

The Risks of Climate Change Adaptation

How policies of adaptation, lower the adaptive capacity of
indigenous communities

A Case Study of the Mishing Tribe
Majuli Island
Assam, Northeast India



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Abstract

This thesis evolved out of a two-month field study in Northeast India, addressing the vulnerability of the Mishing tribe who are living, surrounded by the Brahmaputra River on Majuli Island. Indigenous communities such as the Mishings are often portrayed as the first victims of global climate change. On Majuli, climate change is increasing the scale and frequency of floods on the eroding island. The main approach of the Indian and Assam Government to address these risks is through the implementation of technologies to control the river. This approach is sustained by the UNFCCC Adaptation Framework which is largely based on the transfer of technologies and impact-driven analysis of environmental hazards to address the vulnerability of local communities. This thesis questions such an approach. Investigating an eroded Mishing community, the vulnerability towards floods was found to be related with the policies of flood and erosion adaptation by the government. It is thus suggested that indigenous communities are, to a higher degree, the first victims of unsustainable adaptation policies rather than climate change itself.

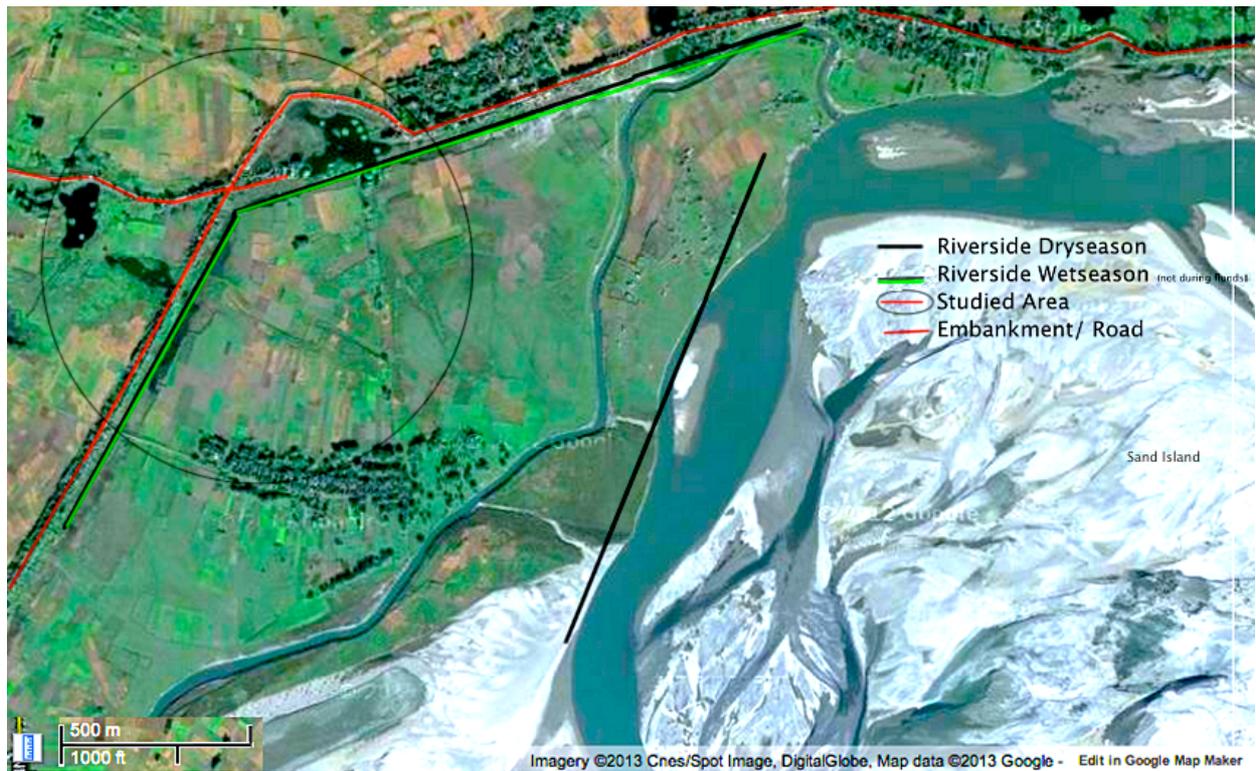
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Map of Field Site



1 Introduction

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report projects that the Himalayan Highlands will experience some of the highest increases of global warming. The flow of rivers such as the Brahmaputra River (Brahmaputra) is already changing volume and intensity (IPCC 2007, p.478). Millions of people from India and Bangladesh depend upon this river as a direct source of livelihood (IPCC 2007, p.493). In India the main part of the population living by the Brahmaputra belongs to the state of Assam. While the state is vulnerable to climate change in several ways, it is already one of the most flood prone areas of the world, having 40 % of its entire geographical area yearly flooded (Goswami 2008, p. 41). The population along the river basin has always lived with floods, using them as an asset among other bringing irrigation and nutrition to the fields. New research indicates that changes which are both climate induced and connected to development related activities, are increasing the amount and frequency of floods (Goswami 2008, p. 41; Pereira & Nasrin 2013, p. 5). Interlinked with floods comes server issues of soil erosion destroying around 8000 hectares of land along the Brahmaputra on a yearly basis (Wiebe 2006, p. VI) and sand casting destroying the agricultural potential of land (Das et al. 2009, p.1).

Majuli Island (Majuli) is one of the world largest inhabited river islands located on the Brahmaputra in Assam. From 1901 to 2001, the island has shrunken from around 1255 to 422 square kilometers (Phukan & Sharma 2005, p. 1). This has resulted in the displacement of thousands of people. Previous studies indicates that some have been able to acquire new land within the island others outside, while a last group is internally displaced along the edges of embankments constructed by the government (Nath 2009, pp. 80-81).

Since the 1950s large projects of adaptation to the occurrence of both floods, soil erosion, and sand casting has been undertaken by the Assam Government (Wiebe 2006, p.15). In the last decade the responsibility has both been with the Brahmaputra Board under the Indian Government, and the Water and Resource Department of the Assam Government (Brahmaputra Board 2012). In recent years a renewed focus on the island as a potential UNESCO World Heritage site, the funds and activities of “saving” the island have increased. The implementation of large infrastructures and other technology intensive structures to preserve the people and the cultural and environmental heritage of the island has created a situation where Majuli Island is the largest receiver of flood and erosion adaptation funds in Assam (Brahmaputra Board Monthly Expenditure 2012).

Majuli, like the rest of Northeast India, has a complex composition of different ethnicities, religions, casts, and scheduled tribes. The largest ethnic group is the Mishing

tribe¹. The Mishings have through centuries developed livelihoods, knowledge systems and technologies according to the environmental risks of the river. The conducted field work on Majuli from February to March 2013, indicated how among the communities having experienced displacement as a result of erosion, only the communities belonging to the Mishing tribe were internal displaced, despite being the signal largest ethnic group.

