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## Introduction and problem definition

### 1.1 Introduction

Transformation of forests to agriculture is a dominant theme in human history, previously associated with progress, increasingly associated with local and global concern. It is a story shared by many regions throughout the world – one initially characterised by overexploitation of available resources, and human desire for transformation – more so during the colonial period. But during the same period, a new set of values emerging from Europe in the form of scientific forestry and conservation challenged the notion of unrestricted conversion of forest to agricultural fields. Imperatives of empire joined a new scientific discourse in placing forests in a category of natural *resources*, which required scientific management lest they be depleted (Herring, 1990). Over time, this desire to exploit and transform changed into an appreciation of the existing ecosystem, and a desire to protect it as such. This is a story of how one such once forested region has worked its way up the ladder of protection, first becoming Reserved, and Protected, then a Tiger Reserve, then National Park and, finally, a World Heritage Site and Biosphere Reserve. This is the story of the Indian Sundarbans<sup>1</sup>. Globally, the Sundarbans' story is of great significance because it is not only a unique forested region but also home to over four and a half million human population, and thus there are a host of development issues, which need to be resolved apart from the ecological ones.

The Sundarbans is an example of an endangered ecological system that is highly populated and both fragile and economically valuable. It serves as a microcosm for examining global dilemmas of development, ecology, and competing values. By nature it is an area subject to periodic tidal flooding, tempered by mangrove vegetation; human presence in the Sundarbans has been made possible by embankments erected to keep saline water out. But these earthen embankments are prone to erosion, embankment failure is also caused due to violent storms, cyclones and tidal surges as well as local human activities like shrimp farming and shrimp seed collection leading to widespread devastation of human settlements in terms of

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<sup>1</sup>The Indian term, or more specifically the Bengali term for the eco-region is Sundarban. However, I will stick to the spelling as Sundarbans, the Anglo-Indian term simply because the thesis is written in English, and not get drawn into the etymological debate that surrounds the nomenclature of the eco-region. See Footnote 2, Chapter 3.

loss of life and livelihood since most of it is land based. Nevertheless, greater value is attached to fresh water agriculture in the Sundarbans by the state and the local communities than to the use of delta area for fishery. There are also many other cases in which fundamental values appear to be competing with each other, for example, on the one hand the global desire to conserve the ecosystem, articulated in terms of large sums of money allotted, and on the other, relatively insignificant spending on human safety and welfare requirements of the millions.

Although the importance of protecting the Sundarbans' natural resources has been recognised by the Indian Government as well as such international organisations as UNESCO, the World Conservation Union (IUCN), and the World Wide Fund for Nature (WWF), little has been studied and written regarding the use of the natural resources by humans, the inherent conflicts therein, and the process of development in this unusual region. The extant body of knowledge though rich in terms of biological and geo-physical sciences leaves a hiatus when it comes to understanding the human-nature dynamics in the eco-region<sup>2</sup>. In the absence of such knowledge, sustaining the Sundarbans or halting current level of deterioration is going to be more difficult than comprehended by agencies of the state charged with the responsibility of administering the eco-region as well as for the world organisations that would like to see the eco-region conserved. A detailed study could thus open up the opportunity to address a number of important policy issues such as: how best to protect an ecosystem/natural resource base while providing for human needs?

The thesis however is primarily concerned with explanations of the current situation; details of its objectives are spelt out in Section 2.5. In particular, it looks at: what competing interests and contradictions are at play in the eco-region? What gives rise to these competing interests and contradictions? How do different group of actors negotiate these competing interests? How can the contradictions be better managed to attain sustainable development goals?

