SURVIVING IN THE SUNDARBANS: THREATS AND RESPONSES focuses on the conduct of different groups and various agencies, and attempts to understand this conduct in the context of deteriorating ecosystem integrity, and heightened vulnerability of human society, where natural processes are averse to human presence, and where the development process is weak.

The study explores the socio-political and physical complexities within which sustainable development strategies need to be developed. The emphasis is not so much on how to develop these strategies but on understanding the contrasting forces, competing interests, and contradictions in operation.

In this study the concept of collective or self-organised action is used as an analytical tool to help unravel the complex interactions that take place at different levels and to shed light on conditions associated with better management of the various contradictions at play in the eco-region.

It is argued that the unique eco-region of the Sundarbans requires special policy measures to address ecological sustainability and distributional equity, to overcome the ills that undermine human well-being, and to ensure that people of this eco-region have the choices to live the way *they* like and value what *they* have reason to value.















DANDA

Surviving in the Sundarbans: Threats and Responses

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An analytical description of life in an Indian riparian commons

Anamitra Anurag Danda





2007

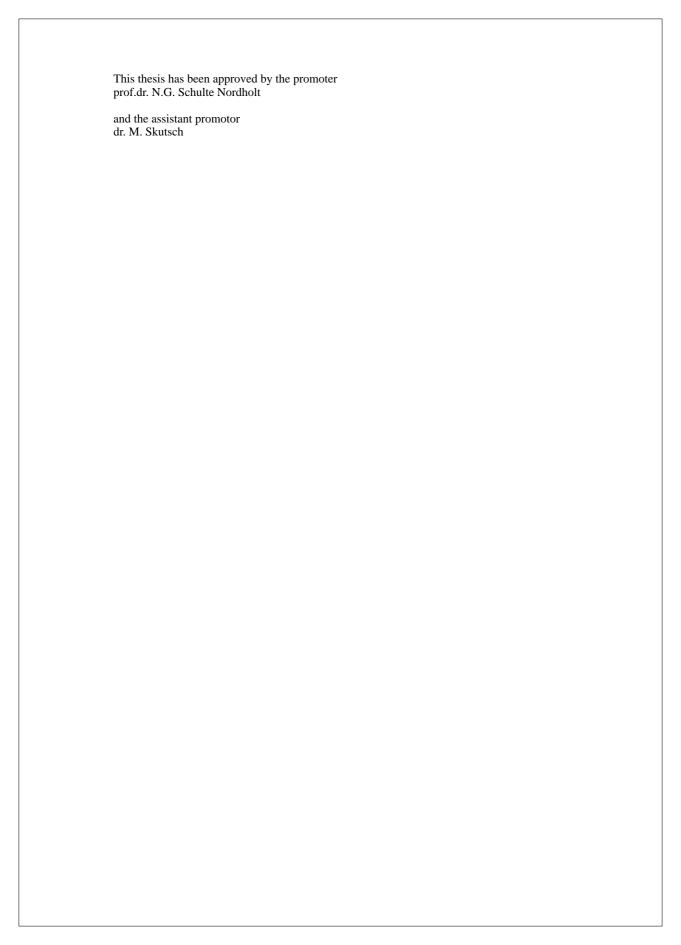
SURVIVING IN THE SUNDARBANS: THREATS AND RESPONSES

An analytical description of life in an Indian riparian commons

DISSERTATION

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on the authority of the rector magnificus,
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Acronyms and abbreviations

ADB Asian Development Bank

ADO Agriculture Development Officer
AGCs Agriculture Growth Centres

BMC Biodiversity Management Committee

BNWCS Bali Nature and Wildlife Conservation Society

BPHC Block Primary Health Centre

BPL Below Poverty Line BSF Border Security Force

CITES Convention on International Trade in Endangered Species of Wild Fauna

and Flora

CPI(M) Communist Party of India (Marxist)

CPR Common-pool resource
CRZ Coastal Regulation Zone
CSO Civil society organisation

DDG Decentralised Distributed Generation

EDC Eco-development Committee
FAO Food and agriculture organisation

FD Forest Department

FPC Forest Protection Committee

GoI Government of India

GoWB Government of West Bengal

GP Gram Panchayat

Ha Hectare

HDPE High-density polyethylene IBWL Indian Board for Wild Life

ICDP Integrated Conservation and Development Plan
IFAD International Fund for Agricultural Development

iNGO International NGO

IUCN World Conservation Union

kW Kilowatt

LPG Liquefied petroleum gas

MARR Multi-Access Rural Radio

MoEF Ministry of Environment and Forests

MP LA Member of Parliament Local Area Development

MT Metric tonne

NFP National Forest Policy

NSSO National Sample Survey Organisation

OECD Organisation for Economic Co-operation and Development

PA Protected Areas

PHC Primary Health Centre

PL Post-larvae

PMGSY Pradhan Mantri Gram Sadak Yojna (Prime Minister's Village

Roads project)

PRI Panchayati Raj Institutions
RCC Reinforced Cement Concrete
RKM Rama Krishna Mission

RSP Revolutionary Socialist Party
SAD Sundarban Affairs Department
SDB Sundarban Development Board

SDMBRI SD Marine Biological Research Institute

SHGs Self-Help Groups

SHIS Southern Health Improvement Society

SPV Solar photovoltaic

STR Sunderban Tiger Reserve
SUCI Socialist Unity Centre of India
TERI The Energy and Resources Institute
TSRD Tagore Society for Rural Development

TSS Tiger Shrimp Seed

TSSC Tiger shrimp seed collection

UNCSD United Nations Commission on Sustainable Development

UNEP United Nations Environment Programme

UNWTO UN World Tourism Organisation

WBREDA West Bengal Renewable Energy Development Agency
WCED World Commission on Environment and Development

WCS World Conservation Strategy

WLL Wireless in local loop

WPSI Wildlife Protection Society of India

WWF World Wide Fund for Nature

Glossary of non-English words

abad: forest clearing for cultivation

abadkari: forest clearer

adivasi para: locality of tribal settlements

barga: principle of sharing crop

bhagi: principle of sharing related to production by the well-to-do with the poor

Bhawali: wood cutter

bigha: measure of land, about 1338 sq. m

Bon Bibi: presiding deity of the Sundarbans, possibly of Islamic origin

bund: earthen embankment

bundh: form of protest – strike – by political parties and their affiliates

daadon: advance sale

Dakshin Rai: tiger-god of the Sundarbans

faqir: Muslim holy man

ferry ghat: platform for embarkation and disembarkation from boat

Ganga mayer masik: menstruation of river goddess, a period for traditional fishermen to

abstain from fishing

Gram Panchayat: statutory, elected village council; last level of local self-government

haat: open market jaatra: folk theatre

jottdar: person responsible for bringing land under cultivation; literally, tiller

khal samiti: committee of water appropriators

khal: canal

kharif: cropping season during monsoon months

khas mahal: government's own estate

kutcha: unpaved

majhi samiti: committee of boatmen meen byapaari: Tiger shrimp seed trader morol: chief of traditional or caste panchayat

mouza: revenue village *nayanjuli*: roadside ditches

Panchayat Samiti: middle tier of local self-government (Development Block-level) Panchayat: literally, a council of five members; traditionally caste based, controlled by

dominant caste *para*: locality

Pradhan Mantri Gram Sadak Yojna: Prime Minister's Rural Roads Project

Pradhan: elected chief of Gram Panchayat *rabi*: cropping season during dry winter months

Rajiv Gandhi Grameen Vidyutikaran Yojana: Government scheme for rural electricity

infrastructure and household electrification named after Rajiv Gandhi

ring bandh: inner embankment

ryot: settler-cultivator

Sarva Siksha Abhiyan: programme for universalisation of education

shramdaan: donation of voluntary labour

zamindar: landlord responsible for paying land revenue to government

Zilla Parishad: District-level local self-government

Zilla: District

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This dissertation book weighs 547 grams. The debt that I have incurred in conducting this research and preparing this book is many, many times heavier since PhD research is a manifestation of collective action, *spontaneous* as well as *institutionalized*, although the immediate benefit accrues to an individual. It is therefore, my individual responsibility to thank all those who have made it possible. Expressing my gratitude individually would take up another volume of similar size as this book. Therefore, I will stick to the minimum, with due apologies to all those who are not being named here, but their contribution is by no means any less than the ones who are being named.

As is usual in eastern societies, I begin with my teachers, without whom I would not have got this far as a human being and a researcher. A Guru *Stotra* is in order.

गुरु ब्रम्हा गुरु विष्णु Gurur Brahma Gurur Vishnu गुरु देवो महेश्वर: Gurur Devo Maheshwarah. गुरु साक्षात् पर ब्रम्ह Gurur Sakshat Para Brahma तस्मै श्री गुरवे नम: Tasmai Shree Gurave Namah.

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Once I reached Enschede and met Margaret at the railway station, I knew I had embarked on a journey that would only end with the completion of this thesis. Subsequently on meeting Nico, this feeling was reinforced and I realised that hereon the only way was to keep going forward. With mentors like Margaret and Nico, who not only supported me academically, but in all other ways possible, a non-completion was just not an option. The investments that Margaret and Nico have made in me are so great that any attempt to thank them would be an outright insult. Thus, I will leave it at that.

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Kolkata, September 2007

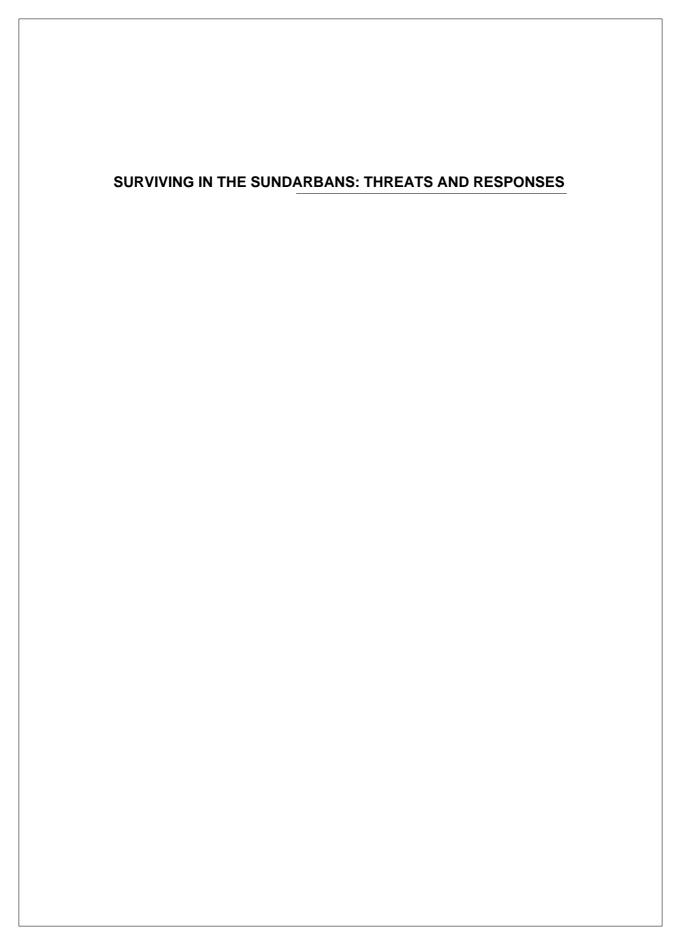
While studying for a postgraduate diploma in Environment Management, I heard the term *sustainable development* for the first time around 1994. The term, at that time, did not seem out of the ordinary or inspiring. However, during the programme what inspired and fascinated me were the stories that Prof. Satyesh Chakraborty told us in the guise of taking classes and delivering lectures.

Working under Dr. Dhrubajyoti Ghosh (also my teacher at the Environment Management Programme) at an environmental planning facility of the Government of West Bengal during 1995-1997, I came across the term *sustainable development* more often and started to get a sense of it. It was during this period that I realised that Prof. Chakraborty had indeed been introducing us to the concept of *sustainable development*. Though excited at the realisation, it remained at that till I had been to the Sundarbans a number of times between 1998 and 2000.

I visited parts of the Sundarbans for the first time in 1998 and was immediately hooked, the landscape fascinated me. Even the stories that I had heard of the Sundarbans had attracted me. Over time, I found the mindscape of the people of the Sundarbans even more fascinating. During the course of my work with a Swiss Project that involved collecting ethnographic data, this mindscape was partly revealed to me, and again more vividly, when working on an energy plantation project under Dr. Asish Ghosh. It was around this time that the question of whether the concept of sustainable development had any significance for a region like the Sundarbans, struck me. Regular interactions with Dr. Ghosh heightened my interest, both in the Sundarbans, and in the concept of *sustainable development*.

The energy plantation project mentioned above was spread across different locations on Mollakhali Island, and I realised that different groups were reacting differently to the initiative. Also, some groups were more successful than others in maintaining the plantations. I was curious to know the reasons for the differences. Earlier, I had noticed differences in coping mechanisms to ecological stress in the Sundarbans when coordinating the ethnographic field research; while some were making the most of a bad situation, others were apathetic. Looking up literature on the Sundarbans did not help much since the studies in general were concerned with the biotic aspects of the ecosystem. While dealing with the human population, this focus was invariably regarding the impact on the ecosystem due to anthropogenic activities and not on how the communities negotiated the various limitations that the ecosystem posed to human presence in the eco-region. I wanted to understand why different groups and organisations conducted themselves as they did in the face of a crisis. This was the inspiration and starting point for the research endeavour described in this book.

In the field, I observed that every time a community in the Sundarbans was faced with crisis due to loss of land and livelihood, 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. The ultimate goal was to understand the conditions under which strategies could be developed so that the aforementioned dilemma could be managed. A number of strategies have been outlined in this book. These could succeed if the micro-realities and the state of permanent impermanence are factored in, and the sectoral tunnel vision is replaced with a broader view.



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 Sundarbans¹. 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

¹The 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-region². 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

_

² 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 protection³,
- ii) Large-scale conversion has not occurred on the Indian side after 1947⁴,
- 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 forested⁵ 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 deer⁶. 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).

³ 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.

⁴ 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.

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

⁶ 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; SDMBRI, 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)⁷ 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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⁷ 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)⁸. 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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⁸ 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")9. 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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⁹ 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 timevelocity 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 ecoregion 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 ecoregion. 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 participant¹⁰. 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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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 sociocultural 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.

Conceptual framework

2.1 Introduction

The main research questions as stated in the previous chapter are foremost about achieving an understanding of the competing values and consequent contrasting forces in operation in the Sundarbans rather than about developing strategies for negotiating the competing values and minimisation of contrasting forces. These contrasts become apparent if the ongoing processes at the local level are viewed from the perspective of commons, collective action, sustainability and sustainable development. There is no ambiguity in understanding the term commons but the other concepts have competing schools of thought. Therefore, I will first elaborate on the concepts and make explicit how I have applied them.

This overview refers to literature on commons and their governance (section 2.2), collective action (section 2.3), sustainability and sustainable development (section 2.4). Finally, in Section 2.5 the objectives of this research alluded to already in Chapter 1, are spelt out in more detail. In this section I also break down the main research questions into sub-questions so as to refine them, as well as take up other questions that I intend to answer, which are incidental to this discourse.

2.2 The commons as an analytical framework

"Common-pool resources [or commons] are a sub-set of public goods. All public goods have the property that many can use them at the same time, because exclusion is difficult. Some public goods yield infinite benefits; in the sense that if 'A' uses more, there is no reduction in the amount available for others. Common-pool resources, by contrast, are public goods with finite or subtractive benefits; if 'A' uses more, less remains for others. Common-pool resources therefore, are potentially subject to congestion, depletion or degradation – a commons situation" (Wade, 1988; p. 183). Common-pool resources (CPRs) are not to be confused with common property. In case of common property, no individual has exclusive property right, the rights to exploit a resource are held by persons in common with certain others. These rights may take a variety of forms based on the nature of the resource and the institutional arrangements by which it is exploited: they may allow unlimited exploitation for those within a specified group, or they may stipulate limits on exploitation for each other. Common property lies somewhere in between freehold property or exclusive possession and no property (res nullius), as in commons, on a continuum of property rights.

Because commons are outside the net of property relations, exploitation of a common-pool resource is always a "commons situation" (Wade, 1988; p. 184). There are essentially two types of commons situations; (i) where, in the absence of collective organisation, benefits of cooperation are foregone despite the existence of some common benefits that could be obtained, and (ii) failures of collective action result not only in forgoing benefits of optimal use of resources but also in absolute degradation of the resource in question (Herring, 1987/91).

But only some commons situations become "commons dilemmas" (Wade, 1988; p. 184): those where joint use and subtractive benefits are coupled with scarcity, and where as a consequence joint users start to interfere with each other's use. In commons dilemmas, private actions of users have costs that cannot be overcome without collective action (organisation) to regulate use, and therefore, collective action is found where commons situation have become commons dilemmas (Blomquist and Ostrom, 1985; Wade, 1988).

Commons dilemmas turn into 'tragedy' when local societal failure to regulate individual maximising tendencies through collective action leads to destruction of the commons. However, when a "tragedy of the commons" (Hardin, 1968; p. 1243) is averted through collective action, it often poses a real threat to the survival of nature itself, which Herring (1987/91) terms as the *second-order conflict*. In such cases, collective solutions to either of the two types of commons situations, when successful, may run counter to solution of the commons dilemma represented by conflict between human use of nature and ecological imperatives. For example, suppose Hardin's shepherds were able to act collectively not only to preserve grazing grounds but to pool labour to extend grazing into surrounding forest or wetlands through tree cutting and/or water diversion or drainage. A common objective interest in preserving the surrounding ecosystem would be forfeited through success in coping with more classic commons dilemmas.

Since the mid-1980s, scholarship on commons has shown that resource users often create institutional arrangements and management regimes that help them to allocate benefits equitably, over long periods of time (Agrawal, 1999; McKean, 1992; Ostrom, 1992; Wade, 1988). In the next section I propose to examine these institutional arrangements and how they are arrived at. Given the history of human settlement in the Sundarbans, the question that needs to be answered is whether the eco-region, especially riparian Sundarbans lends itself to institutional arrangements that help resource users to allocate benefits equitably over long periods of time.

2.3 Collective action

Social dilemmas occur whenever individuals in interdependent situations face choices in which the maximisation of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives. In a public-good

¹Hardin in his seminal essay termed the societal failure to regulate access to commons as the "tragedy of the commons", but it is essentially 'tragedy of open-access'. Due to the connotation that "tragedy" has come to acquire over the decades, I persist with the usage.

dilemma, all those who would benefit from the provision of a public-good find it costly to contribute and would prefer others to pay for the good instead: a tendency to free ride. If everyone follows the equilibrium strategy, then the good is not provided or is underprovided (Ostrom, 1998). A situation where people come together to supply themselves with goods and services (social and or public-good) that they all need but could not provide for themselves individually is termed "collective action" or "self-organised action" (Wade, 1988; p. 14). In the absence of such action, social or public-good dilemmas remain unresolved.

Collective action or organisation operates at different levels and spaces, and has different forms. Strictly speaking, collective interest articulated by the state through democratic governments is also, according to Tilly (1978), a form of collective organisation. In this research, I restrict myself mainly to the community level for that is where most of the actions are, but I also look at higher levels to unravel the complex interactions especially when these have a direct bearing on the communities and the physical conditions with which they have to cope with. At the community level, I view statutorily created democratic institutions such as local self-governments (Panchayati Raj Institutions (PRIs)) as an institutionalised form of collective action/organisation, although it is in many ways different from the spontaneous collective action that comes into being to resolve social or public-good dilemmas. Collective action/organisation also crops up where the state yields space through inaction or withdrawal, for instance erection of jetties by members of a community in the absence of the facility being provided by the Sundarban Development Board or discontinuation of medical facilities by the Government Health Department and subsequently being handed over to an NGO. 'Collective inaction' by individuals in the face of legal provisions for action, to supply themselves with goods and services that they all need is also viewed as a form of collective action. This form of collective action is facilitated by yielding of space by the state through inaction, especially through non enforcement of legal provisions. In this thesis, I intend to identify and demonstrate that at certain levels *spontaneous* collective action is capable and more appropriate for provisioning of goods and services whereas in certain cases even if there is space for collective action, the institutionalised form is inappropriate due to micro-level exigency.

The questions that also need to be answered are why cooperation levels vary so much and why specific configurations of situational conditions increase or decrease cooperation in social or public-good dilemmas. Understanding these is important for the design of institutions to facilitate individuals' achieving higher levels of productive outcomes in social and public-good dilemmas. One of the most powerful theories used in contemporary social sciences – rational choice theory – helps to understand humans as self-centred, short-term maximisers. Models of complete rationality have been successful in predicting marginal behaviour in competitive situations, such as profits in a competitive market or the probability of electoral success in party competition. Rationality models, however, have failed to explain or predict behaviour in social dilemmas in which the theoretical prediction is no one will cooperate. "In indefinitely (or infinitely) repeated social dilemmas, standard rational choice models predict a multitude of equilibria ranging from the very best to the very worst of available outcomes without any hypothesised process for how individuals might achieve more productive outcomes and avert disasters" (Ostrom,

1998; p. 2). Yet, field research shows that individuals do engage in collective action to provide local public goods or manage CPRs without an external authority to offer inducements or impose sanctions. In contrast to rational choice theory, Ostrom (1998) suggests a behavioural approach to explain outcomes of social and publicgood dilemmas.

Behaviour in social dilemmas is affected by many structural variables, including size of group, heterogeneity of participants, their dependence on the benefits received, their discount rates, the nesting of organisational levels, monitoring techniques, and the information available to participants, as well as the location of the group within a space such as a frontier². However, the individual attributes that are particularly important in explaining behaviour in social dilemmas include the expectations individuals have about others' behaviour (trust), the norms individuals learn from socialisation and life's experiences (reciprocity), and the identities individuals create that project their intentions and norms (reputation). At the core of the behavioural explanation are the links between trust that individuals have in others, the investment others make in trustworthy reputations, and the possibility that participants will use reciprocity norms. If initial levels of cooperation are moderately high which is usually the case (both in experimental and field situations)³, then individuals learn to trust one another, and more individuals may adopt reciprocity norms. When more individuals use reciprocity norms, gaining a reputation for being trustworthy is a better investment. Thus, levels of trust, reciprocity, and reputation for being trustworthy are positively reinforcing. This, however, also means that a decrease in any of these can lead to a downward spiral. This is often avoided through contingent agreements wherein some individuals agree to contribute Xresources to a common effort so long as at least Y others also contribute. Contingent agreements do not need to include all those who benefit. The benefit to be obtained from contribution of Y proportion may be so substantial that some individuals are willing to contribute so long as Y proportions of others also agree. Once some users have made contingent self commitments, they are then motivated to monitor other people's behaviour, at least from time to time, to assure themselves that others are following the rules most of the time (Ostrom, 2000).

The literature on common property and common-pool resources (CPR) management since the mid-1980s comprises many important studies that seek to specify the conditions under which groups of users will self-organise and sustainably govern resources upon which they depend. Many scholars (McKean, 1992; Ostrom, 1992;

² The term frontier was transformed by Frederick Jackson Turner from the European definition describing the border or border zone between two states or countries to the American one, which described the border between the settled and unsettled. The frontier, in Turner's view, was a dynamic process (Turner, 1962/1996). According to Elazar (1996), the frontier is not only dynamic but in a few cases, the original rural land frontier set off a chain reaction which generated a continuing frontier process, as in the United States. The continuing frontier, wherever it is found, has all the characteristics of a chain reaction. Each frontier, once opened, has bred its successor and has been replaced in turn by it. Each frontier stage has generated its own new world with new opportunities, new patterns of settlement, new occupations, new challenges and new problems. See Footnote 16, Chapter 3 for the identifying characteristics resulting from the frontier experience.

³ "Substantial evidence from experiments demonstrates that cooperation levels for most one-shot or finitely repeated social dilemmas far exceed the predicted levels" (Ostrom, 1998; p. 2).

Ribot, 1998 and 1999; Agrawal, 1999; and Wolverkamp, 1999) examined the conditions under which communal arrangements compare favourably with private or state ownership, even on efficiency criteria, but especially where equity and sustainability are concerned. These works have important connections to the world of policy-making and resource management. Governments in more than 50 countries claim to be pursuing initiatives especially in the forestry sector that would devolve some control over resources to local users (FAO, 1999). This is a move away from the theoretical presumption that an external, central government intervention is necessary to supply and organise forms of collective action, this presumption had been reinforced by the colonial experience. However, it can be questioned whether the change of administration from colonial to sovereign, democratic (a form of collective action according to Tilly, 1978) governance in India's case, changed the attitude of civil servants; if not, this could be part of the problem for devolving control over resources to local users.

Following Agrawal (2001), I 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

Table 2.1: Facilitating conditions for managing commons dilemmas

	=				
Category A Resource system characteristics	Category B Group characteristics	Category C Institutional arrangements	Category D External environment		
Small size (RW)	Small size (RW, B&P)	Rules are simple and easy to understand (B&P)	Technology: Low cost exclusion technology (RW)		
Well-defined boundaries (RW, EO)	Clearly defined boundaries (RW, EO)	Locally devised access and management rules (RW, EO)	State: Higher level of government should not undermine local authority (RW, EO)		
	Shared norms (B&P)	Ease in enforcement of rules (RW, EO)	State: Supportive external sanctioning institutions (B&P)		
	Social capital – past successful experiences (RW, B&P)	Graduated sanctions (RW, EO)	State: Appropriate levels of external aid to compensate local users for conservation activities (B&P)		
	Appropriate leadership – young, familiar with changing external environments, connected to local traditional elite (B&P)	Availability of low cost adjudication (EO)	State: Nested levels of appropriation, provision, enforcement, governance (EO)		
	Interdependence among group members (RW)	Accountability of monitors and other officials to users (EO, B&P)			
	Heterogeneity of endowments, homogeneity of identities and interests (B&P)				
Relationship between Categ	tionship between Categories A and B: resource system characteristics and group characteristics				
Overlap between user group residential location and resource location (RW)					
High levels of dependence by group members on resource system (RW)					

High levels of dependence by group members on resource system (RW)

Relationship between Categories A and C: resource system and institutional arrangements

Match restrictions on harvests to regeneration of resources (RW, EO)

Adapted from Agrawal, 2001

the works of Robert Wade (1988), Elinor Ostrom (1990), and Jean-Marie Baland and Jean-Philippe Platteau (1996). Each of these arrives at a summary set of conditions and conclusions that they believe to be crucial to sustainability of commons institutions. See Table 2.1 for a synthesis of these facilitating conditions. In the table, the initials RW refer to Robert Wade, EO to Elinor Ostrom and B&P to Baland and Platteau.

In analysing the cases (chapters 4 through 9) I find the categories of conditions especially group characteristics (Category B) and external environment (Category D) important and helpful. However, according to Agrawal "the enterprise of attempts to create a list of enabling conditions that apply universally can founder at a very basic epistemological level. Instead of focusing on lists of factors that apply to all commons institutions, it may be more fruitful to focus on *configurations of conditions* that bear a causal relationship with sustainability" (Agrawal, 2001; p. 1654, emphasis mine). Therefore, my analyses of the cases will focus on the *configurations of conditions* that bear causal relationship with sustainability of collective action institutions, and individual attributes of trust, reciprocity and reputation of actors.

Before moving on to the next section on sustainability and sustainable development, I will briefly visit Tilly (1978) for an introduction to collective action theory which though close to three decades old, remains one of the most comprehensive statements of the relationship between collective action, political structures, and social context (Agrawal, 2001). Tilly classifies collective action into three categories: competitive, reactive and proactive depending on a particular group's claims or no claims on other groups, which is not really the focus of this research. Here, the interest is in Tilly's analysis of collective action, which has four big components: interest, organisation, mobilisation, and opportunity. "Collective action results from changing combinations of interest, organisation, mobilisation and opportunity" (Tilly, 1978; p. 7). The most persistent problem faced while analysing collective action is the lack of sharp edges; interests vary from quite individual to nearly universal, and individuals vary continuously from intensive involvement to passive compliance. Mobilisation has three different forms; defensive, offensive, and preparatory. Endowment of the group affects the probability that its mobilisation will be defensive, offensive or preparatory. The poor and the powerless tend to begin defensively, the rich and the powerful offensively. *Preparatory mobilisation* requires the members to forego present satisfaction in favour of uncertain future benefits. The trouble with *opportunity* is that it is hard to reconstruct the opportunities available to the group at a particular point in time. Collective action, then, is joint action in pursuit of common ends. The extent of group's collective action therefore, is a function of: i) the extent of its shared *interest*, ii) the intensity of its *organisation*, iii) its mobilisation, and iv) the opportunity available to the group at a particular point in time. What, then, are the configurations of conditions under which collective action is organised to overcome social or public-good dilemmas and how *interest*, organisation, mobilisation, and opportunity influence the extent of collective action?

2.4 Sustainability and sustainable development

The concept of sustainability originated in the context of living renewable resources such as forests and fisheries. It deals with the propensity of a system to withstand

collapse and stress. It has to do with the robustness or continuing viability of a system. "Sustainability can be defined as the ability of a system to maintain productivity in spite of a major disturbance such as that caused by intensive stress or a large perturbation. Lack of sustainability may be indicated by declining productivity but, equally, collapse may come suddenly and without warning" (Conway, 1983, quoted in Tisdell, 1988; p. 375). Ecologists believe that there are important thresholds of scale, and that human activities can, by stressing ecosystems in ill-advised ways, set in motion large-scale and irreversible losses in the functioning ecological and physical systems (see Section 8.3, Chapter 8). They place considerable stress on the desirability of sustainability of productive systems. The concept of sustainability has subsequently been adopted as a broad slogan by the environmental movement.

Sustainability came to acquire multiple connotations when the World Conservation Strategy (WCS) articulated by IUCN in 1980 attempted to reconcile the interests of the development community with those of the environmental movement by coining the term "sustainable development". The WCS defined development as "the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of life", and conservation as "the management of the human use of the biosphere so that it may yield the greatest sustainable development to present generations while maintaining its potential to meet the needs and aspirations of future generations" (Tisdell, 1988; p. 373). Sustainability was a major topic in the Brundtland Report (1987) and became the main objective of the UN where after the 1992 United Nations Earth Summit in Rio, it was put on Agenda 21. While sustainability found firm place as a leitmotif in programmes of political parties and green political movements, as a guideline of environmental policy, and as a pervasive term in the development discourse, it was far from being clear, distinct, or with a wholly accepted meaning. "Sustainability is increasingly cited as an explicit goal of development efforts and remains a widely touted global concern in spite of the fact that it is an inherently complex and contested concept for which precise and absolute definitions are impossible" (Pretty, 1995 quoted in Mog, 2004; p. 2139). This raises many ambiguities not amenable to resolution because academicians as well as practitioners in the different relevant fields see different parts of the picture, typically think in terms of different time scales, and often use the same words to mean different things (Holdren, Daily and Ehrlich, 1995). I find Lele's method of "semantic mapping" (Lele, 1991; p. 608) particularly useful in making sense of the concepts of sustainability and sustainable development. Through the semantic map (Figure 2.1) Lele (1991) demonstrates that not all the interpretations of sustainable development are useful and that many of the policy prescriptions being suggested in the name of sustainable development stem from subjective ideas about goals and means, and are often inadequate or even counterproductive at times.

According to Lele, then, sustainable development is the process of directed change that in addition to traditional developmental objectives has the objective or constraint of ecological sustainability. In an ever-changing world, "the specific forms of and priorities among objectives, and the requirements for achieving sustainability would evolve continuously but sustainability would remain a fundamental concern" (Lele, 1991; p. 610).

For Holdren, Daily and Ehrlich (1995), development is a process that overcomes the main ills that undermine human well-being. These ills have been broadly categorised as *perverse conditions* (poverty, impoverishment of environment, oppression of human rights, wastage of human potential); *driving forces* (excessive population growth, misdistribution of consumption and investments, misuse of technology, corruption and mismanagement, powerlessness of victims); and *underlying human frailties* (greed, selfishness, intolerance, short-sightedness, ignorance, stupidity, apathy and denial). The objective then, is to improve the *perverse conditions* by altering the *driving forces* which in turn requires overcoming, to some extent, the *underlying human frailties*.

In figure 2.1 the objective of sustainable development is the attainment of basic needs in conjunction with ecological objectives. Need-based objectives are

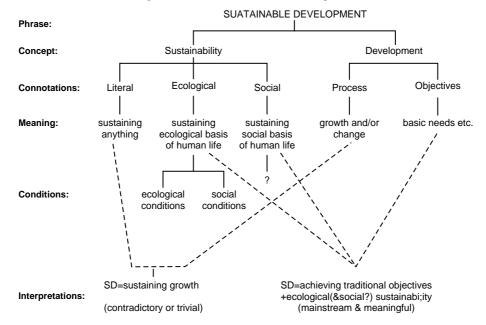


Figure 2.1: Semantics of sustainable development⁴

predominant in sustainable development literature. The definition of sustainable development adopted by the World Commission on Environment and Development (WCED, also know as Brundtland Commission) is "... development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987; p. 43). The Brundtland Commission placed sustainable development within the framework of ethical social choice and distributional equity within which, Howarth (1997) argues that sustainable

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⁴ Reprinted from *World Development*, Vol. 19, No. 6, S.M. Lele, Sustainable Development: A Critical Review, pp. 607-621, 1991, with permission from Elsevier.

development be understood as a unifying principle of justice between contemporaries, and between present and future generations ensuring that current decisions involve a fair treatment of future generations. Anand and Sen (2000) interpret this principle of justice as the universality of claims applied to future generations vis-à-vis us, that is, the capacity of well-being is to be shared between present people and future people in an acceptable way. Since successive age-cohorts overlap in time, each generation, then, must extend the notion of equal opportunity to its children. This establishes a chain of obligation between the present and longrun future. Therefore, present decision-makers hold a duty to ensure that development is sustainable in terms of non-diminishing life opportunities enjoyed by a typical person from generation to generation (Howarth, 1997). Sen (2000) has taken the issue of distributional equity a step further over Howarth by arguing for a freedom-based view of sustainable development. Sen argues that a freedom-based view within Brundtland's general idea will enable future generations to live the way they like and value what they have reason to value since their conception of their needs may not be the same as our conception of their needs. There are issues of individual choice as well as social choice in determining the priorities between different kinds of freedoms and in the identification of different types of needs and the priorities between them. There are important grounds for favouring a freedombased view. Sen argues, an individual's conception of needs may adapt downwards as a result of continual deprivation, and in the absence of any hope for achieving even the most elementary freedoms. Downward adaptation of the conception of needs can happen in many different fields, varying from the unquestioning acceptance of authoritarian interference to fatalistic tolerance. Sen, therefore, suggests that sustainable development be viewed as development which promotes the capabilities of present people without compromising capabilities of future generations (Sen, 2000). Therefore, following Sen, I view sustainable development not as a question of non-diminishing life opportunities and capacity of well-being shared across generations but as a process that ensures choices and the continued freedom to make those choices. Given the dynamics of the riparian commons and the concerns being expressed regarding Sundarbans' future in light of global climate change, I am looking at a time horizon of up to 2030 in terms of intergenerational equity and universality of claims applied to future generations vis-à-vis us.

In a situation like in the Sundarbans, the freedom to make choices comes at a premium which not everyone can afford, implying a low level of distributional equity. Collective action under specific configurations of conditions can enhance this affordability. In other words, collective action may help the achievement of sustainable development goals under certain configurations of conditions, which I will identify in this study. Examining the configurations of conditions will not only help design institutions to facilitate individuals' overcoming social and public-good dilemmas, and achieving higher levels of productive outcomes, but also answer the main research questions of identifying conditions under which strategies could be developed for negotiating competing values and minimisation/management of contrasting forces in the Sundarbans.

2.5 Research objectives and questions

This research has two basic aims: (a) to fulfil certain scientific objectives and policy objectives, and (b) to answer the questions raised so far. The objectives are as under.

- (i) Scientific objectives:
 - To fill the knowledge gap of understanding human-nature dynamics in the Sundarbans.
 - To assess whether collective action as suggested in literature has any significance and relevance in sustaining the Sundarbans.

(ii) Policy objectives:

- How best to protect an ecosystem/natural resource base while providing for human needs?
- To critically assess if the state is able to develop an integrated programme for this unique and valued eco-region, execute it in a coordinated manner, and make adjustments in policies.

The research questions to be answered in the course of this thesis are divided into those dealing with scientific issues and those relating to policy.

Scientific questions

- 1. What competing interests and contradictions are at play in the ecoregion?
- 2. What gives rise to these competing interests and contradictions?
- 3. How do different groups of actors negotiate these competing interests?
- 4. 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?
- 5. 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?
- 6. To what extent do 'frontier characteristics' explain the conduct of different groups and various agencies in the face of deteriorating ecosystem integrity and heightened vulnerability of human society in the Sundarbans?
- 7. To what extent do the concepts of commons and collective action help in understanding and explaining movement of different social categories/local communities of the Sundarbans towards a better life?
- 8. What are the configurations of conditions under which collective action is organised to overcome social or public-good dilemmas and how do interest, organisation, mobilisation and opportunity influence the extent of collective action?

Policy questions

- 1. To what extent are institutional arrangements made by the decentralised Indian political system adequate to help resource users allocate benefits equitably over long periods of time?
- 2. How can contradictions at play in the eco-region be better managed to attain sustainable development goals?
- 3. Why is sustainability difficult to achieve, and under what conditions may further deterioration in the Sundarbans be halted?

Not all the questions will be or can be answered across all the chapters but all of these will be taken up in the appropriate context. In Chapter 3, I intend in examining the prevailing situation in the Sundarbans in some detail along with the historical

conditions through which the current situation has evolved, viz. the intense human pressure on the ecosystem as well as the commitment at the global level to conserve the eco-region as a World Heritage Site. This will lead to a final reflection on what the prospects are of attaining sustainable development goals in the eco-region.

Setting

3.1 Introduction

The Sundarbans delta spanning 355 km in width is the largest mangrove forest in the world at the mouth of the Ganges and is spread across areas of Bangladesh and West Bengal, India (see Figure 3.1). The Bangladesh and Indian portion of the forest are listed in the UNESCO world heritage list separately as the Sundarbans and Sundarbans National Park respectively, though they are simply parts of the same forest. The Sundarbans is intersected by a complex network of tidal waterways, mudflats and small islands of salt-tolerant mangrove forests, and presents an excellent example of ongoing ecological processes. The area is known for its wide range of fauna. The most famous among these are the Bengal Tigers, but numerous species of birds, spotted deer, crocodiles and snakes also inhabit the eco-region.

"The Sundarbans are a network of tidal channels, rivers, creeks and islands. Some of these islands are mere swampy morasses, covered with low forest and scrubwood jungle, but those to the north, which are embanked, grow rich crops of rice. As one approaches the coast, the land gradually declines to an elevation throughout many hundred square miles [that] is scarcely raised above high-water mark. This scaboard area is a typical specimen of new deltaic formation. It exhibits the process of land-making in an unfinished state, and presents the last stage in the life of a great river – the stage in which it emerges through a region of half land, half water, almost imperceptibly, into the sea" (O'Malley, 1914/98; p.2).

3.2 Sundarbans eco-region

The River Hugli marks the western border of the Sundarbans; the Sandwip Channel, which runs west along the Chittagong Hills, acts as the eastern border. On the Indian side, the Sundarbans is located within the 24-Parganas Districts of West Bengal¹. In Bangladesh, the Sundarbans covers portions of the Bakarganj and Khulna Districts, its north-eastern corner reaching toward the city of Morrelganj. According to Chaudhuri and Choudhury (1994) the name Sundarbans has three possible derivations: (i) the forest of the sundari (*Heritiera fomes*), (ii) *sundar* (beautiful)

¹The 24-Parganas District was bifurcated in March 1986. Subsequently, of the 19 Development Blocks within the eco-region, 13 are under the jurisdiction of the South 24-Parganas District while six Development Blocks fall within the jurisdiction of the North 24-Parganas District.

forests, and (iii) forests of the ocean (*samundraban*)². During the period 1829-1830, the region was surveyed and delineated as a Special Forest Cover by the Dampier-Hodges line³ (see Figure 3.2).

The Sundarbans has the distinction of being the first mangrove forest in the world where scientific management of resources was practised; a Forest Management Division was established in 1869, and the first management plan was implemented in 1892. The forest was administered as a single management unit until 1947, when India was partitioned. The Sundarbans today comprise approximately 10,000 sq km of mangrove forest and intricate water channels fringing the river deltas at the head of the Bay of Bengal, remaining wetlands left untransformed are probably less than half of the area intact in the late eighteenth century (Sengupta, 1972 quoted in Richards and Flint, 1990; Townsend, 1987/91). The Sundarbans is one of the last tropical deltaic mangrove forests in Asia, the rest having succumbed initially to paddy fields, and later on to aquaculture.

3.3 Transformation of the eco-region

Historically, the Sundarbans has been a frontier, more in the American sense than in the European sense wherein the frontier is a border or border zone between two states or countries. According to the American definition, a frontier is described as the border between the settled and unsettled, the "civilized" (Turner, 1962/1996; p. 205) and the "wilderness" (Turner, 1962/1996; p. 4). The region presented the conditions which allowed a process of continuous advance, both in physical and socio-political terms and has been the arena for transformation of land, religion and values. The following three sub-sections are an attempt to capture these transformations.

3.3.1 Forest to agriculture

Extension of the frontier into forested Sundarbans began before the Muslim Indo-Turkish Sultans ruled Bengal from 1204 until 1575 (Townsend, 1987/91). Eaton

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² "Because of the familiar problem of unstandardised transliterations (in this case from Bengali), the word is variously spelled. Questions about the etymology further complicate spelling. Yule and Burnell (1903:869) use *sunderbunds*, reflecting their belief that the origin is in *bund*, i.e. "mound" or "embankment" (created by tidal action and sedimentation) rather than "forest" (*ban/van*). Derivations of *sunder/sundar* are likewise disputed, ranging from *sundara* ("beautiful") to *sundari* (the Bengali name of the mangrove, *Heriteria minor*; sometimes *H. fomes*) to *chandra* ("moon" reflecting against the tidal-island theory) to *chandradip ban* (from the name of a large *zamindari* estate) to *chanda-bhanda* (the name of an earlier tribe of salt-makers mentioned on a copper tablet dating from A.D. 1136). The "beautiful forest" notion is probably a retroformation, created by current valuations of forests under a pervasive ecological romanticism. Indigenous perceptions were closer to *jungal* than *ban*" (Herring, 1990; p.5). See Footnote 1, Chapter 1.

³ In the early 19th century the colonial government wanted to augment its revenue by clearing mangrove forest and bringing land under paddy cultivation. The *zamindars* (landlords) to avoid paying enhanced revenue started large-scale encroachment of the forest adjacent to their estates. Threatened with possible loss of revenue, the government set out to demarcate the area as *khas mahal* (government's own estate). A civilian by the name Dampier was appointed as the Commissioner of Sundarbans, and Lieutenant Hodges, an army surveyor was attached to him for the purpose. They drew a line from Kulpi on the river Hugli to Basirhat on the river Khhamati that has since been known as the Dampier-Hodges line, south of which lies the Indian Sundarbans.

notes: "...between the thirteenth and eighteenth centuries Muslim pioneers locally remembered as holymen not only established the Islamic religion in much of south and eastern Bengal, but also played important roles in the intensification of wet rice agriculture, established new modes of property rights, and contributed to a fundamental altering of a natural, forested ecosystem" (Eaton, 1990; p.6). The popularity of Muslim pioneers such as Mubarra Ghazi is well documented. An important figure, Mubarra Ghazi was considered to be a *faqir* (holy man). He is reported to have converted the forested western (left) bank of the River Hugli into paddy land. James Wise recorded: "Mubarra Ghazi is said to have been a *faqir*; who reclaimed the jungle tracts along the left bank of the river Hugli, and each villager has an altar dedicated to him. No one will enter the forest, and no crew will sail through the district, without first of all making offerings to one of the shrines" (Wise, 1883; p.90).

The Muslim pioneers are believed to have either obtained land assignments from authorities in control of forest tracts or were incorporated within the state when the clearing had progressed to the extent where it was capable of generating revenue (Eaton, 1990).

The reverence of forest-clearers continued into the Mughal period as the locals continued converting the Sundarbans forest to wet rice fields and were heavily influenced by the Muslims around them. Even the Hindu Bengali castes living in the Sundarbans prior to the Muslims, the *Pods* in the west, and the *Chandals* in the east were strongly influenced in their livelihoods by such figures. Emergence of *Bon Bibi* as the presiding deity of the Sundarbans may be attributed to this influence. Even today nobody – Hindu and Muslim alike – ventures into the forest or sea without propitiating *Bon Bibi* (see Photograph 3.1). She is believed to have tamed *Dakshin Rai* (tiger-god). The *Pods* and *Chandals* were fisher folk by livelihood; however, the immigration of Hindu cultivators and the emphasis of the Muslim leaders upon cultivation resulted in converting these fishing castes to agricultural ones. In 1883, James Wise noted that the Muslims consider fishing to be a lowly occupation because of its historical association with non-Muslim and outcast tribes, who never became integrated into the Muslim society around them.

It was not only the Muslims that preferred the farmer to the fisher, Hindu sentiments toward fishing and agriculture paralleled those of their Muslim neighbours; farming was the chosen profession. The cultivator's product, grain, could easily be converted into cash, which the government could tax; being incapable of easy storage, the fisherman's product was not as easily taxed. Additionally, lagoons previously laden with fish eventually dried up, as the major rivers washed deposits of silt downstream. As a result, many of those who had previously depended upon fishing for their livelihoods increasingly turned toward cultivation⁴.

⁴ The Muslim and Hindu (non fishing castes) alike still displays the aversion towards fishing and only in dire straits do they take to fishing. However, with the increase in population and subsequent pressure on land as well as loss of land due to erosion, a counter-conversion of occupation can be witnessed. Cultivator families, irrespective of caste and religion are taking to fishing, especially collection of tiger shrimp seeds; caste and religious scruples no longer hold in case of occupation.

This preference for cultivation over fishing continued into the British rule of India. In 1764, the East India Company won over the Mughal powers that had dominated Bengal for nearly two centuries. With thoughts toward bringing land under increased cultivation, both the British government and the Bengalis worked to push the frontier farther south. By 1770, land tenures were given to the Bengalis who would reclaim 'waste land'⁵.