This shows that the need of climate change adaptation in socio-ecological systems such as Assam is an increasing critical issue. Within academia, the international climate change negotiations and among the development assistance community adaptation is increasingly becoming a field of engagement.

The current most important international document on climate change adaptation is the Cancun Adaptation Framework (Framework) part of the Cancun Agreement the main formal result of the 2010 UNFCCC COP16 in Mexico. The Framework argues that the final approach to climate change adaptation has to be “*guided by the best available science and, as appropriate, traditional and indigenous knowledge*” (Cancun Agreement 2010, paragraph 12). This is in a context of climate change according to the Cancun Agreement (2010, p. 2) being “*felt most acutely by those segments of the population that are already vulnerable*” emphasising among other geographical location, status as indigenous and gender as factors that determine vulnerability. The Framework calls for the first time in the history of climate change negotiations under UNFCCC for action taking into account measures “*in regard to climate change induced displacement, migration and planned relocation, where appropriate, at the national, regional and international levels;*” (Cancun Agreement, paragraph 14f).

1.1 Problem Formulation

The following research shows a strand of academic work which has begun to question the current direction of climate change adaptation. Rooted in case studies and incorporating concept of sustainability and social justice these studies find that the current adaptation pathway does not address underlying vulnerabilities but focus on responding to the direct impact of climate change. The end result is a contribution to an increase in vulnerabilities towards climate change among the most marginalised (Eriksen et al. 2011), (Schipper 2007), (Carey et al. 2011). These studies however do not engage directly with the current international climate change adaptation negotiations in relation with current local practises, policies and lessons.

In the Cancun Agreement the word *technology* is mentioned 62 times in the 12 pages of the agreement relating to the Adaptation Framework (Cancun Agreement 2010, paras 11-35 & paras 95-137). This is almost exclusively in relation to transfers, capacity

^{1 1} The term indigenous will be used in relation to the Mishing tribe. The Mishings are not in general referred to as indigenous, a contested concept in Northeast India. But in a broader theoretical discussion of climate change adaptation, the term indigenous is useful, often used broadly to encompass local traditions and cultures (Salick and Ross 2009, p. 137)

building and provision of financial resources in a nationstate context. This indicates how technology is an integral part of the international negotiations on climate change adaptation. The existing practise of the Assamese and Indian Government towards adaptation is not challenged but sustained by the agreement. As the Assam State Action Plan on Climate 2012-2017, (Energy and Resource Institute 2012, p 56-58) specifies, targeting environmental hazards such as floods is continued through structural means of among other constructing and maintaing embankments.

This research shows that when climate change adaptation is state led implemented technological solutions developed outside of communities and when other policies do not take into account the role of indigenous livelihoods, culture and technologies existing inequalities are increased, new inequalities created and as a result adaptive capacity of the community lowered. The study shows how the framework emphasis on technocratic solutions works well with existing political initiatives. Such initiatives creates adaptation which might serve the interest of certain actors but not necessarily the most vulnerable whom risk to have their existing local abilities and mechanism to adapt hampered. As Lefale (2008) argue climate change research needs to move beyond the preoccupation of scientific debates as it is essentially a question of human injustice with widening gaps between the rich and the poor filled with political dilemmas.

1.2 Research Question and Hypothesis

Against the above background I pose the following research question:

- What explains the lack of adaptive capacity towards flood and erosion among an internal displaced indigenous community on Majuli Island

Further elaborated upon the literature review and theoretical framework the following hypothesis is tested in thesis:

- Climate change adaptation policies, which address environmental risks through a structural technocentric approach, reduce rather than increase the adaptive capacity of indigenous communities under high pressures of climate change.

2 Literature Review

2.1 The Main Idea

By looking into how policies addressing environmental hazards might increase the risks and lower the resilience of the most vulnerable groups. I question the belief that as soon as increasing fundings and technology transfers are directed towards state and programmes targeting the specific hazard, adaptation for the most vulnerable will occur. Instead the adaptive policies risk of serving existing vested interest of the state and other powerful actors and not the communities at risk thus contributing to widening inequalities and lower resilience of the most vulnerable.

The study look into the procedural social justice of climate change adaptation, and how it is neglected in the main literature of the field. I then question the technocentric approach; taking into consideration if the most vulnerable segments of the population adapt to climate change. A body of literature engage with the interrelations between human, natural and engineered systems but is yet to be incorporated into closer analysis of the climate adaptation framework. Subsequently the literature review includes the debate on indigenous knowledge as the alternative approach. I argue that such a view might be beneficial, but often utilised in a problematic way. Only when the indigenous communities and their technologies are understood in the specific context and vulnerability is dealt with as the starting point of an analysis rather than limited to the impacts of environmental changes might one begin to address climate change adaptation measures.

2.2 Climate Change Adaptation

There are multiple definitions of adaptation to climate change, from the emphasis on short term coping strategies, to long term abilities. The long term perspective include often an analysis of more complex range of behavioural adjustments of both individuals, communities and institutions aimed at reducing the vulnerability to the risk or hazard brought about by climate change (Eriksen et al. 2011). Some definitions include the ability to make use of the opportunities that are associated with climate change (IPCC 2007, p. 869). However a majority of the definitions of adaptation relates directly to the reduction of vulnerability through adjustments which are either passive, reactive or anticipatory (Schipper 2007, p. 5).

The main academic engagement into the subject of climate change adaption engagement has been from the natural science such as ecology, geography and environmental

science (Finan 2009, p.175). The contributions from the social sciences has often been to incorporate the models and projections of these into their analysis such as looking into structural solutions to climate change adaptation (Adger et al. 2007) or the contributions to the lengthy debate on cost and benefits of adaptation versus the cost and benefits of mitigating climate change (Bruin et al. 2009), (Kates 2000). In general climate change adaptation is looked upon as a process that needs to be planned to address multiple stressors (Pittock and Jones 2000). Overall the focus is on adjustments towards the environmental risk, an impact driven analysis rather than vulnerability driven.

Climate change adaptation and distributive social justice

A substantial body of climate change adaptation literature address the aspect of distributive social justice. That there are unequal challenges and effects of climate change for vulnerable groups. Kates (2000, p.5) argue that there are enormous social cost of adaptation and this is increase existing inequalities. The emphasis in the literature is often on demographic variables such as gender and ethnicity as correlated to the ability to adapt to climate change. A large number of studies see climate change impacting women disproportionately decreasing access to livelihoods and economic and political resources (Denton 2002; Brody et al. 2008; Onta & Resurreccion 2011; Elbat et al. 2012). A second body of literature considers indigenous communities as exceptional vulnerable following the emphasis again from the adaptation framework on vulnerable groups (Tsosie 2007; Mclean 2010, p. 14).

