challenges for climate modelling in the Sundarbans

Bangladesh has well researched ground level scientific data on sea level rise, salinity level, and subsidence or erosion rate. The Indian side does not have the same level of detail, a climate scientist working on the Sundarbans' climate change modelling noted. While the climate scientists of the State of West Bengal have worked on climate modelling of the Sundarbans, they agree that data gaps prevent better and more accurate projections. Further, the debate in the scientific community is centred on how far one can trust climate projections based on limited data sets, or taking into consideration the subjective experience of the people who are facing climate change impacts. Data gaps also persist on identifying people's coping strategies. An example cited by a scientist from Jadavpur University relates to the question of whether migration is a seasonal coping or permanent adaptation strategy. Little official data exists on the actual number of migrants. If one considers the decadal population growth rate of the Sundarbans, there is a 70 percentage growth compared to the last decades vis a-vis the State average. It indicates people from more vulnerable places are coming to this fragile ecosystem, which is beyond the ecosystem's carrying capacity.

3. Policy Apathy and Minimal Convergence

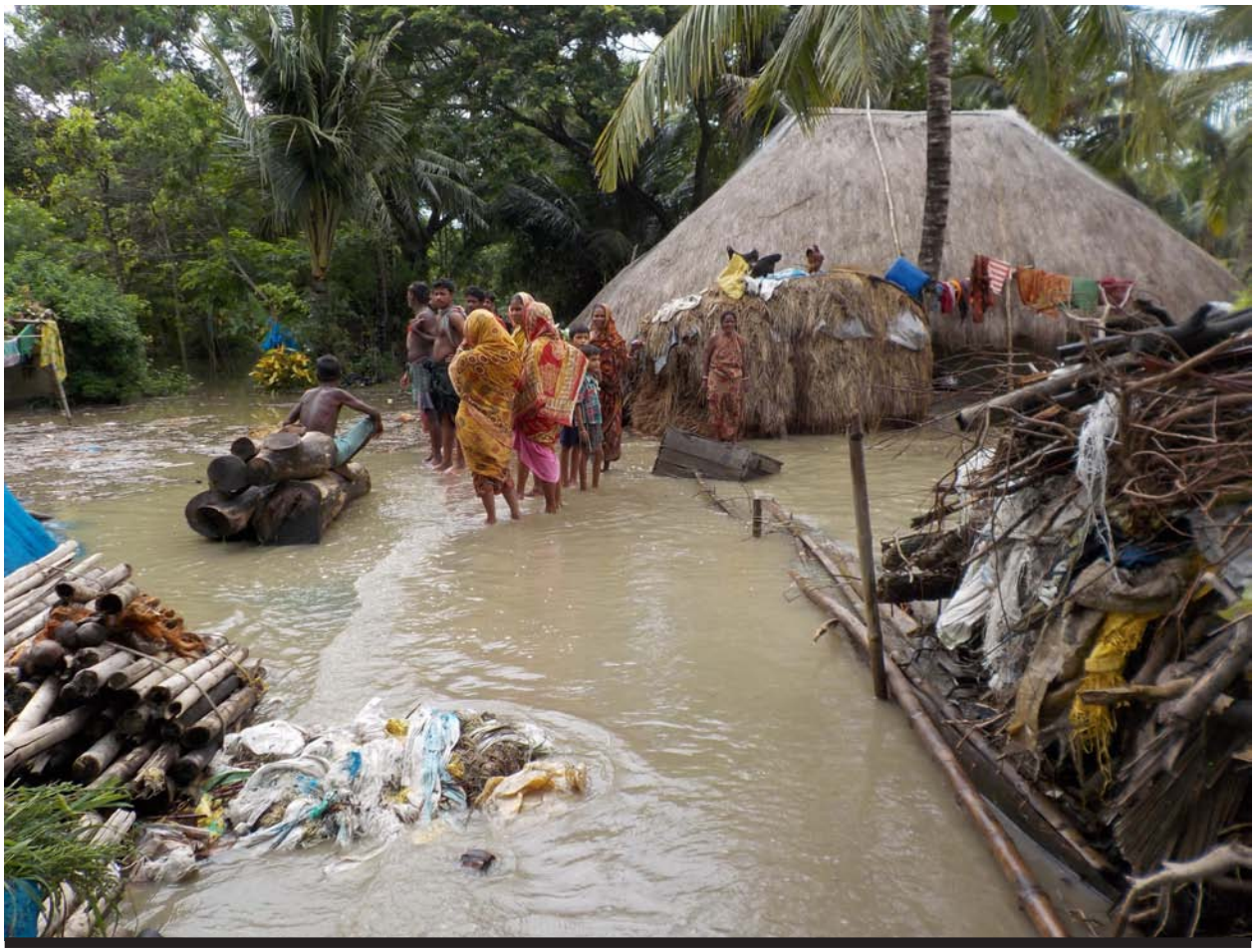
'When we started working in the Sundarbans, we asked the Department of Sundarbans Affairs about their plans for people's health. They stated that it is the responsibility of health department. Again, when we further probed to the social developmental aspects of health to the State Health department, they said it is not their area of concern', as pointed

