

Discourses, Narratives and Purposeful Action – Unraveling the Social–Ecological Complexity within the Brahmaputra Basin in India

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ABSTRACT

Issues of disaster and governance in the Brahmaputra Basin of India have been part of different debates within the epistemic boundaries. This study of a social–ecological regime shift, from a prosperous paddy cultivated region within the north bank of the Upper Brahmaputra Valley to a sediment deposited wasteland, unravels the complex relations between narratives of a problem and purposeful action. It is found that policy and practice solutions may not always be grounded in the problem situation but can be shaped by wider discourses and social learning. The study illustrates the continuation of engineering solutions without deeper understanding of their influence on social dynamics, the typification of community behaviour with an ignorance of cultural legacies, and a lack of prioritization of adaptation needs in the novel social–ecological conditions of the region. The conceptual frameworks of flood control debates contribute to distinct discourses influencing policy and praxis, while the discontented riparian community is motivated, by actors influenced by identity and space politics, towards political autonomy. Such influences of opposing discourses may reinforce the narrative of a trust gap between the Indian polity and its Northeast Region. The study further identifies a latent capacity for flexibility in the community, which requires more attention from policy and praxis to explore management solutions in such a complex social–ecological system. The paper argues for science, policy and practice engagements in such contexts and the use of transdisciplinary heuristics for their design to facilitate shared understanding. Copyright © 2017 John Wiley & Sons, Ltd and ERP Environment

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Introduction – Brahmaputra Context

INDIA'S BRAHMAPUTRA BASIN COVERS PARTS OF FIVE OF ITS EIGHT NORTHEAST REGION (NER) STATES PLUS THE STATE OF WEST Bengal (Goswami, 2008). Flood events are common to this region. The linking of human interventions in the river hydrology with issues of poverty, land loss and social conflict is a post-independence (1947) phenomenon (Goyari, 2005; Nath, 2009). The immediate post-independence policy strategy for flood control led to a political economy associated with embankment construction and maintenance that is alleged to have resulted in corruption¹ (Bhattacharya, 2003). The economic reforms of the 1990s introduced a vision of turning the NER into a power house for meeting the energy demands of the country through construction of hydropower projects with little or no water storage, i.e. run of the river dams (Baruah, 2012).

The issues of disasters and governance within the Brahmaputra Basin have been framed as problems associated with its dynamic fluvial geomorphology (see, e.g., Pahuja and Goswami, 2006), the larger political economy driving technological interventions in the fluvial agro-ecosystem (see, e.g., Saikia, 2012) and the politics of identity and space within and among communities of the NER and Indian polity (see, e.g., Baruah, 2005). Each of the above frameworks tries to capture the interplay of diverse factors in the different levels of the scale characteristic of their disciplinary domains. These conceptual frames² have been part of different discourses³ that are shaping public opinion and policy towards disaster and governance issues in the basin.

Though disciplinary perspectives have helped in understanding the evolution of the hydrological and social contexts in the basin region, they fail to explain current paradoxes. For instance, whereas on one hand there are new institutions and external funding for disaster management in Assam, on the other hand the mismanagement of flood protection and relief continue to dominate policy debates after every flood cycle in the state, and farmer and student agitations against the dams and land loss continue to occur.⁴ This indicates a disconnect between people's needs and interests and government policy, and motivates us to diagnose issues beyond epistemic boundaries.

Literature Review

The current debates on the challenges of disasters and governance in the Brahmaputra Basin give an impression of segregated social and ecological contexts. However, Norgaard (1995) argues that the processes of environmental change, social organization, technology, knowledge and human values interact in complex ways such that issues within ecology, society and economy co-evolve. Issues of natural resource management unfold not only across levels of different scales but also across scales of observations⁵ of different disciplinary frameworks and often even across boundaries of the discourses through which they are understood and managed (Pritchard and Sanderson, 2002). Similarly, it has been observed that issues collide within domains of disaster and governance as, for example, 'state–society' relations influence disaster response and vice versa (Hilhorst, 2004).

The mutuality paradigm of disaster studies examines hazards as an impact of social action, acknowledges uncertainty and focuses more on adaptation and learning than a 'predict and control' discourse for disaster management (Pelling, 2003; Hilhorst, 2004; O'Brien *et al.*, 2010). Intrinsic to this paradigm is the framework of the coupled social–ecological system (SES), which uses metaphors of ecological resilience (Eakin *et al.*, 2008; Adger *et al.*, 2009; Gunderson, 2010) and methods of the systems dynamics approach (Sendzimir *et al.*, 2011; Newell and Wasson, 2002) to diagnose outcomes of non-linear interactions among environmental drivers, ecosystem functioning and human interventions. Disasters in this perspective are crisis situations caused by stresses from any hazard, as the ecosystem ceases its capacity to sustain natural resources and provide ecosystem services for society's

¹Personal communication with Dr Arupjyoti Saikia, Associate Professor, Humanities and Social Science Department, Indian Institute of Science, Guwahati, Assam on 2 May and 4 October 2007.

²A sense-making device, adding meaning to a previously confusing or less meaningful situation or domain' (Dewulf, 2005).

³A discourse is defined as an 'ensemble of ideas, concepts and categories through which meaning is given to phenomena' (Hajer, 1993).

⁴From a review of newspaper archives (*The Assam Tribune*) and Assam legislative assembly debates (1950–2012).

⁵The scale of observation has been described as a 'filter or window of perception' through which assessments are conducted, observations made, and information and knowledge acquired (Dalgard *et al.*, 2003).

development (Kinzig *et al.*, 2006; Walker and Meyers, 2006). An element of surprise can be associated with such ecological regime shifts when the social sub-system does not expect such a shift (Carpenter, 2006; Gunderson, 2010), thereby creating a management challenge or even triggering changes in the governance of the natural resource system (Westley, 1995; Pahl-Wostl, 2009). Varying theories and experiences of multiple actors involved as stakeholders create a challenge in diagnosis of any issue (Dewulf, 2005). Methodologies have evolved to address the uncertainty of external disturbance phenomena (e.g. ecological changes) rather than the uncertainties of the context, i.e. the ambiguities that may arise due to plural ways of knowing, leading to multiple framings (Dewulf, 2005). This presence of 'multiple realities' creates a deeper layer of complexity (Hilhorst, 2004) and challenges the notion of reducing social life to a sub-system (see, e.g., Weick, 2005; Verweij *et al.*, 2006; Pahl-Wostl *et al.*, 2013).

To explore and address the methodological challenge of 'multiple realities' in the Brahmaputra Basin, it is worthwhile to look into the systems approach as a transdisciplinary heuristic (Huutoniemi and Willamo, 2014) that allows for horizontal thinking (e.g. the exploration of different versions of a problem situation) and vertical thinking (e.g. the exploration of the linkages between a problem situation with the wider governance context in which it is evolving). To put these stages into practice, soft systems methodology (SSM) can be helpful because it facilitates the enquiry of 'holons' or different social constructs of a problem and also acknowledges the researcher's reflections as one of the holons of the enquiry (Checkland and Scholes, 1990). The challenge to tailor the methodology for issues of natural resource governance lies in the identification of the purpose of change – i.e., the transformation required in a context. SSM has been applied in other river basin contexts, for example, to track governance shifts from 'control and command' to 'adaptive governance' (Sendzimir *et al.*, 2008) and to derive sustainable solutions for basin management (Magnuszewski *et al.*, 2005). However, in the Brahmaputra context, there is a dearth of enquiry on motivations driving current policy and practice regarding disaster management. The novelty in this study is in the use of SSM to understand different social–ecological realities of disaster events, reasons for matches and mismatches across them and finally their influences on purposeful action. Such a nuanced understanding is crucial for disaster management in a region of conflict such as the Brahmaputra Basin.

Research Design

Case Study

The Dhakuakhana area (Figure 1) within the Lakhimpur district of the Upper Brahmaputra Valley⁶ was referred to in the 1970s as a success story of flood control in Assam.⁷ The Mising tribe of the valley has long coped with monsoon floods primarily by switching livelihoods between agriculture, fishing and animal husbandry (Nath, 2009). However, the breaches of 1998 in the Sissirkolghor-Tekeliphuta embankment led to heavy crop area damage in the villages of Dhakuakhana. For some villages, this was the beginning of a process that finally shifted the regime of productive paddy fields to one of sediment-filled landscape (Das *et al.*, 2009). This issue did not appear much in the public sphere until recently, after agitations by Mising students and political organizations and also after research interest in community adaptation (e.g. ICIMOD, 2013; Varma *et al.*, 2015).

Methodology

The following two points capture the methodology of this study.

- *Narratives through holons.* The interpretation of human narratives provides information about not only the experiences in a context but also the cause–effect assumptions of any event/frames guiding purposeful action

⁶Sub-region within Brahmaputra Basin comprised of the Jorhat, Sibsagar, Dibrugarh, Dhemaji, Lakhimpur and Karbi Anglong districts of Assam (Gajbhiye and Mandal, 2000).