There are however a number of weaknesses in the above literature. The basic structure of each argument is that the climate factors are the main causes in increasing inequalities when interacting with existing inequalities. However, the recommendations and policy responses that flow from such analysis target the environmental impact. In general the vulnerability while acknowledge as an initial factor is mainly analysed and concluded in relation to the risks of climatic change . Elbat et al. (2012, p. 46) writes on gender inequality within indigenous communities and concludes that “*climate change affects gender role especially in farming since it has decreased farm production forcing the woman to work in nearby cities*”. The analysis is not taking into account other structural forces removing the indigenous communities from their traditional livelihoods, and the mirroring of values and structures of the surrounding society. The main issue is policy responses that follow from this create adaptation programmes which often are build on technocentric solutions. Denton (2002, p.18) argues for a larger provision of incentives and technologies to women. This might be appropriate and a good idea, but there are incidents where adaptation programmes have negative impacts. Part of the underlying reason for this is based on the dominating view of climate change adaptation. This relates to the procedural aspects of social justice.

Climate change adaptation and procedural social justice

Adger et al. (2006, p. 4) argue that benefits and cost of external adaptive initiatives on climate change might be distributed in ways exacerbating current vulnerabilities rather

than reducing them. They are among a slowly emerging body of academic literature addressing procedural justice of climate change adaptation (Burton et al. 2002; Schippert 2007, p.3; Eriksen et al. 2011, p. 11; Adger et al. 2006). This research broadly argues that the current adaptation approach is basically flawed and has to take into account, economic, social, political, and environmental circumstances addressing the initial vulnerability of stakeholders.

Carey et al. (2011), on water conflicts in Peru, points to similar concerns of unintended effects of climate change adaptation. The study finds that the adaptive policies have been changing social relations, power dynamics and the ways communities live and deal with the environment, in ways lowering resilience of the most vulnerable communities. Though the study of Carey et al. (2011) is among others dealing with floods, it relates strongly to an issue of privatisation of water management, which the adaptation framework does not directly lead up to.. Carey et al. (2011) raise a number of important issues, questioning the emphasis on technology when not taking into account the mutual constitutive relationship between technology and society and the effects this have on local populations.

Schippert (2007, p.6) has a different analysis, arguing that development needs to come first and then the impact reduction of climate change adaptation programmes might follow. Eriksen et al. (2011) call for sustainable adaptation in the light of adaptation programmes having a negative effect. This they define: “*adaptation that contributes to socially and environmentally sustainable development pathways, including both social justice and environmental integrity*” (Eriksen et al. 2011, p.8). Whereas Burton et al. (2002) call for redirection attention to national adaptation policies and policies in general influencing vulnerability of the most marginalised with a new direction of social scientific engagement.

To understand the issue of the current climate change adaptation approach when applied to indigenous communities, there is a need for a more in-depth discussion on the failure of adaptation projects and in general between the external introduced adjustments and the end vulnerability of communities questioning the sustainability in separating human, natural and engineered systems in areas where such relations are different from where the policies and technologies originate (Cutter 2003, p.7).

A body of academic literature has specifically gone into understanding local knowledge, mechanisms and technologies of adaptation. It has directed attention towards the existing technologies and capacities of communities in developing countries rather than reflecting them as passive victims. The literature stress the importance of indigenous knowledge and technologies as a mean to the creation of participatory, inclusive, appropriate and bottom up climate change adaptation. This acknowledge, how communities traditionally have adapted to environmental changes while putting the most vulnerable at the center of the interventions and policies. The contributions are mainly from cultural anthropologist (Roncoli et al. 2009, p. 94; Rival 2009; Hastrup 2009; Finan 2009) and environmental studies (Salick & Ross 2009; Shaw et al. 2009; Sharma et al. 2009). The argument that there is a long list of undocumented and

overlooked practices in indigenous communities has affected the climate change adaptation literature and policymaking. Seen for example in the creation of large databases and articles on local practises and technologies such as McLean (2010) and the UNFCCC Database on Local Coping Strategies (UNFCCC Database Adaptation 2013). However, the research on indigenous knowledge is very context specific. The lessons are in general taken from case studies and then applied to a theoretical concept which sees the knowledge as something that can be utilised. Agrawal (1995), while not writing directly on climate change adaptation but development operations in general, provides an analysis of the problematic in such an approach. He investigate the failure in general campaigns pushing forward indigenous knowledge as the answer to development. The issue lies in how it is treated as knowledge that can be harvested, learned from and transferred to other areas. The problem is that this approach follows the same line of thinking. The issue can be solved through a technological intervention and knowledge and technology can be freed from its institutions origins. If one see knowledge as locally founded and bound the emphasis on technology transfers become problematic (Watson-Vera et al. 1995). O'Brien et al. (2004) argue that the emphasis on technology derives attention away from more pressing issues creating vulnerability. They argue for an analysis taking vulnerability as its starting point recognising the multiple processes and stressors together with or separate from climate change creating the final risks (O'Brien et al. (2004, p12) advocate)

3 Theoretical Framework

The following theoretical framework focus on the most important elements of the research and explores them in depth. Secondly it engage with a discussion of the relations between these elements in order to move in the analysis from a simple description of the data, to a broader theoretical generalisation. The theoretical framework is the basic foundation of the hypothesis stating; climate change adaptation policies which address environmental risks through a structural technocentric approach, reduce rather than increase the adaptive capacity of indigenous communities under high pressures of climate change

3.1 Climate Change and Indigenous Communities

The thesis build on the theoretical proposition that among indigenous communities there are a multitude of undocumented and overlooked practises (Sharma et al. 2009 p.133). Research related to indigenous communities in larger river basins have shown how indigenous technologies, belief systems and social organisation is essential components of managing risks and benefits of rivers (Shaw et al. 2009, p.7). Academic literature on communities in Bangladesh furthermore shows how floods are embedded in local cultures and past on from generation to generation (Mallick & Rahman 2009, p. 276). Livelihoods based on the surrounding environment, are argued to be part of the overall adaptive capacities of indigenous communities (Salick & Ross 2009).

Anthropological studies on indigenous communities, in relation to climate change, bring in the importance of understanding the relations between culture and the attributions of values to natural occurring phenomena. Culture impacts the way, people perceive and understand experiences and respond to these (Roncoli et al. 2009, pp.87-97). When the use of traditional technologies is limited, there are consequences on the ability of indigenous communities, to sustain the social and cultural systems which are an important part of their ability, to withstand climatic changes and risks. McLean (2012) argues that the key question to explore is wether or not, the indigenous communities has the ability to use their knowledge and technologies. Local resilience depends on local knowledge understood both in terms of belief systems, technologies and social organisation. Limits as well on emotional, spiritual and social wellbeing affect the cultural integrity and hampering identities which have been found to lower resilience to climate change (Mclean 2010, p.14).