Although the clearing of land for cultivation began prior to Turkish rule, the British appear to have been responsible for much of the conversion to farmland, and changing the face of the Sundarbans. "During the time of Pratapaditya [pre-Portuguese and obviously pre-British], forests were cleared from land where the delta-building processes had reached some order of maturity. ... But, during the British rule, even these low-lying tracts were occupied ... and circuit embankments were constructed. ... This is the basic difference between the interventions made during these two regimes [periods]" (Chakraborty, 2005; p. 4). Besides demand for land revenue and other forest produce, the reason for large-scale transformation was the view that: "a land covered over with impenetrable forests, the hideous den of all descriptions of beasts and reptiles ... [can] only... be improved by deforestation" (Richards and Flint, 1990; p.17). This provides a better understanding of the desire to transform the forest into paddy land, which prompted one visitor to write: "It is pleasing to reflect that what was once only a den of wild beasts is now made to yield to not a few their 'daily bread'..." (Richards and Flint, 1990; p.19).

The deterioration of the forests took place over a long period; there was little understanding of the ramifications that would later develop as a result of such an active focus upon cultivation. Within the past three hundred years, the two-horned rhinoceros (last recorded in 1870), the Indian rhinoceros, the Indian cheetah, the golden eagle, and the pink-headed duck, wild buffalo (last shot in 1890), all species indigenous to the Sundarbans, have disappeared (Mukherjee and Tiwari, 1984).

3.3.2 Resource access regime

During the pre-British period, as the frontier was being extended into the Sundarbans, access to resources came to be controlled but this pertained only to the cleared tracts. The forest, watercourses and sea remained as open-access commonpool resource. Eaton notes: "Typically ... indigenous peoples, while working as ordinary cultivators on these newly claimed lands from the jungle, were permitted continued access to the *uncleared* portion of the Sundarbans adjacent to these plots" (Eaton, 1990; p.12). In 1798, Hamilton Buchanan traveled into the Chittagong Hills, an area analogous to the Sundarbans proper so far as the process of agricultural expansion is concerned, and wrote: "The woods, however, are not considered as property; for every *ryot* [settler-cultivator] may go into them and cut whatever timber he wants" (Buchanan, 1798; p.36).

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⁵ It was a Victorian essay by W.W. Hunter, a senior civil servant, published in 1875 that was largely responsible for characterisation of the Sundarbans as wasteland. It must also be noted that by the third quarter of the nineteenth century, to scour off native claims to the vast forests of India, colonial policy-makers were readying the terminology of 'waste' in order to move toward their exploitation (Guha, 1990; p. 66).

It was not only the individual cultivator and fisherman who was appropriating from the commons but also the *zamindar* (landlord responsible for paying revenue). As the East India Company was pushing for extension of settlement farther into the 'noman's land' of the forest by clearing it, disputes arose over ownership of lands and amount of revenue to be paid since the *zamindars* were clearing forest tracts in addition to what they had taken on lease. As a consequence, the 'Permanent Settlement' was established in 1793, in effect giving the *zamindars* complete ownership rights in exchange for paying yearly land taxes to the Company. If taxes were not paid, the state would sell the land to someone else. The state considered itself sole owner of the Sundarbans forests, the *zamindars'* lands extended only to the edge of the forests but boundaries remained uncertain until demarcated by the Dampier-Hodges line.

I have noted elsewhere that the right to fish in the watercourses of the Sundarbans then as now was in the realm of the common-pool, and no revenue for it was collected on behalf of the Government. In 1866 however, the Government put up to auction the rights of the fisheries in all the Sundarbans rivers for a term of five years. The Port Canning Company purchased the fishing rights, but they were withdrawn in October 1868 in consequence of the claims of the Company being disputed by fishermen and others who had prescriptive rights; it was then finally decided that the Government had not the right to farm out the fisheries in tidal waters to private persons (Danda, 2002).

Bhawalis (woodcutters) of the Sundarbans appear to have had all along a prescriptive right to fell forest timber, and no Government revenue was realised from the forests (Richards and Flint, 1990). Nevertheless, in 1866, the Port Canning Company leased un-appropriated forests in the Sundarbans along the sea face of the Bay of Bengal. The lease was cancelled in February 1869, and the forests reverted back to being common-pool resource. The then District Collector of the 24-Parganas District was of the opinion that making the forest open to public would largely increase revenue from forests. A Deputy Conservator of forests was specially sent to the Sundarbans in early 1873 to establish toll stations and issue licenses (Danda, 2003). The fact that forest resources were in the realm of the common-pool, and also that demand for wood, especially firewood was so great, offered ample inducement to cultivators and fishermen, even when comparatively well off. These people were the lower orders of Muslims and the following castes among the Hindus: *Pods*, *Bagdis, Kaoras, Tiors, Chandals, Kaibarttas*, and *Kapalis*.

The trend of constant assault on the forest continued well into the nineteenth century; it was not until 1878 that uncleared forest was declared "reserved" or "protected" vide Act VII because all did not share the enthusiasm for reclamation. With the establishment of the Indian Forest Service in 1865, a precedent toward Indian conservation had been established although establishment of the Service was meant to facilitate appropriation of forests by the state with an eye on revenue from forest resources. Though this new system helped to protect forests, those who had previously depended upon their resources were now legally restricted against the use of these resources. This created a competition over resource uses that had not previously existed. Creation of the Indian National Parks Act in 1934 saw the model of human use of the park repeated, game-hunters and park visitors were recognised

as having valid claims to the park; however, the local residents of now reserved areas were left out of the planning, almost as if they did not exist, and their resource needs not taken into account⁶. In Independent India, champions of the country's natural resources advocated increased protection at the cost of local inhabitants, so much so that in 1973 while launching Project Tiger, Indira Gandhi noted: "The tiger cannot be preserved in isolation. It is at the apex of a large and complex biotope. Its habitat, threatened by human intrusion, commercial forestry and cattle grazing, must first be made inviolate" (Tikader, 1983; p.259).

Thus, the eco-region that was once an open-access commons was initially subject to privatisation of property rights, and then, to central state intervention over resources. Increasingly, the Government found itself in a dilemma. The protection and preservation of the remaining Sundarbans forests became pitted against exploitation of forest resources. The Marichihapi incident of 1978-79 characterises this conflict wherein refugee-settlers were forcibly evicted from the island on the ground that the island was part of the designated forest area. Apparently ecological concerns prevailed over that of human requirement but as Mallick (1999) points out that the new Government feared setting a precedent in the face of the fact that it was practically impossible to rehabilitate the large number of refugees (1.1 million refugees had arrived by June 1948 and kept pouring in through the 1950s, 60s, and 70s) though while in opposition the Left Front had supported the cause of the refugees. It could also be the internal dynamics of coalition partners within the Left Front that prompted the Government to react so strongly since the largest partner, the Communist Party of India (Marxist) (CPI(M)) is not particularly strong in the eastern Sundarbans and the smaller parties (e.g. Revolutionary Socialist Party (RSP)) would have benefited politically had the refugees been allowed to settle. Also, this was the first Left Front government in the State since Independence (barring a threeyear period in the late 1960s, the Congress Party had been in power) and it wanted to be seen capable of governing and taking tough decisions. At a different level, it could also be that caste politics came into play, while the refugees were low caste; the ruling elite are predominantly Hindu upper caste (Mallick, 1999; Jalais, 2005). Whatever be the motivation for the Government for prioritising conservation over human use of the eco-region, it was apparent that the Government needed to balance the needs of its people with the health of the forests' biodiversity. It was in the 1980s that the option of collective action came to be entertained in the management of the Sundarbans. But, again in 2004, fishermen were evicted from Jambudwip Island for degrading mangrove vegetation on the island, which is also designated as forest

⁶ Corbett National Park was the first one set up in 1935 in northern India; Sundarbans became a National Park almost half a century later but the character of the forest of being open-access common-pool resource had changed.

⁷ In the aftermath of Bangladesh's war of independence and with the Left Front coming to power in 1977 in West Bengal, an attempt was made in 1978 in Jhila Block of the forest (Marichjhapi) by the refugees numbering about 16,000, originally from East Pakistan/Bangladesh. Within 18 months the refugees-settlers had built a thriving and viable community on the island on the basis of communal ownership and collective action. Force was used to dismantle the community, 36 lives were lost to police firing but the island was freed of encroachers (Mallick, 1999; Jalais, 2005). Though fictional, an account of the Marichjhapi incident has been very vividly brought to life by Amitav Ghosh in his novel, *The Hungry Tide* (2004).

area. Around the same time the Hukaharaniya incident shows the Government and the dominant ruling party being more concerned with human development than health of the ecosystem⁸

A National Action Plan for Wildlife Conservation was envisaged in 1983, which provided for management of Protected Areas (PAs) and habitat restoration aimed at increasing the quality of management, and consideration for the local people in and around the wildlife reserves; and wildlife protection in multiple-use areas to serve community needs (by raising productivity) while enhancing resource conservation (Sutton, 1990). Nevertheless, the management approach was isolationist, achieved through enforcement of legislation and policing to prevent activities deemed illegal. In 1988, the National Forest Policy (NFP) acknowledged that attempts to protect PAs from human intervention by coercion led to hostile attitudes of local people towards wildlife management and forestry staff. Therefore, the NFP declared that local communities were to be involved in natural resource conservation. Accordingly, since 1991, funds have been committed for eco-development, which envisages a site-specific package of measures for conserving biodiversity through local economic development⁹. Social welfare activities under eco-development include provision of freshwater and irrigation facilities, village roadwork, solar lights for lighting and scaring away tigers, health care camps, and employment generation for local communities through pisciculture (MoEF / Project Tiger Status Report, 2001).

3.3.3 Protection regime

For three quarters of the nineteenth century the Sundarbans witnessed a constant assault on the ecosystem. It took some time before the importance of the Sundarbans for purposes other than cultivation were realised. Men such as Brandis (first Inspector-General of Forests in 1865) and Schlich (the then Conservator of Forests in 1874) had long emphasised the importance of scientific forestry. There were varying ideas of the forests' importance and roles, but eventually it had become clear to some within the Government that protecting part of the forests would be advantageous. Schlich understood the importance in the Sundarbans' supply of timber, thatching grasses, and fuel wood. In places where the forests had been

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⁸ Hukaharaniya is an east-west flowing tidal river in Kultali Development Block which the Kultali Panchayat Samiti (middle tier of local-self government, *institutionalised* collective action organisation) and the Sundarban Development Board, both controlled by CPI(M), the dominant political party in the State, have converted into a freshwater canal for raising agricultural productivity while Socialist Unity Centre of India (SUCI) (the only leftist opposition party in West Bengal) opposed it on the ground of interfering with natural systems. At the ground level though, CPI(M) workers allege that SUCI supporters use the watercourse to travel to and from the forest to plunder its resources while SUCI workers allege that by blocking the river, not only has a natural system been interfered with but also taken away livelihood options of its members. It may be noted that the Legislative Assembly constituency under which Kultali falls is a stronghold of the SUCI and the CPI(M) is desperate to make inroads. See http://www.earthisland.org/map/ltfrn_178.htm.

⁹ For example, budgetary allocation for eco-development in the South 24 Parganas Forest Division (excluding Sunderban Tiger Reserve) for the year 2005-06 amounted to Rs. 33,73,992/- (US\$ 75,000/-) to be shared by the forest protection committees (FPCs). In the Sundarbans, there are 14 EDCs (as of May 2004) and 44 FPCs (as of March 2006) in villages adjoining forests.

cleared extensively, Schlich and others were uncertain of the Sundarbans' chances of regeneration. Schlich wrote: "It is our duty to see that the supply is not exhausted. Moreover, the demand is certain to increase, and we must therefore make sure that the increase also is provided for. It has been said that the supply is inexhaustible, but such is not the case. It appears, on the contrary, that the western part of the Sundarbans, which is that nearest to Calcutta, is already exhausted to a large extent, and that fuel-cutters proceed more to the east year after year" (as cited by Tikader, 1983; p.43). He, then, suggested: "... if the Sundarbans remain open to all comers, and if certain restrictions are not introduced, it seems no doubt that the supply will fall short of the demand. This must be avoided, as no other sources are available, and therefore the Sundarbans should be taken under forest management without delay, instead of extending cultivation towards the south without considering to what extent the permanent yield of forest produce may be curtailed by it" (as cited by Tikader, 1983; p.43). Though the Bengal Government was determined to utilise all available resources and shifted its attention to the 24-Parganas Sundarbans, the countervailing force gained ground on receiving crucial support from the Lieutenant Governor Richard Temple in 1874, which helped avoid complete obliteration of the remaining forest. It was the existence of much-needed products such as wood, fish, and honey that increased the eco-region's chance for continued survival through changes in management policy that offered protection to this area and its living resources.

The Sundarbans came under forest management in 1875 when five forest divisions were created in Bengal. These actions anticipated the sweeping affirmation of forest protection enacted by the Government of India in the late 1870s. After an extended period of investigation and debate, Act VII of 1878 constituted "Reserved" and "Protected" forests for every province in British India. The newly forming Forest Service busied itself in surveying, mapping, and bounding government forest areas throughout the subcontinent. The Sundarbans came under this new regime. To the Reserved forests classification the Forest Department added the "Protected" category. These were lands that could only be opened for reclamation by consent of the Forest Department. By 1890, there were Protected Forests totalling 4,480 sq km in 24-Parganas. By designating the 24-Parganas tidal forests as Protected rather than Reserved, the Forest Department left itself an option. It could either lease these lands for clearing and conversion to rice, or it could transfer them to timber production and management as reserved forests. For the western Sundarbans in 24-Parganas District, the area designated as Protected Forest stayed relatively constant from 1890 through the 1930s at between 4,400 and 4,500 sq. km¹⁰. The state preserved these mangrove forests primarily as a means of ensuring a continuing supply of timber and other forest products. Designation as Reserved or Protected Forests was an intervention designed to protect the Sundarbans forests against the forces of the land market and reclamation pressures. The Sundarbans forests became and remained a production unit run as a state monopoly industry in lower Bengal. Throughout the period between 1890 through 1980 of Forest Department management, the state either produced directly or licensed to contractors the cutting

¹⁰ Until 1904, about 40 percent of the Sundarbans in the district had been reclaimed. Of the total 7,500 sq km, only 3,115 sq km were assigned in various forms of grants to individual proprietors (Ascoli, 1921).

and sale of large quantities of timber, bamboo, and other products from its reserved as well as its protected forests.

Large-scale land clearance occurred between 1940 and 1950; cropland expanded by 23 percent. This reflects a response to two large-scale traumatic events: the Bengal famine in 1943 and the massive dislocations of refugees in both directions across the then newly created India-Pakistan border following the 1947 Partition. During this period, approximately sixty percent of the Sundarbans area in the 24-Parganas District was administered by the Forest Department. This formed the basis for the West Bengal Sundarbans Forest Reserve after Partition (Richards and Flint, 1990).

Independent India witnessed shortage of timber as a consequence of the War. Increased population as a result of transmigration due to partition made expansion of agricultural land a necessity; conservation was not the government's priority. Despite these difficulties, champions of India's natural resources advocated increased protection leading to establishment of the Indian Board for Wild Life (IBWL) in 1952¹¹. It was not until November 1969, however, that Indian conservation gained widespread international attention when the 10th General Assembly of the IUCN (The World Conservation Union) met in New Delhi to discuss issues of conservation. It was then that Indian conservationists had the opportunity to draw world attention to the fate of India's fast dwindling wildlife, including the tiger.

The 1970s were a decade of change in India's conservation movement. The IBWL established many protected areas throughout India, helped create the Indian Wildlife (Protection) Act in 1972, served as motivation for India's membership of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) in 1974, and initiated a National Forest Policy (made public in 1988) and a National Environmental Conservation Policy (brought out in 1992). During this period World Wildlife Fund (WWF) offered India financial aid for Project Tiger¹², a program designed to save the Bengal Tiger through the preservation of its habitat. This protection of tigers and their habitats became a goal for Indian conservationists. The Sundarbans of West Bengal was one of the three areas – the Sunderban Tiger Reserve – in which the tigers as noted already were provided protection in 1973. Subsequently, the area comprising the present tiger reserve was constituted as a Reserve Forest in 1978¹³. The area of the Reserve is 2585 sq. km., covering land area of 1600 sq. km. and watercourses occupying over 985 sq. km. Within this area, 1330.12 sq. km. is designated as core area, which was subsequently declared as Sundarbans National Park in 1984. An area of 124.40 sq. km. within the core area is preserved as primitive zone to act as a gene pool. Considering the importance of the

¹¹ IBWL was mandated to advise the federal and State governments in dealing with problems relating to wildlife conservation and set up national parks, wildlife sanctuaries, and zoological parks and gardens.

¹² It was Prince Bernhard of the Netherlands, founding President of WWF who launched a nature trust in 1970 and raised US\$ 10 million, which convinced donors to make donations towards saving India's charismatic, but severely endangered tigers in 1973.

¹³ The Sundarbans Tiger Reserve has not witnessed encroachment unlike some other Reserves on the mainland except the Marichjhapi incident.

bio-geographic region of Bengal River Forests and its unique biodiversity, the National Park area of the Reserve was included in the list of World Heritage Sites in 1989 and in the same year the entire Sundarbans area was declared as Biosphere Reserve. Ever since, Sundarbans' stature as a significant bio-geographic region has only increased. However, the watercourses outside the forest core area and also elsewhere in the eco-region remain open to fishing (regulated in case of forest buffer area) and are accessible as a commons where excluding potential beneficiaries from obtaining benefits is impossible. This has given rise to a situation where absolute degradation of the commons is a possibility in the near future about which marine biologists and conservationists are concerned (details given in Chapter 8, Section 3). Given the socio-economic state of the eco-region and lay of the land, riparian Sundarbans as of now does not lend itself to institutional arrangements that help resource users to allocate benefits equitably and sustainably over long periods of time.

3.4 Administering Sundarbans

West Bengal is one of the constituent States of the Republic of India. The State is divided into 19 districts (zillas) each headed by a Collector/District Magistrate who is a civil servant and by an elected head of the Zilla Parishad (district-level local self-government). The Sundarbans is not a district by itself but parts of it fall under the jurisdiction of the North and South 24-Parganas districts. Independent India has persisted with the administrative structure that the colonial government had devised to administer Sundarbans. As per the British dispensation, the Collectors of the 24-Parganas, Jessore, and Bakargani districts exercised concurrent jurisdiction with the local Commissioner in revenue matters in the Sundarbans. Practically, it was the Sundarbans Commissioner who performed the revenue work in parts of these districts with the exception that the revenue of all Sundarbans estates was paid into the abovementioned Collectorates. The office of Commissioner of the Sundarbans was established under Regulation IX of 1816 to ascertain the extent of encroachment by the neighbouring landholders beyond their permanently settled lands so as to bring the encroached land within the revenue-paying estates. Jurisdiction of the Sundarbans Commissioner was enhanced in 1819 to grant leases of forestlands on behalf of the government but land revenue, as before, continued to be paid into the treasuries of the respective districts to the north. The Office of the Sundarbans Commissioner was dissolved in 1905, by which time mapping and resource inventory was more or less complete.

Each of the districts in a State is divided into Sub-Divisions (five in case of South 24-Parganas District) headed by a civil servant (Sub-Divisional Officer/Magistrate). The Sub-Divisions are again divided into several Development Blocks (29 including 13 in the Sundarbans) headed by the Block Development Officer and an elected head of the Panchayat Samiti (block-level local self-government). The Block Development Office is the last administrative wing of the State Government. The last level of the elected local self-government is the Gram Panchayat (312 in the South 24-Parganas District including 89 in the Sundarbans) headed by an elected Pradhan (chief). The South 24-Parganas Zilla Parishad is empowered to initiate and implement development activities within the District through the Panchayat Samitis and in turn the Gram Panchayats which are composed of four to five *mouzas* (revenue villages) with a total population of about 25,000. This structure pertains to

settled areas; forests come under the jurisdiction of the Directorate of Forest (Forest Department) of the State Government. In addition to the above, backward areas like the Sundarbans also have specialised organisations like Sundarban Development Board (SDB) for bringing about socio-economic development of the area. However, the new specialised organisation has remained ineffective for a number of reasons such as relatively junior or weaker government minister in charge of the new organisation, the new organisation has to compete for resources and space with larger and older line departments, as well as the eco-region being of little consequence in electoral terms though representation in national and State legislatures is representative. For example, out of 546 Members of the National Parliament (Lower House) just three members are from the Sundarbans, and in West Bengal Legislative Assembly, 13 out of 295 of the members represent different parts of Sundarbans.

As a consequence of the process of decentralisation ushered in by the 73rd amendment of the Indian Constitution ¹⁴, administration is now carried out along two parallel channels throwing up new challenges that need to be resolved to attain the objectives of decentralisation. The local self-government institutions have become responsible for provisioning of public goods and services for which as of now they are not equipped due to a mismatch of responsibilities and personnel, and misalignment of organisations. For example, it is now the responsibility of the Panchayat Samiti (middle-tier of local self-government) to repair embankments but the personnel continue to be with the Irrigation Department of the State Government (see Chapter 4). For a place like the Sundarbans and its people, this is a major handicap because the public good in question is life sustaining.

During the late 1960s and early 1970s, State governments had thought it prudent to create specialised agencies catering to socio-economically backward areas like the Sundarbans, but with democratic decentralisation their roles have become ambiguous and multiplicity of organisations/agencies leads to duplication and turf wars, not helping the cause of the region and its people. An illustrative example will help understand the situation better.

The Sundarban Development Board (SDB) with assistance to the tune of \$ 450,000/- from Asian Development Bank (ADB) in 2001 got down to preparing a comprehensive Integrated Conservation and Development Plan (ICDP) to secure biodiversity conservation in the Indian Sundarbans, and improve the livelihoods of local communities. While work on the ICDP was in progress, the Ministry of Environment and Forests (MoEF), Government of India, with an aid of \$ 0.5 million from UNDP launched a three-year project "Strengthening Sustainable Livelihoods for Biodiversity Conservation in Sundarbans" in 2003. The Forest Department (FD), Government of West Bengal, is the nodal agency for the latter project. Towards the end of 2006, it was expected to come up with a Master Plan but until March 2007 it

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¹⁴ See Annexure I for a note on the 73rd constitutional amendment regarding local self-government.

has not been published. The aims of the two projects are to essentially come up with plans that improve the livelihoods of the people of the Sundarbans while at the same time conserve the ecosystem for its biodiversity. Despite the two projects being similar and the existence of a formal linkage between SDB and FD through deputation of personnel from FD to SDB¹⁵, there is no linkage and synergy between the two projects. Instead of formal consultations between the two groups there is rivalry and duplication evident from the fact that the Minister-in-Charge of SDB publicly complains at not being consulted and invited by the MoEF-UNDP project (The Times of India, Kolkata; June 30, 2004), and Dr. A.K. Ghosh (eminent biologist and environmentalist) who attends meetings of both the groups finds that the two groups are doing almost the same set of things but without consulting each other (pers. comm Nov. 2004). It is also my personal experience that NGOs that work in close association with SDB are not welcome in FD and vice versa, even when it comes to sharing information that should be in public domain in any case, this reflects the antagonistic attitude of the two organisations of the Government of West Bengal. Public spats between two departments or agencies of Government of West Bengal are not unusual (an example can be found in Footnote 1, Chapter 8).

3.5 Sundarbans as home

The Indian Sundarbans between 21° 32'-22° 40' north and between 88° 85'-89° 00' east is home to 4.5 million people. The majority of these people trace their origins either to East Midnapore District across River Hugli or across what is now the international border into parts of Bangladesh depending on their location in the Sundarbans¹⁶; many still have live contacts with their places of origin. The population of Hindus and Muslims is almost equal in the Sundarbans though there are islands and villages where one religious group overwhelmingly outnumbers the other but hamlets are almost always composed of single or similar religious and ethnic identities. Caste and religious scruples in the Sundarbans villages do not apply as strongly as they do in mainland villages, especially, in terms of occupation, though marriages are along religious and ethnic lines. Use of violence is not uncommon in Sundarbans villages, but seldom has it been used along religious lines. Only one of my elderly respondents mentions of religious violence some time in his youth. Often incidents of violence go unreported unless it results in death due to the fact that each of the Development Blocks usually has only one Police Station. Reporting petty crime and incidents of abrupt violence at the Police Station is impractical due to the distance and time taken to reach there, as well as the fact that enforcement is weak. For a resident of the Sundarbans islands, enforcement is not something associated with the state but with the dominant political party, more so, if that party is one among the nine in the Left Front. The state for a typical Sundarbans resident is not something that they have to deal with on a regular basis or even once

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¹⁵ The SDB has a Forestry Division, which is manned by personnel of the Forest Department on deputation, but the arrangement is not smooth. While senior officials of the SDB feel that the deputees are not motivated because they have no stake and are there only to spend a part of their working lives before returning to their parent organisation, the deputees themselves regard the deputation as a kind of punishment posting caused mostly due to not-so-good relation with their superior.

¹⁶ According to the Census of India 2001, about 7 percent of the people of Sundarbans are of tribal origin hailing from parts of Orissa, Jharkhand, Chhattisgarh and West Bengal States.

in their lifetime for some. I have observed that the residents of the Sundarbans do not perceive the Gram Panchayat as an extension of the state although state agencies and planners deem it as such. In villages adjoining forests, readily identified state representatives are the Forest Department personnel, in border villages it is Border Security Force (BSF) personnel. Local government employees, school teachers and health workers are not regarded as being representatives of the state since these individuals are from within the community or become embedded in the community, but educated city-dwelling outsiders are often perceived as agents of the state and their presence on the islands is taken to be a sign of change, mostly related to provisioning of a public-good but at times also as something being wrong.

Despite the frontier characteristics¹⁷ (in a Turnerian sense), the Sundarbans villagers do need to negotiate political delineations since political affiliations can make it relatively harder or easier to access services such as tube-wells for potable water. Political polarisation is intense in the Sundarbans and the uninterrupted communist rule in West Bengal since 1977 is not a single party rule but that of a coalition of leftist parties. The parties at the sub-State level fiercely protect their turfs, even with the use of violence. Political polarisation has intensified after the introduction of statutory Gram Panchayats (local self-government institutions); traditional Panchayats are caste based, controlled by the predominant caste and not the highest caste in social hierarchy. Earlier, traditional Panchayats (a form of spontaneous collective action) would mediate conflicts and oversee adherence to norms but in almost all villages, Gram Panchayats (a form of *institutionalised* collective action) have supplanted the traditional Panchayats. In the Sundarbans as elsewhere in West Bengal, almost every para (locality) has a 'club' with some kind of political affiliation. These clubs have varied activities ranging from sports, cultural programmes, social service, religious festivals, and political groundwork. In exceptional cases such clubs are apolitical. Often these clubs serve as the extension of the dominant political party and the Panchayat, mediating and enforcing decisions even in domestic matters of households. A situation where people come together to supply themselves with goods and services (social and or public-good) that they all need but could not provide for themselves individually is termed "collective action" or "self-organised action" (Wade, 1988; p. 14). In this thesis collective action is termed as *spontaneous* when it is organised by the community as a response to a felt need for goods and services. When collective action is organised by the state backed by statutory provisions, it is termed as *institutionalised*.

Agriculture (mostly rain fed) is the mainstay of the economy of the Sundarbans villages though about 56 percent of the population is landless despite land reforms. From the Club of Rome to the World Bank, the communist regime has received much acclaim for its success in land reforms but instead of redistributing land to tenants, it has mainly regulated tenancy through 'Operation *Barga'* (sharecropper) wherein sharecroppers have security to till the land and take the greater share of the

¹⁷ The identifying characteristics that have resulted from the influence of frontier experience are: individualism; mobility, both physical and social; innovativeness; self-reliance; suspicion/distrust of authority; trust in quick-working relationships; sense of effectiveness; and localisation and portability of civic and governmental institutions (Elazar, 1996). See further, Footnote 2, Chapter 2.

harvest but not ownership of the land. Landless families are dependent on agriculture through labour or lease of land. Members of landless families also depend on fishing including crab hunting and collection of tiger shrimp seeds from the wild. Collection of forest resources has become increasingly difficult though not totally discontinued due to tightening of conservation laws and their implementation, but during this same period commercial aquaculture has created a market for wild tiger shrimp seeds (Chapter 8 deals with aquaculture). Temporary migration is common in the Sundarbans villages; almost all the Bengali-speaking housemaids I have come across or heard of in Delhi are from the Sundarbans (possibly not all of them are from Indian Sundarbans), as are the Bengali-speaking labourers as far as Gujarat, Andaman Islands and even Sri Lanka. Human trafficking in women and children is also common in the Sundarbans villages though exact figures are hard to come by (ADB, 2003a).

Being at the mouth of the Bay of Bengal, the Sundarbans villages have to cope with violent climatic conditions leading to saline water incursion and coastal erosion. Serious concerns are also being expressed regarding the impacts of global climate change, particularly relative sea level rise. According to one estimate, half a million people living in the Sundarbans may be rendered homeless by 2020 on account of relative sea level rise (Hazra et al, 2002; Mitra, 2007). All of the 54 inhabited islands are not equally vulnerable to coastal erosion though; of the 14 most vulnerable nine 18 are uninhabited. Moreover, infrastructure in the Sundarbans is poorly developed and maintained, a brief description of some basic infrastructure follows.

The earthen embankments without which human existence on the deltaic islands would not be possible are often breached for a number of reasons (see Chapter 4) but are almost always repaired on an emergency basis, a reactive response rather than proactive. Though agriculture is the mainstay of the local economy, irrigation canals are few and far between resulting in a single crop over most of the ecoregion. The Sundarban Development Board had undertaken canal excavation as one of its first interventions during the period 1980-1989 with International Fund for Agricultural Development (IFAD) assistance many of which have become derelict in the absence of maintenance by the state or the community.

Even where the embankments and irrigation canals are in relatively better shape, farmers find it difficult to reap the benefits in monetary terms due to poor transportation (details given in Chapter 5). Major movement of goods is by boat since all-weather roads are almost nonexistent and there are no bridges connecting the islands except for a few, resulting in multiple handling increasing cost, damage and time consumption. Thus price realisation for the farmers is poor due to poor road and rail connectivity despite geographical proximity to Kolkata markets (see Chapter 7 for details).

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(Hazra et al., 2002; Mitra, 2007).

¹⁸ Most vulnerable inhabited islands are Dakshin Surendraganj, Sagar, Namkhana, Moushuni, and Ghoramara. The other islands on the list of most vulnerable are Lothian, Dulibhasani, Dhanchi, Dalhousie, Bulchery, Ajmalmari West, Ajmalmari East, Bhangaduni, and Jambudwip

The healthcare delivery system in West Bengal is organised in a way that every district has a District Hospital (located at the District Headquarter) and smaller hospitals (Block Primary Health Centre (BPHC)/Rural Hospital) in each of the Development Blocks followed by a Primary Health Centre (PHC) for a population of about 25,000, which usually coincides with a Gram Panchayat area. In some of the Development Blocks the hospitals are larger than the average BPHC/Rural Hospital because in these places the Development Block Headquarter and the District Sub-Division coexist and the Sub-Divisional Hospital provides services. The system works on a referral basis, that is, a patient depending on nature of illness, gets referred to the next higher level hospital for treatment by a specialist. Additionally, a health worker caters to a population for roughly 3000. The health workers primarily administer the 'mother and child programme' of the Government of India. There are also disease-specific programmes with dedicated personnel at the grassroots. The healthcare delivery mechanism appears impressive, as does the physical infrastructure for it, but for the Sundarbans it is far from satisfactory or adequate. The South 24-Parganas District Hospital is located in Kolkata putting it beyond reach of most of the people in the Sundarbans. Since all district offices and district courts of South 24-Parganas are located in Kolkata, a decision has been made by the Government of West Bengal to shift the District Headquarters further south of Kolkata to Baruipur but there has been no movement yet. Moreover, the Sundarbans Development Blocks are unlike the ones on the mainland due to lay of the land and geographic spread, making it difficult for people to access services since the various government offices (e.g., irrigation, education, and health) are located at the Block Headquarters. Also, for the same reason, PHCs on remote islands remain unmanned by trained personnel rendering investment on physical infrastructure to waste. In certain places, NGOs have stepped in to provide healthcare, the two most notable being SHIS (Southern Health Improvement Society, funded by Dominique Lapierre of Is Paris Burning? and City of Joy fame) and TSRD (Tagore Society for Rural Development).

After independence, education became the responsibility of the States. The Union Government's responsibility was to coordinate technical and higher education and specify standards. In 1976, through a constitutional amendment, education was made a joint responsibility of the States and the Union. A common structure of education was established through out the country and since then students are required to study for 10+2+3 years to earn a bachelor degree. Subsequently, in 2000, education has been made free and compulsory up to 14 years of age. The ten-year programme launched in 2000 (Sarva Siksha Abhiyan (Education for all)) envisages universalisation of education. Under this programme, facilities are being established/augmented for primary (first five years) and upper primary (next three years) education. Education in government schools is free. The government also heavily subsidises education at secondary and higher levels. Education can also be availed at private schools and colleges, especially in urban areas. Private education is not free nor is it subsidised. Schools and colleges have to be compulsorily affiliated to a School Board and colleges/institutes require affiliation from a university or the All India Council for Technical Education. Vocational training, depending on the stream, can be had after a minimum of 8 or 10 years of schooling. Despite great strides in quality and spread of education (vocational training included), rural areas remain disadvantaged as compared to urban areas, especially

regions like the Sundarbans. For example, higher secondary schools and colleges in the eco-region do not offer science subjects due to unavailability of laboratory facilities and trained personnel, putting students from such places at a distinct disadvantage as compared to students from semi-urban or urban areas.

Almost the whole of Sundarbans is without electricity except for the islands where West Bengal Renewable Energy Development Agency (WBREDA) has set up offgrid power stations. There are 15 such power stations but the largest island accounts for nine of them making the electrification process highly uneven (see Chapter 6 for details). On the whole, it is a grim situation for the people of the Sundarbans. According to the respondents of this study, the first five issues that they would like the state to address in order of priority are roads, healthcare, higher price realisation for agricultural produce, better schools, and better access to potable water. Surprisingly, the priority list does not include protection against saline water incursion or embankments, possibly because breach in embankments and saline water incursion are a given (see Chapter 4, Section 4).

3.6 Field research sites

The Sundarbans eco-region can be categorised into three distinct divisions – the beach/sea face, the swamp forests and the mature delta – based on the biogeophysical attributes. As already mentioned in Chapter 1, Section 5, I have left out the mature delta part for this study. For the purpose of this study Sundarbans de jure consists of 13 Development Blocks in South 24-Pargans District, south of the Dampier-Hodges line (see Figure 3.2) whereas Sundarbans de facto consists of eight Development Blocks¹⁹ (see Figure 3.3). In this thesis, henceforward, reference to Sundarbans implies Sundarbans de facto unless referred to from a historical perspective in which case it would mean 24-Parganas Sundarbans. Sundarbans de facto has a population of 1.76 million, about 40 percent of Sundarbans de jure. The two islands, Mollakhali and Mousuni, selected for field research are representative of swamp forests and the beach/sea face categories respectively (see Figure 3.3). The other difference between the two islands is that Mollakhali is administratively fragmented; it has one Gram Panchayat and part of another Gram Panchayat, which is on another island, while Mousuni is one Gram Panchayat. However, the Mousuni Gram Panchayat and the Chotomollakhali Gram Panchayat on the two islands are similar in terms of geographical area (about 24 km² and 23 km² respectively), population size, occupation, and caste/religion composition of the population. A major difference between the two islands is in terms of accessibility; with two river crossings it is possible to avail bus/train services and it takes about two hours to get to this point from Mousuni while from Mollakhali bus/train services are at least four hours away. The threat to embankments is also different on the two islands, while breach in embankment in Mollakhali is due to gradual erosion, at Mousuni (on the western side) it is due to waves coming from the sea but the protective measure is the same on both the islands, thus the extent of damage at Mousuni is greater. Since 1969, Mousuni Island has lost about 15 percent of total area whereas over almost the same period the population has risen by about 265 percent. Moreover, threat due to

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¹⁹ For a list of Blocks in the Sundarbans see Table 1, Annexure II.

global climate change and relative rise in sea level to Mousuni is far greater than Mollakhali; by 2020, 15 percent of current land area of Mousuni is likely to be submerged, according to estimates of the School of Oceanographic Studies, Jadavpur University (SOS, JU). Within the time horizon I am looking at, a significant proportion of the population of Mousuni will be left with no choice but to move to other islands as environmental refugees. It may be noted that Sen (2000) very strongly argues for freedom to make choices as a basic tenet of sustainable development. Therefore, one of the distinguishing characteristics between the two islands is the availability of freedom to make choices for one group, and lack of the same for the other group. The term environmental refugee is being increasingly used by the SOS, JU in the context of the threatened population of the Sundarbans (Mitra, 2007). However, Mollakhali has to cope with a threat that is absent in Mousuni, that of uncontrolled immigration from across the border due to its proximity and live contacts. The following paragraphs describe the two islands in some detail.

Mollakhali Island

Mollakhali Island is composed of five mouzas, viz. Chotomollakhali, Kalidaspur, Hentalbari, Taranagar, and Boromollakhali (see Figure 3.4)²⁰. The first three constitute the Chotomollakhali Gram Panchayat (GP), one of 89 in the Sundarbans. The other two *mouzas* are part of Radhanagar-Taranagar GP, located on another island northwest of Mollakhali²¹. Thus, the people of Taranagar and Boromollakhali are administratively in a neither-here-nor-there situation; for the Chotomollakhali GP, residents of these two villages are of no concern while the Radhanagar-Taranagar GP does not treat their problems and concerns with immediacy. Both the GPs are part of Gosaba Development Block, which has 14 GPs in all. The island has a population of 27,983 with a density of 769 persons/km², of which Chotomollakhali GP accounts for 18,430 persons, about 66 percent. Population density on the island is higher than the average figure for Sundarbans (671 persons/km²) as well as that of Gosaba Development Block (751 persons/km²); about 12 percent of the population is of tribal origin. The island has a major market, a hospital (upgraded Primary Health Centre), two higher secondary schools (one of over 50 years old), two secondary schools, a gasifier power station, bank, post office, Agricultural Growth Centre of the SDB, and an office of the Sub-Assistant Engineer of the Irrigation Department, Government of West Bengal. Usually, for line departments and administrative offices of the State Government, the Development Block Headquarters are the last level; Mollakhali seems to be an exception. Recently (2004), the island has again received telephone connections for public use after an earlier fiasco in the 1990s²². The island cannot be reached by road or rail; nearest road-heads are at Chunakhali (three hours by boat) and Dhamakhali (two hours away by boat/road), and railhead at Canning (see Figure 3.3). As elsewhere in the Sundarbans, people of Mollakhali mainly depend on agriculture for their livelihood. Fishing and tiger shrimp seed collection (TSSC) are other important occupations.

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²⁰ For demographic details see Table 2, and Figures 1 and 2, Annexure II.

²¹ Reference to Mollakhali implies Mollakhali Island in its entirety.

²² An earlier installation never served any purpose, details of which are described in Chapter 5, Section 2.2.

Proximity to swamp forests also provides opportunities for augmenting income through honey collection, small timber and fuel wood collection, and crab hunting; legally and also otherwise.

Mousuni Island

Mousuni Island is located in the south-western part of the eco-region, close to the sea, away from forest (see Figure 3.1). The island is composed of four *mouzas*, viz. Mousuni, Bagdanga, Kusumtala, and Baliara (see figure 3.5)²³. The four *mouzas* together constitute the Mousuni Gram Panchayat, one of seven in Namkhana Development Block. The GP has a population of 20,013 with a density of 830 persons/km², which is almost twice as much of the Namkhana Development Block figure (433 persons/km²). Namkhana has the lowest population density among the Sundarbans Development Blocks because two of the islands within the Block are presently uninhabited²⁴ since they are part of reserve forest. These forested islands are away from Mousuni²⁵. Mousuni Island has one higher secondary school and a secondary school, two solar power stations, an upgraded Primary Health Centre (hospital), and post office. Official telephone connections for public use are recent additions (2004) but telecommunication was already possible in September 2002 when I arrived here for the first time. The island cannot be reached by road or rail but is better connected than Mollakhali Island; nearest rail and road-heads being Kakdwip (two hours away) and Narayanpur (one and a half hour away) respectively²⁶. Agriculture is the main economic activity on the island. Proximity to the sea provides the islanders with the opportunity of being employed on fishing boats, locally known as trawlers. For the economically weak, tiger shrimp seed collection is an important means of livelihood.

One major difference between the two islands, though historical, emerges distinctly through examination of figures 3.4 and 3.5. Notice that the inland features of Mousuni Island are straight lines, be it road or *mouza* boundary. The Bengal Government in 1904 changed the policy of leasing out land exclusively to *zamindars*. Individual *ryots* (settler-cultivators) were encouraged to take up small parcels of land on lease directly under the Government. Thus, forest clearing and settlement progressed along a set pattern in straight lines. Clearing of forest in Mousuni began after 1904, and the first settlement was established in 1909. Each of the *ryots* was given 1.3 ha or about 3.3 acres²⁷ of land; only the official hunter and estate manager were given 65 ha or 165 acres of land. Office of the estate manager

²³ For demographic details see Table 2, and Figures 1 and 2, Annexure II.

²⁴ Lothian Island has traces of human habitation in the past. Artefacts such as pottery and brick pieces from firing mounds on the island suggest that human population flourished about 800-1100 years ago. Jambudwip Island had fishing and fish trading communities until 2004 when a fracas between the Forest Department and Fisheries Department of Government of West Bengal resulted in the island being cleared of human settlement. In an ethnographic account (Raychaudhuri, 1980) of the fishing community of Jambudwip from the late 1960s, it is clear that there were no permanent settlements on the island during the study period, only transient fishing camps. See Annexure IV.

²⁵ Reference to Mousuni implies Mousuni Island in its entirety.

 $^{^{\}rm 26}$ The railway is being extended up to Narayanpur.

²⁷ Ordinarily, *ryots* were given ten *bighas* each. One *bigha* is about 1338 m².

now functions as the local land revenue office of the Government of West Bengal. Usually such offices are situated at Development Block Headquarters, Bagdanga being an exception. Settlement in Mollakhali was established by a *zamindar* in the late 1880s. For the *zamindars*, it was a business proposition²⁸ whereas for the *ryots*, it was an opportunity for better life as compared to their places of origin. As a consequence, the worldview and attitude of the people on the two islands are significantly different, evident from the difference in literacy. People of Mollakhali are generally a resigned lot whereas those of Mousuni are quite enterprising. This attitudinal distinctiveness will be apparent in the case study chapters that follow.



Photo 3.1: Beards of male deities denote Islamic influence

²⁸ Daniel Hamilton who had leased Gosaba in 1903 was a notable exception. See Annexure III for an impression of Hamilton's estate.

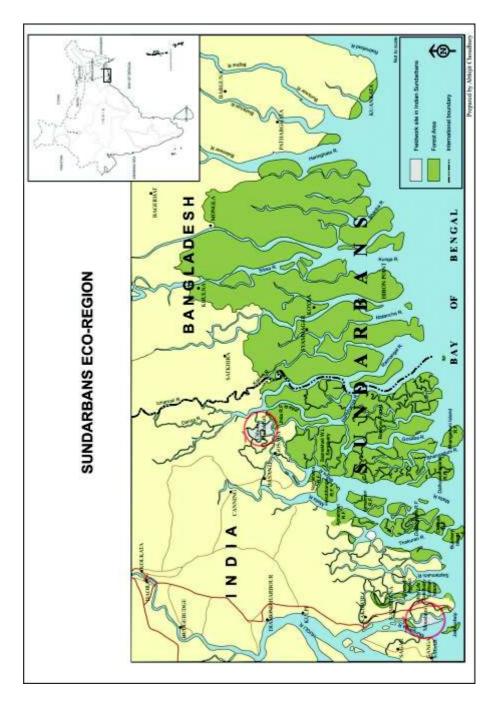


Figure 3.1: Sundarbans eco-region with field study sites marked by circles

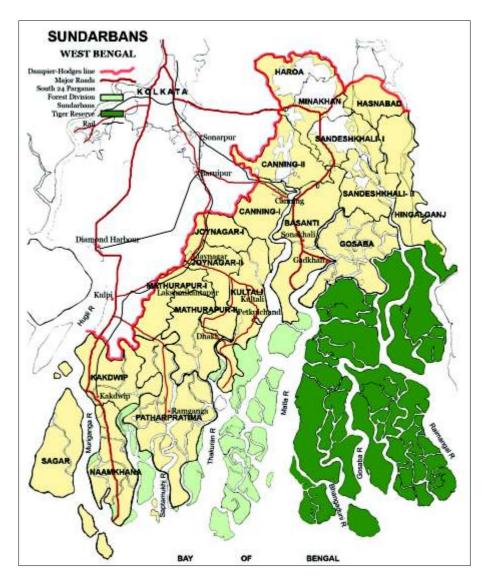


Figure 3.2: The Dampier-Hodges line now demarcates the boundary of Sundarbans eco-region

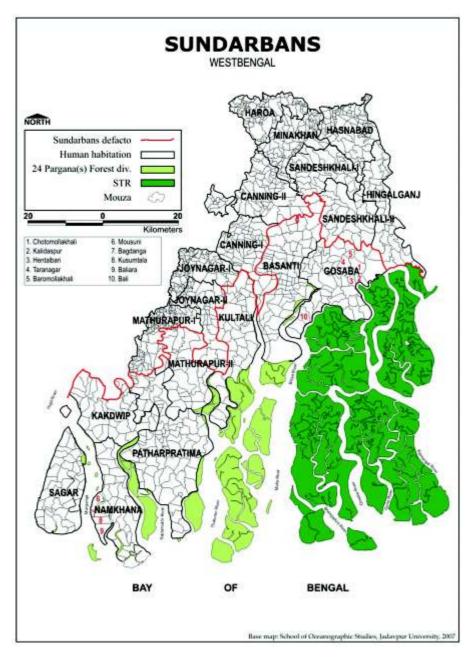


Figure 3.3: Sundarbans de facto and other reference points

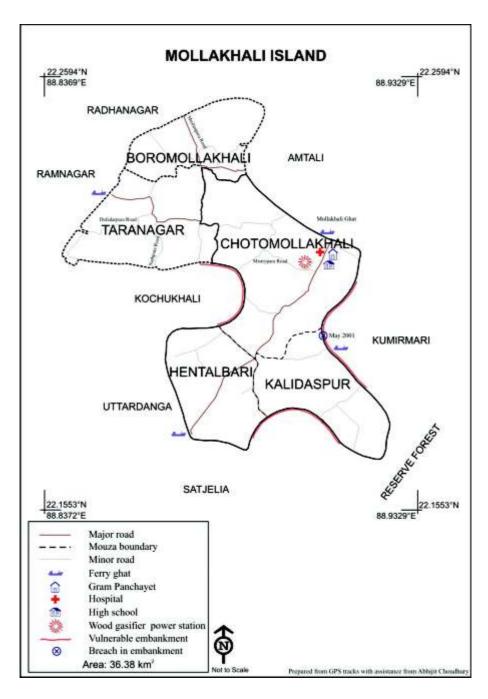


Figure 3.4: Mollakhali Island



Figure 3.5: Mousuni Island

Embankment: the very basis of human habitation in the Sundarbans

4.1 Introduction

Embankments are crucial for the existence of human settlements on the deltaic islands. Breaches in embankments force change in livelihood pattern from landbased 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, explains the contradictions and narrates how the various actors cope with 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. The sub-cases in this chapter partly help meet the objectives of this research. Scientific objective is met in terms of assessing whether collective action as suggested in literature has a positive role to play and under what configurations of conditions. Policy objective is met in terms of responses of the state. These apart, the sub-cases also provide answers to questions such as: how contradictions can be better managed, how different social categories cope with limitations, why different groups and agencies conduct themselves as they do, and influence on collective behaviour of the frontier experience.