The eco-region serves as commons or common-pool resource (CPR) in terms of nursery for many coastal and oceanic fish species and forest produce (Samarakoon, 2004). People from villages adjoining forests and watercourses draw heavily from the CPR. Due to proliferation of shrimp farms since the 1980s, damage to the ecosystem chain has been aggravated, yet people in ever-increasing numbers extract biotic resources. The pattern and intensity of extraction raises serious questions about long-term sustainability and health of the natural resource base. In looking at the human response to management of natural resources, I have selected the concepts of governance of commons, collective action, and sustainable development from a social anthropological perspective as the central tools for examining the processes observed. For an elaboration of these concepts, see Chapter 2 (sections 2.2 through 2.4). Existing literature on governing the commons (Wade, 1988, Ostrom, 1990, and Agrawal, 2001) suggest that collective action may have a positive role to play in sustaining the commons. These of course need to be seen in the context of the public administrative structure in place, as well as the history of human

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<sup>2</sup> See Annexure V for a bibliography of Sundarbans.

occupation of the Sundarbans, and it may well turn out that not all forms of collective action play a positive role.

## 1.2 Background

Sundarbans is the densely forested wetlands of the delta of the rivers Ganges, Brahmaputra, and the Meghna. The larger part of the Sundarbans is in Bangladesh and though the tidal forest and nature reserve constitute one of the principal forest areas for both Bangladesh and the State of West Bengal in India, this thesis is restricted to the Indian Sundarbans. The two parts taken together constitute one of the largest mangrove forests in the world. The reasons for restricting this study to the Indian Sundarbans are:

- i) The Indian side is accorded higher level of protection<sup>3</sup>,
- ii) Large-scale conversion has not occurred on the Indian side after 1947<sup>4</sup>,
- iii) It would not be possible for a single researcher to cover representative parts of the larger portion in a volatile political situation within a reasonable period of time, and
- iv) The researcher's national and religious identity is a distinct disadvantage in Bangladesh.

This active delta region comprises of an intricate network of tidal channels and islands, the land being still under formation. There are currently 100 islands on the Indian side, of which 46 are forested<sup>5</sup> and the rest variably inhabited. This area is home to many endangered wildlife species, and has already seen the disappearance of the leopard, wild water buffalo, Javan rhinoceros, Indian rhinoceros, hog deer, and swamp deer<sup>6</sup>. The keystone species that has brought fame to the Sundarbans is the Bengal tiger.

Habitation of the 54 Sundarbans islands interrupted the normal delta-building process due to erection of embankments, which is a prerequisite for fresh water agro-ecosystem, the mainstay of the economy. In most places the embankments are of earthen construction, providing precious little protection. The incompatibility of human settlement in an active delta is apparent but immediacy prevailed: nature had to be tamed, environment changed and ecology disrupted, land was claimed from the tides. By the 1870s, the colonial state was anxious for new revenues, and “the sight of potentially fertile land lying wild and idle was an affront to the progressive-minded revenue officers of the Bengal Civil Service” (Richards and Flint, 1990, p. 20).

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<sup>3</sup> Bangladesh cannot afford a very high level of protection for the Sundarbans since it is the principal area providing forest resources to newsprint and match industries as well as material for thatching.

<sup>4</sup> Amitav Ghosh in his novel *The Hungry Tide* (2004) brings to life the forcible dismantling of human settlement on one of the Indian islands. It is based on a true incident of late 1970s. It is the only such incident reported since 1947. See Mallick, 1999; Jalais, 2005 for analyses of the incident. See Footnote 7, Chapter 3 for details.

<sup>5</sup> These are under the jurisdiction of the Forest Department of Government of West Bengal with varying degrees of restriction to entry depending on classification.

<sup>6</sup> It is not my intention to present here the rich biotic endowment of the eco-region since this is already well documented. For a detailed list of flora and fauna of the Sundarbans, see Townsend (1987/91), Mandal and Nandi (1989), Chaudhuri and Choudhury (1994), De (1994), and Mandal (2003).

Fifty six percent of the over 4.5 million people living in the Sundarbans villages are landless but almost the entire population depends on agriculture in one way or the other due particularly to historical antecedents. Though the eco-region receives copious rainfall annually (175 cm on average) mostly during monsoon months of June through September, agricultural productivity is low due to recurrent breaches in embankments causing saline water incursion. The Sundarbans has also been affected by earthquakes, strong winds and severe weather conditions in the past which have caused widespread devastation to human settlements, and have claimed many lives and the loss of much agricultural land (Chaudhuri and Choudhury, 1994). Due to the demand from shrimp farms, people in the Sundarbans have turned to wild shrimp seed collection, especially the landless people. Proliferation of shrimp farms catering mostly to the export market has aggravated pressure on the estuarine ecosystem; marine biologists are raising questions about long-term sustainability of the ecosystem (Naylor *et al.*, 2000; Primavera, 1998; SDBRI, 1996; and Sarkar & Bhattacharya, 2003).