The central aspects is to observe and investigate changes, in how the community is socially structured. This is contrasted to the the respondents narratives of life before the separation from their own land. The literature above shows that vulnerabilities towards climate change, is strongly connected to how the individual enter relations with others, the institutions surrounding, and the resource base which they depend

upon. Research of displaced and resettled indigenous communities, shows how it often directly or indirectly contributes to other processes. There is an expansion of the states involvement in the lives of the resettled community and an integration of the community into regional and national market systems (Oliver-Smith 2009, p. 125). Adger (1999), study flood resilience in Vietnam, in relation to market liberalisation. His study highlight how economic and political processes that are not controlled by the community, can lead to new inequalities and a breakdown in the earlier ability to cope with floods.

From above follow that climate change might not be the main issue creating risks towards indigenous communities. More important is the surrounding changes in relation with the community. To understand the vulnerability of the Mishing community, it is needed to address, the relation with surrounding environment, ability to use local technologies and knowledge but also the social processes within the community.

3.2 Climate Change Adaptation as a Social Process

Adger (2003, p. 387) examines how adaptation is essentially a dynamic social process. The main idea being that communities ability to adapt is determined, by the degree of being able to act collectively. Pelling and High (2005, p. 315) study the internal structure of communities, and how this determine their adaptive strategies, including the role of institutions and cultures in shaping this. They understand adaptive behaviour in the interrelation between communities of place and communities of practice (Pelling & High 2005, 315). Thus the ability of the community to act, is both created within the community and shaped by external relations and forces. Traditional mechanisms of coping relate to community of practice that include the communities ability to manage its knowledge (Pelling & High 2005, p. 316). The importance of the interrelation between, on one hand the internal community structure, and one the other external forces influencing this, relates to the concept of communities of place (Pelling & High 2005, p. 316). I operationalize this by analysing below, how the community together cope with floods, the ability to address issues as a community and not only on an individual level and how this relates to external influences. An integral part of the internal community adaptive capacity as a social process is gender roles.

Studies disagree on the impact of climate change on gender inequality. Some find that existing inequalities are consolidated through the impact and following adaptation to climate change (Onta & Resurreccion 2011, p. 355). Others see that inequalities are greatly increased in the adaptive process mainly in direct relation to the environmental changes (Denton 2002; Brody et al. 2008). There are cases, such as Elbat et al. (2012), studying communities where climate change contribute to force women to leave traditional livelihoods for income-generating activities. This study is being inconclusive on the long term gendered impact arguing that central

decision making activities might shift from men to women. While impact is far from agreed upon, there is a general emphasis that the resilience of a community towards climate change, is highly connected to gender equality. If women's participation in managing the risks of climate change is limited, the resilience of the community is diminished (Denton 2002, p. 11). Further the gender inequalities might not be determined as such by climate change as other factors creates both underlying inequalities and contribute to observed patterns of increasing inequalities.

Anderson (1985 cited in Wilson & Heeks 2000, pp. 406-407) examined how the transfer of technologies developed outside of local communities, impacted gender relations. The institutional forms and culture of the transferring party seemed to be reflected and transferred with it. Problematizing gender roles in indigenous communities is a delicate matter. Careful gender analysis is needed to understand that in some incidents, gender different roles have specific cultural and socioeconomic purposes and in other cases the gender differences are adopted inequalities from the surrounding societies through among other the absorption into the general economy (Permant Forum on Indigenous Issues 2012).

3.3 The Role of Technologies

As the literature review brought forth, new research have begun to look into how the main approach to adjustments through technocentric structural measures might actually increase vulnerability. Carey et al. (2012, p.183) argue that technologies of climate change adaptation can be used to manifest existing power inequalities and change social relations. When the UNFCCC Adaptation Framework, emphasise the transfer and implementation of technologies, as the main approach to climate change adaptation, the concept of technology has to be investigated in order to evaluate the consequences of such an approach. Technology is most often perceived, as highly advanced and rapidly changing. Technology has however a much wider application especially in the connection with climate change adaptation. On the one hand systems such as basic infrastructures are technologies. These can be seen in general as a social contract separating nature and society (Edwards 2003, p. 188). On the other hand in indigenous communities, technology is bound to the indigenous knowledge systems, connected to interaction between the physical technology, belief and social systems (Shaw et al. 2009, p.5). Technologies are here used to mediate and connect nature with society. Thomsen et al. (2012) argue that most adaptation projects are made to manipulate and control the environment, which breaks down social-ecological systems, by separating the two.

While embankments, as an adaptation measure in most places of the world are being used successfully to protect cities and landscapes, research from other areas of Assam, as well as India and Bangladesh, highlights problematic aspects of these. In India, embankments are one of the dominating strategies to prevent floods (Dixit 2009, p.70). Most often the critique of embankments relates to the dependency on

these structures. As Dixit (2009, p.74) writes, in a study of the Kosi embankment in Bihar, India, the breach in 2008 became a humanitarian disaster affecting 3.5 million people, because of the reliance on a poorly managed structural solution promoting a false sense of security. A recent study on the governance of embankments in among other Assam and Bihar covering the Brahmaputra and Koshi river respectively, shows how embankments influence peoples lives and adaptive capacities by creating dependencies, which continuously neglect traditional knowledge needed during break downs (Das & Bhuyan 2012). As Edwards (2003, p.195) argue: “*Infrastructure fail precisely because their developers approach nature as orderly, dependable, and separable from society and technology*”.

A dimension neglected in the literature on the weakness of embankment and policies to flood and erosion in general, is the potential of such technologies in altering the social organisation of communities. The idea is relevant in the understanding of the differences between the macro scale implementations of embankments to protect properties, land, nature and humans and the micro scale analysis of the individual and community level. The anthropologist Finan (2009) writing on sea-level rise in the case of Bangladesh, argue that adaption lies in the dynamic relationship between technology adoption and social reorganisation. If one understand vulnerability in narrow relation to the environmental impact this will according to O’Brien et al. (2004) inevitably lead to promotion of the uptake of technological adaptations. Focusing on vulnerabilities as a starting point of an analysis, stress the initial factors distributing and causing vulnerability prior to the disaster. If adaptation is seen as a social process the initial vulnerabilities analysed will impact the final policy.