The scale of impact due to breach in embankment is however not the same on the two field study islands, nor is the consequent impact on the ecosystem the same due to loss of livelihood of the affected (see Photograph 4.1).

4.2 Significance of embankments

As seen in Section 3.3.1, the British hastened the process of reclamation in the Sundarbans; land was being claimed from the tides and forests before normal delta building process could proceed. In this natural process, silting up of the interlocking creeks forms islands. Eventually, the islands are connected by the filling up of the intervening channels and raised permanently above the high-water level. During the nineteenth century and thereafter, land was reclaimed at the limit of the low-water level by building embankments. The silt that would have been deposited on the islands, thus raising their levels, was now deposited in the creeks, raising their levels instead. Over time, the creek beds rose higher than the low-lying reclaimed areas, turning those areas into vast stretches of permanent marshes (Mukherjee, 1969). To prevent reclaimed land from turning into marshes embankments were erected,

although "The presence of embankments seals off the possibility of these tracts ever naturally maturing into lands habitable by humans" (Bhattacharyya, 1998; p. 93). This is the basic contradiction in the Sundarbans, an inherent incompatibility between the normal geomorphic processes and human settlements in the delta (see Figure 4.1). This incompatibility is characterised as "death-struggle" between freshwater and saltwater by Greenough (1998; p. 238). Though Greenough criticises Hunter's A Statistical Account of Bengal, (1875/1998) as historical fantasy, a passage quoted here does bring out the significance of embankments for maintenance of human habitation in the Sundarbans. "... other streams had interfered with and cut off the Kabadak from the Ganges, and left it what it now is, a mere tidal creek, with no headway of fresh water. Fresh deposit must then have ceased to a great extent; the rains would have gradually washed away the upper stratum of soil, and lowered the general level; the place would soon become sickly, and finally forsaken by all but those whom dire necessity kept chained to the spot. Of all the villages that once existed over this portion of Jessore, the miserable village of Gobra remains. The area of this village has also decreased, and the cultivation of rice does not extend to within two miles of where it once did. The soil is gradually becoming more and more impregnated with salt and unfit for crops; and were it not for embankments, and the fresh water that drains and passes down the Kabadak in the rains helping to wash out the salt of the soil near the banks, Gobra would soon be deserted also" (Hunter, 1875 [1998]; p.40).

According to O'Malley (1914/98), for making human habitation possible on the islands, first, land had to be embanked along streams in order to keep saltwater out. Next, the forest had to be cleared, tanks had to be dug for water supply and storage, and huts built for the workers. These were arduous occupations since tigers and fevers were always dangerous companions of the process. When these were accomplished, rice had to be planted immediately, or a reed jungle would soon overrun the region again. The initial erection of embankment, clearing of mangroves, construction of human habitation, and finally, cultivation was sponsored by the zamindars, making them private property. The embankments were very weak due to unscientific building methods (without adequate width, compaction, and free board)¹ and unsuitability of soil characteristics for construction and maintenance of such structures and required regular maintenance. Alignments of the embankment were also defective² (Sarkar, 2002; Bhattacharya, 1999). Since the abolition of the 'zamindari system', these embankments came to be known as ex-zamindari bunds³ (state property or public property). "With the zamindars gone, there was none to repair these. Not even the State Government had any budget to cover the costs of maintenance. Funds were released only when there was an emergency. When the

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¹According to D. Biswas, Civil Engineer of repute, of the Govt. of West Bengal, width of the embankment depends on soil characteristics as well as other factors. Sandy soil or silt demands greater embankment width as compared to clayey soil.

² Tushar Kanjilal, founder of Tagore Society for Rural Development (TSRD) and author of *Who killed the Sundarbans?* has spent all his working life in the Sundarbans. He has been advocating an open-system wherein tidal waters are allowed to come in on the islands till the high-water level, and embankments built at this point (Mitra, 2007; p. 33).

³ Constitution of India was amended for the first time in 1951 after fifteen months of its working. The Constitution (First Amendment) Act, 1951 abolished the *zamindari* system.

ravages were too great to handle, they simply abandoned the affected structure. ... As these *bunds* collapsed under the pressure of the tides, the fields got flooded with saline water. This has been an agonizing experience..." (Chakraborty, 2005; p. 5).

Photo 4.1: Embankments in field study islands



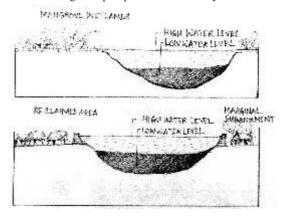
Inhabitants are not threatened by high tide water level on south-eastern side of Mollakhali.



Work in progress on a devastated stretch of embankment on south-western side of Mousuni, stubs of palm trees are from an earlier event.

With the collapse of embankments and saline water incursion into agricultural fields, cultivators turn to other occupations, but, due to cultural preference for agriculture and the inability to raise staple crops for own consumption it is a big psychological blow. As a consequence, most of the affected families feel they are worse off than before. Of the 243 households interviewed on the two islands, 93 have had to change their occupation from agriculture due to embankment collapse and 67 (72 percent) of these households reported being worse off; see Table 4.1 for details. Interestingly, only 4 of the 26 better off households are from Mollakhali, the rest from Mousuni. This difference could be due to the attitudinal difference in general between the

Figure 4.1: Normal geomorphic processes hindered by human settlements



people of the two islands. Perhaps connectivity with the outside world is responsible for the progressive outlook of the people of Mousuni since the degree of exposure is much higher there than in Mollakhali. There is a historical difference as well, people

had come to Mousuni seeking opportunities whereas people were brought to Mollakhali to work as farm labourers; those who had migrated voluntarily did so to escape caste and religious oppression in their places of origin. Thus, one set of people came for the frontier experience and embraced it while the other was compelled to confront the frontier process.

Every time there is a major breach in embankment, human pressure on the ecosystem intensifies; about 52 percent (48 out of 93) of the affected households turned to water-based livelihood activities and became directly dependent on the riparian commons (28 in Mousuni and 20 in Mollakhali). Effective maintenance and management of embankments therefore, has a significant bearing on sustainability of the global commons. However, breaches in embankment do not affect the

Table 4.1: Embankment collapse and its consequences

Number of affected families	Changed occupation	Cultivation on residual land	Reported Worse off	Reported Better off
8	Agricultural labour / cultivation on leased land	0	8	0
32	Tiger shrimp seed collection	4	32	0
34	Daily wage labour + TSS trade ⁴	0	25	9
4	Rickshaw van	1	1	3
2	Petty trade	1	1	1
2	Shrimp nursery	0	0	2
6	Trawler deckhand	1	0	6
5	Aquafarm	0	0	5
93		7 (7.5%)	67 (72%)	26 (28%)

community uniformly. Forest clearers of tribal origin were the initial settlers; they can still be found living along the embankments. On both the islands tribal settlements (*adivasi para*) are along the periphery of the islands facing a river or creek, these people are more vulnerable than others but possibly also more resilient (details in Section 4.4). Cultivator families with relatively large holdings (2.7 ha or more), mostly descendants of persons in charge of clearing operations and bringing land under cultivation (*jottdars*) are centrally located along cross bunds and freshwater *khals* (canals). In cases of embankment collapse over large sections, the larger cultivators appear more vulnerable than the smaller ones, most likely because quickly unfolding events require quick responses and small landholders have less to take care of. It could also be possible that the larger and smaller cultivators are attitudinally different because the two groups cope with different kinds and levels of stress on different counts, e.g. the larger cultivator in case of a destructive event counts losses whereas the smaller cultivator looks for opportunities to feed the family and tide over the crisis.

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⁴ Part-time *meen byapaaris* (Tiger Shrimp Seed (TSS) traders) conduct their trade for 14 days in a month based on lunar position, for the rest of the month they pursue some other means of livelihood, daily wage labour in this case, all three of them are from Mousuni.

4.3 Maintenance and management of embankments

Independent India inherited 3500 km of marginal embankments in the Sundarbans. Responsibility of maintaining and upgrading these embankments was assigned to the Drainage Wing of the Irrigation Department (GoWB). The Irrigation Department has elaborate deployment of manpower in the Sundarbans under the jurisdiction of Joynagar Division; it has to spend as much as 60 percent of its budget on its employees and other overheads (Kanjilal, 1999b). The islands of Mollakhali and Mousuni are under Gosaba and Kakdwip Subdivisions respectively. Under each Subdivision, there are several Sections. One such Section Office is at Chotomollakhali, manned by an engineer, a work assistant and thirty other workers.

Ever since the landmark constitutional amendments of 1993, the Section Offices no longer have the budget to carry out maintenance of embankments; budgetary allocations are now made to the Panchayat Samitis (intermediate level of local self-government). As a consequence of the landmark amendments, a situation has arisen where budgetary allocation is made to one institution whereas the skill is with some other government organisation, unlike Gujarat and Maharashtra⁵. Choudhuri points out, "Administrative reforms transferring control over civil servants from line departments to local governments have to be initiated" (Choudhuri, 2003; p. 8). Though West Bengal has transferred functionaries to local self-government institutions for twelve of the 29 items listed in Schedule Eleven of the Indian Constitution⁶, Drainage Wing of the Irrigation Department is not one of them, and Sundarbans has to wait until then to bridge the gap between intent and practice in terms of better management of embankments as well as conservation of the ecosystem.

4.4 Negotiating embankment collapse

As reclamation progressed in a phased manner, the first patch that was cleared, embanked, and brought under cultivation had at least one embankment facing a river or creek, and at least another facing uncleared forestland. With further reclamation the earlier land-facing embankments became cross bunds within the island serving the purpose of connecting two habitation sites and or as canal banks. The cross bunds also serve as surface water management structures. Many of these cross bunds have subsequently become brick-paved roads. The *jottdars* came to occupy these lands away from the margin of the island and are affected only in case of embankment collapse over vast stretches or washout. Obviously, the centrally located landed households and the households on the margins negotiate embankment collapse quite differently. Moreover, some sections of the islands are more prone to recurrent breaches and erosion than others (see maps of Mollakhali and Mousuni;

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⁵ The western States of Gujarat and Maharashtra were early reformers, transferring many activities, including primary healthcare and education to district Panchayats. In both States, funds were devolved as well and a separate administrative services – the Panchayat Service in Gujarat and the Maharashtra Development Service in Maharashtra – were set up to facilitate the transfer (or deputation) of State-level civil servants to work with the district Panchayats. See Annexure I.

⁶ The newly introduced Schedule XI contains a comprehensive list of functional items that come under the purview of the local self-government institutions; see Annexure I. Schedule VII mentions the State List. There is considerable overlap between the two schedules.

Chapter 3, Figures 3.4 and 3.5). People along these stretches are resigned to the fact that some time or the other the river will force them to move. Cultivators with agricultural land adjoining weak embankments make their own arrangements to derive one last crop before the embankment gives away (see Photograph 4.2⁷). Sk. Abdul Rashid has had to move his semi-permanent house twice in the past 17 years. Sk. Rashid is a teacher at Baliara High School on Mousuni Island. His house was on the western side of Baliara village; remnants of the second house can still be seen during low tide. His family has lost all agricultural land it owned in Baliara. Sk. Rashid is among the wealthier ones in the village with a regular monthly salary, and thus can afford to build his semi-permanent house over and over again. The



Photo 4.2: Embankment on the verge of collapse

overwhelming majority of the population can neither afford to build houses over and over again nor do they have a salary, for them paddy is the main source of sustenance and earning. They just dismantle their huts and relocate them elsewhere, at times even on private land. Sections of the western embankment in Baliara were washed away in October 2004 and it has been moved further inland, it is only a matter of time before the embankment is moved further inland. There is practically no worthwhile mechanism to rehabilitate or compensate the affected families due to inadequate budgetary allocations despite legal provisions for the same. For the affected, the process of seeking compensation is time consuming, and the nature of compensation insignificant (Kanjilal, 1999a), except in the case of Ghoramara Island (Sagar Development Block) from where families are being relocated on Sagar Island since the entire Ghoramara Island is under threat of being eroded away. Gram Panchayats and NGOs provide some material support (bamboo poles, plastic sheets and iron nails) to the poor to rebuild their huts, and distribute emergency relief material to tide over the immediate crisis.

⁷ The embankment seen in the photograph is the inner one, locally known as *ring bandh*, the outer one being already beyond repair has been abandoned.

⁸ Mousuni Island lost about a kilometre-and-half of embankment on the western side along Kusumtala and Baliara *mouzas* in September 2005. This breach, washout in fact, is greater than the preceding year's, along the same stretch of the island.

The following narratives describe four incidents of collapse/breach, and the responses of the various actors. These incidents occurred during my stay on the islands (see maps (Chapter 3, Figures 3.4 and 3.5) for locations), and provided the opportunity to observe collective action, both *institutionalised* and *spontaneous* forms, in the face of disaster; dysfunctionality of official institutions to render services; and blockages to collective action. There were other minor incidents of breach in the embankment during my stay on the islands but those affected only a couple of families at a time. In such cases it is left to the individual household to cope with the situation as is apparent from the photograph on the preceding page. The incidents also demonstrate that collective action in both forms has the potential to make adjustments with forces of nature, if properly backed up, though the manmade structures can never really withstand the ravages of nature.

Kalidaspur: May 2001

Kalidaspur mouza is part of Chotomollakhali Gram Panchayat (GP). Eastern and southern portions of the *mouza* are prone to recurrent breaches in the embankments. The embankment along a stretch close to the ferry ghat (boat landing site) was in a precarious state in January 2001, so much so that people avoided walking on the embankment on that stretch in fear of it collapsing. Villagers had reported the precariousness to the Section Office of the Irrigation Department as well as the Gram Panchayat although they did not expect either the Department or the Panchayat to respond effectively. The Irrigation Department carried out preliminary inspection; the Gram Panchayat was not in a position to respond to the impending crisis due to prevalent political situation. The villagers, particularly the farmers were a worried lot barring two farming households who were looking forward to the breach so that they could turn their agricultural land to aquafarms. Lion's Club of Kalidaspur (para 'club' located close to the stretch) was trying to get all the actors involved; they were the ones to contact the Gram Panchayat, Irrigation Department, as well as Forest Department as a matter of course. Two of its members, Monoranjan and Debabrata appeared to be the driving force. Both are educated (post-graduates) young unmarried males from relatively well-to-do cultivator families, and the community looks up at them to provide leadership. While both do not shy away from providing leadership, they also see these occasions as opportunities to build networks for themselves with the outside world and make it a point to put forward their case for employment outside the island by providing a copy of their CVs to the outsiders. Being educated and in position of leadership, it is imperative that they move on to something more significant than agriculture in the eyes of the community, possibly employment in the city. Their status does not permit them to stick to their traditional occupation of agriculture. If they fail to move out of the village, not only do they lose their position in the community but also run the risk of being ridiculed for studying so much to no avail.

On May 26, 2001 a section of the embankment gave away as water was receding during low tide. Since it was waiting to happen, word soon spread and people gathered to take stock of the situation. Members of Lion's Club decided to start repair work immediately so as to get as much work done before the next high tide. They had the support of the local Gram Panchayat member as well as that of the community. Debabrata got down to coordinating the repair work, which involved erecting a bamboo fence and dumping sandbags. Able-bodied male members of the .

community volunteered spontaneously with labour and material. By the time the first sandbag was dumped daylight was fading. Monoranjan decided to hire a generator and powerful lights since work had to go on till the stretch was secured, money was pooled in for the purpose. Repair work went on late into the night. The club was converted into a large kitchen to feed the men and boys. By day break the stretch had been secured, for the time being⁹. The local Gram Panchayat member suggested that generator and light hiring charges could be claimed from the Gram Panchayat in due course. However, till my last visit to the village in February 2004, the villagers had not been reimbursed of the expenses incurred for repairing the embankment. The Gosaba Panchayat Samiti cannot make good the expenditure since the repair work did not have prior approval. A member of the Public Works Committee of the Samiti said that in view of the emergency situation, the Chotomollakhali Gram Panchayat could have made the payment for the generator and lights had it been functioning regularly, an example of going in circles to nowhere.

Kusumtala: May 2003

On the southwestern side of Kusumtala, close to the *mouza* boundary with Baliara, there is a primary school, not far from the embankment. In May 2003, the embankment breached resulting in saltwater incursion. With high tide, water level would rise to submerge the *kutcha* (unpaved) road, making the school inaccessible to children. The Mousuni Gram Panchayat had just been constituted after the elections in April 2003. The previous regime was voted out; the new one was yet to settle down. Male members of the community were too excited with the political developments (the previous regime was in office for two consecutive terms) to pay attention to the inconvenience of the children. Mothers kept complaining but of no avail. Geeta Jana, a local resident and mother of three school-going children, got in touch with Gayatri Gore of Baliara, the leader of Self-Help Groups (SHGs) on the island. For mothers like Geeta the primary school served two purposes: one, it kept the children occupied for part of the day, and two, it provided uncooked rice and lentil as part of the midday meal scheme of the Indian Government¹⁰. On Geeta's insistence Gayatri Gore spoke to the Panchayat Pradhan (elected chief) who said the Panchayat was too new, and it would take quite a while before it could have the repair work sanctioned by the Namkhana Panchayat Samiti. In view of the fact that rival political groups control the Samiti and Gram Panchayat he suggested that it would be better if the road level were raised through voluntary labour. Gayatri and Geeta spread the word about voluntary labour among SHG members. They decided that women would cook near the site and help the men with the work; the work was scheduled for three days. On the first day, the women waited for the men to arrive but none turned up. After three hours of waiting they decided to do the work themselves and not permit men to work even if they turned up the next day or the day following. It took 118 women working in turns

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⁹ The embankment was abandoned in November 2003. Another embankment further inland (*ring bandh*) was constructed which left several households landless. Lion's Club of Kalidaspur does not have a building anymore since the *ring bandh* passed right through the building.

¹⁰ From the beginning of the academic year 2005-06, rice and lentil are no longer provided in uncooked form to be taken away by the children as part of the mid-day meal scheme. Instead, children are served cooked food at school.

four days to raise the level of the road to the extent that children could attend school again. The women did not seek financial assistance from the Mousuni Gram Panchayat or any other organisation/department. All SHG members take great pride that women could do the job without any help from a single male¹¹.

Baliara: September 2003

The southeastern part of Baliara, just south of the ferry *ghat*, is vulnerable to river erosion and embankment failure. The outer embankment has a number of breaches; a *ring bandh* further inland has been constructed. The Forest Department planted mangrove saplings on the stretch in between the old and new embankment but the saplings barely managed to survive since the stretch was popular with Tiger Shrimp Seed collectors using drag-net, because the older embankment provided them protection against strong currents (Chapter 8 deals with aquaculture and provides details about Tiger Shrimp Seed Collection). As is the practice, none of the families were compensated for the loss of land due to *ring bandh* construction. Thus, the cultivator families were keen that the mangrove plantation survives to give stability to the *ring bandh*. The Forest Department needs success stories to justify the plantation work it does, and therefore, was keen that the plantation survives. However, neither the cultivators nor the Forest Department officials were yet able to prevent the Tiger Shrimp Seed collectors from operating their nets along that particular stretch.

The new Panchayat Pradhan of Mousuni Gram Panchayat (elected in April 2003), however, managed to implement a ban on Tiger Shrimp Seed collection on that stretch. The collectors have moved further south as that part of the island is sparsely populated. Implementation of the ban has been possible for the fact that the Pradhan is a resident of that area, and the stretch falls under his constituency. He has consistently been a Gram Panchayat member from that particular election booth, irrespective of his party's performance on the island. For implementing the ban, the Pradhan involved a community youth club, which enjoys a tremendous rapport with the community because of its social service. The club has galvanised women to form SHGs, provides relief in times of natural calamity, and supports education of children of the poor through book banks and scholarships. It is interesting to note that the club is primarily funded by the well-to-do cultivators but most members are poor who are dependent on the larger cultivators in a number of ways, for example, lease of land for winter crops, access to fresh water from ponds and canals, as well as for homestead land when it is lost to river erosion. One cultivator family was found to have provided homestead land to six families free of charges. The well-todo cultivators also have *bhagi* (sharing) arrangements with the poorer families. In bhagi, the well-to-do fund acquisition of goats and pigs, which the poorer families get to rear and retain half the number of offspring before returning the animal to its owner in an impregnated state. The well to do and the poor appear to participate in a symbiotic relationship and see their own welfare in each other's well being.

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¹¹ Later that year, almost the same group of women helped a newly widowed SHG member to harvest her paddy crop and sell it at an appropriate price.

Baliara-Kusumtala: October 200512

During September 18-21, 2005, Mousuni Island lost a kilometre-and-half of embankment to tidal surge on the western side along Kusumtala and Baliara *mouzas*. The collapse affected 321 families, mostly from Baliara (272 families). As the tidal surge moved from south to north, people attempted to erect bunds from west to east to protect crops. These temporary bunds overflowed and failed to provide protection. Vast stretches of agricultural land were inundated with saline water, killing paddy almost instantaneously; the indigenous varieties however, survived (see intermittent patches of green in the Photograph 4.3). Small landholders converted their inundated paddy lands into makeshift aquafarms by uprooting the dead and dying paddy plants.



Photo 4.3: Paddy land inundated with saline water

In response to the washout, the Namkhana Panchayat Samiti rushed relief material to the island. The Mousuni Gram Panchayat distributed official relief received from the Panchayat Samiti based on the BPL list. Meanwhile, a community youth club (the same one mentioned in the previous incident) sent an appeal for relief to an NGO, which in turn routed it to an international NGO (iNGO). The iNGO rushed relief in the form of rice, lentil, bulgur, cooking oil, and polythene sheets but the supply was inadequate to meet the demand of all the affected families. Arrival of relief material was delayed by a day due to a *bundh* (strike)¹³ called by a leftist trade union organisation. Finally, when relief material reached the island there was disagreement among the local Gram Panchayat member and representatives of the iNGO, NGO, and the community youth club regarding mode of distribution since there was not

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¹² When this incident occurred I was no longer conducting fieldwork. I was informed and asked to visit the village by one of my acquaintances on the island, and had the opportunity to observe and participate in the collective action involved in distributing relief material to the affected families.

¹³ West Bengal is infamous for its *bundhs*. It is a form of protest – strike – by political parties and their affiliates wherein normal life comes to a grinding halt due to forced stoppage of services and closure of public and private establishments. It is an all-India phenomenon, but by and large West Bengal experiences the maximum number of *bundhs* in any given year.

enough of it. The Gram Panchayat member wanted relief to be distributed evenly as per the BPL list to all affected; the iNGO did not want any reduction of amount to be distributed per household while the NGO and the club both wanted to cater to the most vulnerable irrespective of the BPL list. The NGO and the club argued that in the given situation the poorest (with names on the BPL list) were not necessarily the most vulnerable. It took a day's deliberation to reach a compromise in which I participated. Ultimately the NGO and the club prevailed over the Gram Panchayat member as well as representatives of the iNGO but distribution of relief material was delayed by another day due to incessant rain. The victims of disaster suffered due to disagreements among the actors.

4.5 Analysis

In the absence of a Delta Authority in the Sundarbans, the community is faced with a public-good dilemma so far as the embankments are concerned. Individuals who would benefit from the provision of the public-good find it costly to contribute and prefer others (resource transfers to Panchayat Samiti) to pay for the good instead. Naturally, the good remains underprovided. However, there is solidarity in the face of disaster rather than in action to prevent such disaster from occurring. This solidarity is evident from collective action, both *spontaneous* and *institutionalised*. The analysis that follows answers why this is so.

Behaviour of individuals in public-good dilemmas is affected by many structural variables such as group size, heterogeneity, dependence on benefits received and discount rates, as well as changing combinations of *interest*, organisation, mobilisation, and opportunity. Typically, in case of embankment as public-good the group size is in excess of 25,000 individuals and heterogeneous at that, not only in terms of religion and ethnicity but also in terms of location on the island, endowment and dependence on immediate benefit (see Group characteristics under Category B in Table 2.1). Obviously, the discount rates of households on the margin of the island and those further inland are not the same. The ones at the margin apply very high discount rate since they are concerned with sowing one last crop that they can derive before the embankment collapses. Under these circumstances turning embankments into common property from public property appears imprudent since common property management regimes necessitate institutionalised collective action. The institutionalised collective action organisation, the Panchayat Samiti at the Development Block level in this case is under-equipped since skill has remained with the Irrigation Department, institutionalised collective action organisation at the State level. Nevertheless, the four incidents reported in the previous section permit analysis of the extent of collective action (as a function of *interest*, organisation, mobilisation, and opportunity), the behaviour in collective action (as a function of trust, reciprocity and reputation), the facilitating conditions of collective action, and the external environment (Category D in Table 2.1).

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¹⁴ I do not know if the NGO and the club were favourably disposed toward the landed and well off given the dependence of the poor on the well off, and the funding the club receives from the landed. I went along with their argument based on the fact that the coping mechanism of the poor appeared more effective in the changed circumstances, the well-to-do cultivator families appeared less resilient.

In the Kalidaspur sub-case of Mollakhali Island *spontaneous* collective action emerges in the face of disaster. This can be explained with the help of Tilly's four big components of collective action. *Interest* in the community to repair the breach was almost universal with intensive involvement of all those who were threatened by the breach with the possible exception of the two households looking forward to the breach as an opportunity to change land-use from agriculture to aquaculture, who also possibly passively complied with the repair work; *organisation* varies from intensive involvement to passive compliance. *Mobilisation* was defensive as tragedy was at hand and *opportunity* arose because the collapse coincided with the receding tide. Moreover, the external environment in the form of *institutionalised* collective action organisations at different levels was either limp (Gosaba Panchayat Samiti) or dysfunctional (Section Office of the State Irrigation Department) therefore, extent of *spontaneous* collective action was high.

If the community in Kalidaspur is capable of *spontaneous* collective action to such an extent, then the question that needs to be answered is why it cannot be sustained to maintain the embankment. There are two explanations for this: i) endowments and discount rates being different, offensive or preparatory *mobilisation* cannot take place since preparatory *mobilisation* requires foregoing present benefit in favour of uncertain future benefits, and it is only the rich and the powerful who can afford to opt for either of the two or both; ii) *institutionalised* collective action in this case has two basic problems: a) the Panchayat Samiti does not raise resources directly and depends on resource transfers thus intensive involvement is difficult to sustain, and b), while the problem is local (village level), the *institutionalised* collective action organisation is at the Development Block level, a step too far removed from the problem as well as the affected community. This situation is contrary to the Polder Model of Dutch Water Boards where, originally, the 'stronger shoulders' help carry the 'weaker ones' giving rise to solidarity in the face of threat from nature/water (Van de Ven, 2004).

Behaviour of the different actors in the Kusumtala sub-case of Mousuni Island can be explained with the help of individual attributes of *trust*, *reciprocity* and *reputation*. Gayatri Gore had a *reputation* that Geeta Jana and other SHG members *trusted*. This prompted Geeta Jana to approach Gayatri Gore, and also because of this *reputation*, the Panchayat Pradhan made the pragmatic suggestion of making use of voluntary labour to raise the level of the road instead of making promises of looking into the problem and finding a solution. The Pradhan was aware that due to political rivalry, the higher level of *institutionalised* collective action organisation would undermine his authority (unfavourable external environment) if he were to make promises to the people of Kusumtala, the affected women in particular.

Gayatri Gore made use of the social capital (past successful experiences) to *mobilise* and *organise* the women when men did not turn up to volunteer labour. She and other SHG members took this *opportunity* to reinforce their strength and extend their space within the male dominated arena, which was in their interest, and perhaps to affirm gender equity in decision-making.

Note the attitudinal difference between the SHG members of Kusumtala and members of the Kalidaspur Lion's Club. While at Kalidaspur it is unlikely that a

similar situation to that of May 2001 would elicit similar *spontaneous* collective action due to the fact that some of the club members were unable to have the expenses reimbursed and were unhappy about the situation, whereas the SHG members of Kusumtala took pride in what they were able to achieve without assistance through *spontaneous* collective action. This perhaps is a reflection of the frontier mentality characterised by a can-do attitude (self-reliance). This attitude is similar to that of the embankment failure affected people of Mousuni. People in the western Sundarbans came looking for newer opportunities and took up tenancy directly under the colonial administration whereas the ones in eastern Sundarbans were either brought in as labourers by the *zamindars* or migrated from their places of origin to work for the landlords and escape caste or religious oppression. Thus, despite both groups occupying a frontier zone their response to similar situations was different.

The club in Baliara on Mousuni Island was a *trusted* entity in the economically heterogeneous community. The poor (homogeneous group characteristics) could expect assistance from the club while the rich (homogeneous group characteristics) were able to further their interests through the club. The Pradhan who himself is a member of that community is aware of these dynamics and thus got the club involved in implementing the ban on Tiger Shrimp Seed Collection. The seed collectors agreed to abide by the ban because of the club's *reputation* that it would cause them no harm. Moreover, the *interest* of the landed, the Forest Department and the Gram Panchayat coincided. This is an example of *offensive mobilisation* by the landed and well to do.

The Baliara-Kusumtala case of Mousuni Island demonstrates that the two forms of collective action can come together to overcome tragedy when the following conditions exist: the two forms do not undermine each other's authority (favourable external environment under Category D, Table 2.1); there is social capital of past successful experiences; there is appropriate leadership (in this case it was mainly provided by the NGO); there is interdependence among members of the community, that is, heterogeneity of endowments and homogeneity of interests; and nested levels of governance (in the face of disaster the Namkhana Panchayat Samiti did not hold back relief material from the Mousuni Gram Panchayat despite being constituted of opposing political groupings).

Transport and communication: limited mobility, limited choices

5.1 Introduction

Transport and communication have become indicators of sustainable development (UNCSD Framework, 2001), and rightly so since absence of these services result in curtailment of freedom of both individual and social choice. This chapter describes the transportation and communication system in the eco-region and demonstrates how it limits the freedom to such choices, a basic tenet of sustainable development. The eco-region is recognised as a backward area in terms of transport and communication (Das, 2002) with only 42 km of railway, 250 km of metalled road, and about 170 km of unpaved narrow roads (Sharma, 1994; Kanjilal, 2000). The chapter asserts that the linkages between collective action and the process of sustainable development in the Sundarbans are not always positive implying that the higher the level of collective action within a group/category, the less is the choice for the larger group in the population, a case of second-order conflict. The sub-cases in this chapter help to understand the conditions under which negative linkages between collective action and sustainable development become established. The sub-cases also meet the policy objective of this research in terms of providing pointers for designing institutions to facilitate higher levels of productive outcomes, individually as well as collectively. The scientific objective is met in an interesting way. Literature on collective action and governance of commons and negotiating social and or public-good dilemmas necessarily links collective action with positive outcomes but here the lesson is to the contrary. Collective inaction (a form of negative collective action) results in negative outcomes (in terms of working against collective interest articulated by the state). However, as a consequence, it may provide net benefit for the community.

5.2 The state of transport and communication in the Sundarbans5.2.1 Transport

"The navigable rivers and creeks form the principal means of communication in the Sundarbans. Roads hardly exist. The only metalled road is one at Canning [...] the other tracks are mere footpaths" (Hunter, 1875 [1998: 65]). For much of the population of the Sundarbans, the transport system of today is only slightly better than Hunter's observations made about 130 years ago. Most of the people are heavily dependent on boat services for their daily movements but services continue to be inadequate and deteriorating due to siltation of watercourses. For example, among

the 770 villages in the Canning belt, only 220 can be reached by regular boat services (Mandal and Ghosh, 1989).

The Sundarbans islands have a number of gateways with railheads and/or road heads (see Figure 3.2). Train services to Canning (in the eastern Sundarbans) have been in operation since 1863. In 1883, in the western Sundarbans, the railhead terminated at Diamond Harbour. These initial developments of the transport system in the Sundarbans were geared primarily to meet official needs of the British Administration (De, 1994). Despite these advances in the late nineteenth century, it is only now that the railway is being extended up to the last possible points on the mainland. Since January 2006, rail services have been extended up to Namkhana (Narayanpur) on the western side via Lakshmikantapur though sanction for



Photo 5.1: Crossing River Matla at low tide

extension work was granted in 1984. This is the first expansion towards Sundarbans since independence and it is not an extension of the existing Diamond Harbour line. On the eastern side, for extension of railway from Canning up to Sonakhali, a techno-feasibility study was completed in March 2006. Also in 2006, a similar study was sanctioned for the construction of a road bridge across the river Matla.

At Canning, a little distance from the railway station, passengers cross over to Dockghat (Kanthalberia) across the river Matla in a motorised country boat. At the lowest point of ebb tide, there is not enough draft for even country boats to ply and people just wade across (see Photograph 5.1). From Dockghat they have to travel 14 kilometres to reach Chunakhali or Sonakhali (in different directions) to get to their destinations in Basanti or Gosaba Development Blocks. The options to get to Chunakhali or Sonakhali are 'van-rickshaw', 'auto', or 'trekker'. There is also a bus service between Dockghat and Sonakhali and a similar service was available between Chunakhali and Dockghat until 1999 when transport unions of van-rickshaw, auto, and trekker operators forced the closure of the service.

The 'van-rickshaw' is essentially a tricycle with a flat wooden platform to carry load and passengers. A recent innovation has been to retrofit a small diesel engine on the van-rickshaw. This contraption is referred to as the 'engine-van'. The engine-van has

evolved during the past 4-5 years, old motorcycles are cannibalised to make the front section as well as the wheels of the rear section (see Photograph 5.2). Sarberia

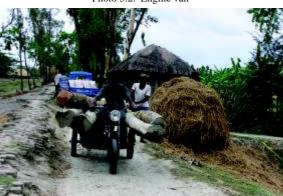


Photo 5.2: 'Engine van'

in Sandeshkhali II Development Block (see Figure 3.3) is a major hub for putting together these engine-vans in eastern Sundarbans. These vehicles are not recognised as motor transport and therefore are without any registration; consequently no traffic rules apply to them. The engine-vans in particular are prone to accidents since the driver has so little control over them. The Panchayat Samiti in Sagar Development Block has banned the use of engine-vans on the island. The van-rickshaw is availed of to carry load, passengers for short distances, as well as to ferry the sick and the

Photo 5.3: News clipping depicting a 'trekker' and lamenting on the state of affairs



old. Islands without brick-paved roads do not even have this form of transport. When I visited Mollakhali Island for the first time in the year 2000, it did not have van-rickshaws, now it has over 160 plying between Chotomollakhali Bazar and Satjelia Ghat (see Figure 3.4).

An 'auto' is a three-wheeled, motorised vehicle with two sections. The front section is *officially* for the driver and the rear section for three passengers. In reality though,

as many as ten passengers travel in an auto. Autos are originally manufactured in the organised sector but are modified at local workshops in the Sundarbans. Over time, the vehicles are quite different from what the manufacturers had produced except for the outer shell. In fact, none of the autos run on the original engines, they are replaced by locally assembled diesel engines, which require the operator to pull a rope to start. People without much luggage and in a hurry use the auto service since it carries fewer passengers and makes fewer stops en route than a van.

The 'trekker' is a four-wheeled, 11-seater, motorised vehicle. It is a very popular mode of transport, and is slightly cheaper than the auto. I have travelled in trekkers with as many as 20 passengers inside and an equal number on the roof with some hanging on the two sides and the rear (see Photograph 5.3). Comfort and safety of the passengers is of no consequence to the operators of the various modes, getting the passenger to his/her destination is the only concern. None of the vehicles adhere to any safety or environmental norms nor do they renew their registration.

Photo 5.4: Watercrafts of Sundarbans



Enforcement of such norms would require administrative and political will which are lacking while the operators are well organised and get away with all kinds of violations, even strictures of the High Court against overloading and pollution control norms are not enforced, not even in Kolkata.

Sundarbans being riparian, the primary means of transportation is through the watercourses. This mode is only slightly better as compared to road transport due to fewer bumps and jerks. Passenger boats in the Sundarbans are referred to by

different names based on size of the craft. 'Bhut-bhuti' is a motorised country boat without canopy and sitting arrangement, and is usually used for crossing rivers, as in Canning and Namkhana. The 'boat' is slightly larger (about 18 metres long), and is like a bus service on water. These crafts have a firm wooden canopy covering about three-fourth of the length under which wooden benches are fixed along the length for passengers to sit. Load is carried on the canopy, and in the uncovered front section (there are boats exclusively meant to carry load, sail boats as well as mechanised). A diesel engine is mounted in the middle (under the canopy), generating enough noise for a first-time traveller to move as far away as possible from the engine. 'Launch' is larger than a 'boat', and is geared, making backward movement possible. In many places launch services have been replaced by boat services due to lack of draft and passengers. All watercrafts except for a 'vessel' are wooden constructions and crafts smaller than 'boats' do not require any registration. A 'vessel' is larger than a launch and is made of steel, the only passenger vessel service in the Sundarbans plies between Lot No. 8 (Harwood Point) and Kochuberia on Sagar Island. Specialised vessels are used to transport cars, buses and trucks to Sagar and Namkhana islands. See composite Photograph 5.4 for different types of watercrafts.

Almost all ferry services except vessel service are private enterprises operated by cartels under nominal oversight of the elected district administration (Zilla Parishad). The inland launch services commenced from four stations, namely Hansnabad, Canning, Kakdwip, and Raidighi in mid 1940s. The service was conducted on individual initiative but has been taken over by 'Launch Owners' Association'. The cartels decide on the routes and frequency of service, as well as tariff effectively leaving almost no place for public voice. Things are changing though, due to the expansion of road network, and siltation of creeks and rivers; on some of the watercourses river traffic is not possible during low tide. The road network is being expanded under a Government of India scheme, the *Pradhan* Mantri Gram Sadak Yojna (PMGSY (Prime Minister's Rural Roads Plan)). A few of the islands such as Namkhana, Amtali and Hingalguni already have these roads and the difference it has made is evident¹. These new roads have also affected some of the older markets and boat services adversely, for example, the boat service to Dhamakhali from Chotomollakhali no longer plies during the day since it is faster to cross over to Amtali and travel mostly by road. Also, the Chotomollakhali market (among the largest on the islands of the eco-region) is losing significance due to improved accessibility.

Major points of embarkation or boat-landing sites, locally referred to as *ghats* have RCC (Reinforced Cement Concrete) jetties erected by the Sundarban Development Board (SDB). However, not all jetties can be put to use either because of their location or design. On the islands of Mousuni and Mollakhali (field research sites), jetties have been erected close to the main market at Bagdanga and Chotomollakhali respectively but both remain mostly unused since these are suitable for launches

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¹During my initial visits to Mollakhali, it would take almost the entire day to reach from Kolkata, but since 2003, it is possible to return to Kolkata on the same day with few hours to spare while travelling through Amtali-Dhamakhali or Gosaba-Sonakhali routes.

rather than boats and *bhut-bhutis*. Absence of buffers on these concrete structures makes the wooden boats and *bhut-bhitis* vulnerable to damage. In the absence of usable jetties or where there are no jetties at all, people have collectively made arrangements to make use of certain locations as boat-landing sites using mud, bamboo and brick. These initiatives are usually either driven by traders or 'clubs' to overcome problems of transhipment of goods and movement of people.

In the case of Mousuni Island, the problem with the jetty is compounded by the fact that for most part of the year the water level does not reach the jetty platform even during high tide (see Photograph 5.5). At Chotomollakhali market, the Forest Department (Sundarban Tiger Reserve) has raised a mangrove patch just southeast of the jetty to provide protection to the adjoining embankment. While the mangrove patch provides protection to the embankment, it encourages silt to be deposited on the jetty itself making it unusable till silt is removed. On both the islands smaller



Photo 5.5: The jetty at Bagdanga Market that can be seldom used

ghats are used on a regular basis. Small ghats and the ones with insignificant traffic are in the realm of the commons wherein most users are free riders while only a handful contribute towards their maintenance. The larger or busier ones are public property but user charges are levied either as a matter of convention or through legal arrangement by private actors such as contractors, market committees², or boat operators' union.

The various boat-landing sites provided opportunities for detailed observations, interviews and interactions. In all, 63 interviews were conducted on transport and communication, ten each at Dockghat, Chunakhali, Chotomollakhali, Namkhana and Bagdanga, six at Sonakhali and seven at Dhamakhali. Greater emphasis was laid

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² Market committees are independent 'collective action' or 'self-organised action' organisations that run the markets. Members of these committees are elected from among the permanent traders operating in the markets except in case of a private market where the owner or her/his representative is a permanent member of the committee. The committees are locally known as *Bazaar Committee*. A *Bazaar Committee* raises subscription from among its members as well as other traders in the market. A *Bazaar Committee* is usually apolitical and members make efforts to keep political influence out of its dealings.

in the eastern part (68 percent of the interviews and five out of seven locations) since it is less accessible as compared to the western part.

Among the regular commuters, traders constitute the largest segment (25 percent) followed by schoolteachers and other employed people (21 percent), students (19 percent), and local politicians (11 percent) and others (24 percent). Traders vary their time of travel and mode of transport as per their convenience. For example, Tapas Mandal, a fertilizer/seed shop owner from Chotomollakhali travels via Dhamakhali to central Kolkata but for south Kolkata he travels via the Chunakhali-Dockghat-Canning route unless it is expected to be low tide while crossing the river Matla in which case he travels through Dhamakhali. Most of those interviewed at Dockghat (6 out of 10), Chunakhali (7 out of 10), and Sonakhali (4 out of 6) have had to wade across river Matla at least once in the recent past (within six months preceding the date of interview). All the commuters aged 50 and above inform that about 25-30 years ago the Matla River always had enough draft for boats to ply, now the situation is different due to siltation.

Box 1

Through the interactions and interviews, 63 in all, at various embarkation locations, the following points emerged:

- a) About 73 percent commuters believe that the journey is uncomfortable due to overcrowding and bad roads;
- b) Almost 32 percent of the commuters feel that the road journey is unsafe because:
 - driver's view is blocked due to luggage on the bonnet of the trekker, and at night the headlamps provide insufficient illumination,
 - the driver virtually hangs out of the vehicle making it difficult for him to remain in proper control, and
 - (iii) the administration neither maintains roads nor enforces safety and traffic regulations;
- c) Most (84 percent) commuters feel that the journey irrespective of mode of transport is expensive and time consuming but some of the older respondents are of the opinion that it is a much improved situation because from some places in the Sundarbans it is now possible to go to Kolkata and return the same day;
- All the commuters feel that Sundarbans is a neglected and backward region of the State.

Among those travelling to Kolkata via Canning, 69 percent (excluding local politicians) avail of the trekker service because trekkers accommodate about 40 passengers per trip and are the cheapest; local politicians prefer travelling by auto or van-rickshaw. The commuters' complain of the journey is, that it is uncomfortable, unsafe, unpleasant, expensive, and time consuming, irrespective of the mode of transport (see Box 1). All the commuters believe that they have to pay according to the wishes of the transport operators who are organised in unions backed by political parties and 84 percent of those interviewed would like to pay less for the quality of service rendered. Due to expensive and poor transportation, farmers in the ecoregion find it difficult to compete in larger markets of Kolkata and its suburbs despite proximity of the eco-region to these places (see Chapter 3, Section 5).

5.2.2 Communication

Till the year 2000, it appeared that the only way to communicate to the outside world from the eastern islands of the Sundarbans was to physically travel and communicate with the intended audience. Over time it was revealed that passenger boats are an important channel of communication. The boatman carries the message and calls the intended person from a public telephone booth on the mainland and asks the called person to return the call at that particular public telephone while



Photo 5.6: Passengers disembarking during low tide at Mollakhali Bazaar

conveying that there is a message from so and so. The booth operator charges ten Rupees (\$ 0.22) for both outgoing and incoming calls. People from the mainland familiar with the system call and leave messages with particular telephone booth operator for the message to be conveyed to such and such boat route which eventually reaches the intended person on the island. This complicated communication system remained in operation due to the fact that the rural telecommunication expansion scheme of the 1990s was abused by the Minister, senior officials and contractors³. Chotomollakhali Gram Panchayat had received a

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³ During the early days of economic liberalisation in the early 1990s, Sukh Ram was the federal Minister for Communications. He, in cahoots with senior officials and contractors, had had Multi-Access Rural Radio (MARR) systems installed ostensibly to expand the country's rural telecommunications network. Many of the equipments never worked. Sukh Ram was eventually convicted for fraud in 2002 along with the contractor and a senior official (Venkatesan, 2002).

public telephone under the rural telecommunication expansion scheme which never served much purpose because it was only possible to make calls to Gosaba, the Block Headquarters though it should have been possible to make calls anywhere.

During the same period, it was possible to make calls anywhere from the western islands using long-range cordless telephones. The base station of the cordless phone would be at the nearest public telephone booth on the mainland or neighbouring large island with landline connection while the handset would be on the island without normal telephone connectivity. To make a call, the booth operator would be paged using the handset, who in turn dialled the desired number. Over time, more sophisticated handsets appeared allowing numbers to be dialled directly from the handset itself. The handset operator collects payments from callers. Owning and using long-range cordless telephones is illegal in India.

The Sundarbans islands were connected to the telephone network in 2004 through the WLL (wireless in local loop) system but the service was unreliable and the long-range cordless phones remained in operation for almost another year. In October 2005 the GSM cellular network became available in the Sundarbans. Though more expensive than WLL phones, the service is satisfactory and it does not cost to receive calls, making it easier and cheaper to send messages to the islands than in the other direction.