out by a researcher working with the Sundarbans' health system for several years. 'Whom should we approach?' The same researcher opened up the debate to the audience by asking the line departments can be converged, as they always tend to see development in isolation. Policy apathy emerged as major concern among the round table participants. A likely reason for the lack of agreement is that there simply is no homogeneity within the 'above'. The above has many conflicting views depending on how they utilise resources and how they understand 'development'. This is reflected mostly in the divergence between goals and strategies of the line departments. Similarly, the middle is also constrained by the government's prerogative to control resources and funding sources for the development of the Sundarbans. This acts as an obstacle in efforts to promote collective action efforts on the part of middle actors.

4. Embankment-The Debate and Scientific Understanding

The World Bank sanctioned 5000 Crore INR for building concrete embankments in the Sundarbans, out of which only 149 crore INR have been utilized in last 7 years, an eminent river scientist and senior bureaucrat pointed out. Embankments of the Sundarbans have not been planned according to well established scientific guidelines that have been provided to the relevant

An embankment washed away by tidal currents, Sundarbans.
Photo: Shibaji Bose.



Islanders of Mousuni island waiting for relief to arrive.
Photo: Shibaji Bose.

departments. The gradual sinking of many islands is also creating significant uncertainty, which is forcing the administration to work out rehabilitation plans. Hence, environmental protection – in efforts to reduce erosion – should be a priority for the Sundarbans Affairs Department. Compared to existing approaches to protect the embankments, this should be more participatory in nature involve the community in ensuring proper planning, supervision and implementation. The incorporation of mangroves for embankment protection is also required if they were to be sustainable.

5.4 Takeaway Messages

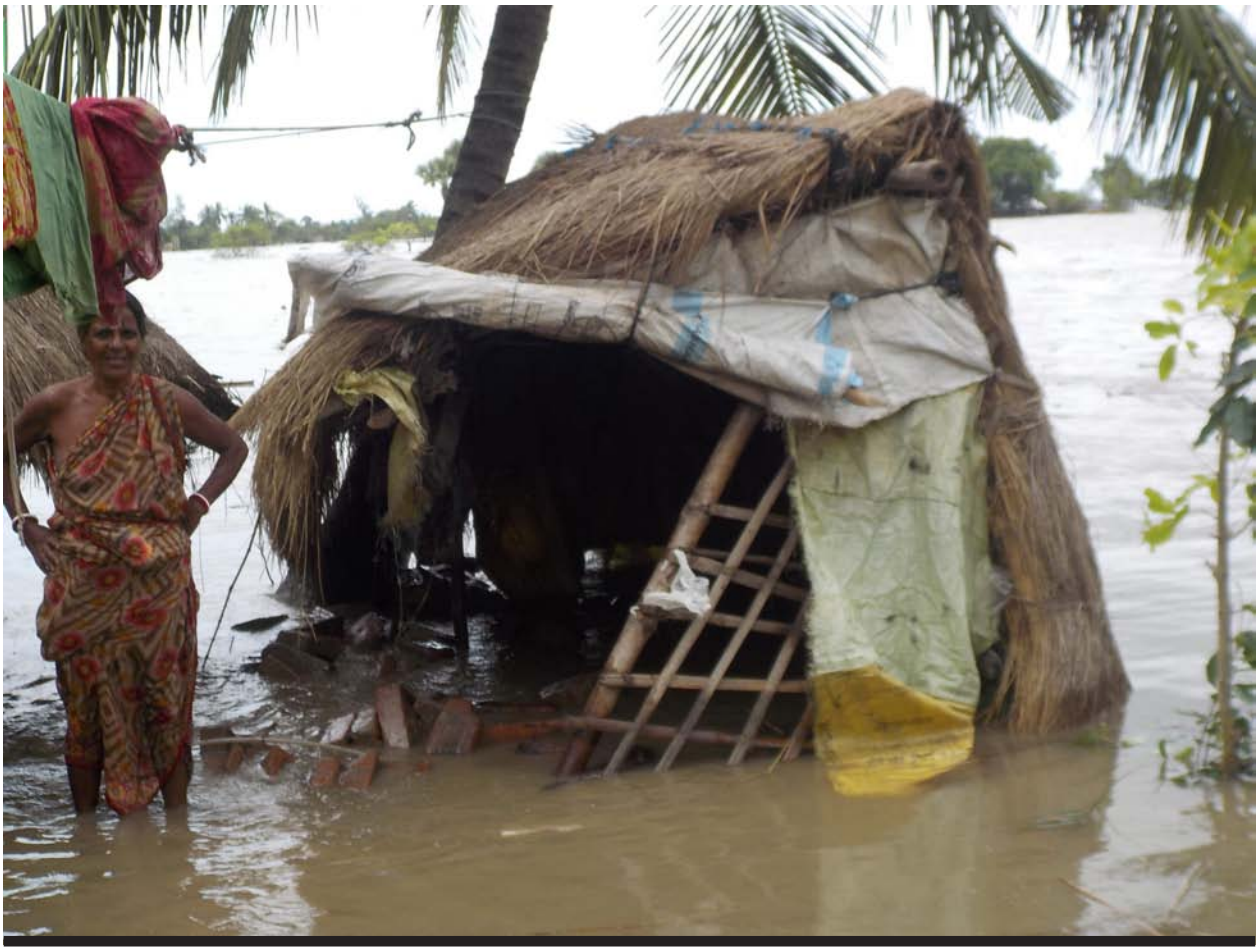
1. Draw up a map of Sundarbans in terms of livelihood depletion, household food security and children's vulnerability. Vulnerabilities to climatic uncertainties are differentially distributed within the Sundarbans as well as within communities. There is an urgent need to identify