⁷From review of newspaper articles and Assam Legislative Assembly Debates, 1950–2012.

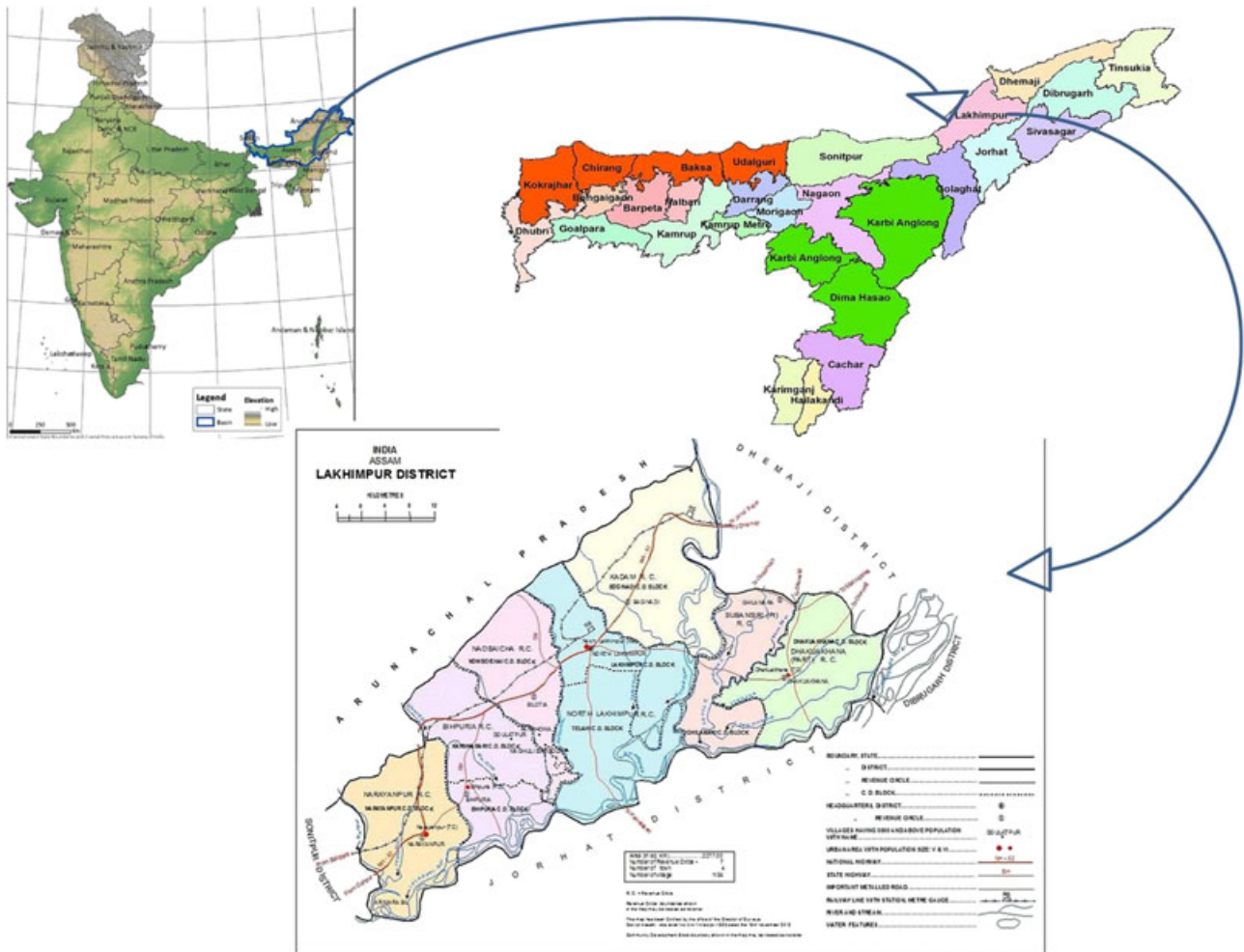


Figure 1. Map showing Dhakuakhana within Lakhimpur district in Assam of Brahmaputra Basin in India. Modified from Lakhimpur district, Census, 2011; Government of Assam (assam.gov.in) and Brahmaputra Basin, 2014, Ministry of Water Resources, Government of India

(see, e.g., Paschen and Ison, 2014). In this study, narratives are identified through the analysis of holons, which provides the means for horizontal thinking. The first two sections of the results give the outputs of this analysis

- *Reflection through narrative.* For vertical thinking, reflections from a review, interviews and field observations are presented as the authors' narrative in the third section of the results. This facilitates insights into the complex relations among different narratives of the problem and frames guiding responses (see, e.g., Hajer, 1993; Herman, 2003).

Data Sources and Analysis

Secondary sources. A review of the following sources of information was conducted to identify the villages for this study (see Table 1), establish a preliminary understanding of the social and ecological situation (see Figures 2–7) and frame guiding questions for in-depth interviews:

1. reports of the Water Resources Department (WRD), Government of Assam (GoA), from 1954 to 2009;
2. newspaper archives of a popular English local daily of Assam (*The Assam Tribune*) from 1950 to 2012;
3. Assam Legislative Assembly Debates from the late 1950s to 2009;

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Name of village	Total area	Crop area	Crop area achieved/year (i.e. remaining/year)	Total crop area loss due to erosion	Total crop area loss due to sand deposition	Farm families
Jangi-dandhora	185.38 ha	140 ha	1999 78 ha 2005 78 ha 2006 nil 2008 nil	100 ha	40 ha	135
Matmora	221.69 ha	182.36 ha	1999 109 ha 200 112 ha 2006 72 ha 2008 nil	101.06 ha	81.3	116
Arkepbaligaon	232.65 ha	200.92	1999 72 ha 2005 53 ha 2006 nil 2008 nil	93.06 ha	107.86 ha	216
Akoria	133 hc	105 hc	1999 105 hc 2005 105 hc 2006 105 hc 2008 47 hc	nil	58 hc	116
Borkhamon	184 hc	145 hc	1998 115 hc 2005 88 hc 2006 61 hc 2008 nil	nil	145 hc	144
Kangkansapori-baghsuk	267 hc	218 hc	1998 218 hc 2005 218 hc 2006 218 hc 2008 76 hc	nil	142 hc	128
CharanchukModarguri	476.8 hc	427.6 hc	1998 nil 2005 nil 2006 nil 2008 20 hc (approx.)	nil	427.6 hc	560
Aunibari	107.07 hc	74 hc	1998 nil 2005 nil 2006 nil 2008 8 hc (approx.)	nil	74 hc	94

Table 1. Description of villages according to Dhakuakhana Circle Office, 2011

- census data of the Dhakuakhana block of the Dhakuakhana sub-division of Lakhimpur district, Assam, Government of India (GoI), 2011;
- survey information of land loss of Dhakuakhana Circle from the Dhakuakhana Circle Office, Lakhimpur district, GoA.

Apart from this, a review of research on flood issues of the upstream Assam Valley was conducted (see Narrative 4 in Results).

Primary sources. Simultaneously to the review, key informant interviews and field visits at different times of the year from 2007 to 2011 were conducted, which helped in the identification of the stakeholder pool (for narratives, see the first section of the results) and key observations (see the third section of the results). In 2011, 54 in-depth interviews using open ended questions were conducted in a snowball sampling method (see, e.g., Paschen and Ison, 2012) of the following stakeholder groups:

- Mising farmers of identified villages;
- employees of government extension offices and non-Mising people of Dhakuakhana;



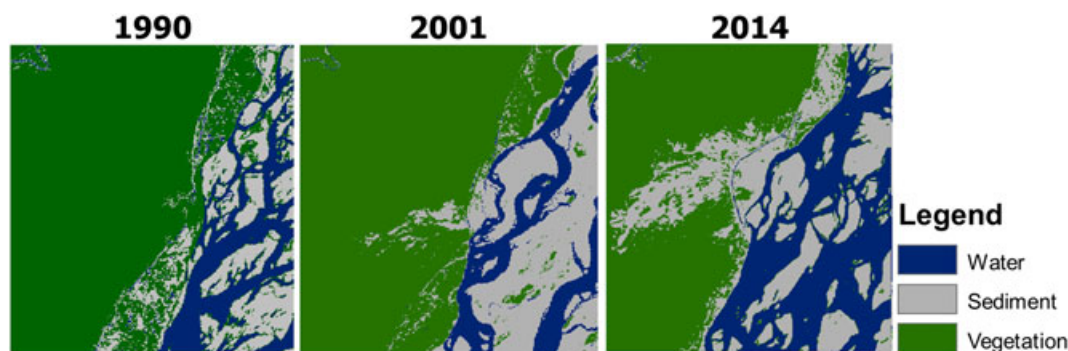


Figure 3. Lateral migration and trend of sediment deposition in study area villages (source- Asia Pacific Network for global change research, 2014)