India has a teledensity⁴ of 16 percent as of December 2006 (targeted at 22 percent by the end of 2007), which is significantly lower as compared to China at 23 percent (as of March 2005) and way behind USA where teledensity is 60 percent (as of March 2005); the corresponding figure for rural India is a meagre two percent. Obviously, for a backward region like the Sundarbans, telecommunication is only for the very few, the rest depend on radio for news from the outside world as well as weather warnings. All India Radio (national broadcaster) has a pan Indian coverage but the most popular channels in the Sundarbans are the private FM stations, in operation since 1999; local announcements are made over the most popular FM channel. Since 2003, it has become legally permissible to run FM community radio stations (campus radio stations to be precise since licenses are granted to educational institutions) and local announcements can be made over these but effectiveness would depend on the popularity of the channel vis-à-vis private FM radio. Moreover, setting up and running such radio stations are an expensive proposition. The Anna FM (radio service of Anna University, Madras) the first of its kind in the country incurs an expenditure of 300 Rupees (about US\$ 7) for every hour of operation and had spent about US\$ 17,000 on installation. It also requires clearances from six federal ministries apart from the State Government.

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⁴ The number of landline telephones in use for every 100 individuals living within an area. A teledensity greater than 100 means there are more telephones than people. Third-world countries may have a teledensity of less than 10. http://www.techweb.com/encyclopedia/defineterm.jhtml?term=teledensity viewed on 30 April, 2007. In India, mobile phones are taken into account while measuring teledensity (see *The Financial Express*, January, 9, 2006).

5.3 Collective action and public-good

Review of literature has shown that although collective action may be successful in managing common property, common-pool resources and provisioning of publicgood, it is not always the case, because of the different levels and spaces at which collective action operates, as well as the different forms of collective action itself. In this section three sub-cases follow. These help to understand the conditions under which negative linkages between collective action and sustainable development get established, as well as how 'collective inaction' as a form of collective action facilitates provisioning of public-good. Understanding these cases is important from the point of view of designing institutions to facilitate individuals achieving higher levels of productive outcomes in social or public-good dilemmas.

Maintenance of boat-landing site

Launch services between Chotomollakhali and Canning were introduced in 1961. To facilitate loading/unloading of goods, and embarkation and disembarkation of passengers, the Sundarban Development Board (SDB) constructed a concrete jetty at Chotomollakhali in 1989, prior to which an earthen brick-lined finger-like extension into the watercourse locally known as Sarasa River was used as the boatlanding site (*ghat*). Around 1997, launch services were withdrawn due to loss of draft and passengers. By this time a number of boats were plying on different routes connecting Chotomollakhali to different islands as well as to different points on the mainland using the *ghat*. The *Bazaar Committee* maintained the ghat. From mid-1997, the Committee started to charge a user-fee of a tenth of a Rupee (a miniscule amount in \$ terms) to engage a cleaner to remove slippery silt from the brick blocks during low tide. The *ghat* poses no problem during high tide since boats are able to berth next to the embankment, but during low tide due to a loss of draft boats were stuck in the soft soil about 20-25 meters away from the embankment making it difficult for the passenger and head-loaders (see Photograph 5.6).

Towards the end of 1997, the Gosaba Block Administration (headed by a civil servant) objected to the collection of user-fee by the *Bazaar Committee* on the ground that a private entity unless expressly authorised by the state cannot levy user-fee on public/state property. Collection of user-fee was discontinued, as was the practice of cleaning the brick blocks during low tide.

Through a bidding process organised by the Gosaba Block Administration, a contractor gained the right to levy user-fee with the obligation to maintain the Chotomollakhali *ghat* from April 1998. Initially, the contractor charged 0.15 Rupee from each passenger, and 0.20 Rupee for each head-load. The contractor did not make any effort for the upkeep of the *ghat*. In the subsequent year, user-fee was enhanced while the state of the *ghat* deteriorated, but boat operators continued to use it instead of the SDB jetty about 100 meters downstream because the *ghat* contractor would not allow such use as he would lose money and the jetty was not in a very good state due to silt deposition. Users of the *ghat* did not complain about the situation but would grumble only when probed. The Chotomollakhali Gram Panchayat maintained that anything beyond the embankment was not within its jurisdiction. Only some of the members of the *Bazaar Committee* were vocal about the state of the *ghat*. The situation appeared ripe as a subject for this research for

examining whether an existing institution could be leveraged to obtain a public-good through collective action.

Some of the *Bazaar Committee* members are more influential than others, two such members are Ashok Gupta and Ramesh Agarwal. Ramesh's family owns the largest grocery store in the market; it is also the major money-lending family on the island. Ashok has different kinds of businesses, and is good with machines for which he is considered smarter than others and knowledgeable. The situation of the ghat was put to Ashok and Ramesh and both agreed that it was foolish to have to pay the contractor for no services received. They took up the matter at a Bazaar Committee meeting. During the financial year 2001-02, the Bazaar Committee appealed to the Block Administration to discontinue the services of the contractor. Members of the Committee visiting Gosaba on business or other purpose kept prodding the Block Administration. Later that year the Block Administration asked for an undertaking from the Committee that it would maintain the ghat without levying user-fee, which was provided before the end of the financial year on March 31, 2002 but by then the ghat contractor had renewed his licence. After another year, on April 01, 2003 the ghat was handed over to the Bazaar Committee. The Committee sought and accepted donations from the traders at the rate of one hundred Rupees (\$ 2.20), as well as one Rupee (about two cents) from members of the community at the market for a period of one month to raise money for repair work and relaying of new brick blocks. Since May 2003, use of the *ghat* is for free, traders contribute a monthly sum of ten Rupees (\$ 0.22) towards maintenance and salary for the cleaner.

Trans-shipment of a load of saplings and two large pots of fish

The following two stories are very specific, incidental small cases but have been used as a sub-case to describe a more general phenomenon of unionisation of transport and its effects.

In the year 2001, an environmental NGO was contracted for raising energy plantation for a biomass gasifier power station at Chotomollakhali which needed to transport ten thousand saplings to the island. To reach the saplings to the island, the arrangement was to transport them by truck up to Dhamakhali from where a boat would carry them to the island. Handling saplings in large quantities is a specialised job since each sapling is in a polythene tube with some loose soil; wrong handling either uproots the sapling or rips the polythene tube. Prior arrangement was made with the Forest Directorate nursery which was supplying the saplings, to provide handlers who would come up to Dhamakhali and load the saplings on to the boat.

On the appointed day a boat waited at Dhamakhali for the saplings to arrive but things did not proceed as planned. While saplings were being unloaded, a group of men demanded that local head-loaders be engaged for the unloading or else the truck would have to return with the consignment. No amount of reasoning seemed to work, including the fact that saplings require special handling. Ultimately, the local group relented after being paid a certain amount of money. Calculating manhours it would take to put the saplings on to the boat and then reducing it by half, was how the monetary figure was arrived at. In effect, the local head-loaders received one half of the amount although they rendered no services at all.

On another occasion in 2002, a man named Sudhangshu had to pay a van-rickshaw driver at Chunakhali for not availing his services. Sudhangshu lives in Sonarpur with his wife and children. His parents and other brothers live in Kalidaspur village on Mollakhali Island, whom he occasionally visits. On one such visit the family pond was emptied, and Sudhangshu decided to carry his share of fish live to Sonarpur, to distribute some among his relatives there, and to sell part of it at the market. He partly filled two over-sized (20 litres in volume) aluminium pots with water and put the fish in them. He took the last boat to Chunakhali from Chotomollakhali at 15:15 hrs to reach Sonarpur by about 21:30 hrs if there were no disruptions or breakdowns en route. About an hour from Chunakhali, due to low tide the boat ran aground. Sudhangshu was getting anxious but he could not wade across the river with two heavy over-sized pots. As the boat finally reached Chunakhali, he hurriedly got on to a trekker and placed the aluminium pots on the roof. The farecollector informed him about the charges for carrying the pots to which he readily agreed. Just as the trekker was about to leave for Dockghat a group of van-rickshaw drivers surrounded the trekker blocking its way. Normally trekkers are not supposed to carry anything other than ordinary personal luggage. The group of van-rickshaw drivers were objecting to the trekker carrying the fish laden pots. At this point the trekker driver asked Sudhangshu to disembark along with his pots. Sudhangshu pleaded that he be allowed to travel by trekker or else he would be stranded for the night. Fellow passengers fearing delay joined the group in demanding Sudhangshu's disembarkation. Ultimately, one of the passengers suggested that Sudhangshu pay the van-rickshaw driver (whose turn it was to ferry such luggage) the fare for the trip to Dockghat which, time permitting, he would have made. Sudhangshu ended up paying twice for his journey to Dockghat, once to the van-rickshaw driver and again to the trekker fare-collector.

Cordless phones and FM radio

In 2003, there were eight cordless phone operators at the Bagdanga market on Mousuni Island and they had their base stations at different locations on Namkhana Island. All the operators had other primary businesses such as textile shop, medicine shop, laundries, grocery and TV repair shops, and were aware of the illegality of the cordless telephony but none of them made any effort to hide or camouflage their operations. The callers which included Panchayat and other government officials had no qualms about using the service though many of them knew about the illegality of the operation, in fact, all of them were pleased with the availability of the service. This was an offence nobody seemed to take any cognizance of.

Once, while administering a questionnaire in 2003 at Pahelagheri on Mousuni Island, the FM radio transmission caught my attention. It seemed that the regular transmission was being interrupted and in its place an incoherent but rather dramatic announcement was being made. I presumed it to be the usual drift in radio reception and that some Bangladeshi channel must have interfered. Days later I noticed it again at a ferry *ghat* while waiting for a boat (a long wait since I had just missed the service I had intended to take). I asked the tea stall owner about the announcement and was informed that it was meant to let people know of *jaatra* (folk theatre) shows being organised. It appeared that announcement through FM channel was common and effective due to the popularity of the medium. There are individuals with FM transmitters in the Sundarbans who make these announcements. I met up with one

who knew it was clandestine and that it amounted to radio piracy but justified his action by saying that visiting the radio station in Kolkata for buying time slot on the channel was time consuming, thus impractical. He avoided detection by interrupting regular transmission in short bursts and would make these announcements from a moving boat. Moreover, he felt that the Police would not try tracking him down since they had more pressing issues to deal with and what he was doing was merely illegal and not something sinister or criminal.

5.4 Analysis

In the first sub-case from Mollakhali Island, commuters and traders are forced to use the *ghat* rather than the jetty and in doing so put a mechanism in place to maintain it whereby *net benefit* remains positive. The arrangement is disturbed due to external influence exerted by the Gosaba Block Administration which undermines local collective action solution (Category D-external environment, Table, 2.1). Also, because the Chotomollakhali Gram Panchayat (*institutionalised* collective action organisation) and the Gosaba Block Administration are parts of parallel channels of governance rather than nested, the situation deteriorates – the Gram Panchayat remains aloof and the Block Administration organises a bid – leaving all actors worse off except for the contractor and the state in terms of profit and revenue respectively. In fact, the institutional arrangement is such that there is no coordination among the different state agencies.

The new arrangement proves detrimental due to individual maximising tendencies of the actors involved, all in different ways; the state (in the form of the Gosaba Block Administration), the traders (in the form of the Chotomollakhali *Bazaar Committee*) and commuters, and the contractor. Gosaba Block Administration does what is least bothersome, legally acceptable, and generates assured revenue. With the intervention of the local Block Administration, the *Bazaar Committee* discontinues cleaning and upkeep of the *ghat*, the immediate interest is the use at hand, long-term consequence is perpetually deferred to next use; similar is the response of the individual commuter. For the contractor, the individual maximising tendency is the strongest; he levies user-fees based on the calculation of revenue paid plus profit, proportionately divided over the average number of users in a given financial year. Over time, *net benefit* declines because the contractor and the Block Administration operate outside the triangle of *trust*, *reciprocity*, and *reputation*, and being 'outsiders' their *interest* is short-term.

With the decline in *net benefit*, the *Bazaar Committee* steps in again in its own *interest* and that of the other traders. As the Block Administration yields space to the *Bazaar Committee* through withdrawal, there is *opportunity* for *spontaneous* collective action since the extent of *shared interest* is high, the *Bazaar Committee* is an *organisation* with *intensive involvement* of its members and is able to *mobilise* resources for repair and maintenance of the *ghat*.

Given the political polarisation and protectionism prevalent in West Bengal, e.g. 'clubs' (Section 3.5), the conduct of the head-loaders at Dhamakhali and vanrickshaw drivers at Chunakhali is neither surprising nor uncommon in the incidents narrated in the second sub-case. While collective action by the members of the two unions is successful, the prospects of achieving sustainable development goals – in

terms of choices available and the freedom to make choices, and overcoming the ills undermining human well-being – are weakened, a case of *second-order conflict* wherein successful collective action by the union members runs counter to larger social and/or public-good. This phenomenon of unionisation is evident in West Bengal wherever the state has yielded space through poor regulation and enforcement; poor regulation and enforcement could be deliberate. Unlike most other places where there are choices, in the Sundarbans, this phenomenon has a negative multiplier effect on the economy as well as ecology.

Availability of limited choices to consumers raises costs leading to inefficient use of resources and out-pricing the eco-region as a production centre for goods and services as will be evident in Chapter 7 in case of agricultural produce. It is the human frailty of short-sightedness that alters the driving forces in the form of mismanagement by state agencies and powerlessness of the people in a manner that the *perverse conditions* of poverty and oppression not only persist but deteriorate leading to a downward spiral. As poverty extends or even sustains at current levels, exploitation of the Protected Area as well as the riparian commons intensifies as will be evident in Chapter 8. Also, continued denial of choice results in downward adaptation, unquestioning acceptance of authoritarian interference, e.g. by clubs and political parties, and fatalistic tolerance of deterioration of the physical situation ultimately leading to lessened movement of goods and people which has a direct bearing on livelihood options of the people of the Sundarbans. The case studies on livelihood (Chapters 7-9) are treated as a separate category in this thesis but the first category of case studies (Chapters 4-6) the 'physical conditions' has a direct bearing on that former category either in an enabling way, or as a constraint.

The third sub-case is an example of linkage between sustainable development and collective action in the reverse order to that of the second sub-case. Legal provisions against use of cordless telephone and radio piracy are articulation of collective interest by the state. Absence of the services in question would bring down the net benefit and therefore, the community, the operators and agents of the state enter and remain in a relationship of trust, reciprocity and reputation for spontaneous collective inaction. This collective inaction permits provisioning of services that would otherwise be unavailable to the community leaving it with fewer choices and means of overcoming the ills that undermine human well-being. Thus it is not always the case that negative linkages will result in lowering of net benefit for the community. These linkages, however, get established for different reasons such as failure of collective action to co-opt the agency of the state, political patronage and regulation of the market, and unavailability of basic amenities to a community. The policy pointer here is not to legitimise what is illegal but 'licit' (acceptable to the community) as opposed to illicit (unacceptable to the community), but to create an enabling condition whereby the 'licit' but illegal activity makes way for a legal and 'licit' activity without any reduction of *net benefit* to the community.

Access to modern energy services

6.1 Introduction

"The agriculture and micro-enterprises sectors that together employ more than 30% of the population [in India] can become more productive and efficient through the provision of clean and sustainable energy options. Hence, in order to address the needs of sustainable development, it is necessary to examine the constraints related to rural energy and to find appropriate solutions that have a bearing across all sectors of rural development" (Srivastava and Rehman, 2006, p. 643). Moreover, for communities to flourish, the entire range of human activities – food production, education, health services, transport and communication, among others – need to be ensured, and energy services are the common requirements for all of these activities. Therefore, limited access to energy services is a serious constraint to development in the developing world where per capita use of energy is less than one-sixth of the industrialised world (UNCSD, 2001). However, use of fossil fuel for energy, as the basis for development is clearly not sustainable since the resources will eventually run out and there is the immediate danger of global warming as a result of waste products of fossil fuel combustion. The long-term aim in energy planning as far as sustainability is concerned must be for promoting development and prosperity (a) through gains in energy efficiency rather than increased consumption where energy access and use has reached a certain level, and (b) by a transition towards use of renewable sources or by providing energy supply from renewable sources² to energy deficit regions bypassing the pitfalls of conventional process of development since renewable energy sources are considered to be more environment friendly. Prior to mainstreaming of the concept of sustainable

¹Energy by itself is not useful, the services provided by energy in combination with appliances are. Examples of energy services are cooking, lighting, processing, communication, transport (Kooijman, pers. comm. Nov., 2006).

² Renewable sources are those from where energy is collected from the current ambient energy flows or are substances derived from them. These include electricity generated from geothermal, hydro, solar, tidal, wind and wave power, and bio-fuels such as fuel wood, bagasse, charcoal, animal and vegetable wastes, and other industrial and municipal wastes, provided these fuels are available on a sustainable basis

development, the extent of commercial energy³ use was taken as a measure of development.

According to the World Energy Investment Outlook (OECD/IEA, 2003), the strategy for promoting sustainable development in rural areas of developing countries must include: (a) clean liquid or gaseous fuels for cooking, and electricity for lighting and other basic needs; (b) liquid fuels to mechanise agriculture; and (c) electricity, sufficiently low in cost to attract industrial activity to rural areas. In fact, the justification for rural electrification is based on two general aims in the context of rural development: (a) raising the standard of living of rural people, and (b) boosting the rural economy. According to Clancy and Hulscher (1994), particular significance is attached to electricity because it is readily identified with modernity. This view persists despite such observations as, "It is rather naïve to think that electricity can lead in expanding economy and production. Other factors such as the availability of resources, skilled labour, entrepreneurship, transport and markets for the products are equally important, if not more so. It can be argued that if other factors are favourable, electricity will follow in some or other way" (Clancy and Hulscher, 1994; p. 353). Because relationships between energy and development are drawn such as, "The relationship between energy and development is illustrated by the fact that the population living below the poverty line in developing countries reduces as we move from a low level of electrification to higher levels" (Srivastava and Rehman, 2006; p. 643), energy provision in rural areas has become synonymous with the extension of the centralised grid to villages or erection of DDG (Decentralised Distributed Generation)/off-grid systems, and if electricity reaches a village its energy needs are taken to have been met. This approach has a flaw; electricity provision does not address the cooking and heating needs for which rural communities continue to depend on inefficient biomass-based sources of energy. Besides, not everyone within the village may be connected. Therefore, in order to link energy provision with sustainable development, the provision of lighting for households needs to be coupled with the provision for meeting thermal and mechanical energy needs.

Decoupling of increased throughput of energy and materials from development represents a major challenge of sustainable development⁴. The ratio of energy supply from renewable to non-renewable resources is accepted as a measure of a country or region's sustainability (UNCSD, 2001). Though there are no international targets or recommended standards for this indicator, it is considered that the higher the ratio the greater is the movement towards achieving sustainable development goals. This chapter examines whether such a notion is relevant for a region like the Sundarbans, and also examines the constraints related to rural energy.

³ Energy from coal, oil and gas, and electricity is considered as commercial energy whereas energy from fuel wood and agricultural farm waste is considered non-commercial.

⁴ Chapter 4 of Agenda 21 calls for an improvement of efficiency in the use of energy sources and for a transition towards environment-friendly use of renewable resources. Renewable resources can supply energy uninterrupted under sustainable management practices through a mix of technology options and their use in general, generates relatively less pressure on the environment.

6.2 Energy use in the Sundarbans

Estimation of annual energy use per capita for any geographical area, especially a rural area is a major task by itself, more so, for a region like the Sundarbans where population density is high (671/km²) and the population spread across 48 islands. Not unlike other parts of rural India, non-commercial energy accounts for between 60 and 90 percent of energy consumed, of which 90 percent is used for domestic activities (Ghosh *et al.*, 2004). Given the fact that the Sundarbans does not host any industrial enterprise worth the name, the bulk of commercial energy use is in transport, agriculture, fishery, and domestic sectors.

In transport and fishery sectors diesel is the predominant commercial fuel although many 'engine-vans' run on kerosene. Any attempt to quantify fuel consumption in the transport sector would throw up figures far below actual consumption since boats below a certain specification do not require any registration, and 'engine-vans', the numbers of which are increasing day by day, do not have any registering mechanism at all. Sale of diesel from fuel stations in the region could have served as a proxy for consumption estimation had the region not had a porous border with Bangladesh where petroleum products are relatively cheaper. Though smuggling of diesel is a known fact the quantum is anybody's guess. Another proxy could have been the figures maintained by the various transport unions but many forms of transport being informal or illegal, obtaining detailed information without the 'correct' party connection is difficult in West Bengal, more so since the CPI(M), the dominant political party in the leftist coalition which controls most of the unions, is relatively weaker as compared to some of the smaller leftist parties in the Sundarbans. There is distrust among coalition members (political parties) at the local level, thus local contacts are not of much help since they are identified with the locally dominant party and not the CPI(M).

Agriculture in the Sundarbans is mostly rain fed; use of energy is restricted to tilling and post-harvest processing in case of *kharif* (monsoon) crop. While tilling is mostly carried out using diesel powered machines, post-harvest processing involves manual threshing and boiling of paddy using agricultural waste, mainly straw and husk. In case of *rabi* (winter) crop, commercial energy use is higher in the absence of rain and the requirements of water management for irrigation using diesel powered pumps⁵, unavailability of adequate water in the season results in a single crop across most of the region.

In the fishery sector use of commercial energy in the form of diesel is predominant, but traditional fishers use row boats or boats with small diesel engines while fishing in rivers and creeks. Estimation of the number of fishing boats in the region is beyond the scope of this study as the smaller boats require no registration or licence except when fishing within the Protected Area.

The domestic sector uses a range of fuels, non-commercial as well as commercial, including LPG, the last being the rarest. Cooking and lighting are the main purposes

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⁵ The next chapter details the practice of *rabi* cropping.

for energy use. A range of biomass-based fuels like firewood, husk and straw, cowdung cakes, and a combination of cowdung and firewood or husk and straw are used for cooking. Kerosene and LPG are bought in cash but some of the households interviewed (36 in number) also buy firewood. Use of kerosene for cooking in households is rare but its main use is in lighting through energy inefficient wick lamps. Amongst the 243 households interviewed, 226 spend Rs. 135/- (\$ 3.00) per month on an average on kerosene for lighting, ten spend a higher amount of up to Rs. 400/- (about \$ 9.00) and the remaining seven have electricity connections (two of these households also have commercial electricity connection at the Markets). Domestic lighting remains poor due to the use of wick lamps and storm lanterns.

As of now very few families (5 out of 243 respondent families) use LPG for cooking since at Rs. 300/- (\$ 6.50) per cylinder plus cost of transportation, it is far too expensive for most residents of Sundarbans villages; on an all India basis, only 5.4 percent rural households use LPG (NSSO, 2001). However, demand for LPG in the Sundarbans is on the rise (see Photograph 6.1) because it works out cheaper than kerosene in the long run for eateries and tea stalls which are switching over to LPG (domestic cylinders) from kerosene and firewood⁶.

Industrial activity in the absence of road connectivity and formal energy supply mechanism at competitive price is next to impossible in the Sundarbans. Small industrial enterprises like ice factories, lathe workshops and grinding mills depend on local demand and their products cannot possibly compete, for example, at Kolkata markets. The agriculture sector is also plagued with low production due to inadequate surface water during winter and the expenses involved in drawing groundwater, and in the fishery sector, no processing takes place locally.

6.3 Rural electrification in the Sundarbans

Lighting in the Sundarbans has improved dramatically where West Bengal Renewable Development Agency (WBREDA) has set up stand-alone (off-grid) power stations. The power stations operate for between 6 and 12 hours a day, and use a combination of fossil fuel with a renewable source like wind power or biomass or are entirely solar photovoltaic. WBREDA was initially established as an agency of the Department of Science and Technology, Government of West Bengal, with the objective of promoting renewable energy technologies, particularly among industries. It is essentially an engineering organisation manned almost entirely by male engineers. Subsequently, WBREDA came under the Department of Power and Non-conventional Energy Sources, Government of West Bengal, and took over from

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⁶ LPG in India is a subsidised fuel for the domestic sector available in steel cylinders (commercial establishments are supposed to buy commercial cylinders which are not subsidised). Transportation of these cylinders back and forth between refilling stations and consumers is the major cost component in the per unit retail price of LPG which is fixed at Rs. 300/- (\$ 6.50) (for domestic cylinders) by the Indian Government. To cater to the demand in the Sundarbans and bring down the turn-around time of cylinders as well as to keep transportation cost low, one of the oil companies has devised an innovative mobile refilling unit. A large LPG container mounted on a tractor-trailer is brought close to the road head on the mainland to refill cylinders. Refilling equipment is also mounted on another truck. This does away with the necessity of transporting individual cylinders to main refilling stations. Moreover, the mobile unit can cater to different areas in this deltaic region.

the State Electricity Board the task of rural electrification in remote and inaccessible regions. It is participating in the Government of India initiative (*Rajiv Gandhi Grameen Vidyutikaran Yojana* – Scheme for Rural Electricity Infrastructure and Household Electrification) launched in 2005 for providing electricity to all rural households by 2012 through rural electrification. The Sundarbans villages are among the over 18,000 villages identified in India which are remote and inaccessible to the grid due to difficult terrain and prohibitive cost and therefore will have



Photo 6.1: Empty LPG cylinders being transported from Gosaba to be refilled

Decentralised Distributed Generation (DDG) or off-grid systems. WBREDA, however, has been establishing off-grid systems in remote areas since 1994, a year after its inception. In the Sundarbans it has established 13 Solar Photovoltaic power stations (with a capacity of 652.5 kW), all of which are still in operation, the first one being in 1996 at Sagar Island. The two Wood Biomass Gasifier power stations (of 500 kW each) at Gosaba and Chotomollakhali (both in Gosaba Development Block) are also WBREDA's work. The Agency with funding from the Ministry of Renewable Energy (Govt. of India) is about to construct a 3.6 MW tidal power station at Gosaba (close to Sainekhali Wildlife Sanctuary) although the maximum potential for generating electricity from tidal action is in Gujarat. The well-to-do in an around Gosaba are looking forward to the project in anticipation that they will have access to round the clock electricity as well as win some of the work contracts to be awarded locally. However, fisher folk and conservation organisations are concerned since one of the creeks will be blocked to serve as reservoir denying passage to fisher folk. Conservation organisations are concerned because the consequences of blocking a tidal creek are largely unknown or poorly understood in terms of impacts the tidal power station will have on the ecosystem.

Table 6.1: Details of power stations on field study islands

nvestment (US\$)	800,000 (approx.)	350,000
Inves (U		
Tariff (US\$)	1.5/2.8 flat rate ¹	0.09 /0.1/0.11 ²
Consumers*	450	1000
Cost/unit (US\$)	0.5	0.07
Commissioned	April 2001	June 2001
Capacity	55 kW	500 kW
Type of fuel	Solar	Wood- Diesel
Location	Bagdanga	Chotomollakhali
Type of project	Solar Photovoltaic	Biomass Gasifier

¹ Consumers are not charged per unit consumption, instead a flat rate is applied per month depending on the number of connection points, for three points it is US\$ 1.5 and for five points it is US\$ 2.8

The rates are for domestic, commercial and industrial consumers respectively #These are figures reported as of March 2006, the figures were lower during field work, Bagdanga had 250 and Chotomollakhali had 225 consumers

Prior to the launch of the Rajiv Gandhi Scheme for Rural Electricity Infrastructure and Household Electrification, which funds 90 percent of the project cost, rural electrification projects were implemented with financial assistance from the Ministry of Non-conventional Energy Sources, Government of India, to the extent of 50 percent of project cost. The remainder was met through assistance from the Government of West Bengal, MP LAD (Member of Parliament Local Area Development) fund, and a soft loan under the World Bank line of credit. Setting up of these off-grid power stations were supposedly demand driven wherein a Gram Panchayat would put forth its demand for electrification to the Panchayat Samiti. The Panchayat Samiti would prioritise the various demands and make recommendations to WBREDA, which in turn would short list the recommendations on the basis of merits of the sites considering the number of potential willing consumers, the location of the proposed sites and the route of a distribution line. A detailed project report would be prepared for the most suitable site and funding sought from the Government of India. However, in reality, WBREDA would send in feelers to a Panchayat Samiti regarding a particular location and the paper work would then be initiated at the Gram Panchayat level. The two projects listed below came along these lines.

The following two sub-sections describe the power projects on the field research islands and their impact. The cases demonstrate the flaw in the notion that electricity and energy are synonymous and clarifies that electricity 'supply' does not imply 'access' and brings out the missing linkage between electricity supply and sustainable development.

6.3.1 Electrification of Mousuni Island (Bagdanga)

A solar photovoltaic power project was commissioned in April 2001 with the Bagdanga Market as the load centre. The power station operates daily for 5.5 hours in the evening, the average supply has remained at about 100kWh per day (18.18 kW x 5.5 hours); less than half the capacity. Solar Photovoltaic power stations are designed with minimum two days of autonomy to cope with unavailability of full sunny days. At Mousuni, full sunny days average about 280 per year. To overcome the problem of cloudy days during monsoon months the power station has been fitted with a 20 kW wood biomass gasifier power unit in June 2006 as an auxiliary power source. The current level of revenue generated by the power station is good enough to cover the running expenses. For the first five years, maintenance including replacement if necessary is taken care of by the erecting contractor. The batteries (wet cells) have a life of 5-7 years and when it is time to replace them an additional investment will have to be made as will be the case for replacing sophisticated equipment like charger, charge controller, inverter and the solar panels which unless physically damaged can last for 20 years.

A local distribution network (mini-grid) delivers electricity to the Bagdanga Market and the neighbouring households, as well as the higher secondary school. The network covers about half of the Bagdanga *mouza* (which has an area of 6 km² with 691 households and about 200 shops) but more than half of the 450 consumers (domestic and commercial) are in and around the market. The power station caters to about 36 percent of the population of Bagdanga, not all households within the network area are electricity consumers since it is beyond affordability. The mini-grid

passes in front of the upgraded Primary Healthcare Centre (PHC) which for some reason is not a consumer. It is altogether a different matter that the six-bedded PHC is lying defunct since upgradation (at a cost of about US\$ 175,000) in 2001, due to unwillingness of trained personnel to be posted at Bagdanga. However, a diesel generator is kept running for four hours in the evening every day at the PHC for lighting up the place and occasional energising of water pumps. Running the generator is the responsibility of a contractor who is reimbursed for the diesel consumed, fixed at six litres a day⁷ by the Health Department, Government of West Bengal.

Next to the market and within the mini-grid network there is a saw mill which continues to operate on diesel. The power station cannot cater for heavy loads which is a technical limitation of the Solar Photovoltaic system.

Electricity from the solar power station is mainly used for lighting. Three other uses have been noticed at the market in three different shops viz., charging of wet cells, ironing of clothes, and using a small grinding wheel at a jeweller's. The last two activities are not permitted but all those who wish, have found ways to steal electricity and use it as they desire. In 2003, the idea of selling prepaid cards to consumers was floated by WBREDA so that theft of electricity could be minimised, but it has not been implemented yet. Due to the flat rate system of payment irrespective of extent of consumption, none of the shop owners switch off lamps when they down shutters for the day; householders also behave along similar lines.

The most visible change at Bagdanga since electrification is the increased number of people (males) in the market area in the evenings. People play cards at the market for longer hours and provide more business to tea stalls; this has resulted in an increase in the number of tea stalls. Other traders also claim increased business but are unable to quantify though tailors work till almost the power station is witched off. Expansion of the market is quite visible – new shops are coming up, shop spaces are reportedly being sold/rented at higher prices – but whether electrification is driving this expansion is not clear because the new shops do not deal in electrical or electronic appliances. Shops with workshops such as jewellers and tailors continue to work till late at night even after transactions have ceased for the day. The number of television sets in the village is also reported to have increased considerably. There is round the clock electricity at the Mousuni Gram Panchayat Office and at the power station where there is a public access tap for drinking water with continuous supply, though it is not of much use except for the immediate neighbouring houses.

The higher secondary school at Bagdanga has hostel facilities for boys and girls and the school teachers claim the students are studying for longer hours but the overall performance at public examinations do not show any marked difference. A former headmaster of the school though originally from East Midnapore District has remained on the island after serving for over 30 years. He does not see a connection

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⁷ This contractor hails from Bagdanga. Prior to electrification he used to sell electricity to the traders at the market. At the PHC, he has installed a smaller generator and decoupled the original one. The smaller generator consumes less diesel in the four hour period than the original, thus increasing his earning.

between availability of electric lighting and performance of the students and cites examples of his pupils who have gone on to become scientists, doctors and engineers even when there was no electric lighting. A private tutorial with facilities for resident students however is able to quantify the difference between pre and post electrification though not in terms of improvement in education but in terms of cost; it is now cheaper to run the tutorial because of the savings on the cost of kerosene which was earlier used for lighting. The tutorial now spends two hundred fifty Rupees (\$ 5.50) on lighting per month, one hundred and fifty Rupees (about \$ 3.50) less than earlier.

Despite electrification and the benefits that come with it, there are instances where individuals and households have chosen not to become consumers; Paresh Mondol is one such individual. His house is adjoining the market and can easily be connected to the mini-grid but he has instead opted for a stand-alone photovoltaic system comprising of a 74-75 watt solar panel, one 12 volt 75 ampere-hour battery, two compact fluorescent lamps, two plug points and a charge controller. Paresh Mondol has paid Rs. 3824/- (\$ 85.00) for the system that comes with a ten-year repair/replacement warranty. The system actually costs Rs. 21,544/- (about \$ 480.00) and the Government pays the difference as subsidy. Paresh's family watches TV, uses a ceiling fan and lights; they can energise either the TV or the fan at a time. According to Paresh the system pays for itself in a little over two years and for the remaining eight years or thereafter, it is for free. His calculation is based on the Rs. 125/- (\$ 2.80) (for five connection points) he would have to pay every month for the mini-grid connectivity apart from an initial deposit of Rs. 1000/- (about \$22.00), and that too for a supply of a fixed number of hours in the evenings. With the standalone system he and his family are free to watch TV as and when they wish to and in case of cloudy weather he can have his battery charged for a fee of Rs. 5/- (about ten cents) at a neighbouring shop. Paresh has a grocery shop at the market where he uses electricity from the mini-grid for lighting for which he pays Rs. 75/- (\$ 1.50) (for three connection points) every month.

6.3.2 Electrification of Mollakhali Island (Chotomollakhali)

The wood biomass gasifier power station operates for six hours daily in the evening; it has been in operation since June 2001. Biomass gasification is basically conversion of solid biomass into a combustible gas mixture also known as 'Producer gas', which is essentially low Btu (energy content) gas. The process produces carbon monoxide as well as hydrogen both of which are combustible. This gas is cleaned and directly fed into an already running internal combustion engine that runs the turbine for generation of electricity. Producer gas being low Btu gas, the diesel engine requires a continuous supply of diesel to maintain combustion. Typically, for producing each unit of electricity, the power station consumes about 0.13 litre of diesel and a kilogram of dried wood chips. Needless to say a sustainable supply of dried wood chips is a prerequisite for harnessing the advantages of the technology or else the power station will relapse into a conventional diesel power-generating unit. The generating unit has a distribution network covering about half of the Chotomollakhali *mouza* catering to about one-third of the *mouza* population; each of the consumers has a meter to record consumption, as there is no restriction to the

extent of consumption and type of use as defined within the categories of domestic, commercial and industrial⁸.

The power station has a lifespan of 15 years, which is not factored in the tariff structure. As of now the revenue that the power station generates is inadequate to meet running expenses due to steep upward revision of diesel price in a period of 3-4 years. Due to this, WBREDA wanted an upward revision of tariff in 2005 but the consumers resisted on the ground that if power generation is biomass-based then diesel price rise is irrelevant. Prior to commissioning of the project and also during energy plantation, WBREDA had repeatedly claimed that electricity would be generated largely from wood. In fact, villagers refer to the power station as the 'wood electricity project'. WBREDA now finds itself in a difficult situation due to the inflated claims regarding fuel replacement to the extent of 80 percent (WBREDA, 2003; Mondal, 2005) which one of their own suppliers (gasifier manufacturer) disputes on the ground that the engines being non-dual fuel, the replacement can at most be to the extent of 60 percent. Also, due to non-payment of dues by consumers there is a gap of about 40 percent between potential revenue (US\$ 1023) and collected revenue (US\$ 614) on a monthly basis (Mukhopadhyay, 2004).

A gap in revenue is not the only woe that plagues the power station. Irregular supply of biomass widens the gap all the more; the power station requires about 400 kilograms of dried wood biomass everyday. Although WBREDA claims to raise seven hectares of energy plantation every year up to a total of 40 hectares, the first plantation effort was made when construction was well underway. By the time land was identified and saplings planted, the power station was nearing completion but the first year plantation (of year 2000) would be ready to harvest only five years down the line (in 2005), the second year plantation in the sixth year and so on (Ghosh and Das, 2003). In the meanwhile, the power station procures wood biomass from the market. The first plantation effort of 2000 was carried out along roadsides and canal banks making the plantations public property rather than common property. In fact, varied responses from sections of the community to undertake collective action to maintain the plantations sowed the seeds of this research. I may add that because the plantations were not common property, there was reluctance to undertake collective action since most members of the community did not see any benefits accruing to them directly.

The power station was commissioned with the Chotomollakhali Market (with over 350 shops) as the main load centre. The Market is one of the largest on the Sundarbans islands but has gone into decline due to infrastructure development elsewhere. Since 2003, the larger traders have started diverting into other markets

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⁸ To keep the meter reading as low as possible and avoid pilferage, the Agriculture Growth Centre at Chotomollakhali (a commercial consumer) has instructed the power station to not provide electricity to the Centre from Friday through Sunday since the office remains unmanned during that period.

⁹ I was responsible as a part of the ENDEV (an NGO) team for raising plantations for sustainable supply of wood biomass at Mollakhali.

and downsizing their investment at Chotomollakhali. The Chotomollakhali-Dhamakhali boat service during the day has been discontinued around the same time; the night service is still in operation and is mainly used by fish traders. One of the probable reasons for this erosion of prominence of the Chotomollakhali Market is due to the construction of an all-weather metalled (asphalt) road on the opposite island to the north, the road leads up to Dhamakhali, a road head on the mainland (see Section 5.2.1, Chapter 5). Although WBREDA claims to have revitalised the village economy and that electrification has led to the setting up of an ice factory and other industrial activities on the island (WBREDA, 2003), the only ice factory at Chotomollakhali predates the power station. The other potential consumer, a grinding mill, has not opted for an industrial connection since the hours of availability of electricity is at odds with its hours of operation, moreover, the mill owner is looking for opportunities to move out of Mollakhali as he feels that with improved road connectivity in the region, the Market will become insignificant over time. This power station is capable of driving small industrial machinery but the nearest saw mill continues to run on diesel since the mini-grid has not reached the area where the saw mill is located. Unlike the Mousuni power station which has technical limitations, this power station is underutilised due to management issues like hours of operation and distribution network.

Prior to electrification, traders had to depend on privately owned diesel generators as in Mousuni. Not only was the quality of power poor in terms of low and fluctuating voltage, it was about four times more expensive. The upgraded PHC that earlier depended on a captive source now draws electricity from the mini-grid for the time the power station is in operation. Beyond supply hours, the PHC usually uses kerosene storm lanterns. The school hostels earlier depended on kerosene lamps, now use compact fluorescent lamps, which in terms of quality of light are a big positive difference. As is the case in Mousuni, people are in the market area for longer hours as compared to pre-electrification days, but there are also similarities in instances of individuals/households and commercial establishments choosing not to become electricity consumers despite being within the catchment of the mini-grid. The three following narratives provide the reasons.

Ratan Ghosh has a busy eatery at the Market, which he runs with the help of his two older sons. His only daughter is a bachelor's graduate and lives in the northern suburbs of Kolkata with her husband's family. Ratan's youngest son lives with that family to be able to pursue a bachelor's degree in Chemistry at a college in Kolkata. Ratan had to take out the second son from school as he could not afford it at that time due to his daughter's wedding which required a hefty dowry. Ratan is keen that his youngest son pursues education as far as possible and sends him all the money he can save. At this stage, a domestic electricity connection is wasteful expenditure according to Ratan which will not only entail a recurring expenditure but also connection fees and costs of installation of electrical fittings and appliances.

Ashok Gupta runs a relatively large business at Chotomollakhali. He has three grinding machines, eight diesel engines, five alternators, three passenger boats, and a number of wet cells, all of which he rents out, except the grinding machines. He also rents out shop space at the market. His only son lives in Kolkata to pursue higher education. He could be one of the larger electricity consumers of the power station

(domestic, commercial, as well as industrial), but he has opted for only a commercial connection at his shop at the market. He runs his grinders on diesel because electricity is available only in the evening hours and most of the grinding takes place during the day. The commercial connection at his shop is used to charge wet cells that he rents out. In his house he uses electricity from a battery-inverter unit. One of his employees who stays with him, carries a recharged battery to connect to the inverter. Ashok and his wife watch TV, use ceiling fans and fluorescent tubes as and when they wish. The inverter unit meets their electricity demand adequately. Ashok feels that his house is already electrified at practically no additional cost and sees no reason to become a domestic subscriber of the power station.

During field research (2002-03) on the island, the only ice factory was recorded as a non-consumer of the power station; it had a captive diesel engine. At that time diesel was about twenty Rupees (\$ 0.40) cheaper than what it is in March 2007 and therefore had no incentive to switch over to electricity. Moreover, the factory would have to make investments in machinery so that it could operate either mechanically or electrically. The changes were made in February 2005 because operating mechanically was proving to be more expensive due to increased price of diesel. The factory now saves money by operating electrically in the evening hours but continues to depend on the captive source during non-availability of electricity during the day.

6.4 Analysis

This chapter is less related to collective action per se, but foremost to sustainable development and attempts to assess the prospects of attaining sustainable development goals in the context of access to modern energy in the form of electricity. According to Srivastava and Rehman (2006), to achieve sustainable development the constraints related to access to modern energy services need to be overcome, and agriculture being the mainstay of the Sundarbans economy, energy requirements of this sector need to be addressed on a priority basis, but the two electrification projects in question do not in any way contribute to the sector, not even in terms of energising water pumps for irrigation during rabi (winter) season and maintaining storage facilities for agricultural produce by replacing fossil fuel. For that to happen, projects such as the one at Mousuni and Mollakhali islands need to overcome technical and management limitations. A solar photovoltaic power station by itself may not be capable of driving machinery but in combination with other types, such as a biomass gasifier, may cater for such demands. The power station at Mousuni has been augmented with a biomass gasifer, but as an auxiliary source rather than a complementary one. Even if the power stations did replace fossil fuel for energising pump sets and storage facilities, the benefits would invariably accrue to the better off since it would entail additional investment as in the case of the ice factory at Mollakhali (Subsection 6.3.2), thereby bypassing the issue of social sustainability. However, the electricity distribution network lays greater emphasis on domestic consumers rather than industrial consumers based on the common misconception that supplying energy (particularly electricity) would encourage production. In almost all cases, in practice, energy follows rather than leading the economy as noted in the following paragraph based on my observations at Mollakhali and Mousuni. Due to this misplaced emphasis on supplying electricity to domestic consumers the opportunity for optimum capacity utilisation and boosting the local economy is missed, so is the opportunity for minimising the revenue gap. Administering many smaller consumers is more expensive as opposed to a few larger ones, and administering the smaller ones along with the larger ones may not be proportionately as expensive in terms of cost per kW supplied. Though it may not be possible to currently meet all the energy requirements from renewable sources, regions such as the Sundarbans do provide the opportunity to bypass the pitfalls of conventional development, as well as operationalise the strategy for sustainable development as articulated by the World Energy Investment Outlook if the technical and management issues are addressed and other fuels are brought within the ambit of energy planning. As of now (March 2007), even the justification for rural electrification based on the general aim of: (a) raising the standard of living of rural people, and (b) boosting the rural economy are unmet. From the cases presented it is apparent that the standard of living improves only in terms of improved lighting arrangement and that too for those who can afford and are within the distribution network; not more than 33 percent of the population in each of the mouzas can afford electricity and are within the distribution network. The majority of the population remains outside the ambit of the projects. Also, realities are constructed differently by different sets of individuals and organisations since not all households or small industrial units choose to become consumers even if they can afford to although there are certain psychological benefits of electrification difficult to quantify, such as a sense of modernisation and social progress. Also, for an organisation like WBREDA, the immediate reality is that of generation and distribution of electricity at remote locations using renewable resources. Financial sustainability is a real concern for those organisations that run on commercial principles.

A boost to the local economy or economic progress due to electrification is not apparent on either of the Markets. Householders are charged at a lower rate than commercial or industrial consumers; in a way encouraging households rather than movers of local economy to become electricity consumers. Therefore, a boost to local economy does not appear to be the purpose of the projects. The Bagdanga Market is expanding while the Mollakhali Market is losing significance due to other interventions elsewhere such as better road and rail connectivity; while the main road on Namkhana Island (adjoining Mousuni and the gateway for Mousuni to anywhere on the mainland) has been improved and the railway track extended on the western side, there is a metalled (asphalt) road almost connecting Mollakhali to the bus route to Kolkata. Therefore, electrification as an agent of the changes on the islands is difficult to prove. Moreover, it is usually one of a number of changes taking place in rural areas at a given point in time, which in synergy contribute to rural development. Also, there is the issue of sequence. Supply of electricity in the absence of resources, skilled labour, entrepreneurship, transport and markets cannot bring about an expansion of the economy and production. Rather, as Clancy and Hulscher (1994) have argued, electricity will follow where the situation is conducive as evident from the fact that both the Markets had access to electricity prior to the off-grid power stations albeit of poorer quality and more expensive for at least 30 years preceding formal electrification. As of now (March 2007) electricity on the islands is incapable of attracting any industrial activity, even the Biomass Gasifier power station at Gosaba which operates for 12 hours a day, by the end of 2006, has

had just one industrial consumer, that too was the telephone exchange and not a manufacturing unit though it must be said that the telephone exchange has vastly improved telecommunication as compared to the experience of the 1990s.

Under the given circumstances in the Sundarbans the ratio of energy supply from renewable to non-renewable sources as a measure of sustainable development does not appear relevant since the basic modern energy demand remains unmet, and for such regions even if all the energy supply at current levels were met by renewable sources, there would be no perceptible movement towards sustainable development goals since none of the ills undermining human well-being as identified by Holdren et al. (1995) are addressed. The perverse conditions characterised by poverty and wastage of human potential persist, the driving forces in the form of misdistribution of investments and mismanagement remain unaltered and the underlying human frailties of short sightedness and ignorance continue to guide development initiatives. All of these are evident from the fact that the investment in the Solar Photovoltaic Power Station is almost five times larger than the investment in the Primary Health Centre at Bagdanga, and it can be argued that if the same amount were to be available for healthcare delivery, trained personnel could be induced to take up postings at remote places though currently the West Bengal Government does not have provisions to raise salary of its staff selectively to induce them to take up postings at less desirable locations. This is in line with the observation made by Clancy and Hulscher that "investment in electricity generation represents a diversion away from other investments, for example for each US\$ spent on education or health, US\$ 8 are invested in the power sector" (Clancy and Hulscher, 1994; p. 351).