The eco-region is also characterised by poor infrastructure in terms of inefficient and expensive transportation, inadequate healthcare and education, and lack of access to modern energy services, weak/misaligned institutional arrangements, few economic opportunities, and poor administrative control. These, in conjunction with burgeoning population (estimated at 2.5million in 1981, 3 million in 1991 and 4.5 million in 2001)<sup>7</sup> not only cause innumerable hardships to the people but also enhance the vulnerability of this important global commons. This dismal situation persists despite the fact that a specialised agency – the Sundarban Development Board – was created in 1973 for socio-economic development of the area. The Sundarban Development Board (SDB) was initially under the Planning Department of the Government of West Bengal. The Board was entrusted with:

- a. Formulation of integrated programme for effective utilisation of resources placed at its disposal from various sources.
- b. Co-ordination of execution of plans for the development of the region.
- c. Supervision of the execution of any project for the development of the region as a whole or part of it.
- d. Review and evaluation of the progress of implementation and adjustment in policies and measures as the review may indicate.

At the initial stage, the main function of SDB was planning and coordinating the development activities of the region. These apart, the Board also got involved in actual implementation of development projects, which primarily consisted of infrastructure improvement like rural roads, small wooden jetties, culverts and foot bridges, re-excavation of derelict channels and tanks (under the food for work programme), promotion of *rabi* (winter crop) cultivation through subsidised farm inputs and nominal extension services, development of brackish water aquaculture, mangrove plantation, setting up small village industrial units like agro-processing, handloom, carpentry, bakery, and backyard poultry, piggery and dairy. To give impetus to the developmental efforts in the eco-region the Sundarban Affairs

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<sup>7</sup> <http://www.unep-wcmc.org/sites/wh/sundarba.html>; 14 Dec. 2006. The demographic changes may not be entirely due to high fertility rate of local people but may also be due to trans-border migration, mostly illegal.

Department (SAD) was created in January 1994 and the Board was placed under this Department directly under a state minister-in-charge. There are many backward regions in the country that have been provided with specialised government organisations for socio-economic uplift but the areas remain underserved. See *Everybody Loves a Good Drought* (Sainath, 1996) for a number of examples.

In order to address the multiple failures of the bureaucratic and centralised apparatus of the state – the failure to ensure efficient and effective delivery of public services, to effectively provide and maintain key infrastructure essential for economic growth, to promote equity, and to eliminate the multiple deprivations associated with poverty – the Constitution of India was amended in 1993, paving the way for evolution of local self-governments in India (see Annexure I). This was seen as a means of promoting greater community participation and involvement in developmental efforts, thereby improving the dismal record of the Indian developmental state in the sphere of human development and public goods provision. This was the process of decentralisation; people were to be given a say in how their communities would develop, their elected representatives at the local level were to be empowered to act in common interest and funds could be raised and spent at the local level.

Obviously, the amendment calls for collective action of the *institutionalised* kind. In addition to this, there is collective action of a non-institutional (*spontaneous*) kind, and both types are covered in this thesis. According to Wade (1988), impetus for collective action comes from the attempt to secure certain benefits, or avoid certain costs, which could not be secured without deliberately concerted action. However, if transaction costs are high collective action is less likely.

In the next chapter (Section 2.3) I propose to focus on three comprehensive attempts to produce theoretically informed generalisations about the conditions under which groups of self-organised users are successful in managing their commons dilemmas. These are: Wade (1988) and Ostrom (1990), and Baland and Platteau (1996)<sup>8</sup>. These studies arrive at a summary set of conditions and conclusions that they believe to be critical, and can serve as the starting point for the analysis of the ensemble of factors that count for sustainable institutional arrangements.