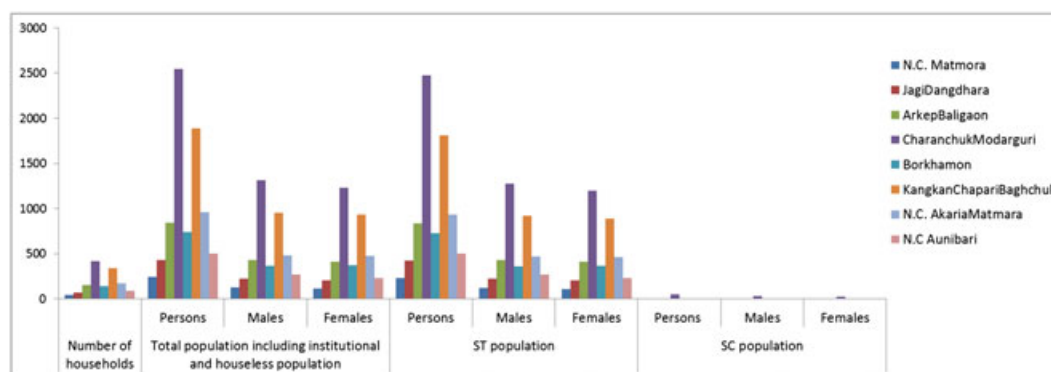


Figure 4. Demography of selected villages of Dhakuakhana. Mising tribe is recognized as scheduled tribe (ST) under the Constitution of India. N.C. signifies non-cadastral

3. members of the Mising students' organization;
4. members of non-government organizations (NGOs) in the study area;
5. journalists in the study area;
6. academics, journalists and government officials in other cities, such as Guwahati, Lakhimpur, Dibrugarh and Jorhat in Assam.

The information from the above primary and secondary sources was examined using the systems tool causal loop diagrams (CLDs) (Sterman, 2000) applying the Vensim software (see, e.g., Sendzimir *et al.*, 2011). Variables were selected from transcripts and content reviewed⁸; the identified linkages between any two variables were assigned a polarity⁹ '+' or '-' and feedback, if any, to a change was identified.¹⁰ Smaller segments of information from a single source were first analysed as building blocks that ultimately formed part of four different narratives of the problem.

⁸Variables were selected following Sterman (2000), but the essence of the particular respondent/s is maintained in the choice.

⁹A positive link (+) means that if the cause increases, the effect increases above what it would otherwise have been, and if the cause decreases, the effect decreases below what it would otherwise have been. A negative link (-) means that if the cause increases, the effect decreases below what it would otherwise have been' (Sterman, 2000).

¹⁰A loop is a positive (reinforcing) or negative (balancing) feedback to a change identified in the causal link. The loop identifier (in our case B for balancing and R for reinforcing) in the CLD circulates in the same direction as the loop it represents (Sterman, 2000).

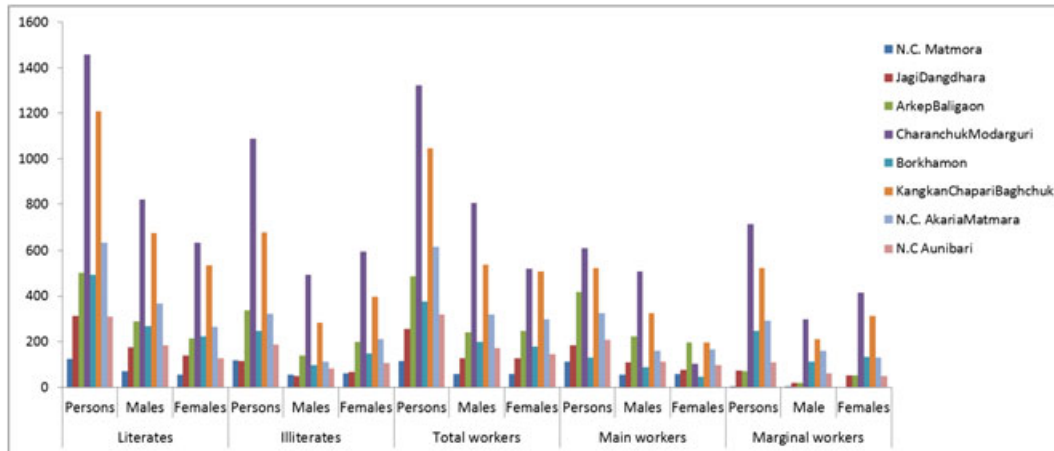


Figure 5. Literacy, main and marginal workers

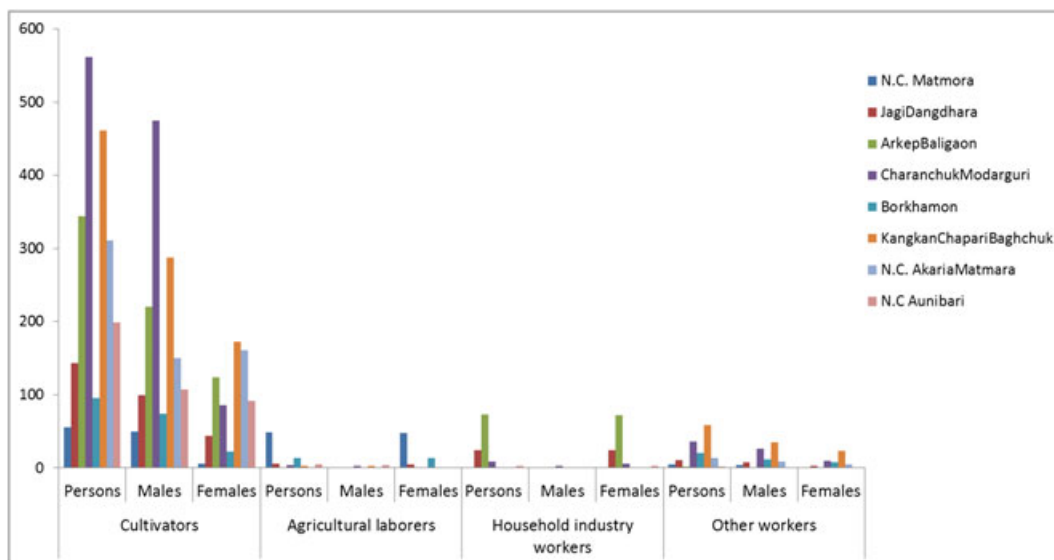


Figure 6. Distribution according to categories of main workers

Results

Section 1. Reality Within Narratives

The concept maps represent the webs of interactions that may have shaped the problem and responses according to different perspectives. For the sake of space, only the summary models (Figures 8–11) of the four narratives are shown in this paper. From here on, following Sendzimir *et al.* (2011), variable names are italicized and feedback loops are identified as B for balancing a change and R for reinforcing a change. Feedbacks are further categorized in each narrative by using specific suffixes, e.g. B1, R1, Ba, Ra etc.