Even the very basic interpretation of sustainable development of Lele (1991) wherein traditional development objectives are to be met in conjunction within ecological constraints, remain unmet as evident from the Mollakhali sub-case given that the power station relies on supply of wood biomass from the market. This is even after an accepted plan to have regular supply from captive energy plantation; 30,000 plants were grown over a period of five years. A harvest cycle of five years was planned but the first batch is yet to be harvested. While on the one hand, there is concern for conservation of mangroves, on the other, there is increased demand for biomass and in the absence of a sustainable harvest from a captive plantation there is every possibility that part of the biomass is harvested from the Protected Area, given its proximity and the propensity of the landless to venture into the Protected Area. Thus, two contradictory forces are in operation within the state domain. Also, in terms of inter-generational equity and universality of claims as articulated by Howarth (1997) as well as Anand and Sen (2000), the electrification initiatives appear all the more dubious in the context of sustainable development since for a vast majority of those interviewed (236/243) across both field study islands, electricity does not figure among the top five priorities simply because for most of the households it is beyond affordability. For those who can afford, stand-alone photovoltaic systems provide a viable alternative 10. Moreover, there is no provision

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¹⁰ The two field study islands do not exhibit any difference on account of access to electricity, its use and impact.

for replacement of capital equipment (through amortisation costs) which in case of the gasifier power station will become necessary in 15 years and in case of solar photovoltaic power station, even earlier in about 7 years for batteries, since inception.

"Rural energy provision [in India] has been basically driven by target-oriented and subsidy-driven national programmes that have either been technology centric (national programme on biogas development, national programme on improved cook stoves) or end-use centric (programme for provision of a single light point in each home) without having any interlinkages" (Srivastava and Rehman, 2006; p. 644). The basic purpose of subsidy on fuels and electricity to stimulate economic growth and production has been lost and instead has become an end in itself, mechanical and thermal energy needs continue to be met as in pre-electrification days. The power stations in Mousuni and Mollakhali put up at costs of US\$ 800,000/- and US\$ 350,000/- respectively are manifestations of targets achieved. If lighting were to be the sole purpose, then according to TERI's experience Solar photovoltaic (SPV) lanterns costing about US\$ 28/- each could have been a sustainable and workable solution to rural household lighting. Moreover, the savings from solar lighting (instead of kerosene lighting) could be used for replacement of battery (TERI, 2005). This approach could have provided more than one solar lantern to each of the residents of Mousuni Island for the cost of the power station which serves only 30 percent of the population of just the Bagdanga mouza. This emphasis on rural electrification, according to Clancy and Hulscher is because "the main parties interested in electrification programmes ... are the consumer, the utility company, the government, the power sector industry, and one or more consultancy companies" (Clancy and Hulscher, 1994; p. 366). It is natural that all these parties push for electrification and any opinion to the contrary is politically incorrect.

6.5 Postscript

Now with the launch of the new scheme (Rajiv Gandhi Grameen Vidyutikaran Yojana, 2005), it is likely that every habitation/village in the Sundarbans will receive connectivity through at least one distribution transformer connected to the local DDG system. The Rural Electrification Corporation (GoI) will provide 90 percent of the capital cost, the State Government may provide the rest or it may come from Local Area Development Fund of provincial/national legislators. The basic difference in approach from earlier initiatives is that the new power stations will provide electricity round the clock even in remote locations without discrimination and at par with urban locations which has the potential to boost and expand local economy. But for all households to benefit, mechanisms such as differential tariff based on income need to be found so that the poorest households can also subscribe, which the scheme leaves up to the State Government. Given the political polarisation in West Bengal it is quite possible that implementation will not be uniform, political affiliation will decide the level of poverty and access to electricity as is currently the case in identification of individuals below poverty line, and in the process jeopardise the prospects of attaining sustainable development in the context of rural electrification. Also, there is the possibility that the compulsion to provide round the clock electricity and increased demand may push renewable resources beyond what is locally feasible. A combination of technologies and resources may prove to be the solution where WBREDA's varied experiences with

different technologies and resources may just make the difference between sustainable and unsustainable development but that process will need to factor in the livelihood options and preferences of the people of the Sundarbans. The next part of the thesis consisting of three chapters looks at these options and preferences in the context of sustainable development, beginning with agriculture.

Agriculture

7.1 Introduction

Farming in the Sundarbans is primarily an individualised household activity but there are aspects of collective action in it, particularly in water provision. *Spontaneous* collective action and institutional arrangements for appropriating water by farmers will help illustrate the collectivistic aspects in farming (see Chapter 2, Sections 2 and 3, for institutional arrangements for exploiting common property and different forms of collective action). Before describing the current agricultural scenario in the Sundarbans, I will first provide a brief historical overview of farming in the eco-region, in order to put the developments of this section in perspective.

From Hunter's account (1875 [1998]) it is learnt that groups of *abadkari* (clearers) cultivators from northern tracts would travel by boat to the Sundarbans twice a year to collectively broadcast and harvest paddy on their individually held abads or clearings. After sowing their native land, they would arrive in the Sundarbans to broadcast salt-tolerant paddy seeds, and come again, to harvest the same after having harvested their native land. This arrangement seemed logical given the lay of the land and periodic tidal flooding, but over time the broadcast method as well as salttolerant variety of paddy was replaced by manual transplanting-sowing method and freshwater variety of paddy. Two developments brought about this change, (i) forest clearing where the delta-building process had reached some order of maturity during the reigns of Hindu and Muslim rulers, and (ii) construction of circuit embankments and occupation of low-lying tracts under the British colonial administration. Moreover, there was always the preference for paddy cultivation despite abundance of fish varieties in the eco-region due to caste and religious preferences, as well as the fact that rice being non-perishable as compared to fish and other edible estuarine/marine life forms, provided a commodity that could be stored and traded (thus, taxed); it also provided food security to the cultivator (see Chapter 3, Subsection 3.1 for reasons for preferring rice cultivation over fishing). "... Both Hindu and Muslim governments in Bengal favored the culture of the peasant – sedentary, docile and productive – to that of the semi-nomadic fisherman. [...] Over the centuries, as ever more silt was carried down the great rivers and was deposited

¹The original salt-tolerant varieties of paddy have been lost and now through genetic research a new variety of salt-tolerant paddy is being created. The genetically modified variety is yet to receive biosafety clearance.

on the deltaic plain, the fish bearing lagoons (*bil*) that were formed in depressions in the soil gradually dried up. As this happened, the indigenous peoples shifted their livelihoods accordingly, relying less upon fishing and more upon cultivation" (Eaton, 1990; p. 14).

With the expansion of the agricultural frontier and permanent settlement of lowlying tracts, the contradiction between the practice of freshwater agriculture and the natural topography came to fore. The land was capable of producing only a single crop of paddy due to scarcity of freshwater (outside the monsoon period); agricultural activity was thus restricted to this single crop except for cultivation of some vegetables on homestead land for domestic consumption. Measures were initiated in the 1970s to change this situation, efforts were made by the state to introduce a second paddy crop and vegetables during the dry winter months but scarcity of freshwater led to failure of the initiatives. It was only in the 1980s when the Sundarban Development Board (SDB) with assistance from the International Fund for Agricultural Development (IFAD) implemented the "Sundarban Development Project" during 1981-89 at a cost of US\$ 36.2 million (www.ifad.org)² that the practice of raising a second crop gained momentum. This World Bank cofinanced project's goal was to improve agricultural production potential in the ecoregion. It supported activities focussed on improving drainage and water control for the wet season crop and expanding irrigation facilities for dry season (winter) crops. The project reportedly achieved 91 percent of its drainage and irrigation targets and benefited 1.2 million people; these irrigation canals are locally known as IFAD khals (canals) and are state property³ but user rights are defined and exercised through collective action (e.g. Olaotha khal on Mousuni Island and Sarak khal on Mollakhali Island). The Sundarban Development Project was successful in its own terms but over time the IFAD *khals* became unusable for the purpose they were created. Primarily, due to lack of collective action, the sluice gates became ineffective rendering the water salty, and even where the sluices have been restored the khal itself has become derelict. Despite the preference for agriculture and the relatively large investment, the practice and the people dependent on the practice remain vulnerable and the prospects of attaining sustainable development goals in the context of agriculture in the Sundarbans remain uncertain.

The following sections describe the agricultural scenario in the Sundarbans (7.2), the role collective action plays in agriculture particular in distribution of water during dry winter season (7.3), and how farmers negotiate the constraints within which they have to operate (7.4). Finally, in Section 7.5, the chapter analyses how the prevailing limitations weaken the prospects of attaining sustainable development goals in the context of agriculture in the Sundarbans.

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² http://www.ifad.org/english/operations/pi/ind/i049in/index.htm as viewed on 20 October, 2006.

³ The IFAD *khals* being state property, rather common property, there is no joint effort to maintain these. As a consequence, over time many of these have become derelict. Due to this experience the SDB has almost discontinued the practice of constructing canals. Instead, since 2005, it has floated a scheme for freshwater ponds creating private property in anticipation that private properties would be better maintained than common property. The property owner has to contribute only 10 percent of the cost incurred; the rest is borne by SDB.

7.2 Agriculture in the Sundarbans

Agriculture is the mainstay of the economy of the Sundarbans despite the geophysical adversity and the fact that 56 percent of the population is landless. In West Bengal in general, marginal farmers constitute the bulk of the peasantry (about 75 percent)⁴, and it is no different in the Sundarbans. This, despite the highly acclaimed land reforms carried out by the leftist government in West Bengal. The West Bengal Land Reforms Act, 1971 allows 5 standard hectare (ha) of irrigated land or 7 ha of unirrigated land for a family of 5, and ½ ha for each additional family member up to a maximum of 7 ha but, in reality average landholding size of a marginal and small farmer in West Bengal is only 0.41 ha and 1.49 ha respectively, and even if all the land on the field research islands were to be distributed evenly, each family would be a marginal farming family with only 0.72 ha and 0.63 ha in Mousuni and Mollakhali respectively according to census figures of 2001⁵. In West Bengal, farmers with land holding below 2.5 acres (1 ha) are defined as marginal and the ones with land holding between 2.5 and 5 acres (2 ha) are deemed as small farmers. However, the concept of marginal and small farmers as perceived by the peasantry of the Sundarbans is a few notches below that defined by the State, a farmer with a holding of between 0.13 and 0.27 ha (1-2 bigha) is considered marginal while a farmer with agricultural land between 0.27-0.67 ha (2 and 5 bigha) is perceived as small. A small farmer with a relatively small family of 5 members is able to subsist without having to work on someone else's land or seasonally migrate for work. Households with less than 0.13 ha (1 bigha) of agricultural land are considered practically landless though I have come across eight households that have no holding at all but still consider themselves as farmers (through their secondary occupation, see first three rows of Table 7.2). Such farmers grow paddy for domestic consumption on seasonally 'leased' land during the rabi (dry winter) season. In the kharif (monsoon) season, paddy is the only crop, but crop produced in the rabi season is diverse, apart from paddy, vegetables and oilseeds are also cultivated. These were introduced through the 1970s and 1980s as cash crops by the Agriculture Department, Government of West Bengal, through the office of the Agriculture Development Officer (ADO) at the Development Block level, the Sundarban Development Board through the Agriculture Growth Centres (AGCs) at the sub-Block level (27 of them), and initiatives of NGOs like the Rama Krishna Mission (RKM) in Kultali Development Block and the Tagore Society for Rural Development (TSRD) in Gosaba and Sagar Development Blocks. Since then cultivation of winter crops has become an important economic activity in the ecoregion. The winter crops are also important from the perspective of conservation efforts in the eco-region since it keeps people away from venturing into the Protected Area and thus, the Forest Department (Sunderban Tiger Reserve), Government of West Bengal, and WWF-India through the Sundarbans Programme, also contribute in raising productivity and the extent of farming during winter by restoring derelict freshwater canals, and providing mechanised farm implements. For example, in Mollakhali, the STR has restored part of the Marichihapi khal and

⁴ 'Agrarian Scenario of West Bengal' official website of Agriculture Department, West Bengal. http://www.wbgov.com/e-gov/English/Departments/DepartmentFrameNew.asp?Dpld=5 as viewed on 24 November 2006.

See Table 7.2 for a break-up of landholding of the sample population.

provided solar lighting sets through the local Forest Protection Committee (FPC) while WWF-India has re-excavated part of the Sarasa *khal* apart from providing pump sets, power tillers and a tractor to the Gobindapur Palli Unnayan Samiti, a community-based organisation ('club')⁶. Due to the experiences of SDB and Forest Department as well as its own experience at Mollakhali as regards collective action for restoration of freshwater canals, WWF is attempting course correction by intertwining *interest* of different social categories/groups so that re-excavation is possible without external aid though it is likely that as with Government initiatives through Ecodevelopment Committees/Forest Protection Committees (EDCs/FPCs) the better off will derive greater benefits than the target population.

Important cash crops of the region apart from paddy in the two seasons are chilli pepper, watermelon and cucumber, different varieties of gourds, pumpkin, tomato, and oilseeds like sunflower, mustard and sesame. Profit margins from vegetable crops are reported to be higher provided the market is buoyant. In the eastern part of Sundarbans, cultivation of watermelon though profitable has been practically discontinued because transportation and storage of produce pose problems. Also, the period when watermelon is ready to harvest, coincides with hailstorms causing extensive damage to the crop while still in the field or while being transported in open boats. Though oilseeds were promoted as cash crops, the produce is consumed domestically because the market for oilseeds is not well developed in the eco-region and farmers have to depend on government procurement which is quota driven, once the quota is reached the market crashes which does not allow farmers to recover cost of production. The Rama Krishna Mission at Nimpith (Jaynagar Development Block) procures oilseeds but for farmers of Mousuni and Mollakhali, getting their produce to Nimpith is not a viable option. The Agriculture Department (the office of the ADO) or the Sundarbans Development Board (the AGCs) do not concern themselves with marketing of produce, the Agriculture Department in particular is concerned with activities relating to policy decisions on agricultural production and productivity, and its extension through technology generation, transfer of technology, ensuring availability and timely distribution of agriculture inputs especially seeds, fertilisers, subsidy, and credit along with support services like soil testing, soil and water conservation, seed testing and certification, planned production, and quality control of fertilisers and pesticides. The SDB through the AGCs provide extension services in terms of availability and timely distribution of agricultural inputs especially seeds and support services like soil testing, soil and water conservation, and demonstration of cultivation techniques. The farmers however, depend more on the fertilizer shops for inputs and information than on the ADOs and AGCs, none of my respondents has ever received any demonstration from the AGCs or have had their field tested for soil characteristics. The ADOs are based at the Development Block Headquarters and for farmers who are from distant islands, it is difficult and time consuming to avail of the services. The AGCs though more disperse are less motivated and the one at Chotomollakhali presents a sorry picture. This AGC is under the jurisdiction of the Canning Branch Office of the SDB. The officials at the AGC cannot entertain requests for a particular variety of seed from the farmers; they can only distribute what they receive. It is usually the

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⁶ See Chapter 3, Section 5, for a description of a 'club'.

Gram Panchayat which selects the beneficiaries of seed distribution and not necessarily the ones who are keen to experiment and innovate since beneficiaries are selected on the basis of political considerations. This leaves the officials of the AGC with nothing much to do, all six of whom are from outside the active delta region. In fact, they man the office by turns while the rest are supposedly on field trips, the person manning the office spends the night in the office itself thus saving personal establishment cost. The power station has been instructed not to provide electricity to the office from Friday through Sunday because the officials by their own admission leave the island by 11:00 hrs on Friday and return on Monday around 16:00 hrs (see Footnote 8, Chapter 6). The officials appear quite satisfied with the arrangement which allows them to attend to personal work during the week and be with their families on the mainland and attribute this 'convenience' to poor communication and isolated existence.

The Markets at Chotomollakhali and Bagdanga have six and two licensed fertilizer shops respectively (licensed by the Agriculture Department). These shops stock fertilizers, micronutrients, pesticides as well as some seed varieties though except for paddy seeds, most farmers depend on seeds from earlier crops of their own or that of relatives and neighbours. Each of the fertilizer shops has a regular clientele of between 100 and 300 farmers who depend on the shop owners for advice on use of chemical fertilizers and pesticides. Until 2002, the shop owners received training from the manufacturers as well as credit from the dealers which they extended to the farmers. The fertilizer shop owners report that around 2002, the agrochemical market was consolidated by a few large companies and changed from being a buyers' market to a sellers' market from the perspective of shop owners and farmers thus training and credit facilities were withdrawn, consequently farmers who require credit have to borrow from moneylenders. The shop owners also feel the squeeze because of the lower off take of chemical fertilizers (which is actually good in ecological terms) and increased competition from newer shops which are coming up in the localities. Fertilizer shop owners at the Markets claim that between 1998 and 2004, the number of fertilizer shops has doubled. Credit from moneylenders is a very expensive proposition, interest rates range between 36 and 60 percent per annum. Many of the farmers are not eligible for credit extended by the State Government for a number of reasons such as not owning land, unclear land title, and default on previous loan; 45 of my respondents (out of a total of 80) are ineligible for government credit facility.

Households with no landholding or marginal holding take land on 'lease' for a season at a time during the dry winter season from relatives and neighbours to mostly produce paddy for self-consumption. Inability to produce paddy for self-consumption is a matter of shame for a cultivator household. The 'lease agreement' is usually verbal and informal, and if the leasee for some genuine reason cannot pay the entire agreed amount which varies between Rs. 200-400/- (\$ 4.50-9.00) per bigha (0.13 ha) per season, the leaser does not make much of an issue and accepts reduced payment in cash or crop yield. However, there is no reverse mechanism to charge more as rental in case of a bumper crop. This mechanism works due to kinship ties, and the 'letting off' is governed by social mores and values wherein it is unjust to cash-in somebody's distress. The leaser does not want to be seen as someone who takes advantage of difficult times of his relative or neighbour. This

'old' value still dominates lease agreements probably due to agriculture being an ancient practice, and the earlier socio-economic structure where market was not the prime mover.

Relatively smaller families (with five members or less) with 0.27 ha (2 bighas) or more of land can afford to produce cash crops which can be vegetables or paddy. Decisions regarding the type of winter crop are based on many factors as will be evident in Section 7.4, but, for the landless or marginal and the well off it is fairly straightforward, the choice is invariably paddy probably because it is a traditional crop and requires no intensive management and day-to-day care. Farmers report ease of cultivation, food security, and less risk (minimum support price declared by the Government), and non-perishability as the factors responsible for large-scale preference for cultivation of paddy.

Unlike paddy, cultivation of vegetables during the *rabi* season is more demanding in terms of labour and infrastructure. Vegetable crops require more skilled labour for soil preparation, continuous attention to individual plants at various stages of growth, watering and harvesting, giving rise to a clutch of service providers. Some of these services are purchased outright, some others are exchanged or paid for in kind, while still others are organised through collective action. Usually, rent for equipment is paid for in cash, labour is exchanged, and water is managed through collective action. Section 7.3 will illustrate water management through *spontaneous* collective action in some detail. For example, in case of a locality where most farmers are cultivating chilli pepper, labour for watering and tending the individual plants is exchanged (mostly women but also men) but labour for harvesting is paid in kind (mostly women and children) while transportation and storage of water is organised communally by men; for every 10 kilograms of chilli plucked, the harvester receives 1kg of chilli pepper which s/he is free to sell.

Depending on plot size, either tractors or power tillers are used for soil preparation. Two of the large farmers at Mollakhali own tractors which they rent out along with the driver for a fee of Rs. 3750/- (\$ 83.50) per ha or Rs. 500/- (\$ 11.00) per *bigha* (fuel excluded). Tractor owners from outside the Sundarbans, as far away as Haryana and Punjab (about 1500 km away to the west) enter into contracts for tilling land and bring over their tractors to the islands for the purpose; Mousuni usually has a tractor for tilling from Haryana for a particular time of the year. Power tillers are more readily available on the islands and can be rented for Rs. 3000/- (about \$ 67.00) per ha (Rs. 400/- (\$ 9.00) per *bigha*), driver and fuel included. Mid-size farmers (landholding 2.7 ha), farmers' associations and NGOs own power tillers, pump sets and other equipments; pump sets (without fuel) and manual threshing machines can be hired for Rs. 40/- (\$ 0.90) a day. Larger farmers also have husking machines but it is cheaper to have rice husked at the Markets; if it is meant for sale only then it is taken to the Market or else it is husked locally.

⁷ Farmers' associations are promoted by the leftist parties, CPI(M) in particular. Such associations have formal membership and political affiliation. A collective-action organisation but not of the *spontaneous* kind, not statutory thus not *institutionalised* either but formal (see Chapter 2, Section 3, for different

forms of collective action).

The Markets on the islands have designated *haat* (open market) days, usually once a week; itinerant traders buy local produce from the farmers on these days. On other days agents of traders who are local residents make rounds of the villages to buy produce at cheaper rates. Agents also extend small loans (between Rs. 3000/- (\$ 67.00) and Rs. 5000/- (\$ 111.00)) to the farmers and once a loan is taken then it is obligatory for the farmer to sell his produce to the particular agent. Produce procured by the agents is not routed through the local Markets but is directly sent to larger markets at places like Canning, Kakdwip and Bashirhat from where it is sent to Kolkata and its suburbs. Farmers seldom take their produce to these larger markets because (i) transportation is difficult, and (ii) farmers do not feel confident operating in these larger markets. Under such circumstances price realisation for the farmers is poor and return on investment inadequate. Moreover, storage facilities on the islands being non-existent, farmers are desperate to sell their produce at the earliest. In fact, one of the reasons for chilli pepper and paddy being preferred is that dried red chilli pepper and rice allow the farmer to exercise some control over the timing of sale, for other crops a farmer has no control over the timing of sale. Lack of storage leads to a glut in the local market, depressing prices and there are instances where the farmer does not recover even the cost of production since there is no minimum support price (declared by the Government) for vegetables as in the case of food grains.

Farmers in western Sundarbans usually receive better prices for their produce as compared to farmers in eastern Sundarbans in absolute terms as well as share of retail price (see Table 7.1). There are two reasons for this, (i) rail and road connectivity is better in western Sundarbans and (ii) there are more markets along the road on the western side for the farmer to choose from, the farther he takes his produce, the better price he receives. For farmers of eastern Sundarbans, this is not an option since the nearest railhead is at Canning but getting there involves a number of changes in mode of transport and is tide dependent as there is no bridge across the Matla River.

My findings are based on interactions with 80 farming households (49 from Mousuni and 31 from Mollakhali) of which 27 are primarily fishers of different kind (18 fishermen, 5 shrimp farmers and 4 shrimp seed collectors) but claim to be farmers reflecting the bias for farming over fishing. These farming households either produce paddy for self-consumption or cultivate cash crops during the dry winter season as a secondary means of livelihood. Details of the respondent households are as in Table 7.2.

7.3 Collective action in agriculture

The Sundarbans receive about 175 cm of rain on an average every year but most of it is during June through September, sporadic rains occur in pre- and post-monsoon months of April, May and October, November. Thus, availability of water is uncertain in the *rabi* season unless secured in advance. Water is stored in canals, ponds and roadside ditches (*nayanjuli*) and is available for agricultural use in the dry season. Ponds are private property as is the water in it, public use of private ponds is restricted to domestic use and bathing. *Nayanjuli* are public property, these ditches

Table 7.1: Price realisation by farmers and producer's share in consumer's price $^{\rm 8}$

	Average price realised (Rs./kg)	ealised (Rs./kg)	Share of ret	Share of retail price (%)
Casil clop	Mousuni	Mollakhali	Mousuni	Mollakhali
Rice	8-9	5-8	54-72	45-72
Potato	က	2-3	50	33-50
Dried red chilli pepper	30-45	20-40	42-64	29-57
Sunflower seed	12-15	10-12		r
Pumpkin	2-2.5	2	27-33	27
Wheat	1	5		80
Tomato	3-4	ı	36-41	
Watermelon	3-3.5 per piece	2-3 per piece	Farmer sells by numbers, consumer buys weight; farmer receives a fraction of what consumer pays	Farmer sells by numbers, consumer buys by weight; farmer receives a fraction of what consumer pays.

⁸ Dollar equivalent of price realisation has not been worked out since the values are very small, all ranging between less than a cent to 30 cents except for dried red chilli pepper which can fetch as much as a Dollar per kilogram.

Table 7.2: Landholding and occupational details of respondents

Primary occupation Secondary occupation	Rabi paddy cultivation	Shrimp seed collection Rabi paddy cultivation	arming Rabi paddy cultivation	Shrimp seed collection Vegetable/Kharif paddy cultivation	Kharif paddy cultivation	Kharif paddy cultivation Migrant labourer/Sea fishing	Kharif paddy cultivation Van-rickshaw driver	Kharif paddy cultivation Shrimp seed trader	Kharif paddy cultivation Fishing/Honey collection	Mostly rabi paddy cultivation but also vegetables at times	Kharif paddy cultivation Vegetable cultivation/Inland freshwater canal fishing	Kharif paddy cultivation Vegetable cultivation/Shrimp farming	Mostly vegetables but also rabi paddy cultivation paddy at times	Kharif paddy cultivation paddy at times	Kharif naddy cultivation Baki naddy cultivation
State defined Primary category	Fishing	Landless Shrimp s	Shrimp farming	Shrimp s	Fishing	Kharif pa	Marginal Kharif pa	Kharif pa	Kharif pa	Kharif pa	Kharif pa	Kharif pa		Kharif pa	Modium Wharifus
Perceived category c		Landless yet farmers		Practically landless yet	farmers			Mal gillal		Small		Medium		Large	
Land holding (ha)	None	None	None	= 0.13	= 0.13	0.13-0.27	0.13-0.27	0.13-0.27	0.13-0.27	> 0.27-0.67	> 0.67-1.3	> 0.67-1.3	> 0.67-1.3	> 1.3-2.0	7 0 0-0 2
Number of households	2	2	_	7	4	13	4	က	2	13	ю	_	12	œ	_

get dug up on the two sides of a road in the process of raising the surface for the road. Canals are also public property but in stretches. It is private property when it is demarcated by cross-bunds. In Mousuni, the Olaotha *khal* is no longer a canal but a series of 14 elongated ponds at least two of which are private property. The users (water appropriators) banded into *khal samitis* have delimited the canal by crossbunds which are roads running perpendicular to the canal. Earlier water could flow under the cross-bunds but with freshwater gaining value after introduction of winter crops the flow of water has been blocked to exercise ownership of water by particular *khal samitis*. Two of the stretches are private property since the canal at the time of construction passed through individual property and the owners have title over those stretches and made monetary contribution towards its construction, therefore, the water contained in such stretches are also private property.

Owners of houses and agricultural fields adjoining nayanjuli have the first right of refusal to the water contained in it, some adjoining property owners do not use it and their share can be used by others which is worked out before the onset of rabi season. These households do not raise the second crop because they have shops at the main Markets or hold government jobs, do not own agricultural land that is viable for raising a second crop or do not have sufficient labour in-house. Subject to volume of water available, farmers from a water scarce locality, get together to arrange transportation and storage into their locality. This involves a series of negotiations not only among the beneficiaries themselves but also the property owners adjoining the nayanjuli to decide on the volume of water to be removed which is measured in hours, for example, 'nine hours of water' implies that water can be drawn from the source for nine hours using a specified pump. However, this water to be removed needs to be stored in some place which could be a pond or canal. Thus, another set of negotiations take place with the owner or users of pond or canal regarding storage and subsequent use. If storage and use is spread over the entire season then two hours of water is deducted, implying that 'seven hours of water' can be used over the season. Water is transported over long distances using polythene tubes (serving as delivery pipes) and diesel powered pump. Beneficiaries pool in the money to hire tubes and pump, and also ensure that there are no leakages or pilferage en route. All of this is carried out through *spontaneous* collective action.

Water from public canals cannot be sold or given away; its use is fixed to a specific plot of land free of charges. A *khal samiti* or canal committee oversees water distribution from the canal or a stretch thereof. The committee consists of an odd number of members from among the users selected through discussion and voice vote, a new committee takes over at the turn of the year. All those who live or have

⁹ Roads and *nayanjulis* are seldom constructed through collective action as in case of embankments. These are constructed through award of contracts by relevant local self-government bodies or departments of the State Government.

Usually canals are public property constructed on public land but are also at times public property on private land where land owners voluntarily give up ownership of land over which the canal passes. However, if labour is provided by a land owner while constructing the canal over private land, that particular stretch remains private. There are also instances of discontinuous canals where a particular land owner has not agreed to the arrangement of constructing public property on private land or for paying for its construction on that stretch to retain ownership.

an agricultural field along the canal up to 300 metre on either side are deemed as users. The volume of water is divided equally among the users, and is measured in hours. Designated plots of the users up to 300 m from the canal can be irrigated; these plots can be 'leased' out and commands Rs. 3000/- (\$ 67.00) per ha (Rs. 400/-(\$ 9.00) per bigha). The samiti or committee however, does not look after the maintenance of the canal or stretch thereof. When depth is considerably lost, the Garm Panchayat is approached for re-excavation which in turn approaches the Panchayat Samiti and if no funds are available then the SDB, Forest Department (FD) and/or NGOs are approached. The concept of shramdaan (donation of voluntary labour) for restoring the canal is absent on the field research islands. Only in dire crises is money pooled in to have the canal partly restored, one such initiative was in progress during my field research in Mousuni. Canals with openings to creeks or rivers (originally designed as irrigation cum drainage canals) are overseen by the Gram Panchayat and are usually leased for brackish water fishery. Thus, instead of spontaneous collective action, the users and the collective action organisation (khal samiti) looks for intervention of institutionalised collective action at different levels (Panchayat Samiti) or at different forms (SDB or FD).

Some of the canal *samitis* which are also farmers' associations or a part thereof own mechanised farm implements like tractors, power tillers and pump sets which are usually donations from iNGOs such as GOAL-India and WWF-India. The *samitis* raise subscriptions among members for maintenance of the implements. Members get to use the implements by turn rent free as worked out by the *samiti*, others can hire the implements.

As noted in the previous section, labour is exchanged as well as paid for in kind among farming households but in Mousuni, labour is also contributed communally to see a household through in times of distress caused due to serious illness or death. Such contribution is made irrespective of the stage of cultivation, it could be during sowing, harvesting or even in between in case of vegetables which require tending.

7.4 Negotiating a dilemma

Though farmers report higher profits from vegetable crops if prices are good, the decision to cultivate vegetables or paddy is dictated by a number of factors. The following narrative provides a glimpse of the choices or rather the lack of them that a small farmer has when deciding on the type of *rabi* crop.

Biplab Mondol is a young man in his early twenties from Chotomollakhali living with his parents and grandmother. Biplab is the last of the four children in the family and the only male child¹¹. His family owns 0.76 ha of agricultural land but his father mortgaged all of it for Rs. 25000/- (about \$ 556.00) (Rs. 5000/- (\$ 111.00) per *bigha*) since he is incapable of working the land himself due to severe injuries he had sustained during two separate encounters with bandits when Biplab was still a child. Biplab's father is a member of a canal *samiti* charged with the responsibility

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¹¹ If the first two children in the family are daughters, couples invariably try for a son which results in a family size of 6-7 on an average. If the first two children are sons, the family size on an average is 4-5.

for monitoring water extraction for which he is compensated by a right to withdraw a specified volume of water from the canal which he usually sells since the plot Biplab cultivates is away from the canal his father monitors. The youngest of the three daughters in the family married in February 2005 and the family incurred an expenditure of Rs. 30,000/- (\$ 667.00). Being the only capable male in the family it was Biplab's responsibility to organise the money. He borrowed Rs. 24,000/- (\$ 533.00) in total from two different sources, his two brothers-in-law contributed the rest. Biplab would have to repay Rs. 16,000/- (\$ 356.00) in six months.

Biplab cultivates 0.27 ha of his uncle's (father's younger brother) land on a 50 percent share basis. His uncle has settled in the southern outskirts of Kolkata with his family and has no intention of returning to the village and has decided to sell off his land. Biplab has just one more season to raise a crop on his uncle's field. Since Biplab has been raising crops on his uncle's land and sharing the crop diligently, he will receive 1/4th of the sale proceed amounting to about Rs. 10,000/- (\$ 222.00) with which he intends to have 0.27 ha of family land released from mortgage.

Before the onset of the *rabi* season of 2004-2005 Biplab has to make up his mind whether to produce chilli pepper or paddy. In the *kharif* season he cultivated paddy and the yield will be about 2200 kg of rice per hectare (about 300 kg per *bigha*). Biplab will receive 300 kilograms as his share which will see his family through for about 117 days. He could repeat the effort in the *rabi* season or he could cultivate chilli pepper. His uncle's plot can produce up to six quintals of dried red chilli pepper which can fetch Rs. 24,000/- (\$ 533.00) if the market is good, it would cost him Rs. 4000/- (\$ 89.00) to cultivate chilli pepper. Thus, his net share of the profit would be Rs. 10,000/- (\$ 222.00), the other half being his uncle's share. Biplab could use that money to repay part of his debt.

Biplab gave up the lure of repaying part of his debt through profit from chilli pepper and instead decided to secure rice for his family for at least another 117 days; productivity of winter paddy crop is higher due to improved seed variety. His decision was influenced by the fact that one of his uncles, Keshab Mondol, a larger farmer with 2.7 ha of land with a smaller family of three, is holding on to four quintals of dried red chilli pepper from the last season because price did not rise beyond Rs. 21/- (about \$ 0.50) per kilogram. If dried red chilli pepper fetches the same amount this year Biplab would just about recover cost since he only gets 50 percent of the profit but has to make the entire investment.

Gauri Mondol, one of Biplab's aunts with 0.9 ha of land and a small family of four (both sons) is looking forward to cultivating chilli pepper instead of paddy during the same season. She expects the price of dried red chilli pepper to improve this season and to make a decent profit. Her logic is that farmers like Biplab and ones even worse off than Biplab have shifted to paddy en masse. She tried explaining the logic to Biplab but he would not change his mind since the plot he cultivates is surrounded by paddy plots which will hold at least 5-8 cm of standing water. Chilli pepper plants cannot survive in standing water and Biplab fears that field crabs could easily cause leaks in the small bunds separating his plot from the plots around. Thus, Biplab's decision against chilli pepper can be interpreted as collective will 'enforced' due to the location of the plot that he cultivates. By maintaining the same

interest as his neighbours, he is assured of a paddy crop but by having a contrasting *interest* he runs the risk of losing the chilli crop though earnings are likely to be higher in the latter case. Biplab does not have the choice but Gauri does, because her plot being larger, she can afford to maintain a buffer between her chilli pepper plot and the neighbouring paddy plots. Biplab is reconciled to the fact that he will sell part of the mortgaged family land to repay his debt.

7.5 Analysis

Sustainable development, as I have come to understand and have indicated in Section 2.4, is the process that ensures choices and the continued freedom to make those choices. But, by the time a farmer like Biplab is born, the family into which he is born has already forfeited the choices and strengthened the *driving force* in terms of 'excessive population growth' that undermines human well-being. Three factors compound the situation even further (i) breach in embankment due to the geophysical dynamic, (ii) limited *spontaneous* collective action within the farming community, and (iii) lack of vision and planning on the part of the Agriculture Department, all together resulting in an inadequate infrastructure.

I will not address the geo-physical dynamic here since it has been dealt with in Chapter 4. As outlined in Chapter 2, this study is about achieving an understanding of the configurations of conditions that cause the contrasting forces to be in operation in the Sundarbans. The freshwater canals and the absence of spontaneous collective action in maintaining them present such a contrast. The freshwater canals are common property in terms of right to exploit water being held by persons in common but the institutional arrangement has an inbuilt contrast. While the arrangement for appropriation of water from the canal gives it a character more like exclusive possession on a continuum of property rights, the canal itself is placed towards the other end of the continuum, like no property or commons thus becoming derelict. Due to absence of *spontaneous* collective action not only do the canals become derelict but also the sluice gates are rendered ineffective/inoperative, eventually turning a freshwater canal to brackish water one. This gives rise to a "commons situation" (as defined by Wade, 1988) where by the absence of collective action, not only benefits of cooperation are foregone but even worse, it results in degradation of the common property. Deterioration of the canal becomes a publicgood dilemma, and all those who would benefit find it costly to contribute and would prefer others to pay for the good instead, which is apparent from the fact that the Gram Panchayat or other agencies are approached for re-excavation exhibiting lack of spontaneous collective action and a dependence on institutionalised forms of collective action. Also, for some of the canal users there might be an incentive in the sluice gates becoming ineffective so that brackish water aquaculture, a more profitable proposition than agriculture, becomes possible. Possibly, the idea of the same canal serving irrigation and drainage purposes as elsewhere is inappropriate for a place like the Sundarbans.

Apart from the desire of a few to turn freshwater canals to brackish water ones, absence of *spontaneous* collective action in maintaining canals by the users themselves has two reasons. One, though endowments and landholding of users are unequal, water is distributed equally among the users and not proportionate to landholding, this has the implication that contributions, if made, need to be made

equally. However, contributions made by the relatively better endowed users cannot be matched by the less endowed users, making reaching a consensus difficult. The second reason that can be attributed to this lack of collective action is the precedence set by the Sundarban Development Board, Forest Department as well as other agencies in restoring canals (collective action organisations of different forms and at a different level). Users have come to expect that every time canals need to be restored, it will be organised and paid for by the state or iNGOs. Therefore, though it is in the *interest* of the users and despite existence of *organisation* in the form of khal samiti, the khal samiti makes no attempt to mobilise the users when opportunity presents itself in the form of declining benefits. Because collective action is a function of a group's (i) extent of shared interest, (ii) the intensity of its organisation, (iii) its mobilisation, and (iv) the opportunity available, collective action remains absent in the absence of intensive involvement of the members of the organisation and lack of *mobilisation* by the organisation despite the fact that common interest and opportunity exist. Khal samitis and farmers' associations are however able to manage the renting of equipment for three reasons: (a) deterioration of farm equipment occurs over a relatively shorter span of time as compared to the siltation of a canal and therefore, the deteriorated state is more perceptible; (b) it costs less to maintain and restore farm equipment and does not call for collective action in terms of labour; and (c) out of service equipment does not affect all users equally since machinery breakdown can occur when some of the users have already benefited from the use of the machinery. To avoid situations where other members cannot benefit from the use of the same machinery, problems are attended to more promptly than in case of a canal which affects all users equally. But, as in the case of a derelict canal which requires re-excavation, a tractor is unlikely to be replaced through collective action. The commonly owned tractor in Mollakhali is relatively new, it was donated by WWF in 2004 and it will be some time before it will need replacement¹².

According to Lele (1991), as already indicated, sustainable development is the process of directed change that not only has the traditional objective of meeting basic needs of current and future generations but also to sustain the ecological and social basis of human life. The population pressure of 700 persons or more per square kilometre on the island does not permit agricultural land to be kept fallow to regenerate and recover thus compromising sustainability of the freshwater agroecosystem. Under such a scenario the Agriculture Department deems it fit to promote cash crops but does not address infrastructure or marketing issues. If farmers are unable to store their produce and market them at an appropriate time, the 'market' will and indeed does take advantage of the situation. The farmer is denied the choice which in turn curtails his freedom to make choices regarding the type of crop he would like to cultivate, he is forced to cultivate chilli pepper and when every other farmer does the same, glut in local Markets lowers the price, making recovery of costs that much more difficult. Sen (2000) argues that continued deprivation leads

¹² The 'club' which manages the farm equipments donated by WWF has built a corpus of Rs. 70,000/- (\$ 1,556.00) (maintained in a separate bank account) from levying user fees which they intend to use for major repairs.

to downward adaptation of needs, and in the absence of remunerative prices for their produce as well as the lack of choices in terms of types of crop, a great majority of the farming households are continually adapting downwards. Under such circumstances, there is hardly any scope for the principle of justice between contemporaries and future generations to play out; as a consequence freedom of future generations is compromised. Consequently, maintaining status quo for households like Biplab's is an uphill task. Biplab and his ilk in Mollakhali and Mousuni as well as elsewhere are sliding down which has a cascading effect across generations. Such a course corrects itself only as a matter of chance, or through extraordinary effort of a succeeding individual or succeeding individuals, but in which generation remains a matter of chance as well. Obviously, given the significance of the eco-region, its fragility and the large human population, course corrections as a matter of chance is beyond what the present generation of Biplab can afford.

Aquaculture

8.1 Introduction

Fish forms an important part of the Bengali diet. The waters of the Sundarbans are a commons producing livelihoods and food for any household with labour to harvest fish. These waters host about four hundred species of fish. Threats to Sundarbans ecology present a clear but largely unknown danger to local livelihoods and nutrition (Richards & Flint, 1990). Fishing in the Sundarbans¹ is primarily a collective activity but there are aspects of individual or household action in it, particularly after the introduction of commercial brackish water aquaculture. Before describing the current scenario especially of brackish water aquaculture in the Sundarbans, I will provide a brief historical overview of fishing in the eco-region.

Between the thirteenth and eighteenth centuries, the spread of Islam and wet rice agriculture in hitherto forest areas of the Sundarbans went hand in hand (see Chapter 3, Sub-section 3.1). The Hindu Bengali castes living in the Sundarbans prior to the Muslims were literally and figuratively at the margins of mainstream society. The *Pods* in the west and the *Chandals* in the east were fisher folk. According to James Wise, the emphasis of Muslim leaders upon cultivation resulted in conversion of the fishing castes into agricultural ones, and for the Muslims

For

For an ethnographic account of fishing in the Sundarbans and the fishing community of Jambudwip, see Raychaudhuri (1980). The ethnographic study was carried out in the late 1960s and remains one of the most comprehensive till date (see Annexure IV). Jambudwip Island has been cleared of settlement in 2004 and is currently out of bounds for most. This was necessitated because the Fisheries Department and the Forest Department were at loggerheads in 2003 on the issue of the use of the island, southwest of Mousuni for commercial drying of fish. The commercial dry fish sector had turned part of the island into a permanent base with a settled population. The Forest Department claimed Jambudwip Island to be part of a reserve forest. After much altercation in public between the two departments and amid deteriorating law and order situation on the island, settlements were removed.

fishing is a lowly occupation because of its association with non-Muslim and outcast tribes who never became integrated into the Muslim society around them (Wise, 1883). Additionally, lagoons previously laden with fish dried up due to silt deposition by the major rivers draining through the region. Hindu fishing castes are still considered low in the caste hierarchy but fishing as an activity, though not the most favoured, is an important occupation with fishing boats locally known as *trawlers* providing employment opportunities, and for the economically weakest the option of tiger shrimp seed collection remains open. In fact, due to increase in population and subsequent pressure on land as well as loss of land due to erosion, a counter-conversion of occupation is underway. Cultivator families with practically no agricultural land are taking to fishing, especially collection of tiger shrimp seeds.

The right to fish in the watercourses of the Sundarbans during the colonial period as now (except within the Protected Area) was in the realm of the commons, and no revenue for it was collected on behalf of the Government. In 1866, however, the Government put up to auction the rights of the fisheries in all the Sundarbans rivers for a term of five years. The Port Canning Company purchased the fishing rights, but as already stated they were withdrawn in October 1868 in consequence of the claims of the Company being disputed by fishermen and others who had prescriptive rights; it was decided that the Government had no right to farm out the fisheries in tidal waters to private persons.

The following sections describe shrimp farming in the Sundarbans (8.2), the practice of shrimp seed collection from the wild (8.3) and the role collective action plays in it, and how the various actors operate within the sector (8.4). Section 8.5 analyses the prevailing practices in light of the concepts presented in Chapter 2, and assesses the prospects of attaining sustainable development goals in the context of aquaculture in the Sundarbans.

8.2 Brackish water aquaculture in the Sundarbans

Bengal has had a long tradition of shrimp culture in paddy fields; traditional farming is mainly based on tidal flow, auto stocking, no supplementary feeding, and in farms alternating paddy and shrimp, this is also known as the "trapping and holding" method.

Policies and programmes for commercial shrimp farming were initiated during the Fifth Plan period (1974-1979) by the Government of India focussing on technology development. It was during the Sixth Plan period (1980-1985) that the Fisheries Department, Government of West Bengal, intensified its efforts to develop coastal aquaculture. This was driven by not only high export value of shrimp but also on higher returns on investment, almost twice as high compared to agriculture and livestock (Krishnan and Birthal, 2002). During the Seventh Plan period (1985-1992), technical assistance through international organisations like the UNDP and the World Bank were brought in, until then traditional farming was the predominant mode of shrimp production. With the introduction of scientific farming of tiger shrimp, an exponential growth took place during early 1990s due to attractive monetary returns, high export demand and liberalised economic policies of the Government. This favourable environment prompted farmers, entrepreneurs, corporate entities and others to enter into shrimp farming. West Bengal became the

largest shrimp culture centre in the country (Banerjee and Singh, 1993). High international market demand has maintained interest in shrimp farming for export despite production being affected by viral diseases and tightening of regulatory norms to safeguard the environment. However, a level of diversification of cultured species has remained low, the most popular being *Peneas monodon* (tiger shrimp). This has had two ecological fallouts, (i) initial loss of mangroves and (ii) depletion of wild shrimp and other fauna stocks. It is reported that in the Sundarbans about 3 percent or 5,000 ha of the total loss of mangrove forest is accounted for by shrimp farming (Silas, 1987 and Sinha, 1999). In the face of an increasing production of shrimp through brackish water aquaculture, the demand for shrimp seeds has been on the rise for over two decades now, and the demand is being met from the wild since West Bengal does not have hatcheries. According to SDMBRI (1996), and Sarkar and Bhattacharya (2003), hatcheries have not been possible in West Bengal, due to a lack of favourable physico-chemical conditions, salinity in particular.