specific vulnerabilities, vulnerable groups and locations, and plan the programs accordingly. Spatio-temporal vulnerability assessment under different temperature scenarios of say 1.5, 2, and 3 (all °C) are required to be able to identify physically vulnerable mouzas (Baliaramouza for example in Mousuni) across time and space.

2. Vulnerable environments like the Sundarbans require pro-poor adaptation as well as the strengthening and protection of local ecosystems and biodiversity, especially mangroves, in a people-centric way. Various knowledge regimes and experiences, including scientific, technical, administrative, and every day practices need to come together to plan for alternative solutions to the problems this region faces. In this regard, the state should facilitate spaces to enable sharing between policymakers and local level policy implementers, NGOs, and CBOs (Community based Organisations) as well as local communities' own experiences and responses. Sundarbans Affairs Department may need to take leadership in the facilitation of such a platform.

Fishing is the second largest source of livelihood in Indian Sundarbans.
Photo: Shibaji Bose.

3. Long term community led adaptation strategies in food production systems will be beneficial besides and in addition to short-term emergency response. State led innovative measures like supplying vegetables and fruits through the public distribution system may help to reduce the food insecurity of the region. Strong surveillance is required to monitor growth of children in the age group between 25 to 36 months.
4. Any developmental approach for the Sundarbans needs to consider the climate sensitivity of a locale. For example, infrastructure for climate vulnerable hotspots is essential to ensure uninterrupted supply and provision of basic services.
5. Developmental planning for Sundarbans also requires a comprehensive approach that goes beyond a singular focus on poverty reduction and awareness raising. Generalized schemes and programs are not fruitful to the specialized needs of this highly dynamic context.
6. Women of the Sundarbans need special attention. Tailored programs for women headed households to provide them support in childcare, skill building and livelihood generation will support them to handle the present day economic uncertainty and sustenance.
7. Waste management initiatives with special focus on the riverbank and coastal areas need to be incepted (e.g. alternatives to plastic bags).
8. Occupational health hazard of the women particularly for those who are engaged in shrimp and crab collection would require improved health services, technical support to make the entire procedure safer and finally changes in livelihood pattern by creating alternative livelihood opportunities.
9. Developing an active model-driven Decision Support System (DSS) to devise adaptation responses starting with people who have been substantially affected in terms of loss of land and livelihoods. The DSS would take into account various scenarios of temperature increases leading to concomitant sea-level rise, and undertake benefit-cost analysis considering the various economic, social, and ecological drivers to arrive at the most feasible and least cost option for in situ adaptation.