There are several possible consequences of implementing technologies of embankments which are not considered in relation to adaptive capacities. The theoretical framework highlight the importance of understanding adaptive capacity as a more complex process of which the social organisation, indigenous knowledge and cultures has an important function. Limiting these creates climate change adaptation programmes, lowering the adaptive capacities of the most vulnerable communities.

4 Method

There has recently been a renewed interest from both the anthropology and political science into the methodological and theoretical challenges of combining detailed ethnographic interest with global political issues (Hastrup et al. 2009, p.11; Burton et al. 2002, p.155-156). The study of international climate politics, has to be related to the local lived experience and consequences.

The following methodological chapter argues that research in the sphere of climate politics can benefit greatly, by a qualitative research approach drawing from the overarching goals of ethnography in general (Punch 2005, p. 152). The study does however, draw from other fields than the classic ethnography. It has a theory and hypothesis testing approach through detailed exploration of a single case study, using participatory observation and semi-structured interviews. Such an approach has in academia generated a great deal of debate, especially if one is able to claim external validity and reliability using such methods (Halperin & Heath 2012, p. 291). Even scholars relying mainly on qualitative methods, a single case study is often rejected. Yin (2003p. 53) writing on the conduction of case studies from a background of psychology, prefers the multiple case design, which consider the analytical benefits and the lower risks of having two or more cases.

However, there are essential reasons, connected to the choice of the single case study, having certain benefits. The overall rationale for a single case study is the same as having multiple cases. To cover contextual conditions (Yin 2003, p.14). It is used to look at how seemingly straightforward stable phenomena or elements in the research such as the embankment or the notion of floods are actually viewed and related to by the respondents themselves. Silverman (2006, p. 44) term this; contextual sensitivity.

4.1 The Single Case Study

In the literature, questioning the dominant approach to climate change adaptation and risks in connection with flood, it is common to link the local with the global. An effort that is the essence of understanding climate change, having complex interrelated global and local causes, consequences and interactions.

The research of Onta & Resurreccion (2011) is based on a single case study using qualitative methods, to capture and understand the complex process of climate change adaptation in relation to gender and caste. Research on indigenous knowledge, in relation to water induced hazards, base arguments on lessons learned from single cases (Shaw et al. 2009). Other research on climate change in general rely on ethnographic techniques in purely qualitative single case studies. Rival (2009), studying the indigenous knowledge as basis of local resilience to climate change in rural communities in the Amazon is an example of such an approach. Single case studies are

used to the contribution of the development of propositions regarding the fundamental issues of adaptation (Finan 2009, p. 181). As Punch (2005 pp.147-149) argue, the single case study is especially valuable in areas where knowledge is fragmented or incomplete.

The common objective is not to generalise to entire populations nor to argue the knowledge of any hidden truth or the key variables to climate change adaptation. It is rather the opposite; indicating that climate change adaptation is a highly localised phenomena dependent on the social context, interrelating with fragile sociocultural dynamics. The respondent are seen as having a complex stock of knowledge which needs to be unlocked to understand their social reality (Flick 2009, p. 156). As Bryman (2012, p.380) argues, qualitative method is the overall best strategy if the objective of the research is related to the understanding of the social world through how the respondents constructs and see this. Active field work is here a crucial strategy (Punch 2005, p.152).

4.2 Negotiating Access

The main sampling approach of the case and participants follows a purposive sampling strategy. Not seeking to sample respondents on a random basis but in a strategic way relevant to the research question (Bryman 2012, p.418)

- Mishing tribe identified in literature and initial research to have a strong resilience towards environmental hazards of floods and erosion.
- An area with high activity of external climate change adaptive related activities
- A deviant case study of the Mishing community having a sample of a community whom had not been able to acquire new land following the erosion of the native land.
- An case sampling of mainly women building on the theoretical proposition of the importance of gender equality in relation to resilience against floods and erosion.

Thus the case of studying mainly women belonging to an eroded Mishing tribe on Majuli Island, has been chosen because it illustrates the features that are interesting in relation to the research objectives (Silverman 2006, p.306), (Flick 2009, p.122). The sampling of case and participants, was connected to the challenges of negotiating access and overall issues of reliability. In order to strengthen the external reliability of my sample, the findings would only be credible and generalizable if the sampling of participants had not been steered by outsiders, but done in a transparent manner.

The initial period, I conducted interviews in a setting, referred to me by my initial gatekeepers. However the participants had developed research fatigue. I thus changed research site and deleted the initial interviews. I chose undirected, an intersection of two embankments. Then I went out from all four directions to interview respondents living on the edges having the inhabitants as the main unit of analysis. I found exploring the case that my unit of analysis what in fact multiple units of analysis embedded in the case (Yin 2003, p. 40). First, the community consisted of an entanglement of two

different villages which had been eroded at different point of time. A second overall unit of analysis became between women. The gender aspect was an increasing factor in my data gathering. I was as well mainly able to talk with women, since most of the men where out working as daily wage labour. An important observation for the analysis in itself.

Getting involved

The choice of case and final unit of analysis led me into a practise with certain ethical dilemmas. The geographer, K. England (1994, p. 85) uses the saying “*the violence of fieldwork*”. As a researcher you disrupt peoples lives, bring up sensitive issues and do not know the long term impacts of your presence. When investigating social constructed concepts, such as gender and tribal identities, I had to be careful onto what extend I was an active part in the reproduction of such concepts, which might contribute to sustain existing power inequalities (Rose 1997, p.315). In relation to this, Sultana (2007, p.375) argues that avoiding the marginalised in the paralysation of interfering with internal power structures, results in accounts of the social world that cannot attempt to be representative of the marginalised community. One has to be attentive to power, knowledge and context using the politics and ethics involved in the research, as something that needs to be negotiated (Sultana 2007, p. 374). This is connected to the internal validity of the study that in general is seen as strong in case studies nevertheless this is something that has to be strived for. The primary strategy was to develop an understanding of both the case and the context and then engage constantly with the connection between this and the theoretical ideas (Bryman 2012, p.390)

Another aspect to take into account and reflect upon is the translator. My only possibility of a translator whom spoke english and the local language was a man from an elite group of Majuli. Using a translator complicates the “*mediation of cultures*” (Desai & Potter 2006, p.172), which further affects ones understanding of the case. Holliday (2007, pp.137-145) goes further into this subject, arguing how the researcher and the respondent, each coming from their own cultures, create a special culture of dealing, which is the actual area being researched. England (1994, p. 84) sees the research as a dialogical process between the researcher and respondent, structuring a special situation of meaning creation. Three different spheres of culture come together and creates the interview situation having a translator. I realised that I had to understand the social world of my translator to be able to understand and steer the interviews and later account for biases. Followed by moving into the Satra (Hindu Monastery) of my translator. The internal reliability was to some extend strengthen through getting to know my translator, learning his discourses and culture, and negotiate a common framework and ground rules of which to conduct the interviews. This also enabled the translator to explain more in-depth my motives of doing the research, which was an important part of gaining informed consent in each interview situation. The translator then became more than a functional mediator. A central actor in the construction of meanings, a good informant and gatekeeper. Having a translator whom did not master the language of english completely, gave perhaps more careful and direct translations but also contributed to a change in the words and the construction of sentences. This has

been taken into account in the data analysis by not relying on an analysis of the discourses in the interviews.