According to aquafarm owners interviewed, two in Sandeshkhali II Development Block (North 24-Parganas) in February 2002 and three in Gosaba Development Block in February 2005, procurement of shrimp seeds from other maritime States of India is not feasible due to seasonality of supply, high mortality, and difference in salinity in different coastal states. However, since 2003-04, Tiger Shrimp Seeds from hatcheries in the southern Indian States have become available in North 24-Parganas District at competitive price. Aquafarmers of Haroa and Minakhan Development Blocks are using hatchery seeds but aquafarm owners in other areas prefer the wild variety from the Sundarbans due to very high mortality reported in case of shrimp seeds from hatcheries. Officials of West Bengal Fisheries Department attribute this high mortality to poor quality of hatchery seeds. A hatchery technician from Andhra Pradesh interviewed on 14 May 2007 confessed that hatchery seeds that fail quality tests are directed towards Kolkata since aquafarmers in the southern States refuse to accept seed consignments without quality certification. Tiger shrimp seed collection (TSSC) therefore, has become an important occupation in the Sundarbans³. While travelling in the Sundarbans it is common to come across individuals, especially women and children straining the water in rivers and creeks for tiger shrimp (P. monodon) PLs (post-larvae) and juveniles. According to an estimate, 50,000 households in the Sundarbans engage themselves in wild tiger shrimp seed collection (Raj and Hall, 1993); more recent estimates put the figure of collectors to about 400,000 (Environment Department, GoWB, 1997 and ADB Report, 2003b). There are a number of socio-economic factors, which motivate a sizeable population

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² By 1992, West Bengal was already a major exporter of shrimp, and to maintain its position it sought World Bank assistance vide Project ID P009921 (Shrimp and Fish Culture Project) along with Orissa and Andhra Pradesh which started on January 14, 1992 and closed on December 31, 2000. The project had a budget of US\$ 3,200,000/- for the shrimp culture component in the three States. Currently, the State of Andhra Pradesh is the largest producer and exporter of shrimps in India. India is the 4th largest shrimp producer after China, Thailand and Indonesia in the Asia-Pacific region.

³ Mr. Bhattacharya, a retired school headmaster at Bagdanga on Mousuni Island, in May 2003, introduced me to about 20 households who are better off than earlier by way of being able to feed themselves twice a day. This has been possible due to their involvement in TSSC. Mr Bhattacharya also stated that severity and extent of poverty has reduced because of TSSC.

of the Sundarbans to engage in TSSC⁴. Low level of investment in terms of material and training has been reported as the most significant motivator. The other motivations are ready cash, availability of shrimp seeds throughout the year albeit with seasonal variations (lowest during winter months and highest during monsoon months) as well as variation within a month (higher catch during Full Moon and New Moon), assured market for the catch, facility of advance sale (*daadon*), and barrier-free occupation, meaning, anybody can engage in TSSC irrespective of gender, age, caste, or religion.

Apart from first generation migrants⁵, tiger shrimp seed collectors represent households that have fallen on hard times due to any or many of the following reasons: loss of land to river erosion, repeated crop failure due to repeated salt water incursion, loss of employment as boatman of mechanised ferry or deckhand of fishing trawler, death of bread-winner, or desertion by husband. Tiger shrimp seed collection may be viewed as the last "safety net"; any family that falls through the upper layers resorts to TSSC. These are the families, which no longer have access or did not have access to begin with, to other means of livelihood.

West Bengal, mainly the Sundarbans⁶, accounts for 30.27 percent of total cultured shrimp area in the country producing about 26 percent of the total produce, second only to Andhra Pradesh on both counts (see Table 8.1). Most of the production

Table 8.1: State-wise details of shrimp culture and productivity

State	Area under culture (ha)	Production (MT)	Productivity (MT/ha/Yr)
Andhra Pradesh	79,600	51,230	0.64
West Bengal	46,750	26,800	0.57
Kerala	14,700	5,540	0.38
Orissa	8,120	8,960	1.10
Karnataka	3,080	3,500	1.14
Tamil Nadu	2,480	4,710	1.90
Goa	930	1,200	1.29
Gujarat	540	680	1.26
Maharashtra	300	320	1.07
Total	1,56,500	1,02,940	0.66

Source: Cyriac (2002; p. 37)

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⁴ About 20 percent of the households as per this study based on random sampling of 243 households (123 on Mollakhali and 120 on Mousuni) engage themselves in TSSC, 38 households reported it as their primary occupation while for other 9 households it was their secondary occupation.

⁵ In fact, the prospect of making a living through TSSC lured 15 of the respondent families to the Sundarbans (six from East Midnapore District), having migrated not more than 20 years ago.

⁶ Most (about 70-80 percent) of the shrimp farming in the Sundarbans takes place in North 24-Parganas District.

comes from small farms with less than 2 ha of water-spread area. In fact, 90 percent of the farms are less than 2 ha, 8 percent between 2 and 10 ha, and 2 percent with water spread of over 10 ha (Cyriac, 2002; p. 4).

A description of different types of shrimp farming practised follows. Among the different farming systems practised in the maritime States of India, semi-intensive, and intensive methods were developed with the introduction of scientific farming and the establishment of commercial hatcheries (not in West Bengal⁷) through imported technology. The traditional system of shrimp farming makes use of tidal flow, auto stocking with no supplementary feeding. In the semi-intensive system, the farm size usually varies between 0.25-4 ha, ponds are manured and fertilised, water is exchanged using pumps, aerators are used, and high nutritive feeds, drugs and chemicals are applied. Selective stocking of shrimp seeds between 6 and 25 post-larvae (PL)/m² is carried out. The *intensive* method is similar to *semi-intensive* farming but with higher stocking density of 25-35 PL/m², frequent water exchange, and removal of sludge (Vasudevappa & Seenappa, 2002). Productivity improved dramatically from about 50 kg/ha/yr under traditional to 4-5 ton/ha/crop in semi-intensive and 10-20 ton/ha/crop in intensive farming (Chennubothla and Rao 1998; p. 6).

With the outbreak of viral diseases and tightening of regulatory norms, the shrimp farming shifted to the extensive method wherein the stocking density is maintained at 5 PL/m² and water is exchanged through tidal flow. Various modifications of the extensive system are in practice with up to 10 PL/m² of stocking density along with as many as 15-18 finfish species and crabs, and providing indigenously prepared feed.

Due to the high demand of tiger shrimp PL, the absence of hatchery in West Bengal, and the abundance of such PL during the initial years in water courses of the Sundarbans, shrimp seed/fry collection became a significant occupation for the people of the eco-region, especially the asset-less. An entire sector servicing shrimp farms developed involving collectors, agents, traders, transporters and auctioneers. The entire chain, except for shrimp seed collectors of the Sundarbans, is well documented in a working paper of the Bay of Bengal Programme titled "Market study of tiger shrimp fry in West Bengal, India" (1993). Therefore, the following section describes shrimp seed/fry collection and the collectors of the Sundarbans. This is also the activity in the value chain that is carried out in the commons and allows space for examining collective action.

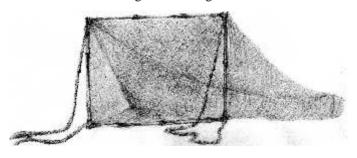
8.3 Collection of tiger shrimp seed from the wild

Individuals engaged in tiger shrimp seed collection (TSSC) are a heterogeneous lot; the only commonality is their poverty in varying degrees and lack of access to other resources. They can be broadly divided into three categories based on their gear, and location along the creeks and rivers.

A small hatchery was established by the West Bengal Fisheries Department with the help from the Bay of Bengal Programme (FAO) in the coastal town of Digha in Midnapore District but it did not attain commercial proportions.

The poorest group, usually women and children use drag-nets (see Figure 8.1) along the banks. Only one family operates in a particular stretch along the embankment at a particular time. Each stretch is about 12 metres long, unless population pressure is very severe. In case of a split in a family, the new family is allotted a stretch of similar length along the embankment. If necessary, all the families reduce the length of their stretches proportionately to accommodate the new family. This is a form of *spontaneous* collective action.

Figure 8.1: Drag-net



The gear of drag-net operators consists of a net attached to a bamboo frame and some rope to drag the net along the bank. The net is made up of fine mesh nylon fabric of 25 m (maximum) and costs between \$ 0.12 and \$ 0.14 per metre. It costs \$ 0.03 per metre to stitch the nylon fabric into a drag-net (\$ 0.7 maximum for stitching the net). The bamboo frame is made of a pole costing about \$ 0.8-1.10. The drag-net operators usually use 4-6 m of nylon rope of 8 mm thickness which is sold at \$1.80 per kg. Most drag-net operators cannot afford to buy the equipment on their own and resort to advance sale (daadon) of their catch. The byapaari (agent) buys the gear for them and has the right to buy the shrimp seeds at a price lower than the prevalent market price varying between \$ 3.30 and \$ 15.40 per thousand seeds. With fluctuating availability and price of seeds, it is difficult to arrive at a figure for earning per day without observing the transaction for about a week in each of the seasons. To get over the problem I sought information from byapaaris who buy seeds every day. According to byapaaris, a family with two drag-nets earns about \$ 0.90 per day while those with three nets earn about \$ 1.50 per day through the year on an average.

The second group uses a shoot-net (see Figure 8.2) fixed to a horizontal bamboo pole. One end of the bamboo pole is embedded in the mud bank while the other end is tied to a long nylon rope, which in turn is pegged on the mud bank a little distance away either upstream or downstream depending on tidal direction so that the pole is held perpendicular to the flow of water. Material requirement for their gear is nylon fabric of 25-50 metres, up to 2 kg nylon rope of 8-9 mm thickness (each kg of rope is about 32 metres long) and two bamboo poles. Per unit cost of material is the same as that of the drag-net operators, just that initial investment is higher due to greater material requirement. Some of the operators are able to procure material on credit from nylon

net and rope traders while others resort to *daadon*. *Byapaaris* are of the opinion that on an average, river bank shoot-net operators earn about \$ 1.10-1.30 per day.

The third group has a relatively more sophisticated gear (see Figure 8.3) as well as a small country boat. This group collects tiger shrimp seeds away from the banks. The shoot-net is fixed to a bamboo pole as in the case of the second group but the pole and the net are held in place using anchors or heavy wooden angles to which plastic (HDPE) barrels are tied as floats. The pole is tied between the two barrels. Midstream collectors usually use 50-70 metres of nylon fabric. Two kg of nylon rope of 10 mm thickness is used but some collectors use more rope due to greater depth in the river. Each kg of rope has 20 metres length. They also use anchors weighing up to 10 kg costing \$ 0.7 per kg. Boats used by the mid-stream collectors are called *salti* or *chot-salti* and costs \$ 132/- for a new one and between \$ 66 and \$ 88 for

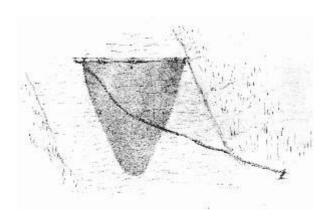


Figure 8.2: Shoot-net

older ones. Mid-stream collectors work in pairs, usually father-son, brother-brother, as well as husband-wife. After setting up the gear the younger person stays back on the boat (husband, in case of husband-wife pair) to empty the net periodically. *Byapaaris* estimate that mid-stream collectors earn about \$ 2.20 per day on an average. In all the three cases, the tapering end of the net is emptied every half an hour or so into a white enamelled flat metal bowl. Collectors use a shell of bivalve to pick up tiger shrimp seeds and store it in an earthen or aluminium pot (*handi*) half filled with creek water; mid-stream collectors usually use plastic containers with lid.

According to my study, 19 percent of the population of the Sundarbans engage themselves in TSSC (a little less than the government and ADB estimates), of which 32 percent are relatively recent migrants; having migrated to the Sundarbans not more than 20 years ago. In fact, the prospect of making a living through TSSC lured them to the Sundarbans. All the families that have lost land to river erosion have had to change their primary occupation, 36 percent of these opted for TSSC, next only to

wage labour (39 percent)⁸. Changes in the landmass are well within the perception of the inhabitants of the Sundarbans. Ninety-three (38 percent) of the respondent families who were essentially cultivators have had to change their primary occupation due to changes in the landmass. They appear to accept the fact that if humans occupy places like the Sundarbans, changes in location and occupation are inevitable. "If you live on the lap of the river, she will ask you to move some time or the other" is the common perception among the affected families. Shrimp seed collectors simply dismantle their huts and relocate elsewhere. Physical mobility and 'can do' attitude of the collectors is a characteristic of the frontier people (see Footnote 2, Chapter 2).

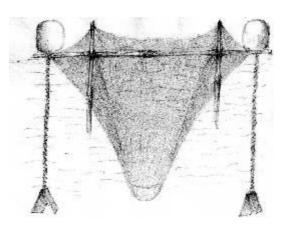


Figure 8.3: Fixed shoot-net

Becoming a shrimp seed collector for the poor is rather simple. All one has to do is to acquire a very basic gear as described above and take it to the waters. Forty five percent of the shrimp seed collecting families manage to buy their equipment with own resources, the rest depend on moneylenders and *byapaaris* or agents. Agents provide money or gear to collectors on condition that the catch is his for a price determined by him, which is usually \$0.20-0.30 less per thousand seeds than the prevailing rate. "...Fry catchers are not sensitive to price, as they have few alternative employment opportunities, it is the middlemen and transporters who cannot afford to move small quantities. While supply from the fry catchers is inelastic, the middlemen have a cut-off point at which they cease to trade in fry, making the supply elastic or price sensitive" (Raj & Hall, 1993; p. 3).

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⁸ Eighty-eight households have lost all or most of their land to river erosion 32 of which have taken to TSSC, and 34 households make a living through wage labour.

⁹ Byapaaris are overwhelmingly men but I have come across one woman byapaari at Baliara on Mousuni Island. She appeared very confident and in control, her clients did not have to quarrel with her over the price of seeds. Only 25 percent of the collectors interviewed do not have to quarrel with their byapaaris.

Dependence of tiger shrimp seed collectors on a single ecosystem for subsistence is near total. However, the natural biotic communities are not an integral part of their lives, nor do they behave as integral components of the ecosystem they inhabit. For the collectors, the ecosystem is the great provider. The collectors do not gather seeds for domestic consumption or local level exchange. Rather they have direct linkage with outside markets unlike subsistence farmers. The collectors do not harbour any sense of obligation towards the ecosystem as opposed to traditional fishermen. For example, caste fishermen have scheduled restraints on fishing attributed to events like menstruation of the river goddess (Ganga mayer masik). Non-traditional fishermen and shrimp seed collectors appear to be in competition with one another and with the ecosystem. Whether shrimp seed collectors are overriding the productive limits of local animal and plant populations is unascertainable as of now though there are signs of the ecosystem being under severe human pressure (Naylor et al. 2000; Primavera 1998; S.D. Marine Biological Research Institute, 1996) as will be discussed below. The collectors view the ecosystem as being inexhaustible. Their opinions range from "how can anything that comes from the sea ever be exhausted" to "if shrimp seed runs out eventually, there will always be something else of value in the rivers and creeks". Persisting with the issue of damage to the ecosystem due to tiger shrimp seed collection invariably provokes collectors to retort "how are we to make a living" or "are the lives of these creatures more valuable than ours", and at times, "are we to make a living through theft and banditry?"

Marine biologists from the Calcutta University and the Zoological Survey of India interviewed in August 2003 are categorical in their opinion that in the process of shrimp seed collection, the target species (*P. monodon*) accounts for only 0.25-0.27 percent of the total catch, one percent at the most, making the process highly wasteful in terms of loss of other life forms especially juveniles of other edible fish, as almost the entire remaining portion is discarded on beach flats or tidal mudflats. The above mentioned biologists believe that the practice of shrimp seed collection can lead to severe stock depletion and hamper energy transference through marine ecosystem food webs, as well as cause soil erosion by uprooting mangrove saplings and salt marsh vegetation. Marine biologists are in favour of restrictions and enactment of tougher laws. Officials of the Environment Department, Government of West Bengal interviewed in August 2003 are also unanimous in their opinion that shrimp seed collection is detrimental to the ecosystem.

In attempts to quantify the loss, Naylor et al. (2000) reported that annual wastage in terms of bycatch is estimated at 63 million to 2.6 billion seeds of various species in just three collection centres in West Bengal Sundarbans. Primavera (1998) reported an estimated loss of 47 to 999 (*sic*) juvenile shrimp in India for every single tiger shrimp seed; a Government of India commissioned report (S.D. Marine Biological Research Institute, 1996) projected that about 5100 gm of juveniles of different categories of fish are wasted per net per day for an average collection of 500 tiger shrimp seeds, the approximate number of juveniles species wasted being 76. "For every post-larvae of *P. monodon* collected from the wild, it has been estimated that 18 PL of other species of shrimp and fish are sacrificed. ... This is a colossal loss of biodiversity" (Sinha, 1999; p. 27). Despite these warnings, the Fisheries Department (Govt. of West Bengal) is drawing up schemes that are likely to intensify pressure on the ecosystem. To address wastage of bycatch the Department is promoting brackish

water canal fishery and has established demonstration projects so that the bycatch is not wasted and juveniles of other species survive due to commercial value of some of the bycatch species. If successful, collection of fish fry from the watercourses can only intensify. To address the issue of dwindling catches of tiger shrimp seeds and subsequent weakening of economic condition of tiger shrimp seed collecting households, the Department is promoting collection of edible mud crabs and has established crab fattening farms on demonstration project basis. The colossal loss of biodiversity does not seem to be of concern to the Fisheries Department.

Religious or caste scruples do not apply in this trade; just about anybody can take up the occupation. Even tribal people originally from Chotanagpur Plateau (far away from the coast to the southwest) have taken to TSSC. It has been observed and reported earlier by others (SDMBRI, 1996) that women collectors outnumber men by 3 to 1, and children up to the age of 14 years outnumber adults by a proportion of 3:2. Women collectors are greater in number due to their limited mobility for employment; need to augment family income, widowhood, and desertion by husband. Child collectors are brought into the trade by their parents to augment family income. Male children, by the time they are about 10 years old develop a sense of economic freedom. Most male children by that age keep aside a part of their earning for themselves, which they spend on video shows, cigarettes/bidis and other addictions. An attempt during 2002-03 by the Haldarchak Chetna Welfare Society, a Sundarbans-based NGO to bring some of these children to educational centres in the hope of putting a few of them back into the mainstream school system failed because of loss of economic freedom experienced by the children as soon as the stipend for attending educational centres ran out.

Most shrimp seed collecting families (80 percent) operate for 5-6 months in a year, for part of the remaining year, males of these families migrate in groups to other districts as agricultural labourers or to other States as wage labourers as far away as Gujarat and Andaman Islands. These workers have a regular schedule and route charted out by labour contractors who are either known in the village or are former residents of the village. The remaining 20 percent of the collecting families carry on for 9 months though the catch dwindles considerably during the winter months and on certain days not a single seed lands in the net. These families are relatively weaker in financial terms than the former, and they try to find work on the island or on one of the adjoining islands since they do not have the means to travel far¹⁰. The weaker the family, the longer it works, and the lesser it earns as compared to others. Fifteen percent of the families work for 20 days for nine months earning \$ 0.40 a day on an average. Another 30 percent work for 7 days for 5 months earning about \$ 1.10 a day on an average. These are the mid-stream collectors with boats. Fifty five percent of the shrimp seed collecting families work for 15 days a month for six months, earning bout \$ 0.80 per day. Mid-stream collectors from Chotomollakhali

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¹⁰ Beginning 2006, the Government of India has launched the National Rural Employment Guarantee Scheme wherein 100 days of employment is guaranteed within the village. The Gram Panchayats are administering the Scheme, mostly for carrying out earthwork for embankments. But, due to limitations of manpower and financial authority, not all eligible households can be provided the guaranteed employment or unemployment benefit within a financial year.

also go fishing in the rivers and creeks as well as collect honey and firewood from forests, mostly without permit from the Sunderban Tiger Reserve (Forest Department). Not that these people are unable to pay for the permit, but getting one is hard, time consuming and involves travelling to another island where the Forest Range Office is located, whereas being caught by forest guards, getting detained and fined happens only a little over half (55 percent) the times they venture into the forests. On rare occasions, the boats are confiscated and members of the group imprisoned which then becomes an expensive and time-consuming affair to deal with. For people of Mousuni finding wage employment is comparatively easier than those of Chotomollakhali because of proximity to the Sandheads where larger vessels offload into smaller vessels capable of moving through the Hugli River to the Kolkata Port. Besides, better road and rail connectivity also contributes to greater employment opportunities, as does recurrent breaches in embankment.

8.4 Collective action in shrimp seed collection

There have been attempts to check this colossal loss of biodiversity through legislative and administrative means as well as civil society initiatives but in the absence of alternative means of livelihood, success remains elusive. However, collective action, *institutionalised* and *spontaneous* might provide an answer. Glimpses of collective action in shrimp seed collection follow.

The poorest group of collectors, the drag-net operators are not organised formally or informally and operate individually, at most as a family unit but have devised a mechanism by which they avoid collecting shrimp seeds along the same stretch at the same time since the chances of collection for the one behind is drastically reduced. However, there are times when disputes related to collection arise which collectors are unable to resolve by themselves. In such cases, the dispute is referred to the local panchayat member; traditional panchayat members are preferred over Gram Panchayat members on account of perceived fairness of the former. In many places though, the Gram Panchayat (*institutionalised* collective action organisation) has supplanted the traditional panchayat¹² (*spontaneous* collective action organisation). Punishment for the offending collector is in the form of suspension of collection ranging from one to seven days.

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No new permits are issued by the Forest Department to venture into the Sunderban Tiger Reserve; permits are renewed annually for a nominal fee of Rs. 35/- (\$ 0.80). On occasion, permits are reassigned due to disuse by earlier assignee. Apart from the permit, each member of the group has to pay a fee of Rs. 20/- (\$ 0.45) for each week in the forest for a maximum of four weeks. Since no new permits are issued, permits are traded at a premium of Rs. 3,000/- to Rs. 10,000/- (\$ 67.00-222.00) depending on the ability of the group to pay. Fine for venturing into the STR without valid permit ranges between Rs. 250/- and Rs. 1,110/- (\$ 5.50-24.50) depending on the location in the forest where the group is apprehended. Imprisonment term depends on material illegally extracted from the forest. Consequently, the amount of bribe to forest guards depends on location and material extracted. The highest bribe amount paid that has come to light is Rs. 60,000/- (\$ 1,333.00); the Forest Department official was convicted in this case.

¹² The Gram Panchayat system in India is a modified and democratized version of the traditional panchayat system that existed prior to Independence. Traditional panchayats were mostly caste panchayats overseeing adherence to caste norms. In West Bengal, traditional panchayats were more of local councils governing social life within a locality. In some places, e.g. Dwariknagar in Namkhana Development Block, traditional panchayats with elected *morols* (chief) are still in existence but post 73rd Amendment, local self-governments in the form of Gram Panchayats came into being all over the country (see Annexure I). In West Bengal, the Gram Panchayats in most places have eclipsed the traditional panchayat.

organisation). Punishment for the offending collector is in the form of suspension of collection ranging from one to seven days.

The mid-stream collectors are organised into several majhi samitis (spontaneous collective action organisation) based on locality of residence rather than location of collection. The majhi samiti protects rights of its members in the water courses. In case of disputes arising out of siting of gear among members, the samiti convenes a meeting to sort out the problem at the earliest. In case of dispute between members of different samitis, office bearers of the concerned samitis meet to resolve the issue. If the concerned *samitis* fail to resolve the issue amicably, standpoint of the numerically stronger samiti prevails due to the threat of use of physical force. Until disputes are resolved, the disputing collectors have to suspend collection. According to office bearers of *majhi samitis*, the *samiti* though a collective action organisation of mid-stream collectors, does not facilitate procurement of gear, loan or insurance as the members lack single-interest relationships due to varied political affiliations. Since membership of *majhi samiti* is based on location of residence, neighbours might have different political affiliations. In rural West Bengal, it is practically impossible to undertake any activity cutting across political affiliations except for crisis situations and at times of religious festivals. The samitis organise Ganga puja (religious festival) during the middle of January each year where each member has to contribute about US\$ 22.00. After the festival, a new body takes over the affairs of a *samiti* but usually the same office bearers continue in their positions.

Collective action – *institutionalised* as well as *spontaneous* – is also used to suspend shrimp seed collection. During the April 2003 panchayat elections, the leftist grouping was voted out of power in Mousuni. The new Pradhan (headman), during 2004-05, implemented a ban on tiger shrimp seed collection at a particular stretch along the south-eastern periphery of the island. The Pradhan believes that the Gram Panchayat is the implementing agency of the provisions of the Biological Diversity Act, 2002. Rules framed in 2004 under the Act empower Gram Panchayats to form Biodiversity Management Committees (BMCs) to control and regulate adverse impacts on biodiversity. Because the Pradhan at Mousuni is concerned with river bank erosion, he sees mangrove plantation as a solution to the problem, and uses the BMC to protect the mangrove plantation. The particular stretch has been planted with mangrove saplings by the Forest Department, Government of West Bengal and the Pradhan does not want the stretch trampled upon by shrimp seed collectors. For an understanding of how the two forms of collective action come together to achieve something that is not possible by any one form alone, see Chapter 4, Section 4.

A recent report on human-wildlife conflict (WWF-India, 2006) shows that most victims are shrimp seed collectors and as long as other livelihood opportunities are unavailable, potential for such conflicts remain high. The Forest Department, since 1991, has been channelling funds for local economic development as part of eco-

development to reduce forest dependence of the adjoining human population¹³. Ecodevelopment Committees (EDCs) or Forest Protection Committees (FPCs) depending on adjoining forest classification have been established by the Forest Department but representation of the poor and the neediest like shrimp seed collectors at these committees is negligible. At Chotomollakhali, shrimp seed collectors are not represented in the EDC at all¹⁴, all the members are cultivators who are not exactly dependent on the forest or water courses. Moreover, as part of the ecodevelopment initiative the EDC at Chotomollakhali has desilted and embanked freshwater canals, raised plantations, distributed stand-alone solar lighting systems, and provided funds for self-help groups none of which have accrued to the shrimp seed collectors. These have been cornered by cultivators mostly at the communal level, but also at individual level. WWF followed the same model from 2003-04 through 2005-06 as part of its tiger habitat conservation initiative at Chotomollakhali and the benefits have been taken up by the stronger elements of the community. After this experience, WWF has attempted course correction through collaboration with institutionalised collective action organisation (panchayat) and spontaneous collective action organisation (para 'club') using this form of collective action as a counter balance for the former form thereby trying to ensure that benefits accrue to the neediest as well, e.g. ensuring that the landless have access to land and water during dry winter months to raise at least one paddy crop for subsistence through interdependence of members of the target community in the form of vesting ownership of water in re-excavated freshwater canals with the landless. This arrangement is likely to forge a symbiotic relationship between the landless and the landed.

8.5 Analysis

This is one case where the concept of sustainability is used in its original context of living renewable resources. In this case, lack of sustainability may be indicated by declining productivity but, equally, collapse may come suddenly and without warning (Conway, 1983). Ecologists believe that there are important thresholds of scale, and that human activities can, by stressing ecosystems in ill-advised ways, set in motion large-scale and irreversible losses in the functioning ecological and physical systems (Tisdell, 1988). Here, the dilemma is between meeting basic human needs of the shrimp seed collectors and ecological sustainability. Further, existing contradictory situations such as liberalised economic policies and promotion of shrimp aquaculture *vs.* absence of hatchery in West Bengal; income generation initiatives for the asset-less and ecosystem dependent population *vs.* benefits cornered by the relatively better off and landed; and, existence of collective action organisations *vs.* lack of orientation of such organisations, intensify the basic dilemma.

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¹³ The National Forest Policy, 1988, of the Ministry of Environment and Forest, Government of India, incorporated ecodevelopment which was thought of to reduce forest dependence of the people surrounding Protected Areas, and to compensate them in cash and kind as well as through non-farm income generating opportunities for the loss of access to resources in Protected Areas. See Chapter 3, Sub-section 3.2 and Footnote 9.

¹⁴ At Mousuni, EDC/FPC does not exist due to absence of forest in adjoining area.

This case vividly presents what Holdren, Daily and Ehrlich (1995) term as *perverse* conditions (in terms of poverty, impoverishment of environment, and wastage of human potential), driving forces (in terms of excessive population growth), and underlying human frailties (in terms of short-sightedness, ignorance, and denial), all of which make achieving sustainable development goals difficult.

Shrimp seed collectors of the Sundarbans, especially drag-net operators and shootnet operators are left with no choice. In fact, it is the only avenue left for these people to subsist and they do not perceive either the basic dilemma in the 'activity' as constructed by academicians, planners and development practitioners. This lack of perception may be attributed to dependence on the benefits received, high discount rates, and lack of information about the sheer number of collectors in the eco-region and extent of damage to the ecosystem, particularly in terms of bycatch. Is this, then, the end of the road or are there conditions that can facilitate reduction or discontinuation of tiger shrimp seed collection? Examples of collective action as enumerated in the preceding section hold the key.

Since traditional panchayat members are able to resolve conflicts among shrimp seed collectors, they most likely are the ones who can exert influence on the collectors provided alternative means of subsistence are available which not only compensate the loss of earning through tiger shrimp seed collection but also address the very short economic cycle of the shrimp seed collectors. As of now the *majhi samitis* organise religious festivals and resolve conflicts but their ambit can be widened to encourage members to take up other means of livelihood and approach institutional lenders for the purpose. Alternative means of livelihood for the shrimp seed collectors can be a possibility if a mechanism of checks and balances is devised through participation on equal terms of *institutionalised* and *spontaneous* collective action organisations.

Tourism

9.1 Introduction

From the preceding two chapters of this thesis, it is evident that agriculture and fishery as means of livelihood under current circumstances do not promise much in terms of attaining sustainable development goals, nor are the enabling physical conditions (chapters 4 through 6) in a state to usher in large-scale economic uplift of the people of Sundarbans. The conditions under which prospects of attaining sustainable development goals *might* be enhanced will be dealt with separately in Chapter 10. In this chapter, a small tourism initiative in the Sundarbans is examined (Section 9.4), as it provides glimpses of a possible 'win-win' situation though the values attached to the eco-region by the local community and the various actors involved are quite different, while for some it is intrinsic, for others it is instrumental.

Before describing the small-scale tourism initiative, I will provide in the following section (9.2), a brief overview of tourism in the Sundarbans in general and reflect on the State Government's views on the matter, including large-scale tourism wherein it is considered as an economic force capable of generating enough revenue and opportunity for effecting large-scale economic uplift of the people of the Sundarbans. Section 9.3, provides the case-specific (tourism-specific) frame of reference, which along with the broader framework presented in Chapter 2 helps to understand and to analyse the contrasting forces in operation in the context of tourism in the Sundarbans. In Section 9.4, I look at the two contrasting schools of thought (somewhat akin to the competing values of deep ecology and social ecology) regarding tourism's role in community and/or market development, as well as present the concepts of sustainable tourism, and tourism commons. Section 9.5 presents an analysis of the current situation in the context of tourism as a livelihood option for the communities in the Sundarbans.

9.2 Tourism in the Sundarbans

The Sundarbans eco-region offers three tourism options: wildlife tourism, beach tourism and religious tourism. Religious tourism is restricted to Sagar Island where during a particular lunar position in the month of January almost half a million Hindu pilgrims, mostly from North India, visit for a holy dip at the confluence of the Hugli River (revered as the holy Ganges) and the Bay of Bengal. For the rest of the year, Sagar Island hosts insignificant number of religious tourists (visiting the confluence and a shrine connected with the great epic behind the holy dip), as well

as the beach tourists. Bakkhali on Namkhana Island is more popular as a beach tourism destination, especially for tourists from in and around Kolkata, possibly due to better road connectivity and infrastructure¹. Bakkhali has a public sector tourist lodge and a number of budget hotels all of which have access to grid electricity. The tourism organisations and the *institutionalised* collective action organisation at the Development Block level have collaborated effectively around tourism in Bakkhali. The Namkhana Panchayat Samiti through the participation of the tourism entrepreneurs raises resources by levying user fee of Rs. 2/- from every tourist who spends a night at Bakkhali and Rs. 30/- (\$ 0.7) from every passenger vehicle crossing over to Namkhana Island. The Panchayat Samiti has also carried out a beach front development with funds from private sources.

In local tourism parlance, a visit to the Sundarbans essentially means the eastern part and is synonymous with wildlife tourism. The Sajnekhali Wildlife Sanctuary (within the Sunderban Tiger Reserve) is the most popular destination which has a public sector tourist lodge. All the private sector establishments are close to the Sajnekhali Wildlife Sanctuary but on inhabited islands. These range from basic sleeping arrangement for the night to modest resort with modern amenities. Since the inception of the Sundarbans Jungle Camp at Bali (details in Section 9.4) in 2002, at least three other similar attempts have been made on different islands. Over 50,000 tourists visit the Sundarbans of which just one percent is of foreign origin. Most tourists are day trippers; others spend 2-3 nights unless they are naturalists or novelists. The West Bengal Tourism Development Corporation (a public sector company) provides onboard facilities from Sonakhali² (the main gateway to Sunderbans Tiger Reserve) to tourists in watercrafts but most tourists hire private launches (also from Sonakhali) for the trip and even spend the night on them. Onboard tourists practically have no interaction with the local community nor do they significantly contribute to the local economy except for hiring the launch and the services of a local guide which has been made mandatory by the Sunderban Tiger Reserve. For Indian tourists the guide fee is Rs. 150/- (about \$ 3.50) per day and for foreigners, it is Rs. 200/- (about \$4.00) per day.

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¹It is possible to drive down to Bakkhali directly from Kolkata. At Narayanpur, there are regular vessel services to ferry cars, buses and trucks across Hatania Doania River (see Chapter 5, Photograph 4). Similar vessel service to Kochuberia on Sagar Island is less frequent from Lot 8 (Harwood Point).

² Sonakhali can be reached by road from Kolkata (distance of about 100 km). In February 2006 a road bridge connecting Sonakhali with Basanti has been opened to traffic and now it is possible to travel by road up to Gadkhali (opposite Gosaba, see map in Figure 3.3) and tourists often bring their vehicles there but no attempt has been made to upgrade the road from Basanti to Gadkhali which is essentially an all-weather metalled inter-village road. Increased traffic has not only damaged the road but also increased the chances of road accidents due to proximity of the houses along the road. Earlier, only van-rickshaws and autos (both modes described in Chapter 5, Subsection 2.1) would ply along the Basanti-Gadkhali road. The bridge connecting Sonakhali and Basanti has taken at least seven years to build, and in the meanwhile, with some planning and foresight the Basanti-Gadkhali road could have been widened and upgraded to cater to tourists and local population alike.

As of now tourism is not a prime mover of the local economy nor does it generate significant revenue for the State; tourist visits to the Sunderban Tiger Reserve (STR) annually generate about US\$ 26,500/- through entry fee of Rs. 15/- (\$ 0.30) per head per day and boat/launch licence fee of Rs. 100/- (\$ 2.20) per day. In 2003, the Government of West Bengal received a US\$ 155 million tourism project proposal from an Indian business conglomerate which was received by it enthusiastically in the hope of earning substantial revenue. The Government signed a Memorandum of Understanding with the conglomerate to float a joint venture to tap Sundarbans' tourist potential in all three segments: wildlife, beach and religious. The proposed project sought 303.5 ha of land on five different islands spanning eastern and western Sundarbans to build world-class facilities including helipads/jetties and bring in watercrafts of various sizes including floatels to which the Government consented. Keenness of the Government was also apparent from the fact that it agreed to have just one director out of seven on the board of directors of the proposed joint venture company. The project in fact, was envisaged as high-end mass tourism though it was termed as an ecotourism project.

Some time between the second half of 2003 and first half of 2004, land surveys were carried out and mandatory public hearings organised. This was also the time when Jambudwip Island was cleared of fishermen settlers (see Chapter 3, Subsection 3.2) thus local public opinion was against land acquisition for the mega tourism project. Local, regional, national and international civil society organisations (CSOs)³ collaborated effectively against the proposed tourism project raising objections at public hearings and petitioning various provincial and national government offices. They also raised concerns regarding the impact of the mega project on the delicate ecosystem, extraction of groundwater, displacement of human population, waste and effluent disposal, and violation of Coastal Regulation Zone (CRZ) stipulations. Since 2005, not much has been heard about the project and concerted collective action on the part of the various CSOs at different levels appears to have effectively stalled it; the project proposal has not been taken up for environmental clearance by the national government.

While the mega project failed to make any further headway, a small project seems to be setting an example along the lines of sustainable tourism. The following section introduces the concepts of tourism as an economic force, sustainable tourism and tourism commons.

9.3 Frame of reference

9.3.1 Tourism as an economic force

Tourism as an economic activity cuts across many sectors, levels and interests. These range from the hotel industry to National Parks authorities, from tourist boards to government departments, and from tour operators to conservation

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³ Some of the CSOs that came together against the proposed mega tourism project are EQUATIONS, Bangalore; Bombay Environmental Action Group and Reef Watch, both Mumbai; Environmental Justice Initiative and Kalpavriksh, both New Delhi; Environmental Investigation Agency, London; PUBLIC and Disha, both Kolkata, and a number of local fishermen organizations along with National Fishworkers Forum as well as local units of political parties.

organisations as well as the host community. Tourism is a powerful economic force in the development of both community-based and global markets. Despite its economic significance, debate continues whether or not tourism truly benefits all entities in its system (Sautter and Leisen, 1999). According to Cater, the various interests involved can be grouped into four categories: the host population, tourist guests, tourism (entrepreneurs) organisations and the natural environment (Cater, 1995). At a most basic level, there are two schools of thought regarding tourism's role in community and/or market development, the political economy view is that of an exploitative force, while the functional view sees it as a proactive force (Lea, 1988). The political economy view posits tourism as an exploitative force under which residents of a destination can only react to its consequences on their home environment. The functional view approaches tourism as a proactive force which seeks to maximise positive returns to a community's overall growth while minimising the costs to the environment and culture. It suggests that all parties or stakeholders interested in or affected by this business within a particular market or community should collectively manage the tourism system (Keogh, 1990; Sautter and Leisen, 1999). However, the relationship between tourism development, socioeconomic development and the environment is circular and cumulative. While safeguarded environment and improved infrastructure result in continued tourist arrivals resulting in relatively improved standards of living due to tourism earnings and better infrastructure, it also places additional pressure on the environmental resources upon which the entire system rests. Globally, the experience has been that initially there is snowballing in economic terms and later of degradation of the environment jeopardising future interests of tourist and host populations as well as those of tourism organisations, unless sustainably managed.

9.3.2 Sustainable tourism

In 1982, a "Joint Declaration" of the World Tourism Organization (WTO)⁴ and the United Nations Environment Programme (UNEP) spelt out the goal of sustainable tourism as: "the protection, enhancement, and improvement of the various components of man's environment are among the fundamental conditions for the harmonious development of tourism. Similarly, rational management (from the perspective of tourism bodies, mainly public sector) of tourism may contribute to a large extent to protecting and developing the physical environment and the cultural heritage, as well as improving the quality of life" (UNEP/GRID-Arendal)⁵. But, in majority of the work published under the banner of sustainable tourism, much of the detail of sustainability remains hidden behind the rhetoric of balance, or obscured by a variety of labels, such as ecotourism or alternative tourism, which may amount

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⁴ The World Tourism Organization is a specialized agency of the United Nations based in Madrid. This intergovernmental organization represents public sector tourism bodies from most countries (145 countries as on December 2005) in the world. This organization is frequently confused with the Genevabased World Trade Organization meant to set the rules for the global trading system and resolve disputes between its member states; all of whom are signatories to its approximately 30 agreements. To end this confusion, the UN General Assembly on 1 December 2005 approved to add the letters UN as prefix to the abbreviation of World Tourism Organization, thus UNWTO.

⁵ http://www.grida.no/Newsroom.aspx?m=54&pressReleaseItemID=507 as viewed on 24 November 2006.

to little more than an attempt to give the impression of environmental stewardship (Butler, 1991; Cater 1993; Wheeller, 1993). According to Cater, therefore, to ensure true sustainability, it is vital that the local population is involved in the management of their tourism resources and that the local population benefits directly from the utilisation of these resources (Cater, 1993). Nevertheless, different interpretations of sustainable tourism might be appropriate under different circumstances. Hence, according to Hunter, sustainable tourism should not be regarded as a rigid framework or as a checklist of things to do, but rather as an adaptive paradigm which legitimizes a variety of approaches according to specific circumstances and results in mutually agreed (by the key stakeholders) desirable outcomes (Hunter, 1997).

According to the "Berlin Declaration" (1997), on Biological Diversity and Sustainable Tourism: "Tourism should be developed in a way so that it benefits the local communities, strengthens the local economy, employs local workforce and wherever ecologically sustainable, uses local materials, local agricultural products and traditional skills. Mechanisms, including policies and legislation should be introduced to ensure the flow of benefits to local communities. Tourism activities should respect the ecological characteristics and capacity of the local environment in which they take place. All efforts should be made to respect traditional lifestyles and cultures" (GDRC)⁶. The criteria mentioned above, the "Berlin Declaration" and the ones outlined in Chapter 2, Section 4, will be used in critically assessing the small tourism initiative in the Sundarbans which now serves as a model for responsible tourism and other tourism entrepreneurs in the region are attempting to follow the model.

Central to sustainable tourism development then, is the issue of how to manage the natural, built, and socio-cultural resources of host communities in order to meet the fundamental criteria of promoting their economic well-being, preserving their natural and socio-cultural capital, achieving intra- and inter-generational equity in the distribution of costs and benefits, securing their self-sufficiency, and satisfying the expectations of tourists (Hunter, 1997; Briassoulis, 2002).

9.3.3 Tourism commons

The concept of tourism commons comprises the whole spectrum of resources that host areas and their surrounding regions possess. These are complex common pool resources (CPRs) because they are subject to multiple uses by diverse groups and are characterised by "multiple, overlapping, and potentially conflicting uses and user groups [a "commons situation", see Chapter 2, Section 2]; volatility in uses and institutional arrangements; and variances between *de jure* and *de facto* property rights" (Selsky and Memon 2000: 1-2 cited in Briassoulis, 2002; p. 1068). The most salient feature of the tourism commons is that their components are under diverse property regimes – state, private, communal or open access – both before and after tourism development (Healy, 1994). Consequently, different producers and management systems are involved with different concerns as regards their use and protection. In particular, external users (tourists and tourism entrepreneurs) using

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⁶ http://www.gdrc.org/uem/eco-tour/berlin.html as viewed on 24 November 2006.

local resources may interfere with existing rules of use and management and influence the status and value of the commons. Similarly, the use of the commons is mediated by different socio-cultural value systems: those of the locals, tourists, and entrepreneurs. Hence, the resources used by tourists in common with other tourists, and for tourism in common with other purposes by tourists and locals, can be visualised as tourism commons. As with other CPRs, they experience the problems of overuse and lack of incentive for individuals to invest in maintaining or improving them (Healy, 1994). "Once they [resources of host communities, the tourism commons] are overexploited, the sustainability criteria are difficult to meet; thus, sustainable tourism development is severely threatened" (Briassoulis, 2002; p. 1066).

Most often tourism commons are heterogeneous and variable, composed of natural and built material (tangible) and immaterial (intangible) elements. They comprise several types of CPRs and public goods, constituting a diversified and tightly connected resource base that is indispensable for the integrity of the tourist experience. Their elements intermingle within space and over time being used during tourist episodes simultaneously by both tourists and locals. Hence, their utilisation and valuation is more socio-culturally differentiated than in cases of simpler CPRs where fewer systems interact (such as the grazing commons). This is especially important for those elements that are controlled by non-tourism interests and poses problems where coordination of users is required for efficient resource management such as infrastructure in general, as well as roads, harbours, airports and railways. Therefore, "policies for the management of the tourism commons should aim to balance the interests of multiple uses and users; to acknowledge and accommodate the spatial and temporal variability of the commons; and to encourage wide local participation and autonomy in decision making" (Briassoulis, 2002; p. 1080).

9.4 Small tourism initiative: Sundarbans Jungle Camp

Prior to 2002, Bali Island in Gosaba Development Block opposite Sajnekhali Wildlife Sanctuary was infamous for its poachers. In 2000, some of the young poachers renounced poaching at the insistence of a local school teacher, Sukumar Paira, and banded together to form the Bali Nature and Wildlife Conservation Society (BNWCS), a collective action organisation of the *spontaneous* kind. The former poachers also became members of the Eco-development Committee (a collective action organisation somewhere in between the spontaneous and institutionalised kind, possibly more towards the latter) on the island promoted by the Forest Department through the Sunderban Tiger Reserve (STR), and were provided with small responsibilities and payments by the STR. Members of BNWCS through the school teacher came in touch with WWF-India and Wildlife Protection Society of India (WPSI). These conservation organisations encouraged the BNWCS members to work for wildlife conservation. Small payments and encouragement was not enough to keep the reformed young men engaged and gainfully employed over a prolonged period and there was every possibility that these men would again take to poaching. At the initiative of the then Field Director of STR, Pradip Shukla, and the Director of the WWF-India West Bengal State Office, the idea of a small tourism initiative was floated. Help Tourism, an Indian tour operator and consultant with 15 successful community tourism initiatives in North Bengal and Northeast India since 1991 to its credit, was invited to explore possibilities. Help Tourism came up with the idea of a community tourism

demonstration project on Bali Island involving the former poachers, thus the Sundarbans Jungle Camp.

Most tourists who are day trippers contribute only about 50 cents per head in revenue which does not generate adequate income in the local economy. With the belief that overnight tourists could contribute more to the immediate local economy, Help Tourism followed the strategy of offering exclusive accommodation in ethnic style cottages and good local food and service. It is held that small-scale, locallyowned tourism ventures probably make a greater relative contribution towards sustainability in terms of enhanced standards of living for host populations (Cater and Lowman, 1994). Help Tourism (the sole monetary investor in the project) invested over US\$ 50,000/- in Bali Island and constructed six of the eight planned cottages in two phases. In the first phase, land for the tourism project was provided by BNWCS; subsequently Help Tourism bought the adjoining land for expansion. The tour operator, apart from offering boat rides in mangrove creeks with a chance to see wildlife as tourist attractions also provides the tourists an opportunity to observe and interact with local culture. Help Tourism leverages the World Heritage Site status of the Sundarbans in its marketing strategy and the designation is of value to its clients but for a majority of the visitors to the Sundarbans it is of little or no consequence.

Since the adoption in 1972 of the Convention Concerning the Protection of World Natural and Cultural Heritage, 830 sites throughout the world have been formally designated (as of 2006) as World Heritage Sites. These sites, by reason of their special historic, scientific, aesthetic qualities, have universal value. The philosophy underlying the convention has implications for tourism. Although it is difficult to document a direct correlation between World Heritage designation and tourism, as many sites were already popular spots prior to receiving their "World Heritage" status, that designation does increase visibility through public information generated by the World Heritage Committee, the host state and the private sector (Cook, 1990).

Natural sites to be in the World Heritage List should either be "outstanding examples of major stages in the earth's evolutionary history", represent "significant ongoing geological processes, biological evolution, and man's interaction with his natural environment; contain "superlative natural phenomena, formations or features", or contain "the most important and significant natural habitats where threatened species of animals or plants of outstanding value still survive" (Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, 1988: Articles 36 and 24). The horseshoe crab known to be a living fossil is still found in the Sundarbans, land formation in the eco-region is still underway and it supports a large human population, and is the most significant natural habitat of the Bengal tiger. Hence, some aspect or the other fits all the criteria for Sundarbans to be in the World Heritage List but the last criterion secures the World Heritage status for the eco-region most firmly.

