

SAMUDRA Monograph

THE SUNDARBANS FISHERS
Coping in an Overly Stressed Mangrove Estuary



Santanu Chacraverti



International Collective in Support of Fishworkers
www.icsf.net

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ABBREVIATIONS

BLC	Boat Licence Certificate
BR	Biosphere Reserve
CRZ	Coastal Regulation Zone
EDC	Eco-Development Committee
FPC	Forest Protection Committee
FRA	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
ICSF	International Collective in Support of Fishworkers
ISD	Indian Sundarbans Delta
JFM	Joint Forest Management
MPA	Marine Protected Area
NP	National Park
NTFP	Non-Timber Forest Produce
SBR	Sundarbans Biosphere Reserve
STR	Sundarbans Tiger Reserve
TR	Tiger Reserve
WLPA	Wildlife Protection Act, 1972
WLS	Wildlife Sanctuary

GLOSSARY OF LOCAL TERMS

Arranged according to subject

LOCAL NAME	ENGLISH NAME/MEANING (Scientific Name given where there is no common English name or the latter is inadequate)
FISH/CRABS/SHELLFISH	
<i>Air</i> or <i>Aar</i>	Long-whiskered catfish; <i>Sperata aor</i>
<i>Bagda</i>	Tiger prawn or Asian tiger shrimp
<i>Bagda meen</i>	Tiger prawn seed
<i>Bamli</i> , <i>bomla</i> , <i>lata</i> , or <i>lyata</i>	Bombay duck
<i>Banspata</i>	Bengal danio or Sind danio
<i>Baul</i>	Chinese pomfret; <i>Pampus chinensis</i>
<i>Bhangan</i> or <i>bhangon</i>	<i>Boga labeo</i>
<i>Bhetki</i>	Asian seabass or barramundi
<i>Bhola</i> or <i>Bhola bhetki</i>	Soldier croaker
<i>Boal</i>	Wallago, lanchi, or sheatfish
<i>Chandani</i> (or <i>Chandana</i>) <i>ilish</i>	Toli shad
<i>Chapra chingri</i>	Indian white prawn; <i>Penaeus indicus</i>
<i>Chela</i>	Silver hatchet or Silver hatchet chela
<i>Chingri</i>	Shrimps and prawns in general
<i>Chuno</i>	Small fish
<i>Ilish</i> or <i>ilsa</i>	Hilsa
<i>Kain magur</i>	Canine eeltail catfish
<i>Kankra</i>	Crabs
<i>Kakila</i>	Freshwater garfish
<i>Kalibaus</i>	Orangefin labeo; <i>Labeo calbasu</i>
<i>Katla</i>	Catla

<i>Khorsola</i>	Corsula mullet
<i>Koi</i> or <i>kai</i>	Climbing perch
<i>Magur</i>	Walking catfish
<i>Mochachingri</i>	Crayfish
<i>Mrigal</i>	Mrigal carp or White carp
<i>Pairachanda</i>	Common scat or spotted scat
<i>Pangas</i> or <i>pangash</i>	Pangas catfish
<i>Parisa</i> or <i>parshe</i>	Goldspot mullet
<i>Patka</i>	Puffer fish; <i>Tetraodontidae</i>
<i>Poa</i>	Pama croaker
<i>Puti</i>	Barb fish; <i>Puntius</i> sp.
<i>Rui</i> or <i>ruhi</i>	Rohu
<i>Saul</i> or <i>shol</i>	Snakehead murrel
<i>Singi</i>	Stinging catfish
<i>Tapsi</i> , <i>taposi</i> , <i>topse</i> , or <i>topshe</i>	Paradise threadfin
<i>Tengra</i> or <i>tyangra</i>	Striped dwarf catfish
<i>Tampira</i> or <i>phasa</i>	Gangetic hairpin anchovy; <i>Setipinna phasa</i>

OTHER FAUNA

<i>Bagh</i>	Tiger
<i>Kamot</i>	River sharks in the Sundarbans
<i>Kumir</i>	Crocodile

MANGROVE

<i>Bain</i>	Indian mangrove or White Mangrove; <i>Avicennia officinalis</i>
-------------	--