Erratic rainfall and resulting floods have become a common occurrence in Indian Sundarbans.
Photo: Shibaji Bose.

10. Build capacity of the local level administration (Block level specifically) to understand Sundarbans better with respect to its climatic, sociological and specific development features. Sundarbans is different in terms of socio-economic and environmental need than other parts in the State of West Bengal. This should be reflected in the ground level planning.

6

Climate Change Uncertainty: Communicating Complexity to Policymakers

By Mihir R. Bhatt

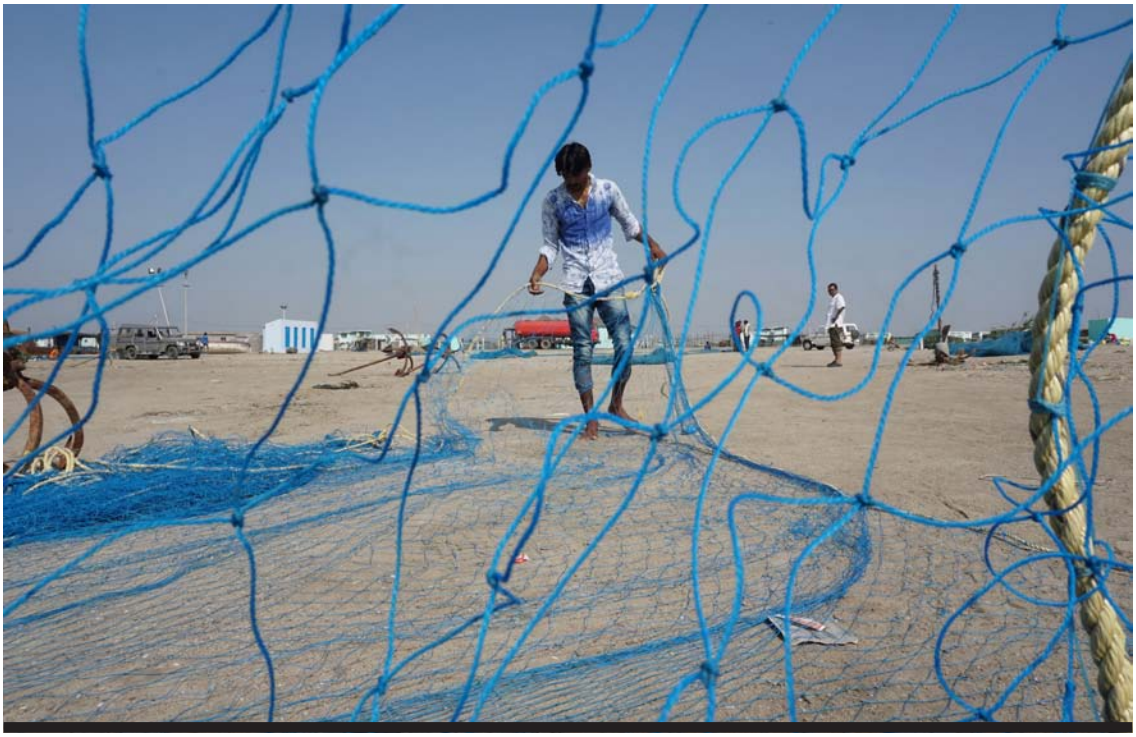
6.1 Background

While there is overwhelming scientific evidence of the causal link between anthropogenic activity and climate change, there is a degree of uncertainty of the precise impacts from climate change – be it with respect to timing, intensity or spatial distribution. The uncertainty induced by climate change thus emerges as a novel challenge to human settlements, ecology and economy. Greater uncertainty also makes the prediction of extreme climate events like droughts, floods and extreme temperatures tougher, which in turn causes complicates adaptation efforts. Climate change related uncertainty has consequently become a 'wicked problem' for planners, policy-makers and at-risk communities.