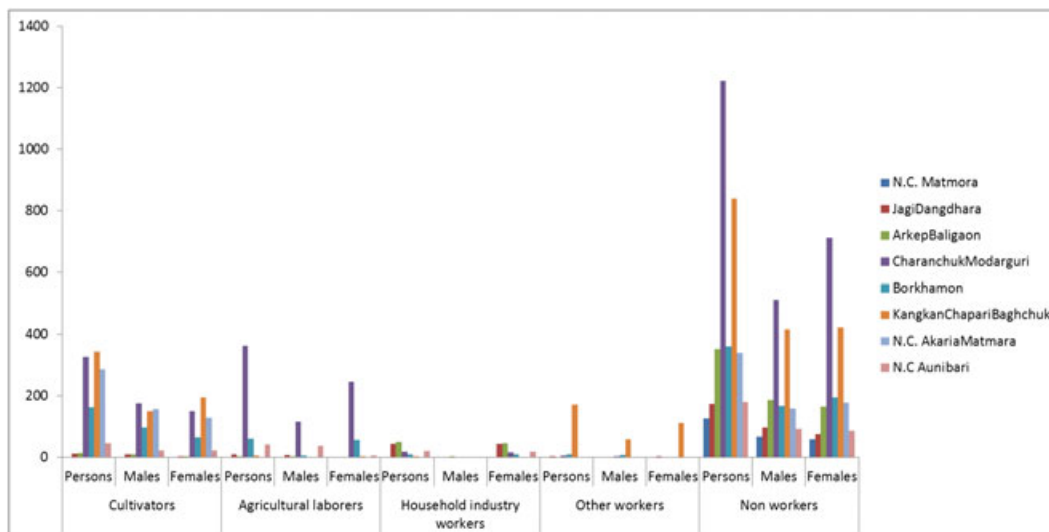


Figure 7. Distribution according to categories of marginal workers

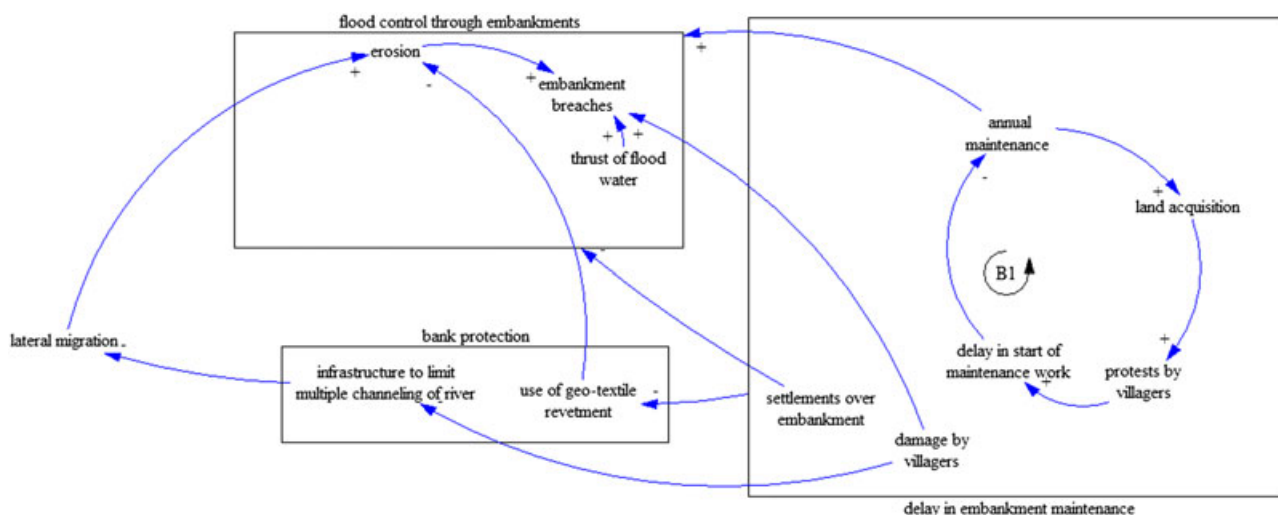


Figure 8. CLD Narrative 1

‘We Are Doing it Right’¹¹ – Narrative 1 (Figure 8)

Narrative 1 is based on information from flood reports and interviews with employees of the Chief Engineer’s Office, WRD, GoA. It explains that *flood control through embankments* has been inhibited by breaches due to the *thrust of flood water* and *erosion*, which has become frequent since 2005 in the study area. The *annual maintenance* of WRD is often marred by intentional damage, *settlements over embankment* and delays owing to first *delay in the allocation of funds*, as well as *protests by villagers* for *compensation for their land loss* (B1). In 2009, a new type of *bank protection* was introduced with the *use of geo-textile revetment* for a distance of 5 km, and this has protected the villages from floods and *erosion*. WRD plans to continue with its *bank protection* measures.

¹¹Interviewee in Chief Engineers Office, WRD, GoA, on 30 August 2011.

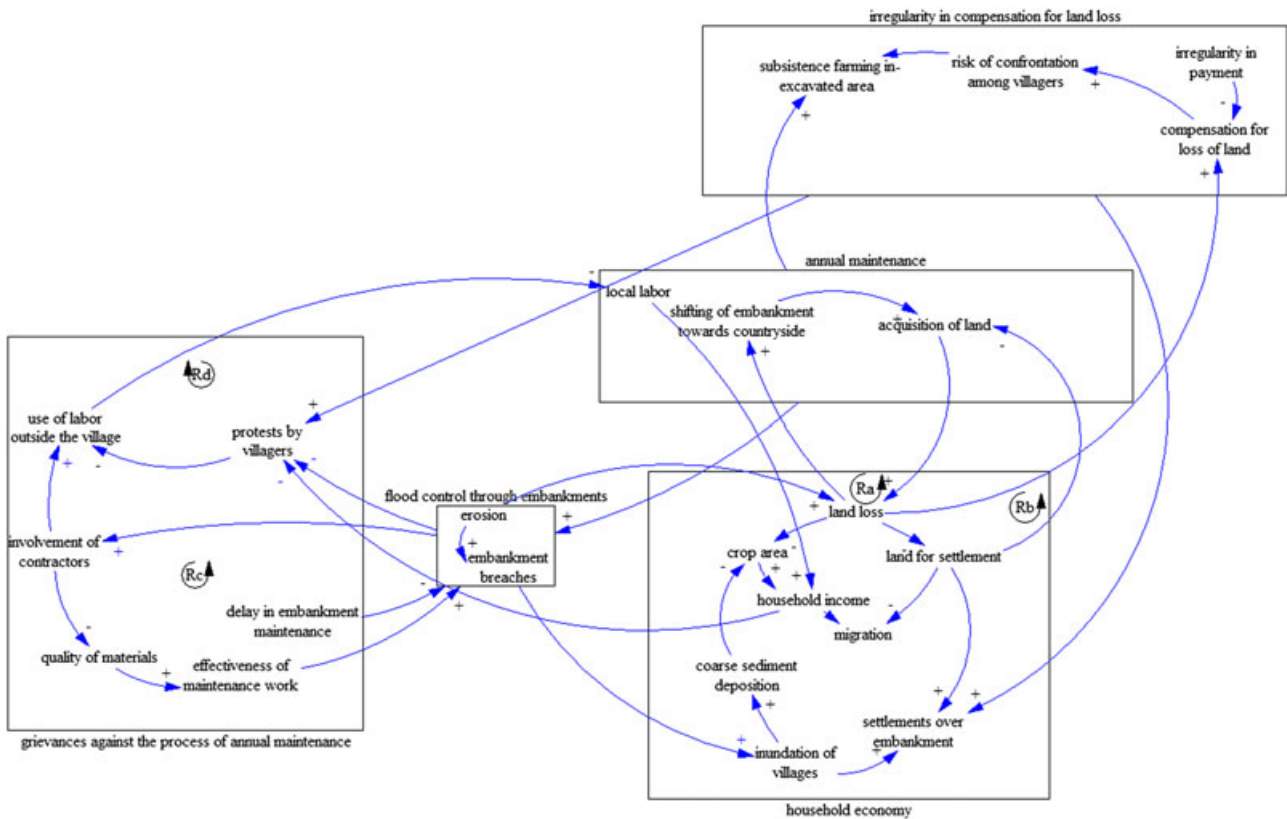


Figure 9. CLD Narrative 2

‘We Are Neglected’¹² – Narrative 2 (Figure 9)

Narrative 2 is based on the information from Mising farm families and leaders within the study villages. It explains that the *household income* of Misings started dwindling as flood control interventions started failing. The extent of rice cultivation decreased due to reduced *crop area* resulting from *loss of land*, first due to *erosion* and then due to the *acquisition of land* during the *annual maintenance* process for *shifting embankment towards the countryside* (i.e. villages) (Ra and Rb). When *coarse sediment deposition* after the recession of flood waters occurred in different patches, first in 1998 and then from 2006 onwards, there was a further drastic reduction in the *crop area*. The decrease in *household income* together with dearth of *land for settlement* has driven *migration* from these villages. Simultaneously, continuous *inundation of villages* and scarcity of land has prompted a set of households to retain their *settlements over embankment* even after floods. The *irregularity in payment for compensation of land loss* has contributed towards longer periods of such settlements, as many villagers plan to buy land elsewhere with the compensated amount.

The villagers have grievances against the *annual maintenance* process even though it contributes to the *household economy* by involving *local labour* and creating opportunities for *subsistence farming in excavated areas*. The *irregularity in the payment of compensation* leads to a *risk of confrontation* over the ownership of land, because land was acquired not only for shifting embankment but also for settling those farm families who did not have any remaining land, again obstructing any subsistence farming. Delays, along with lack of *effectiveness of maintenance work* (Rc), have instigated *protests by villagers*, which are also driven by *irregularity in payment for compensation of land loss* and *use of labour* from outside the villages by contractors (Rd).

¹²Mising farmer of erstwhile Matmora village and now settled above embankment, during an interview on 12 June 2011.