Since the first phase of the Sundarbans Jungle Camp was constructed on the property of BNWCS, it is a partner in the project and receives 10 percent of the surplus generated as its share. BNWCS is free to decide on how to spend its share of the profit which its members claim is directed towards conservation and community

development work. There are also counterclaims and allegations of misappropriation but these appear to be more a case of jealousy and based on hearsay than facts. The Bali II Gram Panchayat and Help Tourism do not seem unduly concerned by the allegations made against certain members of BNWCS. WWF-India State Office and WPSI also appear to be solidly behind BNWCS and its members. The Bali II Gram Panchayat regularly issues the licence to conduct business within its jurisdiction and raises revenue. All the employees (10 women who look after housekeeping and maintenance of cottages and 11 young men) except for the Coordinator of the Camp are from the Bali II Gram Panchayat area. At the outset, it was decided through community meetings where the community was represented by Gram Panchayat members as well as members of the community, that the demonstration project would help the local community at the communal level in as many ways as possible though no specific commitments were made except for employing the former poachers who are members of BNWCS and Eco-development Committee (promoted by STR as a participatory management body).

The project has generated over 3,000 man-days during its construction and continues to contribute to the local economy by making 70 percent of its purchases locally. According to a conference paper presented in Greenwich, this is the maximum possible due to unavailability of items such as furnishings and beverages locally (Bauer, 2006). Apart from the direct benefits to its employees, the project has opened up avenues for the community through promotion of formal education (a book bank has been established which provides books to 100 needy but meritorious students of local schools, four scholarships have been instituted and an informal school is run at the project site for the benefit of school dropouts), skill development especially of women (training for handicrafts such as fabric printing and improvement of traditional quilt making techniques), and sale of local produce (honey, handicrafts and hand painted T-shirts) to tourists, as well as other micro enterprises such as rearing poultry and running a laundry. The tour operator has also helped revive a local *jaatra* (folk theatre) group which performs at the project site when contracted and also elsewhere, augmenting earnings of its 20 members. The revival of the group is also culturally significant as the *jaatra* depicts the story of the local presiding deity, Bon Bibi, which reinforces conservation messages among the performers and the local community, as well as provides the tourists with a glimpse of the traditional worldview.

Since December 2003, when the project started hosting guests, it has hosted 2401 guests (up to March 2006) of which 1242 are foreigners; since April 2004, foreign tourists have outnumbered domestic tourists by 1:0.8. Revenue generated has also risen steadily from about US\$ 13,500/- in March 2004 to about US\$ 41,000/- in March 2006. Tourist arrivals in the Sundarbans (reportedly 75,000 during the period April 2006 to March 2007) as well as at the Sundarbans Jungle Camp (figures unavailable but Help Tourism claims it has had a packed season) are on the rise.

After deduction of expenditure (at least about US\$ 6000/- is fixed expenditure on account of staff salary irrespective of occupancy), 10 percent of revenue is shared with BNWCS, 15 percent is retained by Help Tourism as its share of profit though effectively 65 percent (15 percent as profit + 20 percent for maintenance + 25 percent for marketing + 5 percent for R&D) is under its control, the remaining 25

percent goes towards community development programmes directed at the entire community (Bauer, 2006). Help Tourism believes that Sundarbans Jungle Camp will attain financial independence by March 2008, as of now the project only generates operational profit.

During the first two years of operation, the Sundarbans Jungle Camp provided surface water from a private pond in the bathrooms but guests' preference have made them switch over to groundwater. Help Tourism has constructed a tube well which villagers are free to use. Groundwater being a common pool resource is subject to depletion and degradation but is not recognised as such either by the tour operator or the Gram Panchayat. If a tube well runs dry, the usual practice in West Bengal is to construct another one near by, and there is no regulation of abstraction of groundwater as such. Help Tourism appears prepared to invest in another tube well should the present one run dry, and by co-opting the villagers in its use of groundwater, appears to have avoided a situation where a commons situation might have turned to a commons dilemma.

Four of the six cottages as well as the dining space have been constructed on common property owned and managed by the BNWCS. The dining space is open to community use in the absence of tourists on the property and such use is coordinated by the BNWCS. Not only has the tourism project added to the common property that the community can access, it has also been able to influence a state agency to provide public-good in the form of a jetty. In 2006, the SDB constructed a jetty close to the tourism project and is for use of the tourists and community alike.

9.5 Analysis

In all the cases presented in this treatise, I have attempted to highlight the contrasting forces in operation in the Sundarbans so as to achieve an understanding of these. Tourism initiatives in the Sundarbans both current and proposed present an interesting contrast. While on the one hand the State Government is supportive of mega tourism projects despite opposition from various quarters based on the political economy view wherein tourism as an economic force is deemed exploitative, on the other hand, small-scale tourism initiatives find acceptance in and active participation of the community. But these initiatives lack full-fledged support of the State Government though some of agencies/departments of the State Government do provide support, e.g. the Sunderban Tiger Reserve and the Sundarban Development Board. The outlook on or attitude towards tourism of the State Government is apparent from the keenness of the Government to facilitate and participate in the mega project but its unwillingness to make things easier for smallscale projects or facilitate their replication is evident too. While it is willing to permit land acquisition and facilitate the process, it is incapable of improving road connectivity at the gateway to the Sundarbans. There could be two reasons prompting the Government to behave in the manner that it does. One, low-impact low-visibility tourism projects are also low on revenue due to lower tourist turnover and two, bringing about transformation (that gives a sense of modernisation and makes the State an attractive destination for investment from outside) in the countryside through a large number of small-scale projects is time-consuming and possibly administratively more costly.

Mega tourism and small-scale community tourism reflect two schools of thought as distinguished in Section 9.3.1 and are at different poles of the spectrum, affecting local community differently and eliciting different responses from the community. In the Sundarbans, the proposed mega tourism project brought about *spontaneous* collective action against it but the small-scale initiative witnessed constructive collective action both *spontaneous* and *institutionalised* in its favour. In case of the larger project, the community felt threatened in terms of physical displacement and change in access regime of common pool resources as well as common property resources. Whereas in case of the small-scale initiative the community not only sensed it as a livelihood opportunity for some of its members but also better access to CPR, and augmentation of common property and public-goods, along the lines of functional view of tourism as an economic force.

Since the mega tourism project has not yet materialised it would be conjectural to analyse its impact but the small-scale initiative does provide that opportunity in terms of sustainable tourism. The fundamentals of sustainable tourism as propounded in the UNEP-UNWTO declaration, and the Berlin Declaration are quite evident in the Bali initiative. The Sundarbans Jungle Camp is small; sensitive to local environment and culture; allows space for participation of local community and collective action; benefits the local community in terms of increased employment opportunity, diversified and strengthened local economy through use of local material, agricultural products and traditional skills in congruence with the functional view of tourism. The area of concern that remains is the use of CPR in the form of extraction of groundwater though by co-opting the community in its use, the Sundarbans Jungle Camp has effectively closed the avenue for the community to demand for an alternative arrangement. The CPR in question gains significance in the light of the fact that for the community it is life sustaining since it is the only reasonably safe source of potable water but for the tourists it is a cleansing medium and surface water would do just as well provided it appears clean and causes no bodily harm.

Given the relative positive outcomes of the Sundarbans Jungle Camp, it appears that at least on the islands adjoining the Tiger Reserve and the Reserve Forests of 24-Parganas (South) Forest Division, replication of the model could make substantial contribution towards attaining sustainable development goals in the Sundarbans. But, how substantial would this be? An idea on this can be envisaged if the successes of the tourism initiative are viewed keeping in mind the demographic figures of Bali II Gram Panchayat. The Gosaba Development Block of which Bali II Gram Panchayat is a part, has a population density of over 750 persons/km² (third most densely populated Development Block among the eight in de facto Sundarbans) and the corresponding figure for the Gram Panchayat is even higher at 814 persons/km². The Sundarbans Jungle Camp touches the lives of at least 145 local persons directly in monetary terms through full-time as well as part-time employment and monetary contribution towards education. Even if all these persons were to be from separate families (highly unlikely since benefits tend to congregate within the same group due to kinship ties in rural settings), at least 2,300 families remain untouched directly, discounting the philanthropic act of providing services of a physician and distribution of medicines once every fortnight. The tourism project also touches the lives of people of Bali II Gram Panchayat indirectly in monetary

terms through procurement of local produce. Given, that in the 2005-06 financial year the Sundarbans Jungle Camp had a turnover of US\$ 41,000/- and assuming 70 percent of it is spent locally⁷, it amounts to about US\$ 29,000/- which spread over 2,500 households of Bali II Gram Panchayat is about US\$ 12/- through the year, a miniscule amount. Obviously, a tourism initiative with a financial outlay of about US\$ 50,000/- and community-based cannot generate significantly more.

For community-based tourism to make a substantial impact on the entire community, not only Bali II Gram Panchayat but all the Panchayats adjoining forests, need to have a number of community-based tourism projects each with greater number of tourists than what Sundarbans Jungle Camp currently hosts. Although tourist arrivals are on the rise, at this stage, catering to greater number of tourists through a number of community-based tourism projects might appear daunting but is not impossible altogether if the tourism industry and governments (national, provincial and local) work together to carefully plan and execute as in case of Kwai River tourism in Kanchanaburi province of Thailand⁸.

According to Lele (1991), sustainable development is the process of directed change that in addition to traditional objectives of meeting basic needs of the community has the objectives of sustaining the ecological and social bases of human life. At the broader level, small-scale community-based tourism does help to sustain the ecological and social bases of human life to a large extent in its own interest though there are instances of disharmony and jealousy in the community as a consequence of the tourism initiative (a breakaway rival group is emerging in Bali and unless a mechanism of engagement with it is evolved it could damage the prospects of community tourism). The positives of the process of directed change are apparent from Sundarbans Jungle Camp's contribution towards nature conservation and revival of folk theatre group, and limited contribution towards meeting community's basic needs by providing access to potable groundwater and livelihood opportunities but at the individual or household level, the tourism project has very little impact on overcoming what Holdren, Daily and Ehrlich (1995) describe as the "main ills" undermining human well-being, except for a very small proportion of the population. The *perverse conditions* in the form of poverty and wastage of human potential persist, the *driving force* in the form of excessive population growth shows no signs of letting-up, and underlying human frailties such as greed, selfishness and intolerance are gaining ground. This causes a threat to the potentiality under which the process that ensures choices and the continued freedom to make those choices as a manifestation of movement towards sustainable development goals.

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⁷ It is reported (Bauer, 2006) and claimed by Help Tourism that 70 percent of the purchases are made locally but this figure appears high. It is possible that 70 percent of food items are procured locally.

⁸ See http://expo.nectec.or.th/tat/stable/history.html and www.riverkwaifloatel.com/index_jungle.htm or http://www.losthorizonsasia.com/river_kwai_rafthouse.php

Conclusions, reflections and recommendations

10.1 Introduction

This thesis is primarily concerned with explanations of the current situation in the Sundarbans. In particular, it intends to answer questions such as: 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? These are answered in the next section (10.2). In Section 10.3, I provide a broader critical analysis on the processes observed as a reflective background for Section 10.4, in which considerations for policy-makers are offered. Also, in Section 10.3, a critical reflection is made regarding the usefulness of the collective action concepts used in the research. The last section (10.5) is an epilogue necessitated by the fact that I have remained in the Sundarbans after formal completion of fieldwork, which not only has enriched my understanding of the ongoing processes but also has influenced the writing of this thesis.

10.2 Answering research questions

In Chapter 2, Section 5, I had broken down the main research questions into 8 subquestions and taken up other questions incidental to this discourse. Some of these questions have been addressed implicitly in the preceding chapters. Here, I take up the questions listed in Section 2.5 and provide answers as under.

10.2.1 Scientific research questions

1. What competing interests and contradictions are at play in the eco-region? Globally, the Sundarbans eco-region is the last of its kind and therefore, interest for conserving it is high, manifested in terms of the eco-region being designated as Biosphere Reserve and part of it as World Heritage [Subsection 3.3.3]. Locally, however, particularly those who have very little resource or none at all view the ecosystem as the great provider. For these people, exploiting the ecosystem for subsistence and livelihood is the normal thing to do [Section 8.3]. Thus, the competition is between global and local interests.

At the national level, the competing interests are more along the lines of deep ecology versus social ecology [Section 1.3]. While the Ministry of Environment and Forest has designated parts of the eco-region as wildlife sanctuaries and National Park to provide protection in varying degrees, the Ministry of Renewable Energy is constructing at an enormous cost (as compared to per unit generation cost

in a conventional thermal power station) the first full-scale tidal power station in the country next to a wildlife sanctuary. This reflects the simultaneous significance and insignificance of the eco-region from different perspectives. Environmentally, the eco-region is deemed significant but in electoral terms it is insignificant and thus a suitable location for conducting an experiment with largely unknown or poorly understood impacts on the ecosystem. Possibly, from the Government's point of view, it is a good idea to keep experiments as far away as possible from the intended implementation area, and in India among the maritime States, Gujarat and West Bengal are as far apart as possible. Locally, the competing interests surrounding the tidal power station are between the well off and the poor. While the well to do can afford electricity and take advantage of the contracts awarded locally, it is the poor who depend on watercourses for their livelihood, one of which will be blocked for generation of electricity [Section 6.3].

At the State level (West Bengal), the competing interests are displayed by the Forest Department and Fisheries Department [Section 8.1]. While one is trying to provide protection to the mangrove ecosystem, the other is encouraging greater exploitation of ecosystem resources. Though unenforceable, collection of tiger shrimp seeds using mosquito nets has been made illegal by the Fisheries Department, but the Department is now encouraging collection of edible mud crabs [Section 8.3]. The competing interests displayed by the two departments are also probably political since the two ministers heading the respective departments are from different political parties within the ruling coalition and it is in their interest to be seen competing for political space, and when convenient espouse the cause of the environment or the cause of human development at the cost of the environment. The Marichjhapi and Hukaharaniya incidents are most illustrative of this competition [Subsection 3.3.2]. Public posturing by political parties is a matter of convenience rather than ideology.

Apart from expansion of political turf and protection of existing political space, contradictions also emanate from ongoing land-building process in the active delta and human occupation of the region. Human occupation of the geographical space requires structures that can withstand the forces of nature for at least a few generations but the earthen constructions in the form of mud embankment give away a few times within the span of a generation [Section 4.4, Sk. Abdul Rashid has had to move his semi-permanent house twice in the past 17 years due to shifting of embankment]. Mousuni and Mollakhali islands being at the two poles, Sk. Rashid's example is more or less an 'extreme' case but the competition between natural forces and human ingenuity in the eco-region plays out in varying degrees on the inhabited islands. Also, culturally, the preference for agriculture as opposed to fishery compounds the basic contradiction [Chapter 7, Section 1 and Chapter 3, Subsection 3.1].

These competing interests can be clustered as competition between different value systems (use vs. non-use and deep ecology vs. social ecology), competition between States (Gujarat vs. West Bengal), competition between political parties (irrespective of whether the parties are partners in government or in opposition), and competition between natural forces and human ingenuity.

2. What gives rise to the competing interests and contradictions at play in the Sundarbans?

While the Sundarbans eco-region is valued globally and nationally for its distinctiveness and diversity, these are the very attributes that the public administration system (at the national level as well as the State level) ignores and the eco-region is administered no differently (including colonial attitude of the civil servants) from the mainland, imposing the mainstream, homogenous administrative system. Gram Panchayat areas are based on population size of about 25,000. Based on this criterion, Mollakhali Island is fragmented into one and a half administrative units, the other half being on another island. Mousuni, however, is one composite administrative unit being at the other end of the pole. Obviously, this enforced homogeneity gives rise to contradictions, which impede effective delivery of essential services that are a prerequisite for achieving sustainable development goals. Public service delivery is through a plethora of organisations, numbers of which are on the rise although one nodal agency (Sundarban Development Board) had earlier been created to be responsible and accountable for development of the whole area [Section 1.2]. The SDB has remained ineffective for a number of reasons such as relatively junior or weaker government minister in charge of the new organisation, and SDB has to compete for resources and space with larger and older line departments. These multiple organisations not only have functional overlaps but also are misaligned, so much so that at times budget for a particular activity/initiative is with one organisation while relevant manpower is with another [Section 4.3]. Such multiplicity and overlap creates its own contradictions as shown in Section 3.4.

Another major contradiction at play in the eco-region is the rise in human population against the backdrop of continuous loss of landmass. For example, since 1969, Mousuni Island has lost about 15 percent of total area whereas over almost the same period the population has risen by about 265 percent driving more and more people to draw sustenance from the ecosystem [Section 4.2]. Under such a circumstance modern education has the potential to equip individuals to prepare themselves for employment outside the eco-region but there are few opportunities for demand driven training on offer¹.

3. How do different groups of actors negotiate the competing interests?

The competing interests of conservation and livelihood are negotiated by restricting entry into Protected Areas and limiting resource extraction to mostly buffer zones of forest areas. The Government for its part tries to compensate the loss of livelihood opportunities by taking up local development and alternative livelihood generation through Ecodevelopment Committees (EDCs) and Forest Protection Committees (FPCs) but this hardly compensates for the loss of opportunities since within the

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¹Although education as a sector has not been examined in this thesis for reasons stated in Section 1.5, Chapter 1, the following information is in order. There are only four colleges in the Sundarbans catering to a population of 1,761,675 whereas in other parts of South 24-Parganas District there are 16 colleges and three technical institutes. Moreover, the courses on offer in these four colleges do not equip the students for gainful employment.

community, benefits are cornered by those whose livelihood opportunities have not diminished due to the limitations imposed, as shown in Section 8.4. The global community on its part (through conservation organisations) does almost the same thing as the Government with similar outcomes. Thus, resource extraction in designated reserve areas are carried out legally as well as illegally but generally members of local communities have a rough estimate of cost of illegal resource extraction and operate at a level that the cost-benefit ratio remains positive as shown in Section 8.3.

Competing political interests are negotiated through the ballot during local self-government (Panchayat) elections, by shifting political allegiance en masse or even by use of physical force at times resulting in fatalities [Section 7.3]. Forces of nature are negotiated through relocation and change of occupation as shown in Table 4.1 [Section 4.2]. The space created by lack of effective service delivery by ill-equipped and misaligned public administration system is taken up by dominant political parties and *spontaneous* collective action, not necessarily always legal but licit [Section 5.3, third sub-case].

4. How 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?

For a vast majority of the population in the Sundarbans, aspiring for a better life is unthinkable, maintaining status quo is itself a daunting task. Such households go under for a number of reasons such as: loss of land due to erosion, loss of agricultural productivity due to salt water incursion, loss of life due to humanwildlife conflict or natural calamity, as well as birth of girl children preceding a boy child. Small households with relatively large land holdings and households with salaried income are the ones that aspire for a better life which necessarily means acquiring more agricultural land, higher education for children especially boys, spreading risks across different sectors of the economy and a house in the suburbs of Kolkata, Very rarely, households that are sliding are able to pull themselves out of the situation. Such transformation when does happen is due to extraordinary efforts of individuals that allow them to make a living outside the eco-region, either through higher education or through acquiring skills that are well paying. The only other hope for households in precarious situations are the NGOs but even in NGO projects, more often than not, relatively stronger households derive greater benefits [Section 8.4]. In case of state efforts in the form of rural employment guarantee scheme [Section 8.3], there are procedural bottlenecks and lack of capacity at the Gram Panchayat level, resulting in denial of employment for the eligible despite the guarantee.

5. Why do 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?

Greed, selfishness, intolerance, shortsightedness, ignorance, stupidity, apathy and denial are the *underlying human frailties* (Holdren, Daily and Ehrlich, 1995). All of these are on display in the Sundarbans. Individuals, groups, as well as agencies exhibit these attributes though not all attributes are displayed by the same individual, group or agency. Denial of the fact that the eco-region is very different

from the mainland by the public administration system results in poor service delivery heightening vulnerability of human society in the Sundarbans. This results in organisational apathy; the agencies lack conviction that they can make a positive difference in the situation. For example, the Sundarban Development Board (SDB), due to its somewhat negative experience with freshwater canals where no one takes responsibility for maintenance and canals deteriorate over time, has almost discontinued the practice of constructing canals. Instead, SDB has floated a scheme for freshwater ponds on private land where it contributes 90 percent and the landowner contributes ten percent of the expenditure [Section 7.1]. The scheme fails to take into account all those who either cannot make the ten percent contribution or do not have land to spare. Nevertheless, on paper, the scheme looks probably the same if not better than the scheme for canals in terms of potential improvement of agricultural productivity through a second crop because of freshwater availability.

Individuals and groups display one or more of the above attributes depending on the material condition that they are in and the level of desperation. For example, an external investor in shrimp farming is driven by profit, the higher the better. The investor drives the demand for wild tiger shrimp seeds either ignoring or being ignorant of the impact of shrimp seed collection on ecosystem integrity. While the investor is in a position to earn quick profits, the shrimp seed collector's immediate concern is her/his next meal but both actors display shortsightedness.

6. To what extent do 'frontier characteristics' explain the conduct of different groups and various agencies in the face of deteriorating ecosystem integrity and heightened vulnerability of human society in the Sundarbans?

According to Turner, the frontier is a dynamic process throwing up new opportunities, new patterns of settlement, new occupations, new challenges and new problems (Turner, 1962/1996). The frontier experience gives rise to 'frontier mentality', characterised by individualism, mobility (physical and social), innovativeness, self-reliance, suspicion/distrust of authority, trust in quick working relationships, sense of effectiveness, localisation and portability of civic and governmental institutions (Elazar, 1996). Continuing with the example of wild shrimp seed collection from the previous question, most shrimp seed collectors have taken up the occupation because either they have lost resources to natural processes or did not have any to begin with (new occupation) [Section 8.2]. This occupational group can be found living literally on the edge of embankments and have experienced physical mobility possibly more than once (new patterns of settlement). In case of loss of agricultural land and earlier land-based occupation they have also experienced downward social mobility. The shrimp seed collectors operate very much on their own (individualism), are optimistic of finding something or the other of value to collect from the watercourses to make a living if eventually shrimp seeds are no longer available due to over exploitation (new challenges), and the occupation itself is a new innovation that cropped up with the introduction of commercial shrimp farming in the late 1980s. While this new production system has spawned new occupations through the entire value chain, it has also introduced new ecological threats and challenges as well as heightened human vulnerability evident from frequent human-wildlife conflict [Section 8.4].

The society in the Sundarbans is generally self-reliant, and it receives very little from the state because the public service delivery mechanism remains so weak. For example, all the embarkation points where either the jetty is faulty and thus cannot be used or there is no jetty at all, people have found ways and means to use the locations for the purpose [Subsection 5.2.1].

The frontier is a dynamic process, a process of permanent impermanence. All those who recognise this impermanence are often able to take advantage of the new opportunities. For example, due to settlement under different circumstances at Mollakhali and Mousuni, one set of people have embraced the frontier experience while the other is compelled to confront it [Section 4.2]. But many organisations and agencies are by nature such that these do not recognise the impermanence, especially if these are part of the state thus making these less adaptable to the situation despite deteriorating ecosystem integrity and heightened vulnerability of human society. Moreover, enforcement being weak, the state for a typical Sundarbans resident is not something that they have to deal with on a regular basis or even once in their lifetime for some. Therefore, state organisations and agencies are viewed with distrust making them all the more ill positioned to effectively respond to the continuously changing situations, for example, the Drainage Wing of the Irrigation Department (GoWB) [Section 4.4, first sub-case].

7. To what extent do the concepts of commons and collective action help in understanding and explaining the movement of different social categories/local communities of the Sundarbans towards a better life?

Households that are precariously placed or sliding downward depend on the commons. The more the household goes under, the higher is the degree of dependence on the commons and the lesser is *spontaneous* collective action as shown by the case of the shrimp seed collectors [Section 8.4]. It appears that spontaneous collective action has a threshold below which an individual household operates on its own and at even lower levels, individuals of a household start to operate individually, i.e. the higher is the degree of desperation, the lower is the possibility for spontaneous collective action unless there is external intervention [Section 8.4]. However, with external intervention, collective action starts to resemble less of the spontaneous kind and more of the institutionalised kind though not in the sense that *institutionalised* collective action has been used in this thesis (local-self government or parliamentary national government at the highest level). For example, without the intervention of Panchayat members the shrimp seed collectors are unable to resolve conflicts or users are unable to pool in resources for repair of boat-landing sites without active participation of Bazaar Committee or farmers are unable to re-excavate freshwater canals without help from SDB or Forest Department or iNGOs.

Spontaneous collective action comes into play where material well-being is threatened (but not yet beyond redemption) or where there is a perceived opportunity for improvement as shown in the cases of embankment repair and repair of boat-landing sites. It might be possible through external intervention to bring different social categories/groups together to undertake collective action who are threatened but not yet desperate as well as the desperate, provided *interest* of the different groups/categories are intertwined. Benefits of collective action will be

disproportionate in the sense that the relatively better-off group will benefit more but the worse-off group bordering desperation or already in a desperate state and incapable of *spontaneous* collective action will derive benefits that will allow it to pull itself out of the desperate situation [Section 7.2]. Such external interventions need to be carefully designed and monitored or else all the benefits will accrue to the better-off group as in the case of EDC/FPC interventions and WWF interventions at Mollakhali, and the worse-off group will lose faith in collective endeavours.

Wherever the state has yielded space, people have collectively (through positive collective action) or individually (through negative collective action or collective inaction) made provisions for public goods and services. This space however, at times is taken up by collective action organisations that serve a limited few at the expense of the society at large. This, in fact, is a negative consequence of positive collective action as in the case of transport unions [Section 5.3, second sub-case].

8. What are the configurations of conditions under which collective action is organised to overcome social or public-good dilemmas and how do interest, organisation, mobilisation and opportunity influence the extent of collective action?

A collective attempt by people to supply themselves with goods and services (social and/or public-good) that they all need but could not provide for themselves individually gives rise to collective action. Not in all cases where needed goods and services are lacking does collective action take place because of other prevailing conditions. The configurations of conditions under which collective action is organised are: apolitical atmosphere, existence of space for collective action, type of "commons situation" where the state of desired good or service is close to absolute degradation, the gain from collective action is immediate, there is no precedence of state organisation/agency or NGO providing the desired good or service, and where the sequence is right, meaning that other conditions are in place for the desired good and/or service to have a multiplier effect on the local economy or production system.

A society that is politically polarised where almost everything is undertaken along political lines or keeping political interests in mind is not conducive to collective action as evident from the Marichjhapi and Hukaharaniya incidents [Subsection 3.3.2]. Political parties or their affiliates as in the case of transport unions [Section 5.3, second sub-case] and 'clubs' [Section 3.5] usurp the space for collective action in such social set-ups.

There are essentially two types of commons situations, (i) in the absence of collective action benefits of cooperation are foregone despite the existence of some common benefits that could be obtained, and (ii) failures of collective action result not only in forgoing benefits of optimal use of resources but also in absolute degradation of the resource in question. Recall the case of freshwater canals [Section 7.3] where benefits of cooperation are foregone until absolute degradation is at hand or the case of the boat-landing site [Section 5.3, first sub-case] where net benefit dips to the minimum before collective action re-emerges. In both cases the gain is immediate in terms of availability of freshwater during dry winter months and convenient usability of the boat-landing site. Also recall the case of collective inaction [Section 5.3, third sub-case] where the benefit in terms of availability of

telecommunication service is immediate. However, not in all cases does collective action emerge if there is precedence of external agencies stepping in to provide the needed good and/or service, as for example, maintenance of freshwater canals. Because agencies and organisations like Sundarban Development Board, Forest Department and iNGOs step in to re-excavate canals, there is no attempt by the farmers to maintain the canals.

Finally, it may also be a question of sequence as regards whether collective action will emerge for provisioning of public-goods and/or services. At the Chotomollakhali and Bagdanga Markets the degraded boat-landing sites were coming in the way of proper functioning of the Markets due to difficulty posed in transhipment of goods [Subsection 5.2.1]. Had it not been for the thriving Markets with fairly large catchment areas, the boat-landing sites would have remained in a degraded state as in other parts of the field study islands.

Extent of collective action is a function of *interest*, *organisation*, *mobilisation*, and *opportunity*. Recall that the Market Committees at Chotomollakhali and Bagdanga are apolitical entities and for the members of these committees unhindered movement of goods and people is of prime interest which converged with the interest of the society at large. If *interest* is universal extent of collective action is high.

Breach in embankment [Section 4.4, Kalidaspur: May 2001] spurs collective action. *Interest* is near universal for repairing the embankment except for those wishing to change land-use from agriculture to aquaculture. There is *intensive involvement* of the affected in terms of *organisation* of repair efforts except the ones interested in aquaculture but exhibit *passive compliance* and join the repair efforts. More intense the involvement in organising joint efforts the higher is the extent of collective action. Also, at times when instead of involvement there is indifference exhibited by one group, another group exhibits more than usual *intensive involvement* [Section 4.4, Kusumtala: May 2003] and extent of collective action remains high.

Mobilisation of resources is crucial for successful collective action but contribution of resources need not be equal by all participants of collective action in all cases. In the Kalidaspur: May 2001 case, the implicit understanding was that all would contribute almost in equal measure but those leading the effort incurred greater expenditure and it is unlikely that those who had taken the lead will undertake a similar venture sometime soon but in case of the Chotomollakhali boat-landing site [Section 5.3, first sub-case] some of the actors contributed more than the others and if a similar situation arises again it is likely that all these actors will again contribute relatively greater amount of resources. This is due to "contingent agreements" wherein some individuals agree to contribute greater resources to a common effort so long as at least few other actors also contribute. Under such cases the benefit to be obtained from contribution from a few who agree to contribute greater amount of resources may be so substantial that contingent agreements need not include all those who benefit. However, all said and done, collective action cannot take place in the absence of *opportunity* which may happen due to dispersed nature of users as in the case of passengers of transport systems [Section 5.3, second sub-case] or the space being usurped by other forms of collective action organisation such as 'clubs' or non-yielding of space by the state.

10.2.2 Policy questions

1. To what extent are institutional arrangements made by the decentralised Indian political system adequate to help resource users allocate benefits equitably over long periods of time?

The democratic system was grafted in India after independence. Since the 73rd Amendment of the Constitution of India in 1992, institutional arrangements have been put in place for local-self governance. These are termed as institutionalised collective action organisations in this thesis. Since 1978, regular elections have been held to elect representatives to local institutionalised collective action organisations in West Bengal. Local-self governance was an apolitical Gandhian ideal but elections to these institutions are contested along party lines. The candidate securing the greatest number of votes polled irrespective of whether the candidate secures a majority is declared elected. It is quite possible that a candidate is 'rejected' by the electorate in terms of percentage of votes polled but gets elected due to the fact that she/he has more votes than the others among all the 'rejected' candidates which is quite often the case. Therefore, it is quite possible that the elected candidate does not represent majority interest. Moreover, the electoral process in India is more democratic the farther it is removed from the individual electorate. This is amply proven by the fact that the most popular national leaders like Indira Gandhi and Rajiv Gandhi have lost majority in the Parliament, yet, at the village Panchayat level an unpopular candidate retains her/his seat year after year. The closer the representative institution the process seems less democratic possibly because of the smaller electorate, and it is relatively easier to influence a smaller electorate, if required, even through intimidation.

Another feature of democracy in India at all levels is that everything is negotiable, the closer the institution the more negotiable the issues are though since the early 1990s national economic policies are becoming less and less negotiable irrespective of the party in power but at the village level even the supply of potable water is negotiated on party political lines. This has implications on access to basic amenities at the village level implying one can be denied access due to her/his 'wrong' political affiliation. In rural West Bengal, it is difficult to remain unaffiliated and to some extent it is also unacceptable. Also note the rivalry between political parties within the ruling coalition [Subsection 3.3.2 and Section 8.1]. Under these circumstances it is highly unlikely that the decentralised institutional arrangements can help resource users to allocate benefits equitably over long periods of time. However, individual representatives (Panchayat members) by dint of their elected position are at times able to help resource users allocate benefits equitably [Section 8.4].

2. How can contradictions at play in the eco-region be better managed to attain sustainable development goals?

The basic contradiction in the eco-region is between the active delta-building process and permanent human settlement. Due to the ongoing physical processes human settlement is forced to move from time to time and at times affected households lose all that they have. However, the scale of impact due to breach in embankment is not the same on the two field study islands, nor is the consequent impact on the ecosystem the same due to loss of livelihood of the affected [Section 4.1]. There are two options to manage this contradiction; (i) recognise the physical impermanence and alter the socio-economic institutions accordingly so that when

affected households need to move, it is a matter of relocation but not absolute loss of land resources (adjustments similar to what drag-net shrimp seed collectors make to accommodate a new family [Section 8.3]), and (ii) construct protective structures so that the impermanence is staggered over at least 30 years (see Section 10.4, recommendation 1). In terms of sustainable development goals, the first option is more suited but the population of the Sundarbans being non-indigenous and having migrated from the mainland has transposed the socio-economic institutions from the mainland ill-suited for the 'frontier'; had the population evolved in the eco-region, suitable socio-economic institutions would most likely have been in place. The second option, while providing a sense of permanence to human settlements would require large-scale interference with natural processes. It might not be easier to alter socio-economic institutions but it is almost certainly safer than trying to alter natural processes.

Stemming from the transposition of human society from the mainland is the cultural preference for freshwater agriculture as the mode of production. There could be two approaches to tackling this contradiction. One is to move away from freshwater agriculture to brackish water agriculture and the other is brackish water fishery. Brackish water agriculture especially rice appears to be a distinct possibility given that genetically modified salt-tolerant rice and mustard varieties have been developed and also that older people recall names of naturally occurring salt tolerant varieties of rice. While genetically modified varieties may raise ecological concerns, a concerted attempt to locate natural salt tolerant varieties may be a worthwhile exercise. The other option of brackish water fishery might be more feasible since all it requires is mastering the technique of induced breeding. If hatchery produced fish fry can be made available then the production system can be sustained. In terms of sustainable development goals, this means a process of directed change that has the constraint of ecological sustainability in addition to traditional development objectives (Lele, 1991) as well as improvement of perverse conditions (poverty, impoverishment of environment, wastage of human potential); by altering the driving forces (misdistribution of investments, misuse of technology, mismanagement) and overcoming underlying human frailties (short-sightedness, ignorance, stupidity, apathy and denial) (Holdren, Daily and Ehrlich, 1995). However, in terms of distributional equity between contemporaries and future generations as a goal of sustainable development (Howarth, 1997; Anand and Sen, 2000 and Sen, 2000) the focus is on current generations and whether the freedom of future generations to live the way they like and value what they have reason to value is compromised or not is I am unsure of because every age cohort makes decisions based on what they have reasons to value.

Another basic contradiction emanates from the competing global and local interests which are essentially conservation values attached to the Sundarbans and livelihood issues of the people of the eco-region. The contradiction is between exploitation of ecosystem resources and conservation of biodiversity. Historically the eco-region was an open access common pool resource which over time was appropriated by the state and access denied to the local population [Section 3.3.2, Resource access regime]. Forest and environment protection laws have tightened over time especially after independence while people in the eco-region have continuously lost land resources due to change in landmass. As people lose land resources, dependence on

ecosystem resources increases. Recall the case of shrimp seed collectors [Chapter 8, Section 3 and Chapter 4, Table 1] most of whom take to the occupation because they do not have access to land resources, and the collection method is such that it poses serious threat to ecosystem integrity. This contradiction can be managed through either cutting off the demand for wild shrimp seeds by introducing hatchery seeds and demonstrating that this leads to safer farming practices and higher economic returns or through providing access to land resources to this group or through alternative livelihood options. However, for alternative livelihood options to be viable for the shrimp seed collectors it has to be taken into account that most of them operate in very short economic cycles and make a living on a daily basis, it is almost like being a daily wage earner without being accountable to anyone, for most economic activities neither is the earning on a daily basis nor does it provide the freedom of working for as long or as little as one wants. However, for attaining sustainable development goals the activity of shrimp seed collection has to be discontinued and mechanisms found for tackling poverty (perverse condition), excessive population growth (*driving force*), short-sightedness, ignorance, stupidity, and denial (underlying human frailties).

All political parties vie for as much political space as possible; in that sense all parties are rivals of each other. In a two-party system such rivalry provides for checks on the party in power. However, in a multi-party system when a group of like-minded parties come together to form the government, political rivalry takes a different shape where for the sake of running the government rivalries have to be kept in abeyance yet at the same time for protecting existing political turf and expansion of political space the rivalries have to be kept alive. This built-in contradiction in coalition governments is difficult to manage, because government departments and agencies under different political masters start to act as extensions of the various political parties rather than parts of the same government. Perhaps, this requires a reform in the political system wherein once a coalition government is formed along agreed lines by like-minded parties, political party identities of the ministers get dissolved.

3. Why is sustainability difficult to achieve, and under what conditions may further deterioration in the Sundarbans be halted?

Between 1961 and 2001, the population in the field study villages has increased by 214 percent [Annexure II, Figure 2] and the majority of the population being landless, the absolute number of individuals directly dependent on the natural ecosystem has increased proportionately, jeopardising ecosystem integrity. Though perceptible development in terms of agricultural productivity, aquaculture, transport and communication, and electrification has taken place in the eco-region over the years, the population increase tends to negate the advantages. Also, in certain cases the development initiative in the absence of appropriate or adequate supply of raw material is detrimental to the ecosystem itself; aquaculture [Section 8.2] and gasifier power station [Subsection 6.3.2] are cases in point. Moreover, sometimes investment appears to be at variance with the priorities of the communities in the Sundarbans. Among the top five issues that the respondents of this study want the state to prioritise are roads, healthcare, higher price realisation for agricultural produce, better schools, and better access to potable water. While electrification does not figure among these top five issues [Section 3.5], investment in the power station at

Bagdanga is five times larger than the investment in the Primary Health Centre [Subsection 6.3.1], which is a priority issue. Mismanagement, short-sightedness, ignorance, denial and apathy by the various organisations and agencies charged with the responsibility of public service delivery are in ample display, all of which undermine sustainability not only in terms of distributional equity among contemporaries and future generations but also in terms of choices available and the freedom to make choices.

Halting further deterioration in the eco-region calls for control over population expansion and equipping sections of the population with skills to make a living elsewhere. Given the current population pressure, the eco-region as an agricultural production centre is not viable; efforts need to be initiated to transform the eco-region into a service-based production centre given its proximity to Kolkata and increased connectivity of Kolkata with a globalised economy. The 'open system' in conjunction with large-scale investment in protective structures, and adequate and appropriate education infrastructure will make land in the eco-region suitable for the service industry.

10.3 Reflections

One of the aims of this study is to provide insights into the socio-political and physical complexities within which strategies need to be developed for the sustainability of the Sundarbans. As evident from the previous section, the main research questions are not so much questions of how to develop these strategies but to achieve a deeper understanding of the negotiation of competing values and management of contrasting forces and thus to view the strategies in wider social, political and geo-physical contexts. The cases presented in chapters four through nine, I believe, have allowed deepening of this understanding.

The embankments are crucial for sustaining human habitation in the Sundarbans. Though the significance of embankments is local the ownership is non-local in the sense that these are public property rather than common property and the onus of their maintenance rests on *institutionalised* collective action organisation that is a level far too removed [Chapter 4, Section 5]. The farther the ownership and onus, the lesser is the immediate significance, therefore response is reactive rather than proactive in terms of regular monitoring and maintenance. This mismatch reduces scope for *spontaneous* collective action. However, *spontaneous* collective action is undertaken in dire situations where group behaviour can be explained in terms of *interest, organisation, mobilisation* and *opportunity* rather than *trust, reciprocity* and *reputation*. The latter set of attributes comes into play when ownership is local and action is pre-emptive rather than reactive.

Transport and communication are mainly in the realm of private property but in the absence of effective regulation and enforcement through *institutionalised* collective action from higher levels, there is enough space for *spontaneous* collective action to play out, not always by the investors but by their workers. So much so, that it results in a *second-order conflict* situation wherein successful collective action of a few runs counter to larger social and/or public good. *Spontaneous* collective action need not necessarily yield positive *net benefit* for the community [Chapter 5, Section 4]. Similarly, *spontaneous* collective inaction or a form of negative collective action

need not yield negative net benefit. While both forms proliferate due to availability of space for collective action, outcomes depend on whether such collective action benefits a smaller section of the community at the cost of the larger section or vice versa.

Electricity generation and distribution by nature call for large investments. In the absence of assured returns, such investments are generally made by the state creating public property; Sundarbans eco-region is no exception. However, the decentralised distributed generation (DDG) model allows space for local level *institutionalised* collective action. But, such public investment and collective action do not necessarily contribute towards sustainable development [Chapter 6, Section 4].

Within the 'physical domain' in the case of the embankments, the issue is not so much of collective action but of sustainability and sustainable development. The current structures are woefully inadequate and sustaining them is a losing proposition. Embankment failure and frequent breaches have a direct bearing on the sustainability of the ecosystem as well as the process of sustainable development in the eco-region since these events force sections of the local population to make a living based on ecosystem resources. Under such circumstance not only is the affected section of the population left with no choice but also it is mostly worse off [Subsection 10.2.1, answer 1]. In case of transport and communication, the prevailing situation is such that it neither enhances choices for the population of the eco-region nor the competitiveness of the eco-region as a production centre [Chapter 5, Section 4]. In the case of access to modern energy services the issue is of sustainability of the initiatives and their contribution to sustainable development [Subsection 10.2.2, answer 3].

In the 'physical domain', in terms of Lele's interpretation of sustainable development (1991), the basic needs of the population remain unmet and locally the ecological basis of human life remains under threat. The main ills that undermine human wellbeing as identified and categorised under perverse conditions (poverty and impoverishment of environment), driving forces (excessive population growth and mismanagement), and human frailties (greed, selfishness, short-sightedness, ignorance, stupidity, apathy and denial) by Holdren, Daily and Ehrlich (1995) are either worsened or remain unaffected despite the investments making overcoming the ills almost impossible. In terms of the closely related interpretations of Howarth (1997) and Anand and Sen (2000), where the issue is one of distributional equity between contemporaries as well as future generations, the current state of enabling conditions within the domain are such that life opportunities of future generations are compromised. Also in the case of Sen's freedom-based view of distributional equity (2000), wherein future generations should have the freedom to live the way they like and value what they have reason to value, this basic freedom is compromised due to the prevailing state of the enabling conditions (chapters 4 through 6). The lack of freedom is not only in terms of future generations vis-à-vis us but also among contemporaries. The way out of this not-so-encouraging situation in the Sundarbans eco-region, according to my understanding based on the observations in the course of this research, are presented in Section 10.4.

Chapters seven through nine represent the 'livelihood domain'. In the case study on agriculture the issue is that of lack of *spontaneous* collective action despite the

opportunity where farmers can come together to supply themselves with goods and services (social and or public-good) that they all need but cannot provide for themselves individually. The case study on aquaculture is one case where the concept of sustainability is used in its original context of living renewable resources. In this case, lack of sustainability is indicated by declining catch of shrimp seeds from the wild besides continuing loss of biodiversity by way of destruction of juveniles of fin fishes during seed collection. Here, the dilemma is between meeting basic human needs and ecological sustainability as well as the mismatch between policy initiatives and ground reality. The case study on tourism presents an interesting contrast. Collective interest as articulated by the State Government encourages large tourism projects based on the political economy view that envisages tourism as an economic force capable of generating revenue and opportunity for large-scale economic uplift while disregarding concerns of the local community. The community itself welcomes small-scale tourism initiatives that allow space for different forms of collective action despite being low on revenue generation.

In terms of sustainability and sustainable development in the 'livelihood domain', the agriculture sector as of now appears most promising despite the fact that there is an inherent contradiction in the lay of land and freshwater agro-ecosystem. *Spontaneous* collective action on the part of the farming community and promotion of appropriate crops and storage facilities by state agencies can go a long way in sustaining the practice and contribute towards sustainable development goals, subject to embankments holding out against natural forces. However, with a vast majority of the population being landless, mechanisms need to be devised that will allow access to land and water to the landless to raise at least one food crop in a year. One such mechanism is recommended in Section 10.4, which is currently being put to test by WWF [Section 10.4, recommendation 3].

Shrimp aquaculture on the one hand depends on sustainable supply of raw material from the eco-region while on the other, pushes the ecosystem to the brink by driving a very high demand for tiger shrimp seed from the wild. In terms of sustainability and sustainable development this case study presents a dilemma that is least tractable. If the ecosystem is to be conserved and the shrimp industry sustained then an alternate supply chain for shrimp seed needs to be established but by doing so almost half a million people will be deprived of the only livelihood option available and on which most of them have come to depend as a last resort [Section 8.2].

While small-scale tourism is relatively benign in social and ecological terms, each small-scale resort offers only limited livelihood options for the local community and generates little revenue for the state. Scaling up the number of such initiatives has the potential to create more jobs than it presently does but at the same time also has the potential of becoming more demanding both in social and ecological terms, and in bureaucratic terms, ultimately tipping the scale adversely [Section 9.5]. Moreover, only about 10 of the 89 Gram Panchayats in the eco-region have appropriate locations for such resorts due to their proximity to forest areas. Thus small-scale resorts by themselves are of limited help as a livelihood option for the community but along with allied activities like producing local goods for tourists, being tourist guides, parasailing and water sport helpers may just make the difference.

According to Lele's interpretation of sustainable development (1991), it involves a process of directed change that not only has the traditional objective of meeting basic needs of current and future generations but also sustain the ecological and social basis of human life. As of now none of the options within the 'livelihood domain' secure both the bases. Under such circumstances poverty, impoverishment of environment, wastage of human potential (perverse conditions); excessive population growth, and mismanagement (driving forces); greed, selfishness, intolerance, short-sightedness, ignorance, stupidity, apathy and denial (underlying human frailties) persist, all of which make achieving sustainable development goals difficult. Unless ways are found to improve the perverse conditions by altering the driving forces and overcoming the underlying human frailties, distributional equity between contemporaries as well as future generations, and the freedom of future generations to live the way they like and value what they have reason to value, will remain elusive.

10.4 For the consideration of policy-makers

The unique eco-region of the Sundarbans requires special policy measures to address ecological sustainability and distributional equity, to overcome the main ills that undermine human well-being, and to ensure that the people of this region have the choice to live the way they like and value what they have reason to value, and the continued freedom to make those choices [Chapter 2, Section 4].

The following policy measures are recommended for the consideration of policy-makers, which I believe, will facilitate attainment of sustainable development goals in the eco-region. Since December 2005, my function as a researcher has shifted somewhat due to my new functional position in WWF. The recommendations that I am making here are, in addition to the research findings, influenced by my new functional position. The recommendations are followed by a brief explanation.