According to IPCC 5th Assessment report (2014), South Asian countries are already experiencing the impacts of climate change in the form of altered precipitation patterns, high rate of sea level rise, and extreme temperatures, all of which threaten the lives, livelihoods, health and wellbeing of about one-fourth of the entire world's human population that lives in this region. Research carried out under the Research Council of Norway (RCN) funded project **'Climate Change, Uncertainty and Transformation'** has engaged with this issue in attempts to foster novel ways of approaching climate change related uncertainty. The project spawned four round tables held in Oslo, Mumbai, Gandhinagar and Kolkata to understand the perspectives of various stakeholders such as policy makers, administrators, climate scientists, activists and community. These round tables drew heavily from the experience of vulnerable communities, specifically in the Indian Sundarbans, Mumbai and Kachchh. Deliberations also highlighted the importance of the diversity of opinions, knowledge and world views that need to be captured when considering the multiple effects that climate change has on human and ecological wellbeing. Most importantly, the round tables brought out the importance of taking a multidisciplinary and plural view of climate uncertainty to truly understand its impact on society. Bridging the gaps of these various perspectives and disciplinary approaches is essential to arrive at more socially just and locally attuned solutions to manage climate uncertainty.

Climate change has also been identified as one of the greatest drivers of disaster risk. The Sendai Framework for Disaster Risk Reduction (SFDRR), which guides global disaster risk reduction efforts, also emphasizes the link. Although the SFDRR does not explicitly talk about climate change induced uncertainty, it does refer to the possibility of climate change exacerbating the intensity and frequency of natural hazards. There is also no denying that climate change will affect the progress towards sustainable development goals. Therefore, it is important to identify overlapping areas in reducing disaster risk through addressing climate change related uncertainty and overlaps. One way of doing this is through shared policy objectives. The SFDRR has identified four priorities of action viz. a) a better understanding of risk; b) strengthened disaster risk governance; c) more investment in capacity building and research and; d) more effective disaster preparedness as well as embedding the 'build back better' principle into recovery, rehabilitation and reconstruction. To achieve greater policy coherence and synergy between addressing climate uncertainty and disaster risk, this chapter categorizes the key conclusions from the previously mentioned round tables as per the priorities of the SFDRR.

Fishing nets put out to dry, Jakhau port, Kachchh, Gujarat.
Photo: Shibaji Bose.



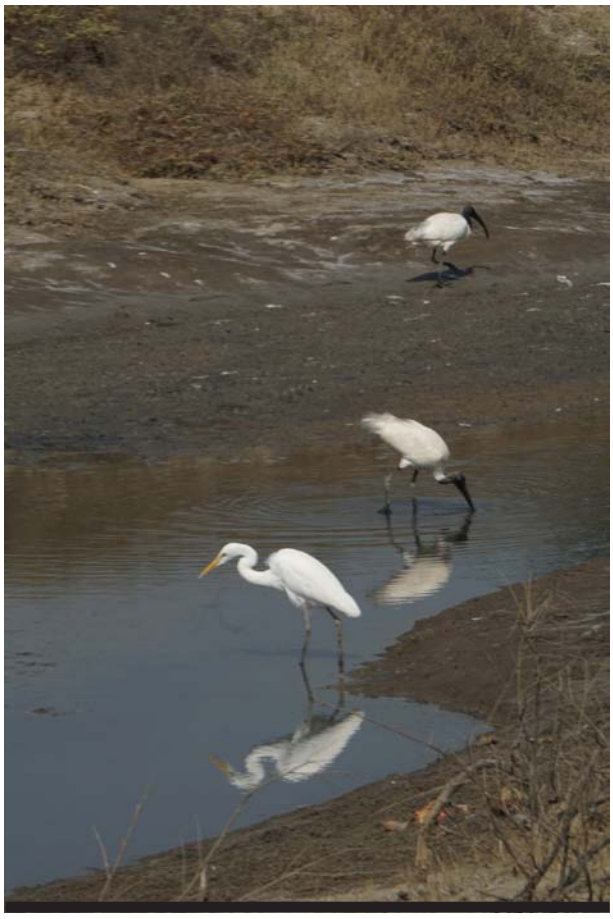
A. A better understanding of risk and uncertainty

Uncertainty and risk are often conflated. However, there is a significant difference between the two. While risk can be quantified, uncertainty cannot. However, the SFDRR has only peripherally addressed uncertainty by treating it as an aspect of underlying risk. The following conclusions from the round tables help in understanding disaster risk in conjunction with climate uncertainty.