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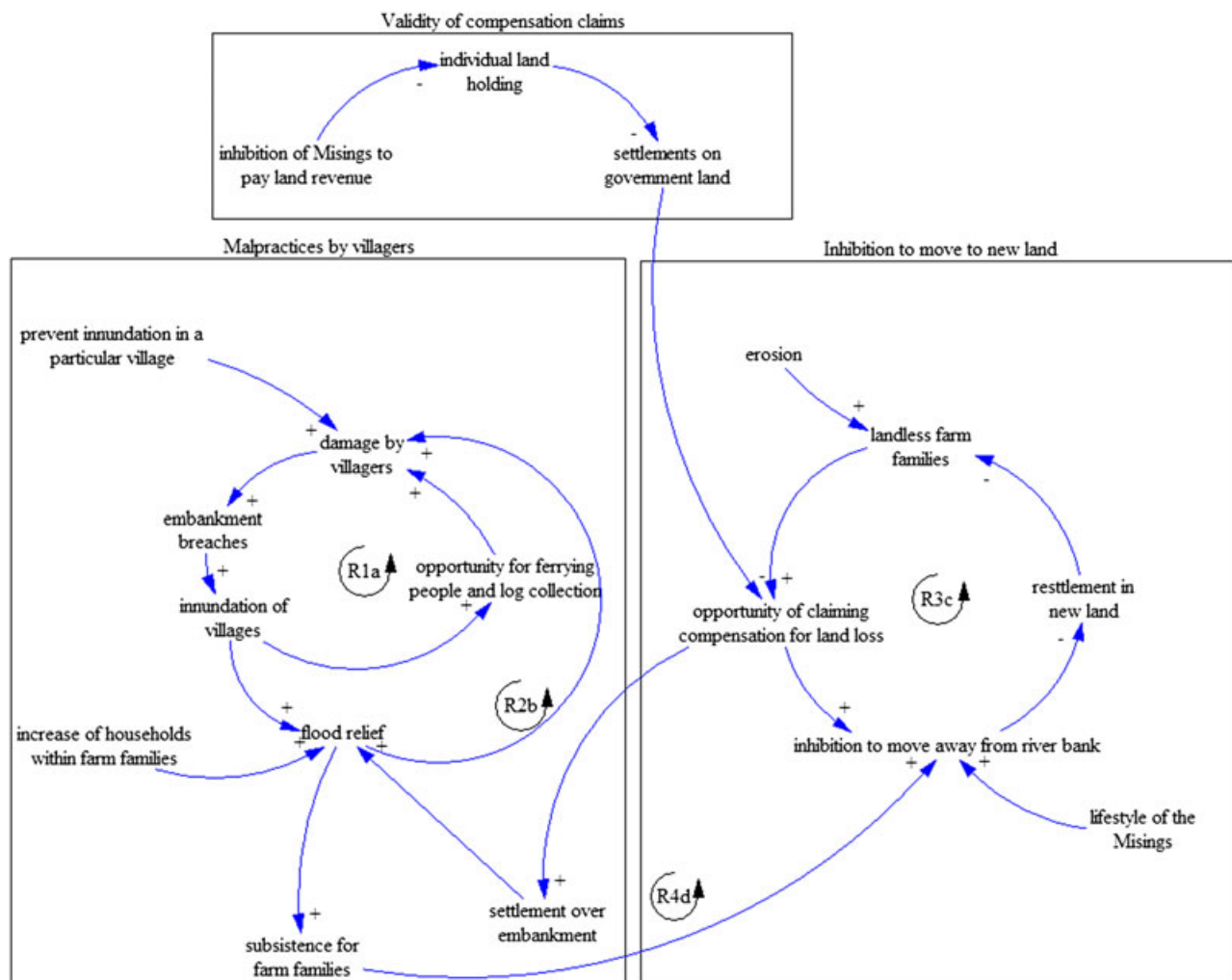


Figure 10. CLD Narrative 3

‘Misings are cunning’¹³ – Narrative 3 (Figure 10)

Narrative 3 is from Assamese¹⁴ employees in government extension offices and locals in Dhakuakhana. This narrative is about certain malpractices by Mising villagers, such as intentional damage and *settlement over embankment*, which are alleged to contribute to the problem situation (R1a and R2b). To increase the credibility of their claim for *flood relief*, villagers increase the number and duration of *settlements over embankments*. Such a practice also finds encouragement from the *new opportunity of claiming compensation for land loss*. Although land is provided elsewhere for resettlement of the Mising villagers, there is an *inhibition to move away from the river bank* that is primarily driven by their lifestyle but also due to the new opportunity (R3c) and continued subsistence from *flood relief* (R4d). An inherent *inhibition of Misings to pay land revenue* has led to a dearth of *individual land holdings* among the tribe. This has led to a majority of their *settlements on government land* creating issues in the validity of the compensation claims.

¹³Non-Mising interviewee in Dhakuakhana on 1 July 2011.

¹⁴Non-Mising Assamese speaking.

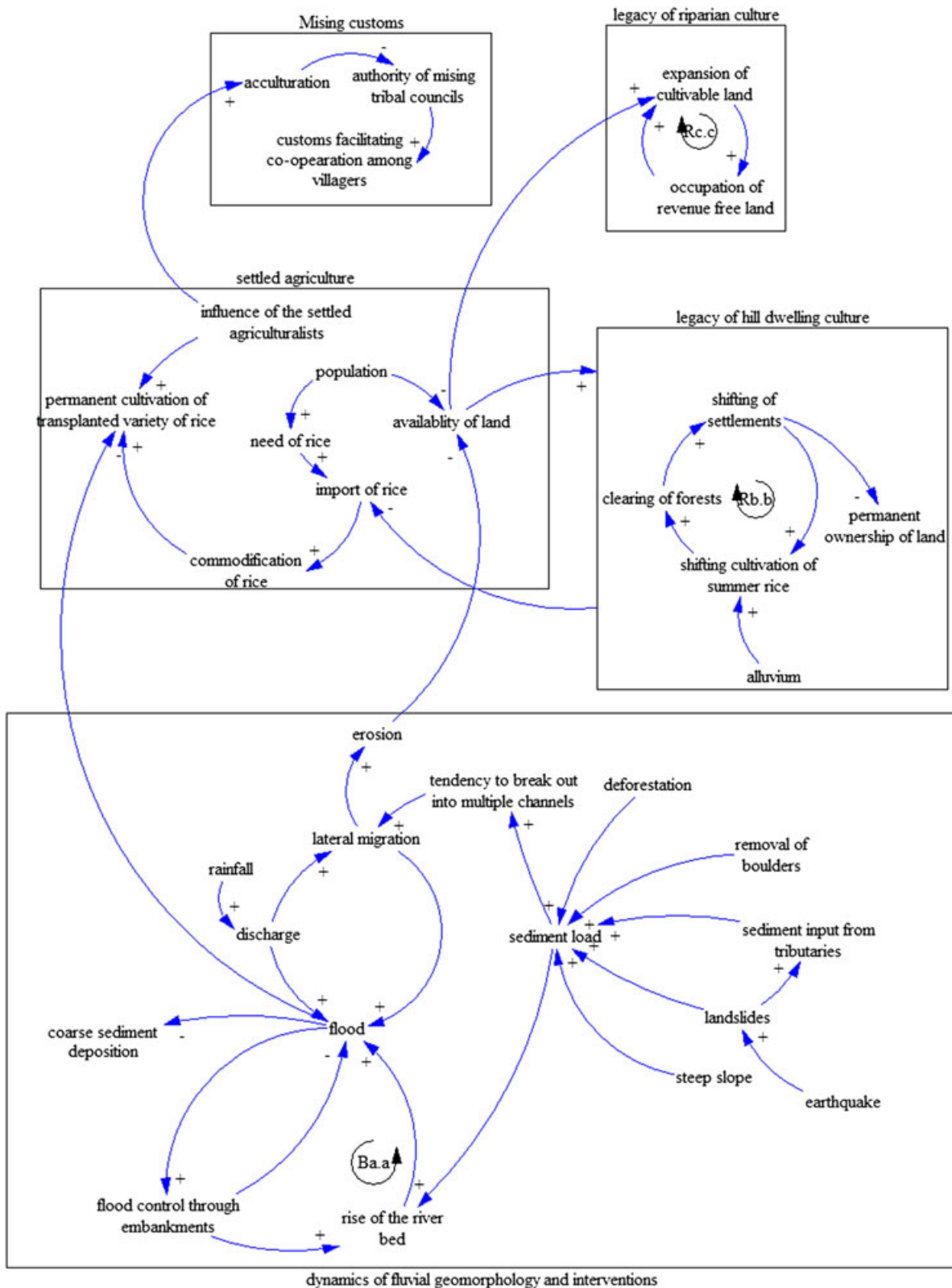


Figure 11. CLD Narrative 5

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Narrative	Stakeholder group	Spatial scale	Temporal scale
We are doing it right	CEO, WRD, GoA	Assam State	1955 onwards
We are neglected	Mising farm families and leaders	villages of Dhakuakhana circle	1998 onwards
Misings are cunning	non-Mising Assamese employees of government extension offices and locals of Dhakuakhana town	Upper Brahmaputra Valley	19th century onwards
Problem is not here	academia	Brahmaputra Basin	19th century onwards

Table 2. Spatial and temporal scale of narratives

‘Problem is Not Here’¹⁵ – Narrative 4 (Figure 11)

Narrative 4, from an academic perspective, depicts the crucial role of the dynamics of fluvial geomorphology and interventions in shaping Mising society. The *availability of land* on the banks of the Brahmaputra together with a flood regime depositing *alluvium* encouraged the early Mising settlers to maintain a *legacy of hill dwelling culture*, i.e. *practicing shifting cultivation of summer varieties of rice, shifting settlements* and without *permanent ownership of land* until the early 20th century. A check on this legacy started with the decline in the *availability of land* due to increase in *population*.