My interest in collective or self-organised action as an analytical tool is threefold. First, such action when successful according to literature has a direct positive bearing on the sustainability of the ecosystem, and second, the prospects of achieving sustainable development goals in the broader context become that much more likely, especially where inter- and intra-generational equity is concerned. Third, this has important connections to the world of policymaking and governance although I would be quite satisfied with answering the intellectual questions that arise in the aforesaid contexts. Collective action as an analytical tool helps unravel the complex interactions that take place at different levels in the context of the Sundarbans and shed light on the conditions that could help better manage the various contradictions at play.

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<sup>8</sup> They are among the earliest careful comparative studies that are attentive to theoretical developments and use theory to inform their analysis. In addition, they use a relatively large sample of cases to analyse the validity of theoretical insights (Agrawal, 2001).

Though the Constitution of India was amended in 1993, keeping in view the idea of democratic decentralisation as envisaged by the Balwantrai Mehta Committee of 1957, the West Bengal Panchayat Act was enacted in 1957 itself while the West Bengal Zilla Parishads Act came to force in 1963; the first among Indian States. Consequent upon constitutional amendment the provincial legislations were modified accordingly. Thus the enabling framework for *institutionalised* collective action is in place. Apart from the local self-government institutions, line organisations of the State Government like departments of education, irrigation, and agriculture operate up to the Development Block level and at times even below in the Sundarbans. The Development Block is usually the last level with administrative offices of the State Government.

### 1.3 Problem definition

The Sundarbans is a region of global significance because of its unique coastal zone ecology. The mangrove forests also offer protection against storms, tidal surges, and erosion to not only local communities but also to the city of Kolkata (Calcutta), about 130 kilometres away. This was very poignantly brought home by the tsunami disaster of 26 December 2004 which was immediately leveraged as a reason for protecting the Sundarbans by the Government of West Bengal (see Photograph 1.1: a hoarding put up by the Government at a prominent location in Kolkata soon after the disaster stating “Take lesson from Tsunami, Save our Sundarbans. To save Kolkata, Save Sundarbans”<sup>9</sup>). However, Sundarbans is in crisis for a number of reasons, historical and current, natural and anthropogenic including global climate change, and it is vital that a more sustainable path is found for development in the eco-region. In this research, sustaining the Sundarbans implies two things: sustaining the human development process in the Sundarbans and sustaining the ecological base on which the human society is dependent. The research will look at the relationships between these two elements. Through understanding these relationships light will be thrown on the questions of why sustainability is difficult to achieve, and under what conditions further deterioration may be halted.

The proposition that particular human practices would prove unsustainable has cropped up in literature going all the way back to the ancient Greeks and somewhat more frequently and sweepingly in the two hundred years since the work of Malthus, above all in the period since World War II (Holdren, *et al.* 1995). Only in the past two decades, however, has sustainability become a catchword capable of capturing the attention not only of environmental scientists and activists but also of mainstream economists, other social scientists, and policymakers. Now, there is an urgency to find solutions that not only enhance the prospect of human development in remote and backward regions of the world but also provide adequate protection to the natural surroundings to flourish.

Currently, as Herring (1990) explains, the social process of restricting access to exploit resources of the Sundarbans entails a conflict between deep ecology and social ecology. Dogmatic adherents of the values of deep ecology resist any human

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<sup>9</sup> The world at large appears to attach intrinsic value to the Sundarbans whereas for the State Government, it is more of instrumental value.

interference with the functioning of natural systems. Biological diversity takes precedence over conceptualising, and managing, nature as a 'resource', whether common or private. Social ecologists are concerned with walking a fine line between the interests of preservation of nature *per se* and the legitimate interests of human populations in exploiting their environment for livelihoods and habitats. Survival of the Sundarbans forest however, is the result of the fact that in the conflict between use value of Sundarbans as paddy cultivation area and forest, conservation of forest resources has had very strong institutional support.