- There is ambiguity of information about local level conditions and impacts, and more research is required to understand ground level realities. Research approaches should also be inclusive, open and innovative – a prerequisite for more effective policy interventions at the local level.
- Needs assessment related to training and capacity building can be useful at different levels (above, middle and below). For building community resilience, multidisciplinary approaches need to be promoted across different levels, ranging from local people, and civil society to authorities. Differentiated impacts of climate change on socio-economic groups have to be factored while engaging with communities.
- Disciplinary divides are palpable at every stage of project planning and execution. The framing of EIAs/SIAs, for instance, needs to become more participatory and less exclusionary in its epistemic basis. The major challenge is bringing in transparency to mandatory exercises like public hearings in EIAs, which take place as closed and opaque exercises. Climate and weather modelling should also be opened up for feedback mechanisms that incorporate local level ecological and socio-economic conditions.
- Critical evaluation exercises of economic, ecological, and social impacts of climate change, extreme events and uncertainty are necessary to avoid the pitfalls of simplistic neo-liberal development approaches, often used to justify environment-unfriendly and socially exclusive development projects
- Underlying vulnerabilities (related to socio-economic status, location) that accentuate climate impacts need to be properly identified prior to policy and programme implementation. Spatio-temporal vulnerability assessments under different climate scenarios are one robust way forward.

B. Strengthened disaster risk governance

- In terms of risk and uncertainty, there is a big gap in perception between researchers and decision-makers. Social scientists often highlight complexity and uncertainty, which is sometimes used as an excuse by policymakers to do nothing. Decision-makers think about uncertainty in a very different way from scientists. To a decision-maker, the primary concern is what can I do to limit my losses in case my expectations are not met?
- There exists a need to translate research findings into something politicians actually can use. The importance of having people who can function as effective switchboards between researchers and policymakers was stressed. Response times were highlighted too. Decision-makers often have to respond very quickly e.g. to natural disasters, and have to come up with a decision and plan that they are reasonably confident of.
- Policymakers want actionable information. Better training and education on limits/ opportunities with models and forecasting can improve decision-making.
- Bridging asymmetries of power between stakeholders, policy makers, and citizens is a prime need. Good case studies of successes and failures in adaptation planning can help to develop better transformation strategies. While policy makers find it uncomfortable to work with high degrees of uncertainty, ignoring it is no solution either. There is a need to factor uncertainty into decisions and do what is possible/can be reasonably 'managed'. Better public communication to tone down expectations from decision makers, as well an understanding of the different dimensions of uncertainty between the above, middle and below can help arrive at better decisions.
- Photovoice is an important tool for conveying the lived experience of uncertainty. A problem with this approach is that when the message is conveyed from communities to decision makers, a fragmented institutional landscape, riddled with internal power dynamics obstructs a



Vanishing mud flats: A key indicator of a vibrant coastal ecosystem.
Photo: Shibaji Bose.

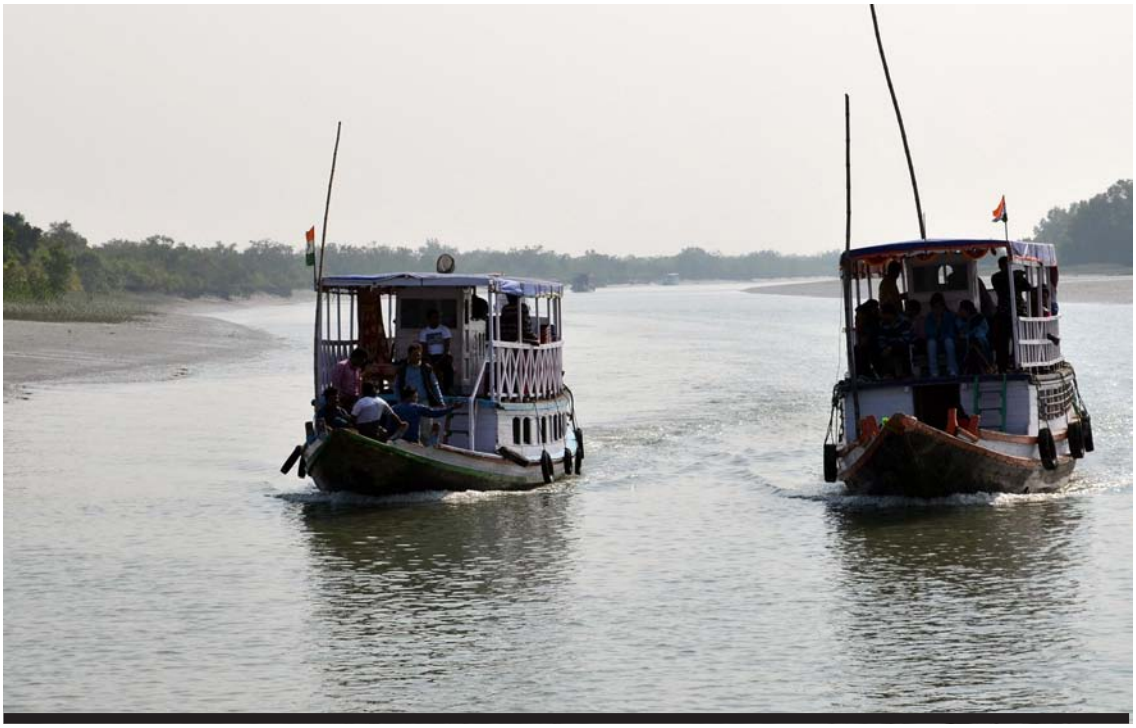
translation into practice. In order to build bridges here, the role of the middle is important as they can engage with both, the below and above.