As a result of *population* increase the *need of rice* grew and soon led to the *import of rice* from outside the cultivated land area, initiating the process of *commodification of rice*, which until the 19th century was not prevalent. This along with the *influence of the settled agriculturalists*¹⁶ contributed to the adoption of *permanent cultivation of transplanted variety of rice* among the Misings. Finally, *flood control through embankments*, which began after the earthquake of 1950, brought an end to the flood regime and ushered in a prosperity that was previously unknown to the tribe (Nath, 2009). However, the *influence of settled agriculturists* initiated a *process of acculturation* that weakened Mising customs (Mipun, 2000).

In pre-colonial Assam, it had been a practice for tribal and even some non-tribal farm families to *occupy revenue free land*¹⁷ in the river bank areas, which provided an *opportunity for expansion of cultivable land* among farm families. The decrease in the *availability of land* after the erosion process of the late 1990s made such practice difficult, but a *legacy of riparian culture*¹⁸ is still observed (Rc.c).

Section 2 – Reality Across Narratives

It can be inferred from Table 2 that the extent of each narrative varies across space and time. Narrative 1 observes the problem at the spatial scale of the state of Assam because the delay in embankment maintenance is partly attributed to a delay in the allocation of funds from Dispur (the capital of Assam). The narrative has a temporal scale from 1950 onwards, i.e., from the time of the earthquake that triggered extensive course change of the Brahmaputra and its tributaries, and uses certain elements of the fluvial geomorphology framework for legitimizing action. Narrative 2 observes the problem as endemic to the Mising villages of Dhakuakhana and seems to have started after the 1998 breaches. Narrative 3 finds the problem to be of a wider scale, one that is present in Mising habitations all across Upper Brahmaputra Valley,¹⁹ and traces it to the lifestyle of Misings, which is two centuries old. Narrative 4 is the widest, with its analysis drawing from both natural and social sciences, encompassing basin-wide fluvial geomorphology and its complex interactions with changes and legacies within Mising culture.

¹⁵A hydrologist, during an interview on 16 September 2011, while referring to the sediment deposition issue of the villages as a basin scale problem.

¹⁶‘...Misings had no system of settled agriculture; it was only through their gradual contact with the plains people of the Brahmaputra valley that they became acquainted with the agriculture system of the plains’ (Nath, 2009).

¹⁷Nominal/no revenue was levied on the occupation of forest land cleared for cultivation during the Ahom rule (Baruah, 2005; Nath, 2009).

¹⁸A tendency among riparian communities in Assam for expansion of their land by ‘occupying swamps, drains and slopes of the embankment’ is observed (Rc.c) (Nath, 2009).

¹⁹This can be illustrated by the flood reports of intentional damage by villagers as ‘damage by miscreants’ both upstream and downstream.

Narratives are often based on hypotheses of cause–effect relations of any problem, whereas in reality causal mechanisms may lie in combinations of factors within many such hypotheses (Gunderson, 2001; Sendzimir *et al.*, 2011). Table 3 illustrates an exploration across the identified narratives to obtain a deeper understanding of the systems dynamics of the problem situation.

Section 3 – Problem Will Not Be Here – Narrative 5

During fieldwork (presented as four cases in Table 4), it was observed that the villagers were networking with different actors from government extension offices, local government institutions and civil society (students' organization and local NGO). The network actors are mostly from the Mising community (with one exception of the NGO); thus, the networks can be treated as 'bonding ties' (see, e.g., Pelling and High, 2005). This is explored deeper with the help of the matrix in Table 5.

Time-period	Change events	Key processes
1800s–1950	Settled agriculture among Mising tribe	<ul style="list-style-type: none"> Decrease in <i>availability of land</i> across the Upper Brahmaputra Valley pushed the Misings to break out from the legacy of hill dwelling culture (Rb.b) towards settled agriculture, which was facilitated by <i>influence from settled agriculturalists</i>.
1950–1998	Prosperity from agriculture	<ul style="list-style-type: none"> Basin level crisis ushered flood control intervention in Assam that helped the Misings of Upper Brahmaputra Valley to make the final switch to <i>permanent cultivation of transplanted varieties of rice</i>.
1998–2009	Landlessness and discontent	<ul style="list-style-type: none"> i. After 1998 and more so after 2005, the <i>household income</i> of the Misings in villages of Dhakuakhana, along with <i>land for settlement</i>, has been dwindling, driving out-migration. ii. The <i>annual maintenance</i> of the embankment created opportunity for <i>local labor</i> and some <i>subsistence farming</i>, while <i>flood relief</i> incited malpractices among farm families (R2b). iii. The <i>annual maintenance</i> led to more <i>land loss</i> in subsequent years due to <i>acquisition of land</i> (Ra and Rb) and <i>irregularity in compensation of land loss</i>, lack of <i>effectiveness in maintenance work</i> (Rc) and <i>use of labor outside the village</i> (Rd) created grievances against the process of annual maintenance. iv. Apart from <i>delay of allocation of funds</i> from GoA, the <i>protests by villagers</i> also led to a <i>delay in start of embankment maintenance</i>, which marred the maintenance process (B1). v. The <i>irregularity in payment of compensation for land loss</i> also created <i>risks of confrontation among villagers</i>, a risk which can be assumed to be higher with the decreasing influence of Mising customs facilitating co-operation. vi. This <i>irregularity in payment</i> together with diminishing <i>land for settlement</i> also facilitates continuation of <i>settlements over embankment</i> even after recession of flood waters, again leading to failure of maintenance. vii. The Misings prefer to continue these settlements in order to make their claims more credible for <i>flood relief</i>. viii. This can also be attributed to a legacy of riparian culture (Rc.c), a practice observed among different communities in banks of the Brahmaputra, at a time, when land is fast disappearing. ix. The choice to remain near river banks at present is not only driven by their lifestyle, but also the opportunity for compensation and continuance of subsistence from <i>flood relief</i> (R3c and R4d). x. As a result of a legacy of hill dwelling culture, <i>permanent ownership of land</i> is rare among the Misings, which makes most of their <i>settlements in government land</i>, making their compensation claim invalid.

Table 3. Major change events from 19th century onwards till 2009 in the Mising society of the study area and processes across different scales leading to them as delineated from the four different narratives

Village groups	Villages (revenue village and their clusters)	Existing crop area ¹	Reasons for land loss ²	Network actor	Location	Response action
1	<i>Matmora</i> (Baghsuk camp and Khamonbirina clusters), <i>Janjidangdhora</i> (Ujonijani and Namonijani clusters), <i>Arkepbaligaon</i> (Arkep and Baligaon clusters) and <i>Borkhamon</i> (Uporkhamon cluster)	nil	erosion (except Borkhamon), acquisition and sand deposition to varying extent	civil society agent– Mising students' organization	adjacent to the geo-fabric revetment	protest for compensation
2	Khamonlagasu cluster of <i>Borkhamon</i>	nil	sand deposition	civil society agent– local NGO	not adjacent	commercial scale weaving protest for compensation
3	<i>Akoria</i> (Namoniakoria and Ujoniekoria clusters) and <i>Kankansapori-baghsuk</i> (Kankansapori and Baghsuk)	47 hc and 76 hc respectively	sand deposition and acquisition	civil society agent– Mising students' organization	not adjacent	
4	<i>Caranchukmodarguri</i> (Santipur and Joirampur) and <i>Aunibari</i> (Aunibari)	approximately 25 hc and 74 hc recovered respectively	sand deposition	government agents– employee of agriculture sub div. Dept and counselor of local government institution (Panchayat) respectively	not adjacent	banana plantation and bamboo plantation respectively

Table 4. Diversity in local actions¹From Table 1.²From Table 1 and Narrative 2.

Village groups	Network agent		
	Mising students' organization	Government agents	Local NGO
1 and 3	protest	–	–
2	–	–	weaving
4	–	plantation	–

Table 5. Matrix showing type of response of village groups vis-a-vis network actor

Villagers of Groups 1 and 3, irrespective of the varying status of cultivable land and reasons for land loss (Tables 4 and 5), have been continuously exposed to embankment breach–annual maintenance dynamics (e.g. ii, iii and v of Table 3) from 2005 to 2009, and have developed bonding ties with leaders of the Mising students' organization. In these groups, the villagers seem to be motivated towards protests and using elements of their narrative as a guiding frame for action.

On the other hand, the villagers of Group 4, who have been disassociated from this dynamics since 1998 and are observing revival of some cultivable land, seem to have used their networking skills²⁰ to experiment with plantations (Tables 4 and 5). Of interest is the case of one of the village clusters, Group 2 (Tables 4 and 5), which kept losing land to sand deposition until 2008. It was left without any cultivable land in 2012. This group is geographically positioned away from the site of the breach–annual maintenance dynamics and has succeeded in forming 'bridging ties', i.e. outside of the community (see, e.g., Pelling and High, 2005), with local NGO members to explore an alternate livelihood opportunity (i.e. weaving on a commercial scale).