As above shows the research had a personal involvement on several stages. Extensive writing of field notes daily, contributed to strengthen the link between data and theory. This has then continued with an analytical induction of the constant comparative method. Comparing the data arriving from the transcripts and participatory observation with each other, matching patterns and testing rival explanations a method of qualitative data analysis argued by Silverman (2006, p.295) and Yin (2003, p. 36) to strengthen the validity of the study.

The Interviews & Data Analysis

Each of the 16 main in-case interviews took between forty to seventy minutes and was conducted using an interview guide. Having a semi-structured approach was to ensure that each interview would evolve around the same themes. It allowed a flexible approach, to follow new leads and be reflexive on the knowledge sought (Kvale 1996, p. 88). It also had the flexibility to strengthen the personal relations during the interview, like being able to encourage the respondent to go one with a particular subject, trying to get closer to the idea of a conversation rather than a questioning (Spradley 1977, p.6). The semi-structured interview was also most suitable, considering the general specific focus of the study, and to strengthen the overall external reliability providing the availability of transcripts and field notes, upon request, ensuring a transparent research process (Silverman 2006, p. 282). The interview guide became a necessity considering the use of an inexperienced translator. Each theme was discussed with the translator prior to the interview, to ensure the general translation of concepts was understood and used in the right way. The interviews together with the longer and more unstructured expert interviews has been fully transcribed. A thematic coding strategy to find common themes and patterns (Bryman 2012, pp. 578-581) These has been written into a matrix displaying each respondents and data from notes written doing the interview and the transcripts under 29 themes and sub themes.

5 Data Analysis

On Majuli Island, the entire population is affected by floods and erosion. During the monsoon season, lines of communication are for longer periods down. When the water retreats the island is shaped in new ways. As a consequence there are no maps of Majuli since erosion, floods and constructions constantly change, the physical appearance of the island. As power relations are shaped by and altered together with the map. Erosion have replaced thousands of families. The monks of the Satras and the “general cast “ have in general been able to buy or rent new land or migrated outside of Majuli. Only the eroded Mishing communities have not been able to do either. Without land they have settled on the edges of the government constructed embankments surrounding the island.

The Mishing are in general identified in among other research conducted by non-governmental organisations (Das et al. 2009) and through expert interviews to have a high ability to cope with floods. In the words of one of the main academic experts on the Brahmaputra river “*The Mishing people are very very resilient in terms of adaptation to floods....They a living close to the river. They have been surviving because they are close to the river. They have a symbiotic relationship with the river. They need the river as much as the river needs them*” (Goswami 13.03.2013, Interview)².

5. 1 The Main Policies to Address Floods and Erosion

As research on the rivers of India indicates, the main approach of the governmental authorities to assist populations in adaptation to flood and erosion, is structural measures of control, such as embankments (Das & Bhuyan 2012, p.50), (Dixit 2009, p. 70). The Assam Embankment and Drainage Act from 1953 (Assam Act 1, 1954) followed by the validation act of 1960 (Assam Act No XXVI 1960), specifies how embankments were one of the first large scale approaches in Assam to control the Brahmaputra. Today, it is still the main strategy of the Assam Government but with an involvement of the Indian Central Government and the Asian Development Bank (ADB). The World Bank is currently doing an assessment of further involvement to become “*an intrinsic part of the latest technology driven projects to tackle flood and erosion in the state.*” (Times of India, 2012).

The Asian Development Bank (ADB) in their Technical Assistance Report to the Assam Government, question the usefulness of embankments pointing to the importance of non-structural measures such as increasing stakeholder participation (ADB 2006). However looking into the latest revised procurement plan, specifying the use of the ADB loan and support, the resources are going into maintaing the existing framework.

² See Appendix 1 for overview of Interviews

Most of the funds go to strengthening embankments and dykes using new materials such as geobags and wire-netting sheets (ADB 2012). In tandem with the ADB, the Brahmaputra Board under the Indian Central Government is working with the Assam Government, on the overall strategy of managing risks and benefits related to the Brahmaputra river. While the Brahmaputra Board is assigned to cover all of the Indian share of the Brahmaputra, the majority of the resources are diverted to Majuli (Brahmaputra Board 2007). The work of Brahmaputra Board (2012) according to their own report consist of a complete reliance on structural measures through implementing technologies of spurs, dykes, embankments and boulders, to protect against floods and erosion. The report (Brahmaputra Board 2012), does not mentioned the knowledge and technologies of the local population, any involvement of local stakeholders or the fact that large parts of the embankments are being populated. Instead the report specifies how the plan has been constructed outside of Majuli by scientist building models of the island at the North Eastern Hydraulic & Allied Research Institute (Brahmaputra Board 2012, pp. 13-14) to measure impact of different interventions.

According to Dr. Goswami such measures are a part of a piece meal approach worsening the entire situation of floods “*Where we see a a Satra or village treated we set out a spur or other measures there. What we do is mostly localised, designed to provide some immediately relief to the suffering population. The whole concept of sustainability is forgotten*” (Dr. Goswami 2013, Interview).

There are however a range of more fundamental consequences for the most vulnerable communities. As argued in the literature review and theoretical framework, a proportion of the academic work on climate change understand the climate impacts as increasing existing socioeconomic vulnerabilities and inequalities. These are measured in relation to the environmental impact. Most of these analysis leave out the question of how policies, to mitigate the effects of climate change and enable adaptation of the most vulnerable, might interact with climate change. The following relates to the direct consequences of the river management policies of the Indian and Assamese Government on the case studied.

5.2 The Mishings on the Embankment

Living on the embankment

The name of the community is Namsuniwal, or the name is Lahoti, depending which of the respondents I asked. The community was in fact two different villages that had been merged. Namsuniwal which graduale eroded 17-20 years ago and Lahoti eroded 3-5 years ago. Each respondets identified him or her self with the old village resulting in neighbours giving the same location two different names. Thus the spatial domain of the study become more blurred.

Contrary to any other Mishing villages observed on Majuli, the physical outlay of the community was on lines, dictated by the embankment. Most of the houses where on

stylts however never as high as the embankment. Thus the houses were clinging to the edge of the around four meter high embankment with the entrance a few meter down. Half of the respondents lived on the outside of the embankment. This was connected to the fact that while the government owned the embankment, the land going directly up to the edges belonged to the neighboring village. Being non-Mishing they had chosen to use as much of land on the inside of the embankment for cultivation. The land not in danger of irregular floods, sand casting or immediate erosion.