1) Make large-scale investments in embankments so that these structures can withstand forces of nature for at least 30 years. Erect durable structures further inland as in an 'open system' so as to reduce interference with time-velocity symmetry of tidal currents. Shift responsibility of erecting and maintaining these structures to the national level.

Shifting a large population of over 1.76 million out of the eco-region does not appear feasible given that rural West Bengal already has a population density of 676 persons per square kilometre. Minimising further degradation of the land mass is the only option to ensure that the population has the opportunity to develop with the rest of the country. Large-scale investments in concrete structures located further inland so that tides have the space to play is likely to allow more stability than currently possible. Given the magnitude of physical forces, the global phenomena of sea level rise, the level of investment required for erecting and securing the structures, and the significance of the eco-region, it might be more appropriate to transfer ownership of embankments and the responsibility of maintaining these even further by several levels to the national level or even beyond since the Protected Area is of global significance and has consequences for the World Heritage site. Moreover, it is not within the means of the State of West Bengal to make such large-scale investment.

2) Reconstitute Sundarban Development Board (SDB) and make it the nodal agency for anything to do with the Sundarbans.

The SDB is a specialised agency of the West Bengal Government under the Sundarbans Affairs Department headed by a relatively junior minister; it currently operates more as an implementing agency than a coordinating agency. Just by putting SDB under the charge of a senior minister in the government and making it the nodal agency in terms of decision-making may not allow it to live up to its mandate. Given that the Sundarbans is a special region and that two parallel administrative systems operate post decentralisation, SDB should be converted into a three-tier representative body, fused with the Panchayat institutions and mandated for local-self governance and development functions. It should withdraw from direct implementation and delegate that responsibility to dedicated sections of line departments to cut out overlaps and misalignment². The dedicated sections of line departments should be accountable to the SDB. The three-tier representative SDB should have nominated experts to guide decision-making along scientific lines. In other words, the new SDB should have the advantages of a specialised government agency as well as that of three-tier local self-government institutions. Unless exceptions like these are made for special areas like the Sundarbans, the current problems will persist and eventually deteriorate.

- 3) Ensure access to land resources for the landless
 As of now, the mechanism to rehabilitate land losers is woefully inadequate. With
 increased population it is not physically possible to provide land to all land losers
 unless impermanence is factored in. Every time households are displaced due to
 shifting embankments there is a shift away from ecological and social sustainability
 due to increased dependence on ecosystem resources and downward socio-economic
 movement of affected households. To halt this downward spiral, mechanisms have
 to be devised so that affected households have access to land resources and
 freshwater to raise at least one staple crop per year. This might be made possible by
 transferring ownership of freshwater in public canals to the landless which the
 landless can trade with the landed. With assured access to freshwater, the landless
 can enter into 'lease agreements' with the landed for a few units of land against small
 payments and raise one staple crop during the dry winter months. Through this
 arrangement, the landed can look forward to an assured second crop.
- 4) Improve transport connectivity
 Despite physical proximity of the eco-region to the city of Kolkata, the region appears remote due to poor transport connectivity. Agriculture still being the mainstay of the economy, there is need for efforts to be directed towards better price realisation for the farmers. Price realisation is poor due to high transport cost and wastage. Improved transport connectivity will also help the population in accessing healthcare services, attract more tourists to the eco-region, as well as provide better access to modern energy services.

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² In a similar situation in Digha, another coastal area in West Bengal, the Digha Development Authority has delegated the responsibility of implementation to the line departments since the 1980s.

- 5) Improve access to modern energy services Energy by itself is not useful, the services provided by energy in combination with appliances are. Examples of energy services are cooking, lighting, processing, communication, and transportation. As of now access to modern energy services is limited to consumptive uses and does not enhance productivity of the eco-region. There are no facilities for storage and processing of local produce except for a few ice factories leaving the producers with little choice but to sell their produce as soon as possible leading to poor price realisation. Improved rail/road connectivity will in all likelihood lead to better access to modern energy, e.g. bridges serving as links for electricity grid across water courses. Improved access could lead to higher productivity which in turn could lead to greater energy demand and given the current trend of technology deployment, is unlikely to be met entirely through renewable resources. The issue of improved access to modern energy services cannot be addressed locally nor can the demand be met locally and calls for a concerted state effort to address the issue.
- 6) Upgrade education delivery mechanism to equip students to be gainfully employed outside the eco-region.

Given the population growth and loss of land in the eco-region, it is no longer possible to contain the entire population and make it economically productive. Already, the eco-region is faced with seasonal migration and human trafficking. Individuals migrate as labourers where they work long hours and are poorly paid. This is because the education system has remained archaic unable to cater to the new economy and consequently the people of Sundarbans are unable to take advantage of the opportunities opened up in the liberalised and globalised economy. Investment in adequate and appropriate education will equip students to be gainfully employed outside the eco-region (till the time eco-region is transformed and is able to absorb large numbers of educated youth). Unless addressed, lack of appropriate education and training, and consequent unemployment, might over time lead to discontent and social tensions. What is needed is education that is targeted to the specific needs of the inhabitants of this unique eco-region.

7) Over time, transform the eco-region from an agricultural production centre to a service centre

The current economic drivers in the eco-region are agriculture and fishery. Fishery, especially aquaculture will retain its natural advantage but sustainable farming practices will have to be adopted. Agriculture, over time will not remain viable due to increased population pressure. If further degradation of the landmass is minimised through the 'open system' in conjunction with durable embankments, transport connectivity and access to modern energy services improved, the eco-region could take advantage of its proximity to Kolkata. Kolkata has limited opportunities to grow physically due to its location but the expanding economy will demand more space. Manufacturing facilities require large tracts of land but land requirement for the service industry is small. Appropriate skill development of the local population, especially of the youth, and improved infrastructure has the potential to transform the eco-region from being one of the most backward areas of West Bengal to a prime location in the new economy and facilitate higher levels of productive outcomes, individually as well as collectively. Also, if the service industry were brought to the eco-region it would ensure that embankments are appropriately

strengthened. Due to relatively less space requirement of the service sector than manufacturing facilities, it might be possible to allow tides the space to play as in the 'open system' suggested earlier. This would no doubt displace farmers but their trade is in any case losing viability, and those who are able to make use of the new opportunities would have a better life in material terms.

10.5 Epilogue

Before launching the PhD fieldwork I was already in the Sundarbans and after formal completion of the fieldwork in October 2005, I have remained in the Sundarbans as an employee of WWF responsible for its overall Sundarbans Programme. While the Programme benefits from my earlier experiences in the ecoregion and the intensive research, I have benefited no less since I now have the opportunity to examine the processes from a different perspective altogether and interact with the various actors accordingly. I believe it is my good fortune that I am still in the Sundarbans and able to enrich my understanding even further while at the same time exert some influence (hopefully positive) on the unfolding processes. This thesis has not remained completely unaffected due to my change in role since December 2005 when I took up employment with WWF but at the same time I believe that the thesis has not lost its objectivity. Interestingly, my change of role this time around was not missed by the community as it was in 2002. In fact, in Mollakhali where WWF has made relatively significant investments since 2003 aimed at tiger habitat conservation, there was a sense of pregnant expectation among my acquaintances and respondents. This has been a noticeable disadvantage of my continuing presence in the Sundarbans because some of my friends and acquaintances on the islands of Mollakhali, Mousuni and Bali are disappointed at not receiving any special benefits either for themselves or their organisations despite my changed role. The other disadvantage has been the delay of almost two years in finalisation of this thesis though it has probably not been a disadvantage in terms of quality of work. This delay has of course meant an additional burden on my family, strains of which are beginning to show.

This thesis, as is to be expected, has made no difference in the lives of the people of Sundarbans where threats continue to remain high and service delivery complicated and confused (a beginning has been made though), while the eco-region continues to gain global significance. On 05 April 2007, WWF released a briefing "Natural wonders feel the heat" from Brussels (Sundarbans being one of them) a day ahead of the IPCC Working Group report release with subsequent international and national media coverage³. Exactly a week later, the West Bengal Government on 12 April 2007 announced the establishment of yet another agency – Sundarbans Development

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³ http://www.panda.org/about_wwf/what_we_do/climate_change/news/index.cfm?uNewsID=98600 as viewed on 09 April 2007. http://www.dnaindia.com/report.asp?NewsID=1089334

http://www.ndtv.com/convergence/ndtv/story.aspx?id=NEWEN20070007928 and http://timesofindia.indiatimes.com/NEWS/India/Warming a threat to natural wonders WWF/articlesh ow/1862816.cms as viewed on 15 April 2007.

Corporation – for comprehensive development of the eco-region (*Indian Express*, Kolkata). Whether this Corporation factors in the permanent impermanence in the eco-region I do not know, nor do I know what these developments entail for the Sundarbans. Perhaps, I will revisit the Sundarbans from an academic standpoint again in 2015 for a reassessment unless other researchers take interest in this globally significant yet underdeveloped 'natural wonder' of the world.

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73rd Amendment and the Schedule XI of the Constitution of India

Introduction

Article 40 of the Indian Constitution states that "the State should take steps to organise village panchayats and endow them with such powers and authority as may be necessary to enable them to function as units of self-government". This Article is in the nature of a directive principle for state policy, responsibility for the implementation of which is devolved to State governments. In 1957, the Government of India instituted the Balwantrai Mehta Committee to make a detailed set of suggestions for establishment of a three-tier local self-government system.

Keeping in view the idea of democratic decentralisation as envisaged by the Balwantrai Mehta Committee, the West Bengal Panchayat Act, 1957 was passed. Subsequently, the West Bengal Zilla Parishads Act, 1963 was enacted. Under the Act of 1957, the Gram Sabha is the foundation on which the entire Panchayati Raj institution rests. It is a village assembly consisting of all persons whose names are included in the electoral roll of that area for the West Bengal Legislative Assembly. The experience of a couple of other States bears mentioning. The western states of Gujarat and Maharashtra passed legislation in the 1960s transferring many activities, including primary health care and education to district panchayats. In both States, funds were devolved as well and a separate administrative service — the Panchayat Service in Gujarat and the Maharashtra Development Service in Maharashtra — was set up to facilitate the transfer (or deputation) of State-level civil servants to work with the district panchayats. But the original vision behind the decentralisation effort has not been sustained.

The enactment of the new West Bengal Panchayat Act, 1973 was necessitated because of the failure of the West Bengal Panchayat Act, 1957 and the West Bengal Zilla Parishads Act, 1963, to fulfil the aspirations of rural people and therefore, was replaced by one comprehensive Act encompassing all tiers of the Pachayati Raj institution. Under the new Act, the operational area of the Gram Panchayat was enlarged to make it an economically viable unit with resources of its own in the form of taxation, grants and loans from the Central or the State Government but the capacity of local governments to raise local revenue remained limited due to non-implementation of the provision.

The Left Front gained power in West Bengal in 1977 and since 1978 it has been holding direct elections for seats at all three levels of the panchayats once every five years. Each level of local self-government is comprised of a number of seats and operates as a council that makes decisions collectively. At the district and development block levels, the councils include representatives from the lower level, and corresponding officers of the state bureaucracy (e.g., Collector/District Magistrate in the Zilla Parishad and Block Development Officer at the Panchayat Samity). Reforms to the system were effected in 1985 to shift responsibilities to the local self-governments, away from bureaucratic officials in concerned departments of the State government and to create a bottom-up budgeting system. The principal responsibilities

entrusted to the panchayats included implementation of land reforms, of the two principal poverty alleviation schemes (the IRDP credit programme and the Food for Work programme), distribution of subsidised agricultural inputs, local infrastructure projects, and miscellaneous welfare schemes (old-age assistance, disaster relief, and housing for the poor). The role played by the Gram Panchayats therefore consisted mainly of selection of beneficiaries of various development programmes handed down from the Central or State government.

Multiple failures of the bureaucratic and centralised apparatus of the Indian developmental state, and the decentralisation and devolution effected so far – failure to ensure efficient and effective delivery of public services, and to effectively provide and maintain key infrastructure – necessitated the 73rd amendment of the Constitution of India.

Table 1: Eleventh Schedule of the Constitution of India

Category

NO.	Description	Category
1	Agriculture including agricultural extension	Agriculture and allied
2	Land improvement, land reforms, land consolidation, soil conservation	Agriculture and allied
3	Minor irrigation, water management, watershed development	Agriculture and allied
4	Animal husbandry, dairy, poultry	Agriculture and allied
5	Fisheries	Agriculture and allied
6	Social forestry, farm forestry	Agriculture and allied
7	Minor forest produce	Agriculture and allied
8	Small scale industries	Industries
9	Khadi, village, cottage industries	Industries
10	Rural housing	Welfare
11	Drinking water	Core
12	Fuel and fodder	Agriculture and allied
13	Roads, culverts, bridges, ferries, waterways	Core
14	Rural electrification, electricity distribution	Core
15	Non-conventional energy sources	Welfare
16	Poverty alleviation programs	Welfare
17	Education, including primary and secondary schools	Welfare
18	Technical training and vocational education	Welfare
19	Adult and non-formal education	Welfare
20	Libraries	Welfare
21	Cultural activities	Welfare
22	Markets and fairs	Agriculture and allied
23	Health and sanitation, hospitals, primary health centres, dispensaries	Core
24	Family welfare	Welfare
25	Women and child development	Welfare
26	Social welfare, welfare of handicapped and mentally retarded	Welfare
27	Welfare of weaker sections, Scheduled Castes and Tribes	Welfare
28	Public distribution system	Welfare
29	Maintenance of community assets	Core

No. Description

The 73rd Amendment and the Eleventh Schedule

The 73rd Amendment Act, 1992 requires the States to devolve powers and authority to Panchayats so as to enable them to function as institutions of self-government. In particular, the provision calls for devolution of powers and responsibilities for the preparation of plans and implementation of schemes for development and social justice dealing with an impressively wide range of items, which are listed in a new schedule, Schedule XI, of the constitution (Article 243G).

The newly introduced Schedule XI of the Constitution (shown in Table 1) contains a comprehensive list of functional items, ranging from agricultural extension, implementation of land reforms, poverty alleviation, and promotion of small-scale industries to health, primary and secondary education and family welfare. There is considerable overlap between Schedule XI and Schedule VII, the State List (items within the purview of State Government) of the constitution, with one of the notable omissions in Schedule XI being law and order.

Outcome

Prior to the 73rd constitutional amendment the functional domain of rural local selfgovernment bodies was largely limited to the provision of some core services such as street lighting, water supply, sanitation, and local roads. To the extent that Panchayats were involved in developmental activities, they played the role of implementing agencies at the local level for various schemes sponsored by either Central government or State government departments. In this capacity, Panchayats oversaw the management and implementation of various local infrastructure schemes funded through various State government departments. This situation was expected to change in the new scheme of things with the empowerment of the Panchayats. However, a number of reports that have reviewed the State-level legislations indicate that, in most instances, the statutes merely provide a 'shopping list' of various activities and sectors for which Panchayats would be newly responsible (Government of India, 2001a and 2001b). Nevertheless, there have been attempts at various points in time and in various States to enhance the role of local governments. As of 2001, West Bengal (one of the most progressive States, second only to Kerala in terms of devolution and decentralisation) has transferred all of the 29 functions envisaged in Schedule XI to the Panchayats but has transferred funds and personnel for only 12 of those functions up to the sub-district (Development Block) level.

Overall, in most States there has been very limited progress in terms of administrative and financial devolution. This suggests a lack of political will and significant bureaucratic resistance but at the same time it also needs to be recognised that the process of transferring funds and functionaries can be quite complicated. In terms of transferring personnel, two sets of issues arise. The first is a practical one: the need to adequately address bureaucratic career concerns in order to retain and attract suitably qualified individuals to these positions. The smaller scale of the bureaucracies supporting local governments potentially limits upward promotion possibilities for civil servants and practical ways have to be devised to get around these limits. A second issue that arises is the tension between the need to, on the one hand, make bureaucrats accountable to elected representatives, and on the other, ensure some degree of insulation for the bureaucracy from political pressures. The basic tension between bureaucratic accountability and autonomy does not of course exist only at the local level but it does complicate the process of reconfiguring bureaucratic structures.

For a further discussion on Panchayati Raj institutions see Down to Earth, Jan. 31, 2007.

Annexure II

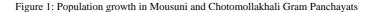
Administrative and demographic details of Sundarbans *de facto* and field research islands

Development Block	Population		Percentage of	Literacy	ıcy
	density (persons/km²)	Population	population primarily	(perce	(percentage)
			agriculture	1991	2001
Kakdwip	947	239,326	18.59	52.14	70.53
Sagar	658	185,644	29.99	65.05	77.87
Namkhana	433	160,627	27.33	62.24	78.40
Patharpratima	595	288,394	28.05	54.15	72.77
Mathurapur II	872	198,281	20.45	52.87	68.24
Kultali	614	187,989	22.41	41.16	60.09
Basanti	689	278,592	23.69	39.88	56.98
Gosaba	751	222,822	28.40	53.61	68.93
TOTAL	671	1,761,675	24.80	52.64	69.23
As against:					
South 24-Parganas (rural)	595			52.30	67.40
West Bengal (rural)	929			50.50	63.42
India (miral)	255			44.70	44.70 58.74

Table 2: Population, population density, dependence on agriculture and literacy of Mousuni and Mollakhali islands*

Mouza	Population density (nersons/km²)	Population	Percentage of population primarily dependent on	Literacy (percentage)	y tage)
			agriculture	2001	1991
Mousuni	629	3148	19.66	52.73	63.79
Baliara	644	7802	12.57	39.34	56.61
Bagdanga	629	4027	18.27	53.64	98.89
Kusumtala	5723	5036	15.47	46.60	69.14
Mousuni GP/Island	830	20,013	15.56	46.26	63.59
Kalidaspur	759	5154	20.35	41.39	55.84
Hentalbari	710	3643	13.94	42.76	57.18
Chotomollakhali	905	9633	12.29	50.58	59.70
Chotomollakhali GP	817	18,430	14.84	46.65	58.12
Taranagar	712	5753	10.05	41.24	52.00
Boromollakhali	878	3800	16.58	33.74	44.71
Mollakhali Island	800	27,983	14.09	43.87	55.04
Sundarbans	671	1,761,675	24.80	52.64	69.23

 $*All\,figures\,from\,Census\,2001\,unless\,specified$



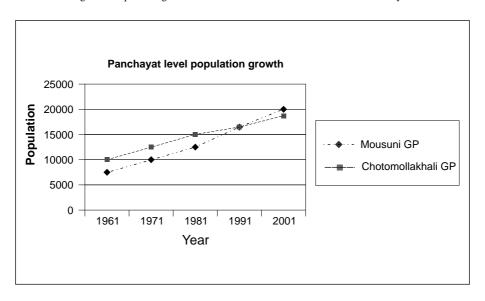
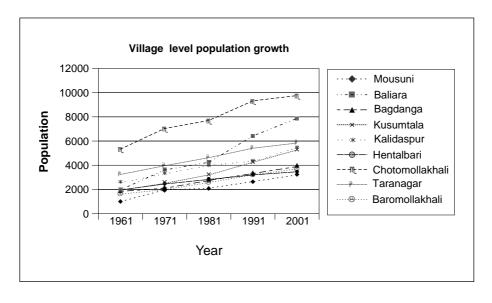


Figure 2: Population growth in the nine mouzas on field research islands



A glimpse of Daniel Hamilton's estate in Gosaba

Daniel Hamilton was a notable exception among the *zamindars* (estate holders) of the Sundarbans. In 1903, he leased Gosaba, Rangabelia and Satjelia islands but he was not the typical *zamindar* interested only in revenue; rather his interest lay in social experimentation. His objective was to achieve overall development by creating model villages based on cooperative principles. "He brought labour from the mainland, built dykes to keep out the sea, a plant to distil seawater and other similar works. To finance this activity he issued his own notes based on the sum of eleven hundred rupees held in the Estate Office. It is interesting to note the words which appeared on his own [currency] note issue. On one side it stated:

Sir Daniel Mackinnon Hamilton promises to pay the Bearer, on demand, at the Co-operative Bhundar, in exchange for value received, one rupee worth of rice, cloth, oil or other goods.

On the obverse side of the note was written:

The value received in exchange for this Note may be given in the form of bunds constructed, or buildings erected; or in medical or educational service. The Note may be exchanged for coin, if necessary, at the Estate Office. The Note is made good, not by the coin, which makes nothing, but by the assets created and the services rendered. The Note is based on the living man, not on the dead coin. It costs practically nothing, and yields a dividend of One Hundred percent in land reclaimed, tanks excavated, houses built, etc. and in a more healthy and abundant LIFE.

The notes were willingly accepted by the workers on the island, villages were built – each with its school – and eventually what was formerly an uninhabited area achieved a population of twelve thousand" (Holloway, 1971[73], pp. 5-6; emphasis mine).

This illustrates how infrastructure was built and public services provisioned and paid for in the estate, through a consumer cooperative, the oldest of its kind in India.

Annexure IV

Raychaudhuri, Bikash. (1980). The Moon and Net: Study of Transient Community of Fishermen at Jambudwip

Bikash Raychaudhuri (1980) is credited with one of the few ethnographies carried out in the Sundarbans. He studied a temporary fishing settlement on Jambudwip (also known as Bulberry Island, southeast of Mousuni Island) in the Sundarbans in the 1960s. Temporary fishing camps were being established on Jambudwip every season in order to ensure a fresh supply of fish to the markets by the fishing community for part of the year since at least 1955. Although fishing was not regarded as being as worthy an occupation as was rice cultivation, it ensured the survival of those for whom it was the only possible livelihood. These temporary camps attracted fishermen from villages as far away as districts of Howrah, Hoogly, to the north, Midnapore to the west and parts of Bangladesh in the east. The fishermen at these temporary camps set up a transient society for about four months (November through February), away from their families.

Over time, fishing as an occupation did not remain as lowly as it used to be, attracting greater numbers. Some time in the late 1980s the transient society at Jambudwip changed its character. It did not become a wholesome society; nevertheless, the settlements became permanent centering on *khuntis* or fish trading posts. With encouragement and support from the Fisheries Department, Government of West Bengal, the settlement at Jambudwip flourished and became a permanent centre for the dry-fish sector. All this while the island was designated as "Reserve forest" under the Namkhana Division¹. It came to the notice of the Forest Department that mangrove patches were being destroyed because of the activities of fishermen. According to Raychaudhuri's account fishermen did use mangrove branches for firewood for cooking and boiling their nets with resin derived from barks of mangroves. Fishermen had also cleared patches of mangrove to set up fish drying beds. A competition of sorts ensued during 2002-03 between the Fisheries and Forest departments of West Bengal, carried out very much in public and often through the media. Ultimately, on March 31, 2004 access to the island was completely closed, and the island came under the direct control of the Home Department of the Government of West Bengal.

In the context of conservation of the Sundarbans, the two aforementioned government departments have on earlier occasions worked at cross-purposes. The Fisheries Department had taken the initiative of introducing intensive and semi-intensive aquaculture farms that resulted in high demand for Tiger shrimp seeds while the Forest Department was trying to protect wildlife and its habitat. In fact, there was a time (late 1980s) when Fisheries Department initiatives resulted in clearing of mangrove patches, which was in direct conflict with the stand of the Forest Department that felling of mangroves was illegal.

¹Jambudwip was notified as Reserved Forest on May 29, 1943. As per provisions of the Forest (Conservation) Act, 1980, seasonal occupation of Jambudwip by fishermen and fish-drying activity is a non-forest activity not permissible without prior approval of the Government of India.

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Summary

This thesis is primarily concerned with explanations of the current situation in the Indian Sundarbans. In particular, it looks at: what competing interests and contradictions are at play in this eco-region? What gives rise to these competing interests and contradictions? How do different groups of actors negotiate these competing interests? How can the contradictions be better managed to attain sustainable development goals? The thesis is based on field research carried out in the Sundarbans between January 2002 and April 2004 with additional data inputs until March 2007.

The Indian Sundarbans is part of the delta of the rivers Ganges, Brahmaputra, and the Meghna that is not only a unique forested region but also home to over four and a half million human population. The eco-region is 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. There are a host of development issues, which need to be resolved apart from the ecological ones. Although the importance of protecting the Sundarbans' natural resources has not been lost on governmental and intergovernmental agencies, as well as world conservation organisations, the eco-region is in crisis for a number of reasons, historical and current, natural and anthropogenic, including global climate change. There is a difficult ongoing conflict between the survival strategies of desperate people and protection of environment in its natural state, and it is vital that a more sustainable path is found for development in the eco-region. Therefore, this study is an attempt to understand 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.

In looking at the human response to management of natural resources, the concepts of governance of commons, collective action (*spontaneous* as well as *institutionalised*), and sustainable development have been applied as the central tools for analyzing the processes from a social anthropological perspective. Existing literature on governing the commons suggest that collective action may have a positive role to play in sustaining commons. Accordingly, collective or self-organised action when successful has a direct positive bearing on the sustainability of commons, and 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. Therefore, the research concentrates primarily on the conditions under which strategies could be developed for minimisation/management of contrasting forces arising out of competing values and interests and, secondly, on the question of how to develop strategies for negotiation of competing interests.

The research design is based on qualitative research and triangulation, and combines a literature study with multi-site case studies in the field. The case studies analyse the outcomes of various forms of collective action as encountered in the field and the prospects of attaining sustainable development goals. The cases are thematically presented into two categories: 'physical domain' (enabling conditions) and 'livelihood domain' (three cases in each group). The 'livelihood domain' helps to understand the opportunities and constraints in making a living whereas the 'physical domain' is the basis without which sustaining human life and livelihood in the Sundarbans would not be possible, thus the thematic grouping.

Chapter three gives an analytical description of the Sundarbans and the transformations it has witnessed over time. It starts with a physical description of the eco-region and continues by providing an overview of transformation beginning in the pre-colonial period to the post-independence period until present time. The chapter then gives an impression of the field research sites including the features of the institutional and bureaucratic environment in which collective action takes place, and various groups and organisations operate.

Chapter four focuses on maintenance and management of embankments and the role of collective action. 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 chapter describes the current situation with its crises caused by forces of nature, explains the contrasting forces and how the various actors face these.

Although the significance of embankments is local, the ownership is non-local in the sense that these are public property rather than common property and the onus of their maintenance rests on *institutionalised* collective action organisation that is a level far too removed from the communities immediately affected due to breaches/collapses in embankments [Chapter 4, Section 5]. The chapter argues that the farther the ownership and onus, the lesser is the immediate significance, therefore response is reactive rather than proactive as regards regular monitoring and maintenance. This mismatch reduces scope for *spontaneous* collective action. However, *spontaneous* collective action is undertaken in dire situations where group behaviour can be explained in terms of *interest*, *organisation*, *mobilisation* and *opportunity* rather than *trust*, *reciprocity* and *reputation*. The latter set of attributes comes into play when ownership is local and action is pre-emptive rather than reactive.

Chapter five describes the transportation and communication system in the eco-region and how it limits 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. It helps to understand the conditions that allow negative linkage between collective action and sustainable development.

Since transport and communication in this eco-region are mainly in the realm of private property, in the absence of effective regulation and enforcement through *institutionalised* collective action from higher levels, there is enough space for *spontaneous* collective action to play out. This results in a *second-order conflict* situation wherein successful collective action of a few runs counter to larger social and/or public good. The chapter argues that *spontaneous* collective action need not necessarily yield positive *net benefit* for the community [Chapter 5, Section 4]. Similarly, *spontaneous* collective inaction or a form of negative collective action need not yield negative net benefit. While both forms proliferate due to availability of space for collective action, outcomes depend on whether such collective action benefits a smaller section of the community at the cost of the larger section or vice versa.

Chapter six 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. Electricity generation and distribution call for large investments and in the absence of assured returns, such investments are generally made by the state creating public property. The chapter shows that the decentralised distributed generation (DDG) model allows space for local level *institutionalised* collective action. But, such public investment and collective action do not necessarily contribute towards sustainable development [Chapter 6, Section 4]. The chapter further argues that the notion equating access to modern energy services with development, as well as the one that equates use of renewable energy sources with movement towards sustainable development goals is, under certain conditions, not valid.

Within the 'physical domain' in the case of the embankments, the issue is not so much of collective action but of sustainability and sustainable development. In case of transport and communication, the prevailing situation is such that it neither enhances choices for the population of the eco-region nor the competitiveness of the eco-region as a production centre [Chapter 5, Section 4]. In the case of access to modern energy services the issue is of sustainability of the initiatives and their contribution to sustainable development [Subsection 10.2.2, answer 3]. The chapters covering the 'physical domain' show that in terms of sustainable development, the basic needs of the population remain unmet and locally the ecological basis of human life remains under threat (Lele, 1991). The main ills that undermine human well-being are either worsened or remain unaffected despite the investments, making overcoming the ills almost impossible (Holdren, Daily and Ehrlich, 1995). In terms of distributional equity between contemporaries as well as future generations, the current state of enabling conditions within the domain is such that life opportunities of future generations are compromised (Howarth, 1997; Anand and Sen, 2000). The case studies also show that in case of freedom-based view of distributional equity wherein future generations should have the freedom to live the way they like and value what they have reason to value (Sen, 2000); this basic freedom is compromised due to the prevailing state of the enabling conditions. This lack of freedom is not only in terms of future generations vis-à-vis us but also among contemporaries.

Chapters seven through nine represent the 'livelihood domain'. In Chapter seven, the basic contradiction between the lay of the land and preference for freshwater agro-ecosystem is analysed. It illustrates how farming families cope with this contradiction which helps to understand the rationale for preferring 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 are weakened. Here, it is explained that the basic issue is that of lack of *spontaneous* collective action despite the *opportunity* where farmers can come together to supply themselves with goods and services (social and or public-good) that they all need but cannot provide for themselves individually.

Chapter eight demonstrates that though geographically suitable for fishery, it is considered only second best to agriculture in the eco-region as a livelihood option. The basic conflict emanates from use of the eco-system in an unsustainable manner illustrating the linkage between poverty and ecological sustainability. This is one case where the concept of sustainability is used in its original context of living renewable resources. The chapter helps to understand the dilemma between meeting basic human needs and ecological sustainability, as well as the mismatch between policy initiatives and ground reality.

Chapter nine provides glimpses of a 'win-win' situation. It brings into contrast the values attached to the eco-region by local communities as a resource base, and the tourists and tourism companies. The chapter establishes the linkage that the higher the integrity of the ecosystem, the greater is the possibility of augmenting the human development process through tourism. The chapter presents an interesting contrast; collective interest as articulated by the state encourages large tourism projects based on the political economy view that envisages tourism as an economic force capable of generating revenue and opportunity for large-scale economic uplift while disregarding concerns of local communities. The communities however, welcome small-scale tourism initiatives that allow space for different forms of collective action despite being low on revenue generation. The chapter demonstrates that while small-scale tourism is relatively benign in social and ecological terms, each smallscale resort offers only limited livelihood options for the local community and generates little revenue for the state. It is explained that while scaling up the number of small-scale tourism initiatives has the potential to create more jobs, but at the same time these have the potential of becoming more demanding both in social and ecological terms, and in bureaucratic terms, ultimately tipping the scale adversely [Section 9.5]. It is argued that small-scale resorts by themselves are of limited help as a livelihood option for local communities but along with allied activities like producing local goods for tourists, being tourist guides, parasailing and water sport helpers may just make the difference.

Sustainable development involves a process of directed change that not only has the traditional objective of meeting basic needs of current and future generations but also sustain the ecological and social basis of human life (Lele, 1991). As of now none of the options within the 'livelihood domain' secure both the bases, nor does the 'physical domain' present an encouraging situation. Chapter ten presents, according to my understanding, the way out of this not-so-encouraging situation. It is argued that the unique eco-region of the Sundarbans requires special policy measures to address ecological sustainability and distributional equity, to overcome the main ills that undermine human well-being, and to ensure that the people of this region have the choice to live the way *they* like and value what *they* have reason to value, and the continued freedom to make those choices.

Samenvatting

Dit proefschrift concentreert zich voornamelijk op een uitleg van de huidige situatie van de Sunderbans in India. De volgende vragen staan centraal: welke rivaliserende belangen en tegenstellingen spelen een rol in deze ecologische regio? Wat ligt ten grondslag aan die rivaliserende belangen en tegenstellingen? Hoe kan er met de tegenstellingen om worden gegaan zodat doelstellingen op het gebied van duurzame ontwikkeling kunnen worden bereikt? Het proefschrift is gebaseerd op veldonderzoek in de Sudarbans in de periode januari 2002 tot april 2004 met aanvullende gegevensverzameling tot maart 2007.

De Indiase Sundarbans is een onderdeel van de delta van de Ganges, de Brahmaputra en de Meghna rivieren en is behalve een uniek bosgebied ook het woongebied van vier en een half miljoen mensen. Deze ecologische regio wordt gekenmerkt door een slechte infrastructuur, inefficiënt en duur transport, ontoereikende gezondheidszorg en onderwijs, gebrek aan toegang tot moderne energievoorzieningen, slecht geïmplementeerd overheidsbeleid, weinig economische kansen en slecht openbaar bestuur. Naast deze ecologische problemen vragen een groot aantal ontwikkelingsproblemen om een dringende oplossing. Hoewel de nationale overheid, intergouvernementele organisaties en wereldwijd opererende milieuorganisaties de bescherming van het milieu van de Sunderbans niet uit het oog hebben verloren, is deze ecologische regio toch in gevaar vanwege historische en recente redenen door natuur of mens veroorzaakt, inclusief de wereldklimaatverandering. Er is een voortdurend ingewikkeld conflict gaande tussen de belangen van mensen die wanhopig proberen te overleven en het behoud van flora en fauna. Daarom is het van belang dat deze ecologische regio op duurzame wijze wordt ontwikkeld. In dit proefschrift wordt onderzocht waarom de verschillende groepen en organisaties handelen zoals ze doen te midden van een steeds verslechterend ecosysteem met een toenemende kwetsbaarheid voor de samenleving van de Sundarbans.

Om de reacties van de bevolking op het beheer van het milieu te bestuderen zijn concepten als 'governance of commons', 'collective action' (zowel de spontane als geïnstitutionaliseerde vormen) en 'duurzame ontwikkeling' toegepast als instrument van analyse van de processen vanuit sociaal-antropologisch perspectief. Bestaande literatuur over 'governance of commons' gaat er vanuit dat 'collective action' een positieve rol kan spelen in het behoud van 'commons' (de gemeenschappelijke goederen).

Volgens die literatuur heeft collectieve of zelfgeorganiseerde activiteit, indien succesvol, een direct positieve invloed op het behoud van 'commons' en worden de kansen voor duurzame

ontwikkeling in de brede zin realistischer, vooral in geval van inter- en intra-generationele gelijkheid. Het onderzoek richt zich daarom primair op de voorwaarden waaronder bepaalde strategieën ontwikkeld kunnen worden voor de minimalisering of het beheersen van conflicterende krachten als gevolg van rivaliserende waarden en belangen; en pas vervolgens op de vraag welke strategieën voor onderhandeling tussen die rivaliserende belangen kunnen worden ontwikkeld.

Het onderzoeksontwerp is kwalitatief van aard en past *triangulation* toe in case studies verspreid over het onderzoeksveld in combinatie met literatuurstudie. De case studies richten zich op die gebeurtenissen die zich tijdens het veldwerk voordeden en die een analyse van de gevolgen van '*collective action*' op de kansen voor duurzame ontwikkeling mogelijk maken. De cases zijn thematisch ingedeeld in een 'fysiek domein' en een 'domein van levensonderhoud' (drie cases in elke categorie).

Hoofdstuk drie geeft een analyse van de historische ontwikkelingen in de Sundarbans. Het begint met een beschrijving van de fysieke kenmerken van de eco-regio, gevolgd door een overzicht van de veranderingen die hebben plaatsgevonden sinds de prekoloniale tijd, de periode na de onafhankelijkheid tot het heden. Het hoofdstuk geeft vervolgens een beschrijving van de locaties van het veldonderzoek inclusief de kenmerken van de institutionele en bureaucratische omgeving waarin vormen van 'collective action' plaatsvinden en waarbinnen de verschillende groepen en organisaties opereren.

Hoofdstuk vier richt zich op het onderhoud en beheer van dijken in relatie tot 'collective action'. Dijken zijn cruciaal voor de mogelijkheid tot bewoning op deze delta eilanden. Breuken in dijken dwingen tot veranderingen in het levensonderhoudpatroon van een bestaan afhankelijk van land naar een bestaan waarbij men afhankelijk wordt van water, wat grote invloed heeft op de kwaliteit van het ecosysteem. Het hoofdstuk beschrijft de huidige situatie met haar crises, veroorzaakt door natuurkrachten, legt de rivaliserende krachten uit en analyseert hoe verschillende actoren hiermee omgaan.

Hoewel de dijken vooral lokaal van belang zijn, is het eigendom ervan niet van de lokale gemeenschap; de overheid is eigenaar en daardoor liggen de onderhoudstaken bij organisaties (institutionele 'collective action') die te ver af staan van de bevolking die direct wordt getroffen door dijkbreuken (Hoofdstuk 4, sectie 5). In dit hoofdstuk wordt gesteld dat hoe groter de afstand tot het eigendom en het nut is, des te geringer is de betrokkenheid waardoor de overheid eerder reactief dan preventief regelmatige controle en onderhoud zal uitvoeren. Deze wanverhouding vermindert de kans op spontane 'collective action'. Maar spontane 'collective action' komt wel voor in die situaties waarin interest, organisation, mobilisation en opportunity, in plaats van trust, reciprocity en reputation aan de orde zijn. De laatste set van attributen spelen wel een rol als het eigendom lokaal is en de actie preventief is in plaats van reactief.

Hoofdstuk vijf behandelt transport en communicatie in de eco-regio en hoe die de keuzevrijheid beperken, een basis principe van duurzame ontwikkeling. Dit hoofdstuk laat zien dat het verband tussen 'collective action' en het proces van duurzame ontwikkeling in de Sunderbans niet altijd positief is. De voorwaarden voor zulk negatief verband tussen 'collective action' en duurzame ontwikkeling worden in dit hoofdstuk uiteengezet.

Aangezien transport en communicatie hoofdzakelijk in handen zijn van private organisaties, door gebrek aan effectieve regelgeving en handhaving door institutionele organisaties op hoger niveau, is er volop ruimte voor spontane 'collective action'. Dit resulteert in een zogenoemde 'second-order conflict' situatie waarin succesvolle 'collective action' van een paar actoren botst met een groter sociaal belang en/of een publiek goed. In dit hoofdstuk wordt gesteld dat spontane 'collective action' niet noodzakelijkerwijs zorgt voor een positieve netto opbrengst voor de samenleving [Hoofdstuk 5, Sectie 4]. Op dezelfde manier hoeft spontane 'collective inaction' of een andere vorm van negatieve 'collective action' niet te zorgen voor een negatieve netto opbrengst voor de samenleving. Terwijl beide vormen zich kunnen voordoen als gevolg van de ruimte voor 'collective action', wordt het resultaat bepaald door de vraag of een dergelijke 'collective action' voordelig is voor het overgrote deel van de samenleving en ten koste gaat van een klein deel, of vice versa.

Hoofdstuk zes begint met een beschrijving van het gebruik van energie in de Sundarbans. Dit bepaalt namelijk mede hoe individuen, groepen en organisaties vorm geven aan hun werkelijkheid. Het opwekken van elektriciteit en de distributie ervan vragen om grote investeringen en door gebrek aan zekerheid over inkomsten worden dergelijke investeringen alleen gedaan door de staat, waardoor het een publiek goed wordt. Het hoofdstuk laat zien dat het *decentralised distributed generation* (DDG) model ruimte toelaat voor institutionele 'collective action' op lokaal niveau. Echter, zulke publieke investeringen en 'collective action' dragen niet noodzakelijkerwijs bij aan duurzame ontwikkeling [Hoofdstuk 6, Sectie 4]. In dit hoofdstuk wordt verder geconstateerd dat de stellingen: dat toegang tot moderne energievoorzieningen leidt tot economische ontwikkeling, en dat toepassing van herbruikbare energie bronnen leidt tot duurzame ontwikkeling, onder bepaalde omstandigheden niet geldig zijn.

Binnen het 'fysieke domein,' is het, in geval van dijken, niet zozeer een kwestie van 'collective action' dan wel van duurzaamheid en duurzame ontwikkeling. In geval van transport en communicatie is de situatie dusdanig dat noch de ruimte tot het maken van keuzes door de bevolking van deze eco-regio wordt vergroot, noch de concurrentiepositie van het eco-gebied als productiecentrum wordt verbeterd [Hoofdstuk 5, Sectie 4]. In het geval van toegang tot moderne energie voorzieningen is het een kwestie van duurzaamheid van de initiatieven en hun bijdrage aan duurzame ontwikkeling [Subsectie 10.2.2, antwoord 3]. De hoofdstukken over het 'fysieke domein' laten zien dat, in termen van duurzame ontwikkeling, aan de noodzakelijke behoeften van de gemeenschap niet wordt voldaan en dat zelfs de ecologische basis van de locale gemeenschap wordt bedreigd (Lele, 1991). De belangrijkste oorzaken die het welzijn van de bevolking ondermijnen, worden of verergerd of worden niet beïnvloed ondanks gedane investeringen, waardoor de situatie eigenlijk alleen wordt verergerd (Holdren, Daily en Ehrlich, 1995). In termen van gelijke verdeling tussen de huidige generatie en de toekomstige generatie is de fysieke situatie dusdanig dat de levenskansen van toekomstige generaties sterk zijn verkleind (Howarth, 1997; Anand en Sen, 2000). De case studies tonen ook aan dat gelijke verdeling op basis van vrijheid tot het maken van keuzes die toekomstige generaties zouden moeten hebben om hun leven zo in te richten als zij willen en die waarden nastreven die zij hooghouden (Sen, 2000), nauwelijks bestaat als gevolg van de heersende omstandigheden. Dit gebrek aan gelijke verdeling op basis van

vrijheid tot het maken van keuzes bestaat niet ten opzichte van toekomstige generaties en de *onze*, maar ook niet tussen onze eigen tijdgenoten.

Hoofdstukken zeven tot en met negen handelen over het 'domein van levensonderhoud'. In hoofdstuk zeven wordt de basale tegenstelling tussen de lage ligging van het land en de voorkeur voor een zoetwater agro-ecosysteem beschreven. Het illustreert hoe ondanks die tegenstelling boerenfamilies toch een voorkeur hebben voor een zoetwater agricultuur. Het behandelt verder de relatie tussen de slechte infrastructuur en het ontbreken van de mogelijkheid tot het maken van keuzes voor de gemeenschap met gevolg dat de kansen op duurzame ontwikkeling verder worden verkleind. Het cruciale punt is dat ondanks de mogelijkheid voor boeren om samen te zorgen voor goederen en voorzieningen (gemeenschappelijk of publieke goederen) die ze allemaal nodig hebben maar voor hen individueel moeilijk te regelen zijn, er geen spontane 'collective action' voorkomt.

Hoofdstuk acht laat zien dat de eco-regio geografisch gezien geschikt is voor visserij, maar dat dit slechts na landbouw op de tweede plaats komt als optie om in het levensonderhoud te voorzien. Dit leidt tot een onduurzaam gebruik van het ecosysteem, waarmee het (negatieve) verband tussen armoede en ecologische duurzaamheid wordt aangetoond. In deze ene case wordt het concept van duurzaamheid gebruikt in zijn originele context, leven met herbruikbare bronnen. Het hoofdstuk gaat verder in op het dilemma tussen het voorzien in de basis behoeften en het duurzaam behoud van het ecosysteem, en op het falen van overheidsbeleid om in te spelen op de werkelijkheid in het veld.

Hoofdstuk negen toont een glimp aan van een 'win-win' situatie. Het brengt de waarden die de lokale gemeenschap aan de eco-regio als hulpbrongebied toeschrijft in contrast met de waarden die toeristen en toeristenorganisaties aan dit gebeid toeschrijven. In dit hoofdstuk wordt het verband gelegd dat hoe meer het ecosysteem in tact blijft hoe groter de mogelijkheid wordt om door toerisme het ontwikkelingsproces voor de bevolking te versnellen. Het presenteert een interessant contrast: collectief belang zoals door de staat verwoordt, bevordert grote projecten voor toerisme die op een politiek-economische visie zijn gebaseerd, namelijk dat toerisme van groot economisch belang kan zijn voor het generen van opbrengsten en daardoor kansen biedt voor een grootschalig economische groei, terwijl het de zorgen van de plaatselijke gemeenschap negeert. Echter, de gemeenschap wil kleinschalig toerisme wat ruimte laat voor verschillende vormen van 'collective action' ondanks dat het weinig inkomsten opbrengt. Het hoofdstuk laat zien dat kleinschalig toerisme relatief onschuldig is in sociale en ecologische termen, maar dat dit slechts beperkte opties voor levensonderhoud biedt voor de lokale gemeenschap en weinig opbrengsten genereert voor de staat. Verder wordt uitgelegd dat het vergroten van het aantal kleinschalige initiatieven op het gebied van toerisme inderdaad de potentie in zich heeft om meer werkgelegenheid te creëren, maar dat vraagt dan tegelijkertijd meer in sociale, ecologische en in bureaucratische termen waardoor uiteindelijk de schaal ongunstig zal uitslaan [Sectie 9.5]. Gesteld wordt dat kleinschalige resorts op zichzelf slechts in beperkte mate bijdragen aan het levensonderhoud voor de lokale gemeenschappen. Echter, de combinatie met de productie van lokale goederen voor toeristen zoals gidsen, parasailing en watersport zou wellicht het verschil kunnen maken. Duurzame ontwikkeling betreft een proces van gerichte verandering dat niet alleen het traditionele doel heeft van het voorzien in de behoeften van huidige en toekomstige generaties, maar ook het behoud van de ecologische en sociale basis van menselijk leven tot doel heeft (Lele, 1991). Tot nu toe bevat geen van de opties in het 'domein van levensonderhoud' beide elementen en ook het 'fysieke domein' biedt geen bemoedigende situatie. Hoofdstuk tien wijst in mijn ogen de mogelijkheid aan om uit deze niet-zobemoedigende situatie te ontkomen. Hierin wordt gesteld dat de unieke eco-regio van de Sundarbans speciale beleidsmaatregelen vereist die tegemoet komen aan ecologische duurzaamheid en aan een gelijke verdeling om de grote problemen die het welzijn van de bevolking ondermijnen op te lossen. Tevens moeten die maatregelen er voor zorgen dat de mensen uit deze regio de keuzes hebben om te leven zoals *zij* dat willen en de waarden kunnen behouden die *zij* willen blijven waarderen en de vrijheid tot het maken van die keuzes behouden.