- Developing an active model-driven Decision Support System (DSS) to devise adaptation responses , starting with the most vulnerable communities. The DSS would take into account various climate scenarios and undertake benefit-cost analysis that considers the various economic, social, and ecological drivers to arrive at the most feasible and least cost option for effective adaptation.

C. More investment

- Advances in attribution science will be important for better natural disaster management and allow for specific resource allocation of adaptation projects. Uncertainties will continue to exist in modelling but can be managed better through (interdisciplinary) information sharing.
- Build capacity of the local administration in areas characterized by a high level of climate uncertainty. Such capacity building exercises need to be informed by the climatic, sociological and specific development features of such areas.

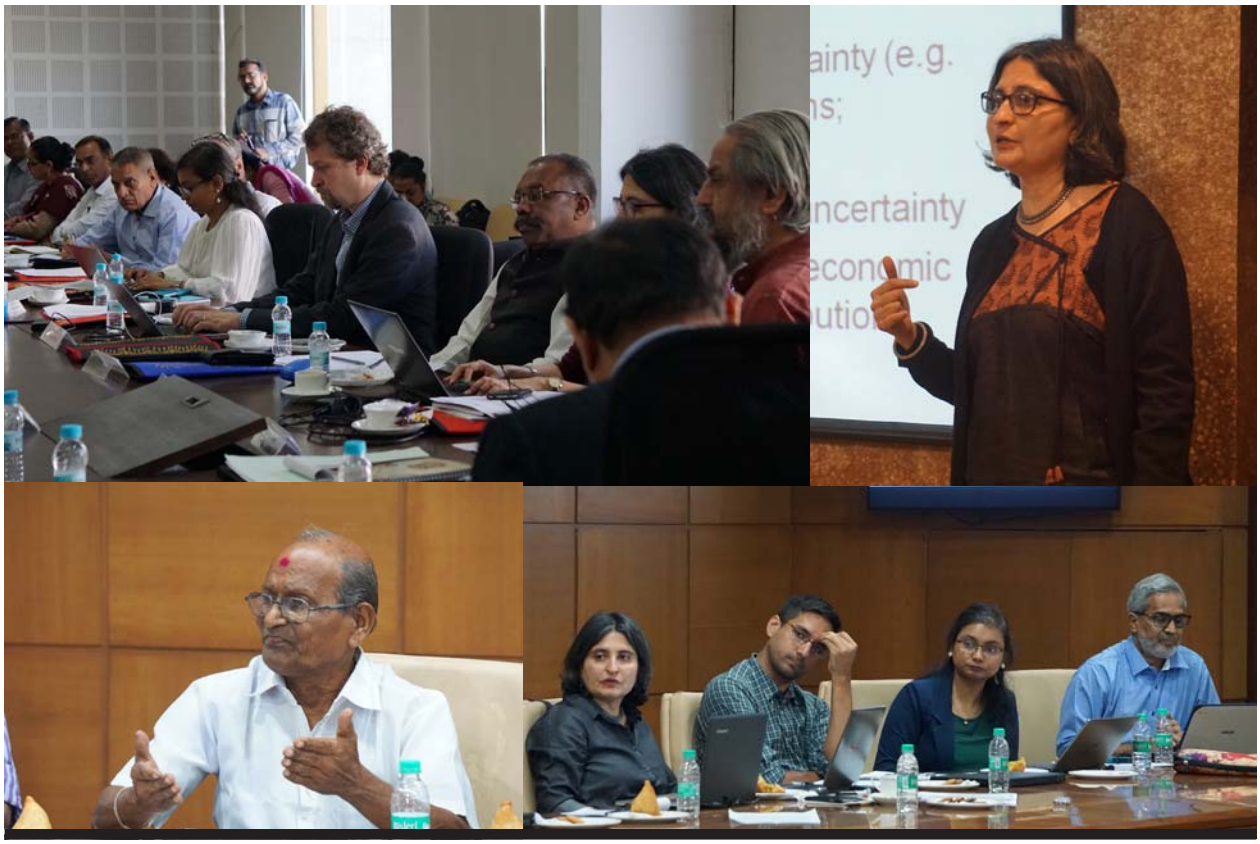
Sundarbans – rescue team; islanders feel too little too late.
Photo: Shibaji Bose.