Given the restrictions of access to exploitation of natural biotic resources, limited infrastructure and consequent lack of choices and multiplicity of concerns, actors and organisations, finding appropriate solutions to the demands of human development process in the Sundarbans is easier said than done. There is a difficult ongoing conflict between the survival strategies of desperate people and protection of environment in its natural state. How, then, do the different social categories/local communities of the Sundarbans cope with the limitations, natural or otherwise, and negotiate their movement towards a better life?

Photo 1.1: Government hoarding exhorting protection of Sundarbans



In the Sundarbans, there is not only a conflict between use and non-use values but also among different use values. From the perspective of local communities denial of access to exploit forest resources appears as a non-use but from the global perspective as well as that of non-local communities, non-use itself is a multiple use of a different kind, for example, recreation, carbon sink and gene pool. Given the natural setting, use of the delta area for fishery as opposed to freshwater agriculture might have been less demanding for the communities and the state, as well as less damaging for the ecosystem, but I find a distinct preference among the population for agriculture. The larger conflict that persists within the setting given the preference for agriculture is the protection afforded to the inhabited islands. What probably would be needed for this would be total engineering control of water movement like the Delta Works of the Netherlands but what is in place are mud

embankments. This conflict is evident in organisational terms as well, a Delta Authority with the power and resources to draw up and implement a massive integrated delta plan would be required for protecting human life and livelihood but what exists is a multiplicity of misaligned organisations as is evident from the narrative in Section 4.3. However, the expenditure required for something similar to Delta Works is unrealistic in the Indian context and the challenge is to find a mechanism that is somewhere in between the two ends of the spectrum. Moreover, with the current level of relative sea level rise, even something akin to Delta Works may appear inadequate and vulnerable over a longer period of time. Under the circumstances, an 'open system' as proposed by Kanjilal (Mitra, 2007) may be worth examining. The 'open system' envisages as little interference as possible with time-velocity symmetry of tidal currents by moving embankments further inland. Large-scale investments in the 'open system' are unlikely till farmlands of low economic value can be transformed into prime land suitable for a new economy.

#### **1.4 Research question and structure**

The current endeavour is to understand from a social anthropological perspective why different groups and various agencies conduct themselves as they do in the face of deteriorating ecosystem integrity and heightened vulnerability of human society in the Sundarbans. This will lead to an assessment of the prospects of attaining sustainable development goals in the eco-region.

In this thesis I use the concept of commons in general, and in particular, the role of collective action in sustainably governing the commons, and whether it has any significance and relevance to a large and diverse commons like the Sundarbans. By applying these concepts, I critically assess their usefulness in increasing understanding of the outcomes of governing the commons through collective action. I would also like to make an attempt to determine the configurations of conditions of collective action that bear causal relationship with sustainable development.

The main research questions to be answered in this thesis are:

- i) ***Under what conditions do people develop strategies that allow for negotiation of the competing values that arise out of intense human pressure on the ecosystem due to its use as a riparian common-pool resource, and the commitment at the global level to conserve a part of the eco-region as a World Heritage Site?***

One of the challenges to be addressed in this study is to provide insights into the socio-political and physical complexities within which sustainable development strategies need to be developed for the Sundarbans. The main research question is not so much a question of how to develop these strategies but to achieve an understanding of the contrasting forces, competing interests and contradictions in operation and thus to view the strategies in a wider social and political context.

- ii) ***Under what conditions could strategies be developed so as to allow minimisation/management of contrasting forces arising out of the competing values?***

Following an overview of the conceptual framework (in Chapter 2) within which my understanding and analyses are situated with a recapitulation of the research questions that are to be answered, the thesis will move on to an analytical



description of the Sundarbans (given its uniqueness) and the transformations it has witnessed over time (in Chapter 3).

Chapters 4 through 9 examine the issues outlined so far through concrete examples broadly categorised into enabling physical conditions (Chapters 4 through 6) and livelihood strategies (Chapters 7 through 9) both land-based as well as water-based, and also tourism based which is a possibility simply because the Protected Area exists. Chapter 10 provides the answer to the main research questions, conclusions and reflections as well as some recommendations for policy-makers. A brief description of the chapters 4 through 10 follows.