<i>Chak keora</i>	Apple mangrove
<i>Gawran</i> or <i>Garan</i>	No common English name: <i>Ceriops decandra</i>
<i>Genwa</i>	No common English name; <i>Excoecaria agallocha</i>
<i>Golpata</i>	Nipa palm or Mangrove Palm
<i>Keora</i>	No common English name; <i>Sonneratia apetala</i>
<i>Posur</i> or <i>Ail</i>	Cedar mangrove
<i>Sundari</i>	No common English name: <i>Heritiera fomes</i>

OTHER PLANTS/TREES

<i>Babla</i>	Gum Arabic tree or Egyptian thorn; <i>Vachellia nilotica</i>
<i>Khirish</i>	Rain tree or monkeypod
<i>Sal</i>	Indian dammer

ASTRONOMY/ALMANAC NAVIGATION/FISHING

<i>Amavasya</i>	New moon
<i>Bawrogawn</i>	Fourteenth lunar during Krishnapaksha to second lunar day during (the following) Suklapaksha; Tenth lunar day during Krishnapaksha to third lunar day during (the following) Suklapaksha when the tide is strongest
<i>Behundi</i> or <i>Beonti</i>	Bagnet
<i>Berjal</i>	Drag shore seine
<i>Bhata</i> or <i>bhati</i>	Ebb-tide
<i>Chawrpata</i>	Shore stake net

<i>Dinga</i>	Slender country boat
<i>Dingy</i>	A smaller version of a <i>dinga</i>
<i>Duania</i> or <i>duno</i>	Channel/stream connecting two larger streams
<i>Galsba</i> , <i>gaysba</i> or <i>chbandi</i>	Gillnet
<i>Gawnmukh</i>	First to fifth lunar day, when the tide is strong
<i>Jal</i> or <i>jaal</i>	Fishing net
<i>Jele dingi</i>	A dingi used for fishing
<i>Khalpata</i>	Channel stake net
<i>Khyapla</i>	Throw net
<i>Krishnapaksha</i>	Lunar fortnight from full moon to new moon
<i>Marani</i>	Sixth to ninth lunar day, when the tide is very weak
<i>Nonapoka</i>	Any of the different kinds of marine/estuarine wood borer
<i>Paksha</i>	Lunar fortnight
<i>Panjika</i>	Almanac
<i>Pratipada</i>	The first lunar day following the new or full moon
<i>Purnima</i>	Full moon
<i>Suklapaksha</i>	Lunar fortnight from new moon to full moon

AUTHOR'S FOREWORD

The task was to undertake an approximately two-month study on fishing communities in the Sundarbans, focusing on traditional knowledge and perception, in their specific geomorphologic, ecological, and social context. The study was completed and report submitted in January 2014, though giving the report a publishable form was delayed.

Although not specifically mentioned, it was understood that the spotlight would be on the artisanal fishers. For, it is in this community that traditional knowledge, fishing mores, and techniques are most prominently extant. These are the fishers who use the country boat, the small *dingi* (from which the English 'dinghy' originates) or the somewhat larger *dinga*. The craft is oar-driven, particularly in the Sundarbans Tiger Reserve (STR), where the authorities do not allow powered vessels. Outside the STR, the *dingi* or the *dinga* often takes the assistance of a motor, usually the single-cylinder ones, though the marine *dingas* often have 2-cylinder engines.

Further, the idea was to look at the entire Sundarbans region, variously described as the *Sundarban*, the *Indian Sundarbans Delta* (ISD), and the *Sundarbans Biosphere Reserve* (SBR). The forested areas, particularly the STR, would command the most attention, for reasons that will be apparent in the report.

What has emerged from the study is the present report, the nub of which the title (*The Sundarbans fishers—coping in an overly stressed mangrove estuary*) tries to capture, though somewhat inadequately.