From the above observations, it can be inferred that Mising villagers may not always respond as expected (i.e., they can break out from the Rd feedback loop driving protests (see iii in Table 4), such as Groups 2 and 4) or not comply with others' perceptions of their behaviour (i.e. break out from feedback such as R2b, R3c and R3d²¹; see ii and ix in Table 3). They can not only use bonding social ties but also create bridging ties for motivation, as well as for accessing a different source of knowledge for innovative practices (such as Group 4). However, this seems to have been possible only when the villagers are dissociated from the embankment breach–annual maintenance dynamics (such as Groups 2 and 4), i.e., when the perceived needs from management practices such as relief, compensation and local labour associated with the dynamics are absent.

Though local responses were shaped in an environment of uncertainty and according to the perceived needs of farm families, a notion of political autonomy seems to be gaining ground among villagers as an alternate vision.²² Specifically, those engaged in the network with the Mising students' organization (from Groups 1 and 3, Tables 4 and 5) spoke about the need for autonomy for the development of their area. The students' organization, together with a Mising political party, demand the reconstitution of the Mising Autonomous Council (MAC) of 1995, which after its origin remained as an ad hoc body run by state-appointed committees until its suspension in 2009 under allegations of financial misrule (ICIMOD, 2013). Mising leaders argued that only a reconstituted MAC can bring together the entire tribe under one governance unit. The MAC is perceived as essential for mobilizing government funds directly to Mising leaders, which will facilitate solutions to flood and erosion issues.²³

Further, empathy among key members of the local NGO, leaders of the students' organization and another Assam wide agitating farmers' organization provided an opportunity to gain the support of local youth for the ongoing protests against dam construction in the Brahmaputra Basin. This struggle has also attracted the attention of some scholars because it draws arguments from debates about basin-wide political economy discourse (e.g. Baruah, 2012).

Thus, though local factors have contributed to the genesis of the informal responses, the shadow networks²⁴ of intermediary actors have provided an opportunity to connect discontented villagers to a struggle targeted at power

²⁰Through different historical periods, Misings have demonstrated their ability to network, which has helped them to sustain during times of change. Non-tribal Assamese use the term 'Miri' to refer to the tribe, and the British ethnographer Gait defines it as corresponding to the image of 'go between', i.e. being channels of communication between different communities (Dowrah, 1996).

²¹Embedded in the 'Misings are cunning' narrative, driving malpractices and dependence on their habitation for relief and compensation.

²²A prerequisite for the transformation of a social–ecological system (Wilson, 2013).

²³In interviews with leaders of MAC on 4 August 2009 and 20 September 2011.

²⁴Self-organizing, informal groups of people who mobilize in response to a crisis (see, e.g., Sendzimir *et al.*, 2008).

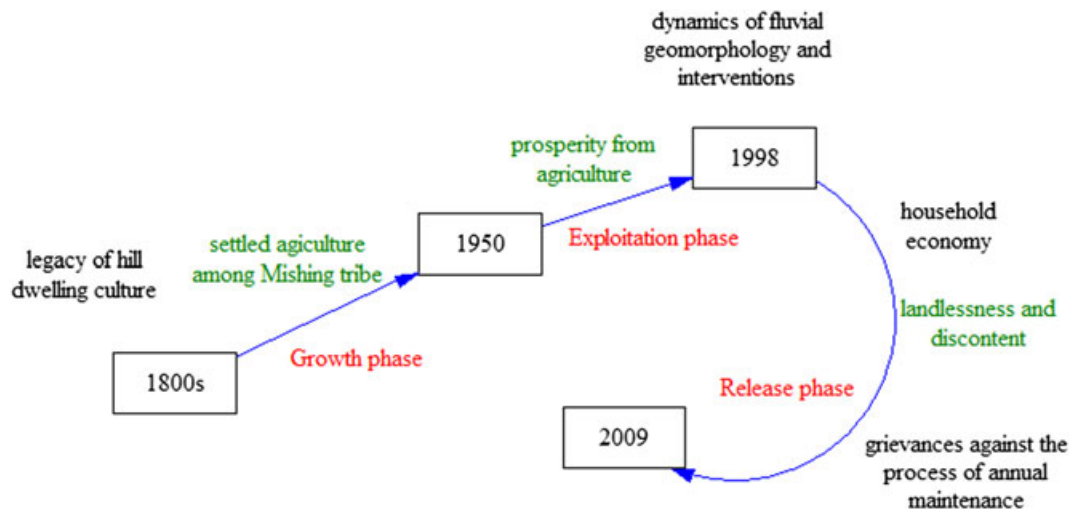


Figure 12. Change events and key processes in Mising society

structures shaping governance in the basin, i.e., more for political autonomy²⁵ and less against control of the river. To reveal this out-scaling of the problem, a metaphor, ‘Problem will not be here’, is used to present these reflections as a fifth narrative.

Discussion

Based on Table 3, three distinct phases emerge in the temporal scale, which can be interpreted using the adaptive cycle metaphor (see Figure 12) (Holling and Gunderson, 2002).

- The period from the 1800s to 1950 depicts the ‘growth phase’ of the cycle, in which Misings attempted to start a new lifestyle in the Upper Brahmaputra Valley as a result of limited land availability and external influence.
- The period from 1950 to 1998 depicts the ‘conservation phase’, in which flood control in Assam and the new prosperity of the region²⁶ led to success stories of the intervention.
- The period from 1998 to 2009 depicts the ‘release phase’, in which Misings are unable to adapt to a new ecological regime of the region within the valley and discontented with the formal interventions.

During the conservation phase, the slow change of sediment load in the Brahmaputra River increased flood (Ba.a), erosion and the risks of coarse sediment deposition in the basin (see Figure 12). Based on Tables 2 and 3, it is also evident that the government authority identified an overly generalized notion of the feedbacks of engineering-based interventions (i.e. B1 in Figure 8; iv of Table 3) while ignoring the dynamics leading to local grievances against such intervention process (see Figure 9 and iii, v, vi of Table 3). In addition, there is typification of the cunningness of community behaviour observing certain practices, such as settlements over embankments or inhibition for resettlement (see Figure 10 and ii, vii and ix of Table 3), without complete understanding of cultural legacies (see Figure 11 and viii and x of Table 3). As basin-wide changes contributed to a state of landlessness, such misdiagnoses of the problem situation have led to continuation of adaptation needs in the new ecological regime.

From Narrative 5, the extent and type of change achieved by formal and informal responses since 2009 can be tracked using the concept of learning cycles (see, e.g., Mian, 2014) (see Figures 13 and 14). The shift in formal

²⁵The MAC was reconstituted in 2013, but it is still unclear how it fits in the institutional framework of the existing governance regime (Sarmah, 2011; ICIMOD, 2013).

²⁶Success in agriculture in Dhakuakhana had been attributed to flood control in the debates of Legislative Assembly of Assam (Assam Legislative Debate, 1970).

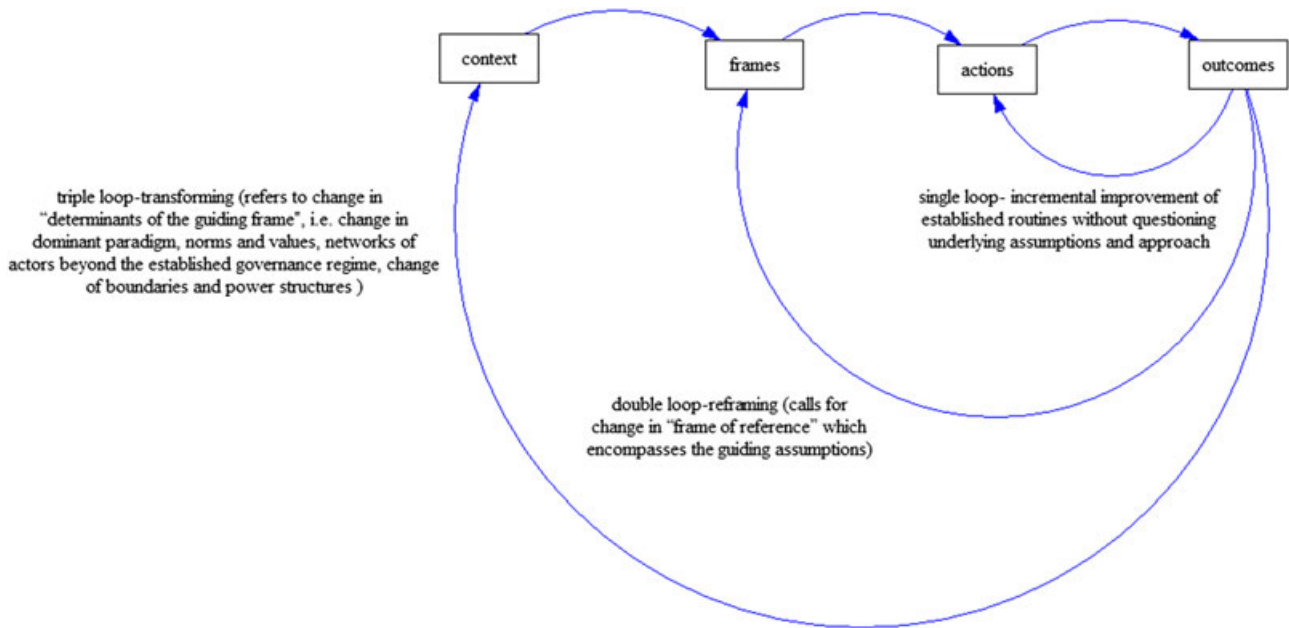


Figure 13. Learning cycle (Pahl-Wostl, 2009)