*Chapter 4: Embankment: the very basis of human habitation in the Sundarbans*

Embankments are crucial for the existence of human settlements on the deltaic islands. Breaches in embankments force change in livelihood pattern from land-based to water-based, which has significant bearing on the health of the ecosystem. The main focus of this chapter is on maintenance and management of embankments and the role of collective action. The chapter describes the current situation with its crises caused by forces of nature, explains the contrasting forces and how the various actors manage these. It helps to understand the behaviour of groups and organisations through collective action as an analytical tool and sheds light on configurations of conditions that facilitate collective action.

*Chapter 5: Transportation and communication: limited mobility, limited choices*

The chapter describes the transportation and communication system in the eco-region and how it limits the freedom to make choices, a basic tenet of sustainable development. This chapter demonstrates that the linkage between collective action and the process of sustainable development in the Sundarbans is not always positive implying that the higher the level of collective action among a particular group of the population, the less the choice for the larger group. It helps to understand the conditions that allow negative linkage between collective action and sustainable development.

*Chapter 6: Access to modern energy services*

This chapter begins with a description of energy use in the Sundarbans. It helps to understand individual, group, and organisational behaviour, and how realities are constructed differently. The chapter critically examines the notion that equates access to modern energy services with development and that if the energy source is renewable then it means movement towards sustainable development goals, and informs about the conditions under which the notion is not valid and the reasons for this.

*Chapter 7: Agriculture*

The basic contradiction between the lay of the land and preference for freshwater agro-ecosystem is described in this chapter. It illustrates how farming families cope with this contradiction and helps to understand the rationale for the preference for freshwater agriculture despite adversity. The chapter brings out the connection between poor infrastructure and lack of choices for the community as a consequence of which the prospects of attaining sustainable development goals in the Sundarbans are weakened.

### *Chapter 8: Aquaculture*

In this chapter it is demonstrated that though geographically suitable for fishery, in the eco-region it is considered only second best to agriculture as a livelihood option. Brackish water aquaculture is the most attractive form of fishery but is ecologically demanding. The basic conflict emanates from use of the eco-system in an unsustainable manner illustrating the linkage between poverty and ecological sustainability.

### *Chapter 9: Tourism*

This chapter provides glimpses of a 'win-win' situation demonstrated by one of the initiatives already undertaken. The chapter shows that the eco-region is valued by tourists, domestic as well as foreign for its non-use, bringing in contrast with the value attached to the eco-region by the community as a resource base. The chapter establishes the linkage that the higher the integrity of the ecosystem, the greater is the possibility of augmenting the human development process in the Sundarbans.

### *Chapter 10: Conclusions, reflections and recommendations*

This chapter answers the research questions and provides a broad critical analysis of the processes observed. The chapter also critically reflects on the prevalent situation in the Sundarbans in the context of the competing values at play. In addition, a critical analysis is made of the relevance and significance of the concepts of commons and collective action. Finally, in the chapter recommendations are offered for the consideration of policy-makers.

## **1.5 Methods used**

I did not embark on fieldwork with the purpose of testing a preconceived theoretical hypothesis. Nor did I set out with the explicit intention of contributing to any particular conceptual approach. Rather, I started this project from the point of view that theory emerges from experience through an iterative process. In fact, I was already in the field implementing a plantation project for a wood biomass gasifier power station through an NGO initiative. The plantation project was being implemented on Mollakhali Island. The plantation project was spread across different locations on the island, and I realised that groups were reacting differently to the initiative, and that some groups were more successful than others in maintaining the plantations. I wanted to know the reasons for the differences. I had noticed differences in coping mechanisms to ecological stress in my earlier experience in the Sundarbans while coordinating an ethnographic field research; while some were making the most of a bad situation, others were apathetic. Looking up literature did not help much since the studies in general were concerned with the biotic aspects of the ecosystem and while dealing with the human population the focus was invariably on the impact on the ecosystem due to anthropogenic activities and not on how the communities negotiated the various limitations that the ecosystem pose to human presence. I wanted to understand why different groups and organisations conduct themselves as they do in the face of a crisis. Therefore, in the first instance, this research endeavour was theoretically not founded on, though guided in very broad terms by, the concept of sustainable development.