In general, the houses in the case were inspired by the Mishing tradition such as constructing stylts and separating kitchen from the main house. However the houses were in general smaller than the traditional Mishing houses which are enabled to embrace the joint family system (Borah 2012, p. 35). While the Mishing houses on the island in general almost exclusively used natural materials, in the case, the houses were build as a patchwork of diverse materials from bamboo to metal. Initially it seemed like a result of poverty but many of the families had as a result of the monetary income through the work of the men, the ability to buy other commodities such as televisions. Dulal (2013, Interview) one of the most wealthy respondents having among other been able to acquire a small plot of new but poor land (only able to grow grass) was building a concrete house on stilts. It was more a combination of breaking with traditions and make ends meet of what was available.

The embankment was in general eroding but several traditional ways of combating erosion was employed by the respondents such as planting bushes and creating bamboo fences. However the respondents where not able to fully operationalize such traditional mechanisms especially in relation to floods. One respondent reported the loss of ability to foresee floods (Bhupan 2013, Interview). Priya (2013, Interview) talked about not being able to build houses high enough, due to the sandy character of the soil. She also discussed how there was not enough space for the whole family. Several of the respondents reported to have their livestock killed by the vehicles passing by on the road above.

“I don't know why the Brahmaputra Board is building here and how they are making the roads and the protection (pause) Why are they coming here?...when making the protection the river is coming to this side. I believe this.” (Atul 2013, Interview)

Directly coping with floods

Majuli, face yearly breaches of the embankment which results in floods. Last year the floods came several times however, one came in the month of September, after sowing of the paddy fields and the main monsoon season. Every respondent within the case pointed to where the water level had gone up, most of them pointing to the middle of their house, despite each house was build on stylts. All had experienced losses. Some had their entire houses swept away by the water, others experienced the loss of the little paddy field the family was renting.

“Destroyed all rice, finished, all rice died. I bought some seeds in the market and after going to the paddy field but also rice died..... House broken needed to build a new.” (Atul 2013, Interview).

“Three times the floods came. Bigger than other years” (Mira 2013, Interview)

“Last year was very dangerous, my house also drowned” (Anand 2013, Interview)

Living on the embankment is thus not a safe option. All of the respondent told how each year, the main strategy to deal with floods was to move most of the belongings and livestock to the roadside on the top of the embankment and construct a temporary house. In addition the respondents reported to safe up money or food, and a few builded an additional floor in the house to store their belongings.

But the individual interview situation was characterized by, an expression of lack of opportunities and measures to deal directly with the floods. Several of the respondents told how they didn't have the resources to build boats any longer. Both the temporary floats build out of banana trees and the heavier wooden boats which where next to most house on Majuli.

“Before we lived in our own places in the middle of the Brahmaputra and that time we prepared for floods. We were having some stult homes, two stult homes. When one stult homes when down water and going to another stult homes. But now no available bamboo in Majuli. Also there is not enough money to buy bamboo so we are just going to roads” (Bhupa 2013, Interview)

This indicates that the community adaptation capacity was reduced both by increasing pressure of floods and by a dependency of embankments. These broke each year and created a natural limit of the size and structure of houses as well as a physical positioning in a vulnerable zone. The following show that longer term impacts of this positioning had more severe consequences of the adaptive capacity of the Mishing community.

Food insecurity

More than half of the respondents told that they suffered a lack of food during the monsoon season. *“Problem is flood season. Flood season is very difficult. Try to save rice...But flood season there is sometimes no food”* (Anjali 2013, Interview)

The lack of food was connected directly to a lack of income doing the whole monsoon. Strategies to cope with lack of food was fasting or relying on humanitarian assistance from NGOs or the Government. However the lack of food was also connected to inabilities of getting food through other mean. Subsequently several of the respondents took loans to rebuild houses or get through the monsoon season in general. None of these where able to obtain formal loans. But, a majority of the respondents had not the opportunity to take any loans due to the loss of land.

All of the respondents had been forced to shift from a mainly self sufficient household economy, to a diversified dependent on a monetary income, to buy commodities on the nearest market. However this posed some immediate difficulties and limits on the ability of the respondents, to get through the periods of floods mainly in the form of high food insecurity. It also resulted in less obvious consequences with longer term impact of the adaptive capacity of the community, in the form of breaking the relationship between nature, culture and society. Lowering overall community trust, identity and reciprocal bonds and increasing gender inequality. Themes which will be dealt with next.

Nature and Society

“In old motherland. Working in the paddy field. Now its changing with no land...There is no work. We have no cows.” (Bhawa 2013, Interview)

Bhawa, is a young and in general dedicated women engaged in an effort to gather other women and setting up a cooperative. Her statement indicate the importance of ownership and the frustations of not being able to engage with what is considered work, relating to the old agricultural practises on ones former land. All of the respondents told narratives about the old land. The general stories was on the availability of food, wild nature, work and the repeated emphasis of having ones *own* land. The following extract represent well what I receptively heard *“Most of the time we spend in the paddy field, growing vegetables, all kinds of vegetables available in our old place...We have so many difficulties in our life (long pause). Today I eat some food but tomorrow? Having old land is better”* (Priya Interview 2013)

The loss is also connected to a loss in the ability to uphold the cultural and spiritual relations with the nature. Floods where in the old days connected to the importance of availability of fish *“Bad for fish when flood is not coming. Flood is important, no flood no fish”* (Bhupan 2013, interview). Bhagwa (2013, Interview) told how current floods where bringing poisoning killing the fishes. Livestock, important to all of the respondents where difficult to keep due to lack of space and several of the respondents told how they got killed by vehicles on the road. In connection with the buying of food; *“Cleaning rice and this type is good for health. Buying rice and eating is not good... Now we can't do anything. No fishing, cleaning rice or anything just staying”* (Reklu 2013, Interview). Above shows how being able to withhold a relation with nature was eroding. Local knowledge and activities related to rice production, rearing of livestock and fishing was limited and stories of killing, poisoning and bad influence of health is an expression of the this loss.

Sustaining this analysis was the fact the ceremonies in connection with the Ali Aye Leegang and Porag, the two main festivals of the Mishing community did not take place in the community.. Participatory observation from the festivals in non-eroded villages and later a religious ceremony gave an opportunity to experience the attributes and values given to nature by the Mishing in general (Field Notes: 14.02.2013; 15.02.2013; 07.03.2013). The lack of celebrations, manifests the loss in culture and traditions. As

stated in the theoretical framework integral elements of the overall adaptive capacities to climate change of indigenous communities.