The study has sought to understand how the artisanal fisher of the Sundarbans draws upon his repertoire of knowledge and beliefs to cope with the world in which he finds himself. This has necessitated an understanding of the Sundarbans. The Sundarbans of the fisher, however, is not merely the natural world of the Sundarbans—its geomorphology, hydrology, and ecology. It is also the social world—the people, demography,

economy, administration, and governance. The whole of this constitutes the fishers' conditions of existence and his problem-set, which we must understand if we have to make sense of the fishers' means and measures of coping. The means and measures—i.e. beliefs, cognitive-elements, and techniques—while often retaining the traditional fabric, have evolved with time.

The narrative does not have the characteristic that is often expected of a project report—laying out questions, hypothesis, findings, analysis, and conclusions. It just goes ahead to present a narrative, often a complex one, weaving in queries, assumptions, problems, and findings into the tale. Indeed, it is more a tale than a report.

Lastly, this report is often critical of forest governance in India, and in the Sundarbans in particular. This is largely because I have often tried to view things from the standpoint of the ordinary Sundarbans-dweller. Yet, I have tried to be fair. Interestingly, two relatively recent works, Amitav Ghosh's novel *The Hungry Tide*, and Annu Jalais' *The Forest of Tigers*, both of which have earned acclaim, express similar shock and dismay about the anti-people stance of the forest department in the Sundarbans. However, I suspect that there are a few excellent forest officers who would be sympathetic towards the concerns expressed in this report. The fishers often tell of forest officials who are understanding and courteous.

That, I suppose, would have to suffice for a foreword.

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Kolkata

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NATURE OF THE SOURCES

Here, the sources of information for this report are classified in terms of the nature of the activity. In evaluating the activity, one must bear in mind that the following was accomplished over a period of some three and a half months.

- i. “Secondary Material”: The first task was to acquire the so-called secondary material on the Sundarbans, fishing community in Bengal, the fishing community in the Sundarbans, history of Indian forestry, history of wildlife conservation, and all related aspects. Surprisingly, a great deal of material could be found from the net, from both subscribed and free sources. Books and journals that could not be accessed on the net were found in the National Library, the Forest Department collection at Aranya Bhavan, Bengal Gazetteer, Jadavpur University Library, and personal collections. Attempts to locate unpublished works led to finding an interesting dissertation on the life and cultural world of Sundarbans fishers (later we could also locate the publication based on the dissertation, cited in the report in the appropriate place).
- ii. “Primary Sources”: The hunt for certain “primary” documents took the researcher and his assistants to the State Archives, West Bengal, and, once again, to the National Library, Aranya Bhavan, and the Fisheries Department. The major finds were the Forest Act of 1865, the Forest Act of 1878, and the First Management Plan of the Sundarbans Tiger Reserve (1973). The stint at the Fisheries Department resulted in examination of recent “fish production” statistics.
- iii. Interviews and Discussions: Interview of Prof. Amallesh Choudhuri (on 2 November 2013), of Prof. Pranabes Sanyal (over two days) on 25 October and 16 December 2013, and of Mr. Pradeep Shukla, IFS, Addl. Principal Chief Conservator of Forests and Director, SBR, on 23.12.2013. One long conversation with Kalyan Rudra, noted river