Every time a community was faced with crisis due to loss of land and livelihood the pressure on the riparian common-pool resource greatly increased, which was in

direct contrast with the state, national and global commitment to conserve the eco-region. I decided to assess whether the concepts of commons, collective action, and sustainable development were helpful in analysing the current situation in the Sundarbans as suggested in the literature on commons, and to arrive at conditions under which strategies could be developed so that the aforementioned contrast could be managed.

The material for this thesis comes from three principal sources. First, from semi-structured interviews with sampled households, and impromptu discussions with common people as well as local and regional (pan Indian Sundarbans) decision makers. Second, I collected data as an observing participant<sup>10</sup>. Third, the material for this thesis is derived from archival and other documentary sources. With the realisation that documents can be embellished and that memories can be selective and self-serving, I have tried whenever possible to check the validity of the data by triangulating the different kinds of information that I had collected, crosschecking interviews with written documents, and vice-versa.

In pursuance of the objectives of this study, the first step was to get to know the place better; the land and its people, the way the community conducts itself, the various ways of making a living, and the different institutions at work, the role of the state, perceptions and adaptive strategies of the community, as well as the agencies and agents of the state. These are covered in some detail in Chapter 3. Obviously, I could not possibly cover the entire eco-region and decided to select two representative islands as the next step though questions might be raised about the extent to which two sites/islands enable me to make broad policy oriented statements and generalisations.

My earlier work as an NGO worker on Mollakhali Island, the varied reactions and successes of the various groups, size of the population, the physical size of the island (I would have to walk all over due to the absence of any mode of transport), and location of the island within the eco-region prompted me to select this island as one of the field study sites. The challenge was to find another island with similar attributes but at a different location within the eco-region since there are three distinct divisions within the eco-region namely, the beach/sea face, the swamp forests, and the mature delta. I have not covered the mature delta part since it is no different from the other rural areas of the South 24-Parganas District within which most of the Sundarbans eco-region is located. Mollakhali Island is adjoining the swamp forests and was part of it before being cleared for human habitation in the late nineteenth century. I, therefore, selected Mousuni Island, a sea facing island as the second site which was cleared in the early years of the twentieth century. The

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<sup>10</sup> Though participant observation is often taken to imply that the observers will participate in what they want to observe, here the emphasis is on the ability of the observer to empathise with the observed rather than on participation per se. Nevertheless, on occasion I did participate in the process being observed and I will mention this in the appropriate places. Moreover, during the initial period of field research on Mollakhali Island, the community perceived me as a change agent who could make things work for the community differently in a positive way; therefore, at times I had little choice but to participate in the ongoing process. To overcome this situation I discontinued fieldwork in Mollakhali and shifted to Mousuni Island where I was an unknown entity.

other inhabited islands fall within the range with these two at the poles with varying degrees of proximity to forest and sea, as well as origin of the recent (colonial period) migrants in terms of location, except people of tribal origin. Interestingly, the selected islands present two contrasts which are important for understanding the current situation; one, administration of the island as a unit, and two, history of human settlement on the island. Further details of the two islands as well as similarities and dissimilarities in attributes are presented in Section 3.6.

For studying the community and understanding the way it conducted itself, field research was carried out on the two islands for a period of ten months on each of the islands between January 2002 and April 2004. The duration of ten months on each of the islands was interspersed with study periods at the University of Twente, Holland, and in Kolkata. The months of May through August were deliberately avoided on the islands due to rains but this was compensated for through my observations during these months in the preceding two years in the course of raising energy plantation. Since I had decided on my field research and its method by middle of 2000, I was all the more observant of the processes. Between January and April 2002, I attempted systematic data collection on Mollakhali Island but realised that the community had missed my change of role from being an NGO worker to researcher and continued with their expectations. This, I realised was contaminating the information I was seeking. To avoid this confusion I moved to Mousuni Island where initially the community mistook me for a government physician since I had set up camp within the Primary Health Centre campus on the island that had been lying defunct for some time. Soon, I was able to clarify my role as a researcher. I returned to Mollakhali Island in November 2003 and this time I was able to convince the community of the purpose of my stay on the island.