- Greater investments into emergency response will improve the capacity of governments and communities to bolster short-term responses to natural disasters. Similarly, greater investments in community-based development strategies (e.g. food security, health care) and their concomitant monitoring can help in adaptation efforts within vulnerable areas.
- In urban areas, smart city projects need to pay more attention to flood proofing and incorporate climate risk assessments across all levels of planning – from national to local. Understanding the city as an integrated urban space, and paying attention to aspects spatial planning is a way forward.

D. More effective disaster preparedness and embedding the 'build back better' principle into recovery, rehabilitation and reconstruction

- Regions exposed to climate uncertainty require pro-poor adaptation as well as the strengthening and protection of local ecosystems and biodiversity. Various knowledge regimes and experiences, including scientific, technical, administrative, and every day practices need to come together to plan for alternative solutions to the problems that such region face. In this regard, the state should facilitate spaces to enable sharing between policymakers and local-level policy implementers, NGOs, and CBOs (Community-based Organisations) as well as local communities' own experiences and responses.
- Development planning in regions with a high degree of climate uncertainty needs to go beyond a singular focus on poverty reduction and awareness raising. Generalized schemes and programs will not be suited to the special needs of such dynamic and precarious ecosystems. Any development approach in such ecosystems should be grounded in and tailored to the local milieu.
- Promoting women's leadership to address the challenges of climate change is absolutely essential. Specific programs for women headed households to provide support in child care, skill building and livelihood generation will allow them to address to multiple uncertainties, including those from climate change.



Round table participants at Gandhinagar, Kolkata and Mumbai.
Photos: Shibaji Bose.

6.2 Conclusion

Uncertainty is an important dimension in the daily lives of vulnerable communities, and climate change serves to accentuate it. It is consequently important to improve understanding as well as bridge gaps between its various conceptualisations – at the above, middle and below. The round tables highlighted that multisector and interdisciplinary approaches are required to understand differentiated impacts on various sectors and social groups. This can be a little difficult because of the ambiguity of information about local level conditions and impacts, which is why local feedback mechanisms are so important, including in model building. Better and effective ways need to be devised as well to manage uncertainty in decision-making and avoid the pitfall of short-cut, possibly maladaptive action or to do nothing.

Policies need to be communicated to the local level, on the back of more innovative, locally appropriate and co-produced data. Similarly, building community resilience has to be predicated on multidisciplinary approaches that cut across different levels, and

factor in the lived experience of climate uncertainty. Any unified strategy to address the detrimental impacts of climate change uncertainty is bound to be inadequate. Fine tuning adaptation strategies will benefit from building on and leveraging the diverse expertise of policy makers, experts and members of at-risk local level communities. Undoubtedly, challenges exist in this process be it a fragmented institutional landscape, asymmetric power relations or scientific challenges. However, the round table discussions also brought out encouraging examples of sympathetic coalitions of actors who have managed to incept projects that fall outside mainstream interventions and could herald in more transformative action. This was observed in initiatives that co-developed saline tolerant rice varieties and aquaculture farms in the Indian Sundarbans, camel breeding in Kutch or community driven flood mitigation projects in Mumbai. All of these involved various actors from above, middle and below and signified a departure from existing coping and adaptation strategies. Thus, taking any meaningful adaptive action to enhance capacities of vulnerable and marginal communities can immensely benefit from more holistic and inclusive approaches that transcend disciplinary and epistemic divides.

APPENDIX 1: OSLO ROUND TABLE PARTICIPANTS

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APPENDIX 4: KOLKATA ROUND TABLE PARTICIPANTS

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Photo: Shibaji Bose.