- expert (on 04.11.2013). Discussion with several officers of the Fisheries Department over several days in October 2013. Discussion with individuals closely associated with the fishers' movement.
- iv. Field Trips: It was possible to make six investigative field visits; to Narayanpur (situated on the Hatania-Doania River) on 18 and 20 October 2013; Dakkhin Chandanpiri (located on the Saptamukhi River) on 19 October 2013; Purandar (located on the Hogol and Matla Rivers) on 27 October 2013; G-Plot (on the Bay of Bengal and the Thakuran River) on 27–29 October 2013; and Sagar Island (in the Bay of Bengal, and placed between Hooghly on the west and Muriganga on the east) on 29 November–1 December 2013. These field trips involved going on two fishing expeditions, one on the Saptamukhi River and another into the sea, off the coast of Sagar, for observing the methods and gear employed by fishers. Besides, these trips involved extensive discussions with and interviews of fishers and boat-makers. We interviewed 2 fishers (who fish in the sea) and 1 boat-maker at Narayanpur, 6 fishers (who fish on Saptamukhi) and 1 boat-maker at Dakkhin Chandanpiri, 10 fishers at Purandar (5 who fished in the Hogol, Matla, and Bidya and 5 who went fishing to the sea), 14 fishers at G-Plot (10 who fished on the Thakuran River and 4 who fished on the sea), and 2 marine-fishers at Sagar Island. In all the cases, the talk with the fishers had the nature of a general discussion, often with several fishers chipping in on a conversation. The conversations were recorded, but there was no effort to procure the fishers' views through survey questionnaires. The exception was G-Plot. Here, Ujjwal Sardar used a questionnaire for surveying, in addition to discussion. [For further information on questions, see next section. For additional information on the field trips, see **Appendix I.**]
- v. Workshops: Another kind of field-trip ensued from the workshops (entitled *Fishers as participants in the Sundarbans Eco-Region—Resources, Rights, Responsibilities, and Problems*) that coincided with this study. Although there have been eight workshops in all, materials from only four workshops could be utilized in this study—at Rajat Jubilee (Lahiripur, Gosaba Block) on 26 November 2013, Saterkona (Amlameti, Gosaba Gosaba Block) on 27 November 2013, Canning Town (Canning-I Block) on 29 November 2013, and Shamsdernagar, Hingalganj Block on 26 January 2014. The numbers of fisher participants in the workshops were 40, 81, 45, and 25 respectively.

We had the opportunity of discussing various issues with the participants before, during, and after the workshops. [For themes discussed in the workshops see later. For further information see **Appendix I**]

Some of the questions posed to fishers/crab-collectors

(The following are the basic questions. However, the questions often varied according to the person/persons and the context. The general thrust of the interview was to get the fishers talk of their own accord, on issues they considered important. However, effort was made to procure information on the lines indicated in the following questions.)

1. Are you a first-generation fisher?
2. If not, for how many generations has your family been fishing?
3. When did you or your family arrive in the Sundarbans area?
4. Do you fish or catch crabs or engage in both?
5. (For those who were [mostly] crab-collectors) Where do you catch crabs? Please describe your method of collecting crabs.
6. In which geographical area do you fish?
7. Do you use a boat (go with a team on a boat) for fishing?
8. If yes, what is the usual duration of a fishing trip?
9. If no, how do you fish? Please describe your method.
10. What kind of nets do you use?
11. Do you need to time the tide?
12. If yes, how do you do so?
13. Which are the *tithis* (lunar days) when the tide is strong?
14. How do you know which *tithi* it is?
15. What in your view has been the trend of fish catch down the years? Have they remained the same? Are they increasing? Are they declining? (Always, without exception, and often accompanied by great vehemence, the answer was that fish catches were declining.)
16. What do you think are the reasons for the decline?
17. Can you specify any fishing method or gear that you would consider harmful for fish populations?

18. Is your boat registered with the fisheries department?
19. If yes, do you renew your fishing license? How often?
20. Do you have to interact with the forest department?
21. If yes, why and how?
22. Describe your experiences with the forest department.
23. There were also discussions with fishers about the use of local herbs and plants in cooking, and as medicines.

For fishers fishing in the STR

Questions relating to BLC (Boat Licence Certificate), relation with the forest department, frequency of fines, amount of fines, other problems with the forest department, etc.

For makers of fishing boats

Questions related to materials and methods of boat-making were asked.

Focal themes discussed in the workshops

1. What was the condition of the fishers and the experience of fishing before the present restrictive regulatory regime emerged in the Sundarbans?
2. Has there been a rise in population in the area under consideration? How has the increase in population impacted fishing?
3. What kinds of gear are used for fishing and which of them are harmful?
4. Does tourism lead to any environmental problems or pollution and/or affect fish resources?
5. What is the fishers' experience with the STR regime?
6. Has there been any increase in tiger attacks? Have the victims been compensated?
7. What are the other problems that the fishers face?
8. What measures or governance methods can lead to a solution of the problems?
9. What are your views on fishers' rights in the forest and fishers participation in fisheries resource management in the forest and outside?

