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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 sub-questions 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 offer[1].

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

[1]Although 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 human-wildlife 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 well-being 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 misalignment[2]. 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 eco-region 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 coverage[3]. Exactly a week later, the West Bengal Government on 12 April 2007 announced the establishment of yet another agency – Sundarbans Development

[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.siiaonline.org/home?wid=171&func=viewSubmission&sid=1190 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/articleshow/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.