Community Relations

“Very difficult to adjust to one society coming from another society... Every person they do themselves and they are working for themselves people are not socialising they do their own business... Before one person suffering all villagers would come and help that person but its not like this now ...they are busy with their own business” (Reklu Interview 27.02.2013)

The above extract is from an interview with Reklu, an old women. *“Reklu was sitting on her porch chewing paan and beetle-nut which she continued with throughout the interview, interrupted only by leaning forward to spit down through the gaps between the bamboo sticks of the floor* (Field Notes 27.02.2013)

It represents how living on the embankments had certain consequences of the reciprocal relationships between the members of the community. When asking other respondents how one helped each other doing floods, most answered that nobody helps, it is just you and your family. There was in the community no space to meet. In the interviews respondents would not in general relate to others in the community. Several of the respondents explained how after the erosion, the community and their families had been spread out across the island. *“Before people were neighbours, now not neighbours, they go to different places. Community, neighbours all have changed”* (Sarita 2013, Interview)

Manager of IMPACT NE(Interview 2013) described his view of the eroded communities; *“No loveliness. When they shift one family here one family there. Communication less. We help our family and neighbours. But they lost their neighbours”*

Gender

The gender inequality of the case was in a stark contrast to general impressions, participatory observations of other Mishing communities and read literature. Earlier studies of the Mishing finds a nuanced picture of gender roles. Along certain parameters there is high gender equality such as the women being financially independent and even in some cases the main income earner (Das 2012 pp. 53-55), (Borah 2012 p. 36). In Assam in general, gender inequality is very high, as stated by the Human Development Report of Assam (HDR 2003, p. XI-XII) measured on indicators such as economic activity and control of earned income.

There was a pattern in every interview indicating three important aspects of gender inequality. First, a general static view among men and women themselves, of the role of women in the community. Second, the limited ability to diversify livelihoods among the

women. Third, a loss of identity as a result of among other above and more complicated losses connected to land and culture.

There was in every interview both with female and male respondents, a noticeable difference between initial responses, when asked about the main occupation of women, and later elaborations. Most of the initial answers was that women worked in the house, paddy fields or having no work. By asking the respondent, to show the surrounding area and explain the use of land and equipment these initial answer were always elaborated greatly.

Half of the female respondent had been able to find, a sort of monetary income as a supplement to their other duties, such as selling hand woven cloths and livestock. Two of the female respondents were engaged with the production and sale of rice beer, an activity they had not been engaged with on a commercial basis before. However most of them only as a secondary and seemingly small contribution to the family income.

As the manager of IMPACT NE states in relation to women of eroded Mishing communities “*Women, they do work at other people's field. Like paddy and mustard oil. Some busy weaving. But their lifestyle is very poor with a very little earning*” (IMPACT NE, Manager Interview 2013)

These occupations are very much in line with the traditional spheres of the Mishing Women according to other academic studies. However the noticeable aspects relates to perceptions and underlying values in the work and the kind of work actually being done.

There was a great insecurity in reporting about the work in general. The difficulty in getting the respondents to talk about the occupation of women might not only point to gender perceptions but also to more complex issues connected to the loss of land and the living on the embankment.

Above shows how the erosion and the following move to the embankment affected the community in several ways with no exact differences between those whom lived on the embankment for 20 years and the newcomers. The change happened instantly and the consequences of lowering the adaptive capacity and the mirroring of gender relations in the general society equally fast. These are consequences which have not been dealt with in the literature on embankments of Assam in general. It is not the embankments in itself causing the changes but the coming together of this with climate change.

6 Conclusion

The case study unveils the negative consequences of climate change when interacting with inappropriate policies of adaptation. The embankment has been analysed as a technology developed outside of Majuli without the participation nor the consideration of local stakeholders. The community is becoming vulnerable due to the loss of their indigenous knowledge base, livelihoods and the social organisation which has evolved around living with the river and floods. Gender inequality is increasing, most of the respondents are experiencing food insecurity and the community coherence is eroding together with the island.

There is a very low amount of academic work questioning the sustainability of the current Adaptation Framework of the UNFCCC in tandem with existing policies of member countries. Academia has been preoccupied with gaining attention on the issue of climate change and the success criteria has been, a normative idea of any effort addressing adaptation, is needed for the most vulnerable communities in developing countries.

The case study questions this, arguing that adaptation is having a negative impact when the local context and situation is not taken into account but structural means are adopted across scale. The focus of the UNFCCC, ADB, the Brahmaputra Board and the Assam Government into new types of technologies securing the embankments do not address this vulnerability.

Majuli has a long term experience with high environmental impact, indigenous communities and long term external and internal engagement to address the environmental risks. A situation seen in several areas of the world. Future research of climate change adaptation, needs to take into account, the existing dichotomy between local and governmental efforts to tackle environmental changes. It needs to question when the use of external technologies are suitable. Most of all, future research needs to integrate the Adaptation Framework of Cancun Agreement (2010) with other measures addressing the underlying vulnerabilities and root causes to climate change. This means in some cases, not to engage with a protection from the environment but instead an integration with the natural surroundings together with a human protection stressing social adaptation and the right to social justice of climate change.

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Appendix 1

Interviews

Name	Sex & Age group	Date & Time of Interview	Place of Interview
Anjali	F (young)	20.02.13 09:36	Namsuniwal
Bhagwa	F (young)	20.02.13 10:30	Namsuniwal
Chanda	F (middle aged)	20.02.13 15:59	Namsuniwal
Kavita	F (middle aged)	20.02.13 16:46	Namsuniwal
Anand	M (middle aged)	26.02.13 12:27	Namsuniwal
Bhupan	M (middle aged)	26.02.13 13:15	Namsuniwal
Dulal	M (middle aged)	26.02.13 16:56	Namsuniwal
Hari	M (middle aged)	26.02.13 17:44	Namsuniwal
Mira	F (old)	27.02.13 09:44	Lahoti
Atul	M (middle aged)	27.02.13 10:43	Lahoti
Reklu	F (old)	27.02.13 11:14	Lahoti
Sarita	F (middle aged)	02.03.13 10:18	Lahoti
Varuna	F (young)	02.03.13 11:00	Lahoti
Priya	F (middle aged)	02.03.13 15:46	Lahoti
Mohini	F (young)	02.03.13 16:42	Lahoti
Anil	M (old)	02.03.13 17:01	Lahoti
Dr. D.Goswami	M	13.03.13 15:31	Guwahati University
Manager IM:NE	M	05.03.13 17:36	IMPACT NE HQ

M: Male

F: Female

* The names of all respondents have been changed. The real identities of the respondents are known by the author of the thesis.