CHAPTER I: THE SUNDARBANS FOREST AND REGION: PHYSICAL AND ECOLOGICAL FEATURES

The Ganges-Brahmaputra delta is one of the largest deltas and one of the most fertile regions of the world. This delta is also home to the world's largest mangrove forest (the Sundarbans) and the largest population of the world's tigers. The Sundarbans forest is the only mangrove forest and littoral tract that has the honour of having tigers. These tigers appear to surpass any other tiger population, in India and elsewhere, in 'man-eating' propensity.¹ Further, this mangrove forest, and the Sundarbans region in general, is also home to an impressive spectrum of flora and fauna.

Bordered on the south by the Bay of Bengal, the Ganges-Brahmaputra lower delta is crisscrossed by a maze of rivers, creeks, and rivulets that have made the area an archipelago of numerous large and small islands (see Map 1). This abundance of rivers, rivulets, and creeks defines the landscape. The brackish estuarine water permeates the upper layers of the soil, rendering it selectively and variably fit for vegetation and cultivation.² For most crops, the soil yields subsistence with difficulty and profit with great reluctance. This has become more so after the 2009 cyclone Aila, and would happen again if any such event were to occur (which climatologists tell us is unlikely in the changing-climate scenario).

The salinity has resulted in the predominance of halophytic vegetation, especially mangroves. The Indian Sundarbans alone boasts of 69 plant species, of which 30 are true mangroves, 20 are mangrove associates, and 12 belong to the black *mangal*. Only 40 species of mangroves are known in the entire Old World.³

The ecological richness extends to the waters. Mangroves and their roots play a role in purifying and enriching the waters⁴ and acting as nurseries to a large number of fish and shrimp species. It has been said that "Sundarban mangrove forests...form the largest nursery for fish and shell fishes and are responsible for the coastal fishery of the whole of eastern India."⁵ One source mentions some 154 species of fishes in the Indian Sundarbans.⁶ The intertidal zone in this region, with its mudflats are known to host a wide variety of invertebrates, provide feeding ground for juvenile fishes, and play an indispensable role in the local food web.⁷

Some 200 years ago, the Sundarbans forest extended much further north than they do today. Historically, the northern stretch of the halophytic

forest merged into what has been called the Sundarbans Freshwater Swamp Forests. A description of these forests reads as follows:

This ecoregion represents the brackish swamp forests that lie behind the Sundarbans Mangroves...where the salinity is more pronounced. The freshwater ecoregion is an area where the water is only slightly brackish and becomes quite fresh during the rainy season, when the freshwater plumes from the Ganges and Brahmaputra rivers push the intruding salt water out and also bring a deposit of silt (Champion and Seth 1968). Like the vast mangrove ecoregion, the freshwater swamp forest ecoregion also straddles the boundary between Bangladesh and India's state of West Bengal.⁸

However, the forest is almost gone. The revenue hunger of the British government led to clearing of the forests and settlement in the northern areas. This began a process that led to settlement and deforestation of large tracts of the Sundarbans in what is today West Bengal and Bangladesh.

The delta and the archipelago

The Bengal delta, whose estuarine and littoral tract the Sundarbans forest occupies, is a prograding delta.⁹ Map 1 shows the light blue deposit of sediment just south of the delta mouth, known as the *Bengal fan*, indicating the process through which the delta has advanced—surely, and rather rapidly on the geological timescale. The present Sundarbans area was occupied by the sea not too long ago and came into being between five and two thousand years ago.¹⁰ Paleo-ecologists tell us that some six thousand years ago, the coastline was very close to what is today Kolkata, as testified by the carbon dating of the peat excavated during the metro railway drilling.¹¹

Map 1: Southern portion, Bengal Delta



Sundarbans: Many Meanings

The original word, as pronounced in the local language, Bengali, is *shundorbon* which simply meant the dense forests of deltaic-coastal Bengal, characterized by the tiger, the crocodile, and the *kamot* (any of the few species of Sundarbans river sharks). It was the British, who altered the pronunciation and, strangely, pluralized the word, to the *Sundarbans*. Then there is the English-educated Indian's version, *Sundarban*, foregoing the unnecessary 's'. The remnants of this resistance to the British version can be seen in certain government circles even today—e.g., in West Bengal, it is the Department of *Sundarban* Affairs and the *Sundarban* Development Board. However, the colonial 'Sundarbans' acquired global, and thereby, pan-Indian currency. Thus, in the Government of India pronouncements, it is the *Sundarbans* rather than the *Sundarban*.