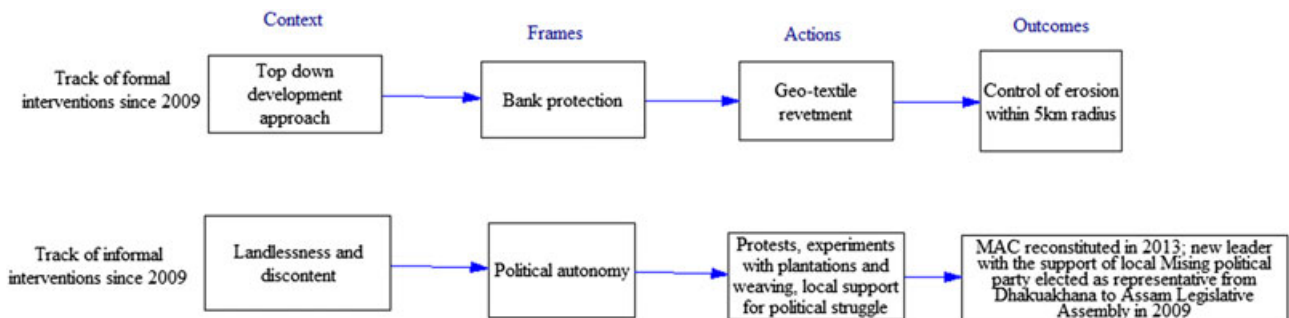


Figure 14. Extent and type of change achieved since 2009

responses from flood control to bank protection is shaped within a larger development approach that has been organizing the Indian polity since its neo-liberal reforms of 1990. This is evident, as similar interventions elsewhere in Assam are now under an Asian Development Bank (ADB) funded programme with GoA. Such change can be inferred as a 'reframing' of the technical interventions within the dominant discourse of controlling the river in the Brahmaputra Basin; hence, the structural 'context'²⁷ remains unaltered. Though four villages within the 5 km radius of the new embankment remain safe from further erosion, such an outcome does not match with current adaptation needs (e.g. means of alternate livelihood, land restoration and rehabilitation). Discontent among Misings is widespread, as illustrated by protests in the majority of the clusters of six villages and out-migration from all eight studied villages. Therefore, the formal response trajectory was shaped within the dominant discourse in the context without complete grounding of the problem situation. Though the formal track reacted to a new element, i.e. erosion, it achieved only 'reframing' within the governance context. The discontent with management practices (e.g. the annual maintenance of embankments and the uncertainty of formal responses), on the other hand, was mediated towards a political struggle through the influence of shadow networks. Such networks function within the existing discourse of neglect from the polity, and mobilize sections of the community towards autonomy. Autonomy

²⁷The governance structure includes 'pertinent legal and organizational frameworks as well as the cultural and socio-economic environment' (Pahl-Wostl, 2009).

Discourses, narratives and purposeful action

Discourse coalition	Approaches towards issues/ management paradigms	Actors	Institutional/management practices
Control of river	top down approaches of development and disaster mitigation	government institutions such as WRD	technological interventions, involvement of experts/ consultants with engineering skills, development projects with external aid/loan
Extractive political economy	raising public opinion towards marginalization of local communities by a 'centre–periphery' model of governance	academia, specifically from social sciences and civil society groups like the Assam wide farmers' organization agitating for land loss	may range from articles and seminars to protest marches trying to impact public opinion and policy
Neglect from polity	mobilization for political space and protection of identity	various ethnic students' organizations and separatists groups	may range from protests, blockades and/or strikes to insurgency

Table 6. Discourse coalitions within Brahmaputra Basin context

provides new vision to a tribe that feels neglected by the government, motivating them to strive for a re-arrangement of the power structure by putting tribal leadership in control of development funds flowing from the polity for this area. The informal response trajectory aims towards 'transformation', the scope and efficacy of which is yet unknown. At the same time, the continuation of the adaptation needs of the problem situation has facilitated its framing within the discourse of an extractive political economy serving elites of the polity (as in Baruah, 2012), also illustrated by the participation of local youth from the study area in protests against dams.

Conclusion

From the discussion on the social–ecological dynamics within the Brahmaputra Basin, it can be concluded that the relation between the narratives of the problem situation and frames guiding purposeful action is complex. On one hand, there is a scope for social learning, but on the other hand, there is the influence of what Hajer (1993) explains as discourse coalitions²⁸ (see Table 6). A discursive affinity²⁹ can be observed between the narratives of 'Misings are cunning' and 'We are doing it right', legitimizing the top-down expert-driven approach for interventions. The institutionalization³⁰ of the 'control of river' discourse seems to not only influence employees of government institutions and non-Mising locals to ignore the deeper feedbacks of management practices and cultural legacies of the Misings but also sharpen³¹ the 'protest', 'funding' and 'malpractice' aspects of the problem. The continuation of discontent along with perceived needs from management practices (e.g. relief, compensation, labour) has led the majority of the Misings of the study area to use chunks³² of their experience for responding (and in the process become motivated³³) to the approach of autonomy. At the same time, the continuation of adaptation needs in the study area has

²⁸A discourse coalition is '...the ensemble of a set of storylines, actors that utter these story lines and the practices that conform to these storylines, all organized around a discourse'.

²⁹Hajer (1993) observes discursive affinity among discourse clusters, i.e., 'arguments may vary in origin but still have similar ways of conceptualizing the world'.

³⁰If a discourse is successful – that is to say, if many people use it to conceptualize the world, it will solidify into an institution, sometimes as organizational practices, sometimes as institutional ways of reasoning. This is called discourse institutionalization' (Hajer, 1993).

³¹'...narrative is posited to comport to an individual's reality to the extent that it is congruent with their belief systems' (Jones, 2010).

³²The notion of chunking within narrative research explains how experiences are segmented, classified, stored in memory and remembered to recognize phenomena and patterns that in turn influence further cognitive operations on new experiences or actions (Herman, 2003).

³³For motivation, the subjects have to be satisfied with not only the information but also its sources (Frank *et al.*, 2011). The legitimate role of the Mising student leaders could be assumed as they were referred to as 'bhai', meaning brothers, a term that the villagers were found to use to refer to members within their community.

facilitated its framing within issues of marginalization by an 'extractive political economy' (see Table 6). Mising leadership is also observed to be using 'neglect' narrative to expand the scope of conflict³⁴ to other issues, such as the loss of the natural resource base of riparian communities and their rehabilitation due to dam construction.

It is evident from this study that different frames guiding action in the problem situation are being influenced by the competing discourses existing in the wider Brahmaputra context (see Table 6). Such a continuum of opposing discourses can only reinforce the narrative of a 'trust gap' between citizens of NER and the Indian polity (Baruah, 2012) and further polarize society. In the absence of vital social capital such as 'relations of trust and reciprocity' within the diverse actor groups (Plummer, 2009), it is doubtful whether such trajectories can drive 'positive transformation', i.e. towards a sustainable social-ecological system providing for desirable outcomes and navigating through regime shifts (Wilson *et al.*, 2013). Moreover, the much-required link between existing governance institutions and shadow networks through key actors, observed to be vital for transforming policy objectives in other river basins (Pahl-Wostl *et al.*, 2013), was absent here.

However, a breach³⁵ is possible in the 'neglect' and 'cunning' narratives because the actions of the Misings in Groups 2 and 4 were observed to be motivated towards innovation and experimentation. There is an inherent ability among the Mising tribe not only to adapt to ecological fluctuations, such as the annual flood regime, but also to network with other communities and learn to seek opportunities in changing socio-political situations. They have changed with the influence of different cultural practices, co-existed with different communities and political regimes, prospered and were observed to foster different networks according to their perceived needs. This latent capacity for flexibility requires more attention from policy and praxis (Plummer, 2009; Wilson *et al.*, 2013) in seeking management solutions. In such a context, there is a need for science, policy and practice engagements to facilitate a shared understanding of issues. The methodology derived here along with the combination of communication heuristics can play a significant role in the design of such engagements.

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³⁴This is often observed among actor groups who utter a 'victim' story to involve more people and influence political coalitions (Jones, 2010).

³⁵Break from expectations within stories (Herman, 2003; Jones, 2010).

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