For this research, the household was considered as a unit of observation rather than individuals within a larger group. Households with similar affiliations or interests such as agricultural labour, self-help groups, political groupings, and households vulnerable to erosion were considered as the larger group within which sampled households were situated; caste and religion were deliberately not used for group identification since, as I shall explain, the Sundarbans is a frontier region, in which caste and religious scruples apply less rigidly.

The initial observations and data were used to determine the key issues/events/variables as perceived by those being studied, and the relationships between issues/events/variables were similarly derived from the data collected. Continuing data collection yielded refined understanding and, in turn, sharpened the focus of data collection itself; a kind of dialectic. To gain explanatory insights into the social-cultural processes in operation, the case study method was adopted since the research – a) focuses on contemporary processes, b) relates to contemporary phenomena within its context, c) aims at understanding complex social processes, and d) employs multiple sources of evidence – fits with Yin's (1994) observations on the case study method. The cases selected for observation are: (i) embankment, (ii) transport and communication, (iii) access to modern energy services, (iv) agriculture, (v) aquaculture, and (vi) tourism. Sectors such as health and education though important from the perspective of sustainable development are deliberately not considered as cases for three reasons; i) both the sectors are dependent on

trained manpower which is evidently in short supply in the Sundarbans, ii) both the sectors are state regulated and funded allowing little space for collective action, iii) inclusion of these sectors make the enabling conditions dimension of the thesis disproportionately heavier than the livelihood dimension.

These selected cases broadly fall into two categories, a) enabling physical conditions (chapters 4-6) and b) livelihood strategies (chapters 7-9) with the case on access to modern energy serving as the link between the two categories. The cases selected allow examination of: (i) attitude and behaviour of different actors, (ii) spaces for collective action, and (iii) outcomes of collective action within the ongoing socio-cultural processes. It is also possible to analyse the findings of the case studies on the basis of the concepts identified earlier, namely, commons as used by Wade (1998), collective action (Ostrom 1990), and sustainable development as used by Lele, (1991), Holdren et al., (1995), Sen (2000), and Anand and Sen (2000). The concepts are further elaborated in Chapter 2. Social processes within the cases allow generalisation of the configurations of conditions of collective action that bear causal relationship with sustainable development, which in turn provide an idea about the circumstances under which the contrasting forces at play in the Sundarbans could be managed more sustainably.

To address the issue of internal validity, this research systematically repeated and compared observations at different times and locations, and crosschecked information with other respondents. Regarding external validity, there is some tension between understanding one or a few cases in detail and the degree of generalisation to other similar settings, and therefore, the emphasis is on processes rather than on outcomes. Results may vary from location to location. The extent to which the research findings can be replicated or reproduced by another researcher is limited by the use of a grounded-theory approach. On objectivity, this research has adopted the modern view of reality, which acknowledges the inevitability of human subjectivity (Anderson, 1990).

To be able to generalise to people and events not observed, this research resorted to a combination of sampling methods, both probability and non-probability. Households for census survey were selected on the basis of probability sampling based on the number of electoral areas (locally referred to as booths) in the villages. All the households on the islands are listed under one or the other of several electoral areas depending on population of the island. All the electoral areas have similar numbers of households listed in them, usually about 1000 voters from a particular electoral area cast their vote in a particular booth every time irrespective of level of representation, be it for national parliament or local village council (Gram Panchayat). Probability sampling from such a list is expected to closely represent the population on the island. Other lists such as voter list and BPL-list (Below Poverty Line) are far too specific to be of use for probability sampling for this study. Where appropriate, non-probability techniques like purposive or judgemental sampling was used, and informants selected. As is to be expected, the most carefully selected sample will never provide a perfect representation of the population. This thesis accepts that limitation.