Yet, today, in official and academic discourse, the terms 'Shundorbon', 'Sundarban', and 'Sundarbans' have the same set of meanings. First, they stand for the forest in India and Bangladesh. While physically undivided, politically and administratively they are separate entities and hence referred to as the Indian Sundarbans and Bangladesh Sundarbans, respectively. In the non-forest administrative circles of West Bengal, 'Sundarban or Sundarbans affairs' would usually mean the economic, social, or administrative issues connected with the non-forest areas of the 19 community development blocks (sub-districts) in the districts of North 24 Parganas and South 24 Parganas in southern West Bengal.

The terms also stand for the region in general, either forested or settled, south of the Dampier-Hodges Line, which once marked the northern borders of the Sundarbans Forests. This *Sundarbans*, i.e. the 19 CD blocks plus the forest area, appears in United Nations Educational, Scientific and Cultural Organization (UNESCO) and Government of India documents as the Sundarbans Biosphere Reserve (SBR). This SBR is also occasionally referred to as the Indian Sundarbans Delta (ISD).

Unless otherwise indicated, the context will inform the reader which of these Sundarbans is being referred to.

Ebb, flow, change

The eastern portion (yellow area in Map 2) of the delta, dominated by the Meghna mouth and distributaries, is supposed to be an area with much higher delta-forming activity than the western part (the green area in Map 2).

However, the western portion is also tidally active. River expert, Kalyan Rudra, thinks that delta-transformation has not entirely stopped in the western portion of the lower delta.¹²

Whether the Indian Sundarbans can be seen as the site of delta-building activity or not, storm surges, tidal action, and siltation continuously determine and transform the geomorphology of the region. According to a standard (and extremely informative) source:

The Indian Sundarbans Delta is bounded by the Ichamati-Raimangal River in the east, by the Hugli River in the west, by the Bay of Bengal in the south, and the Dampier-Hodges line drawn in 1829-1830 in the north. A little over half of this area has human settlements on 54 deltaic islands the remaining portion is under mangrove vegetation. Soils of ISD are principally Alfisols (older alluvial soil) and Ardisols (coastal saline soil).¹³

The number 54 has acquired the status of a convention. The ISD is said to consist of 102 (or 100) islands, of which 54 (or 46) are settled and the rest forested. The problem is that this does not reflect the dynamic mutability of the Sundarbans. Siltation closes channels dividing two islands, leading to their merger. Or, the river might seek new avenues, aided by tidal action or storm surges, leading to creation of new channels and thereby new islands. Hence, statistics, such as the number of Sundarbans islands, is extremely vulnerable. This is testified by the experience of the dwellers of the Sundarbans islands. Kalyan Rudra makes the same observation and, indeed, gives specific figures in his unpublished report on the rivers of West Bengal. He notes that recent satellite images shows that the actual number of islands is 128 of which, 33 are completely deforested.¹⁴

Map 2: Bengal Delta



Source: Banglapedia: http://www.banglapedia.org/HT/B_0456.htm last accessed 26 Dec 2014

Keeping out the flood

Most of the inhabited islands of the Sundarbans were originally uninhabitable, for large portions were regularly inundated with brackish water during spring tides, even during ordinary high tide, particularly when such tides coincided with storms.

As the novelist Amitav Ghosh notes in *The Hungry Tide*, the Sundarbans was not always known by this name. In the Mughal records, the region was named for a tide—*bhati*. The land was called *bhatir desh* or ‘tide country’.¹⁵ The ebb and flow of the tide constitutes the basic rhythm of this eco-region, around which everything in it revolves. The tidal current makes and

unmakes the land it touches; the height of the tidal swell determines the extent of inundation; the state of the tide affects the degree of salinity. All these determine the physical, chemical, biochemical, and biological environment in myriad ways.

Another source describes the vital role of tides:

The coastal tract of the Sundarbans continues to form by the deposition of silt mostly pushed back from the estuary by tidal waves. The water in creeks during the high tides spills into the flood plain and deposits the sediments, which provides the base for the growth of the dense mangrove vegetation. The pneumatophores and stilt roots of the mangroves withstand this sediment mobility. The rate of accretion may be as high as 12 cm/yr, as observed in Prentice Island (Paul, 2002). The mangrove swamps are dynamic and differ horizontally and vertically due to the varying environmental conditions. The tidal fluctuations causing temporary changes in sea level are high in the western creeks than in the east and near the sea face it is about 2.2 m, which rises to three-five m. in further upstream. Estuary is the buffer zone between freshwater from the rivers and salt-water inflow from the sea. Here the opposing and oscillating tidal currents meet and exert considerable and complicated force on the entire biota. (Chaudhuri and Choudhuri, 1994).¹⁶

The tide-inundated islands were made habitable by creating embankments to keep out the saline water. However, the “two Himalayan rivers, the Ganges and Brahmaputra, are among the most sediment-laden rivers in the world”,¹⁷ and there is a tendency of the river beds to rise higher due to sediment deposition. This process was enhanced due to embankments. This prevented the rivers from shedding some of their sediment loads on the islands. This, in turn, deprived the soils of the chance to recuperate from agricultural exhaustion. This accounts for the relative poverty of the Sundarbans soil.¹⁸ No wonder, the river beds continue to rise, leading to a situation where, in many areas of the Sundarbans, the river often flows at a level higher than the adjacent land, and does not spill over into the latter thanks only to the embankments. The non-embanked islands, the forested ones, fare better. Devoid of embankments, they are blessed with inundations and silt, and continue to rise.¹⁹

Yet, without the embankments, human existence in its present form would be impossible in the Sundarbans isles. Hence, keeping the embankments in place and in sound health remains a perennial challenge for the Sundarbans administration.

Most of the rivers in the Indian Sundarbans do not have headwaters and sustained water inputs. Their main source of inland water is local runoff, coming from the monsoon and pre-monsoon showers.²⁰ Therefore, the water level in the river depends hugely on tidal variation. During the ebb, the smaller creeks are almost totally depleted. This huge water level variation plays a major role in the use of certain nets, particularly the *charwpata* and *khalpata*.

There is a caveat. The dynamism and mutability applies to the tidally active delta (which is most of the Sundarbans), often depicted as the *island Sundarbans*. There are some parts of the official Sundarban region (i.e. of the SBR)²¹ that reach into the mature delta and do not exhibit the characteristics of tide-governance and mutability.

The 'Fishing Community' and the 'Fisher'

This study is concerned with the artisanal fishing community of the Sundarbans. The term community here denotes occupational community—those who fish as a profession. It does not denote fisher by caste—for example the *jelia kaibarta*, *pod*, or *namasudra*. Ancestral practice and caste identity is certainly one of the factors in choosing an occupation, but opportunity and convenience has played a major role, particularly during the last two decades. Parental occupation is of course important, but that, in the context of the Sundarbans, has not been synonymous to caste-determined occupation from the very beginnings of settlement in this area. Further, fishing as an occupation does not exclude other occupations. Many fishers are cultivators, labourers, carpenters, and so on, on the side.

In the context of the Sundarbans, and in the context of this study, the term 'fisher' includes crab-collectors. When referring to themselves as a community, a Sundarbans fisher almost invariably says: *amra jara mach-kankra dhoi*, i.e. "those of us who catch fish and crabs". Although crab-catching involves methods different from fishing, many a fisher in the Sundarbans diversified into catching crabs. With the rapid escalation in crab prices, this trend appears to be on the increase.

Therefore, when the report refers to fisher, it does not necessarily exclude crab-collectors. Such exclusion would be implied only in certain contexts, which would be obvious to the reader. It also does not exclude women, for in the Sundarbans, many women are engaged in professional fishing (See Appendix III).

CHAPTER II: THE HISTORY OF HABITATION AND SETTLEMENT IN THE SUNDARBANS

Knowledge of the Sundarbans' past is unusually patchy. Nevertheless, various tracts of the Sundarbans area in the South 24 parganas have recognizable historical antecedents. For example, Sagar Island has a history of human habitation going back to the pre-Christian period.²² Harinarayanpur (near Diamond Harbour) has also yielded artefacts dating to the Mauryan period.²³ The Kulpi area has yielded architectural samples hailing to the 10th–13th centuries of the Christian era, while an impressive brick temple from the early Pala period (10th century) has been found close to Kankandighi (near Raidighi).²⁴ The archaeological findings by two villagers at Gobardhanpur, at G-Plot, in the Pathar Pratima Block and subsequent investigations by archaeologists have indicated a thriving settlement as old as the third century BC.²⁵ However, all these finds are from sites close to major rivers in the past (which have undergone substantial shifts in the historical period) or, as in the case of Gobardhanpur, close to the sea. Therefore, these are not necessarily indicators of extensive habitation in the Sundarbans area in general.

Evidence indicates that the more accessible and the less hostile areas of the Indian Sundarbans had human habitation until the 15th-16th century. Archaeologist Dilip K. Chakraborty writes that “there is reason to believe that from the pre-Mauryan-Mauryan period to the fifteenth-sixteenth century AD the forest did not grow at the expense of human habitation.”²⁶ From that time, a tectonic process caused the main course of the Ganga to shift eastwards, gradually causing the Padma to become the main distributary of the Ganga. Consequently, there was a marked decline in the supply of fresh water to the Indian Sundarbans.²⁷ Therefore, this area lost its attraction for the usual settler or cultivator. Comparatively, the eastern Sundarbans received much more freshwater supply, mainly from the combined waters of the Padma and the Brahmaputra, making the eastern Sundarbans attractive to settlers. The easternmost portion, known in colonial times as the Bakharganj Division (presently the easternmost margin of the Bangladesh Sundarbans), was partly reclaimed by the 17th century and occurs in Shah Suja's rent rolls (1658).²⁸ No wonder, during the British rule, the reclamation in this part of the Sundarbans was more extensive than in other parts.²⁹ However, most of the Sundarbans was settled during the British rule.

The Sundarbans frontier

Anamitra Anurag Danda, drawing mostly on Eaton and Wise, gives the following description of the settlement of the Sundarbans during the 13th to the 18th centuries.

Extension of the frontier into forested Sundarbans began before the Muslim Indo-Turkish Sultans ruled Bengal from 1204 until 1575 (Townsend, 1987/91). Eaton notes: "...between the thirteenth and eighteenth centuries Muslim pioneers locally remembered as holy men 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 western³⁰ (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).³¹

However, as the geographical locales mentioned in Eaton and Wise indicate, the Sundarbans to which Danda refers appears to have been mostly the Sundarbans Freshwater Swamp Forests. The main movement of human population into the Bengal delta occurred from the northwest and progressed east and south, first cutting down the moist deciduous forests of the lower Gangetic plains³² (in the upper reaches of the delta and further north) and then progressing southwards into the Sundarbans Freshwater Swamp Forests (now almost extinct). During the greater part of the last two millennia, the Bengal delta constituted a frontier for the North Indian civilization. Riding on the backs of enterprising peasants, the Buddhist-Brahmanical-Sanskritic cultural matrix moved into Bengal. Subsequently, Islam also followed the same route, with its Ghazis

spearheading the geographical expansion of both Islam and agrarian settlements.

The frontier moved further south and east. The forests were assaulted from the north and west and gave way to wet rice cultivation. As Eaton describes it:

The advance of wet rice agriculture into formerly forested regions is one of the oldest themes of Bengali history. Wang Ta-yüan, the Chinese merchant who visited the delta in 1349–50, observed that the Bengalis “owe all their tranquility and prosperity to themselves, for its source lies in their devotion to agriculture, whereby a land originally covered with jungle has been reclaimed by their unremitting toil in tilling and planting....The riches and integrity of its people surpass, perhaps, those of Ch’iu-chiang (Palembang) and equal those of Chao-wa (Java).³³

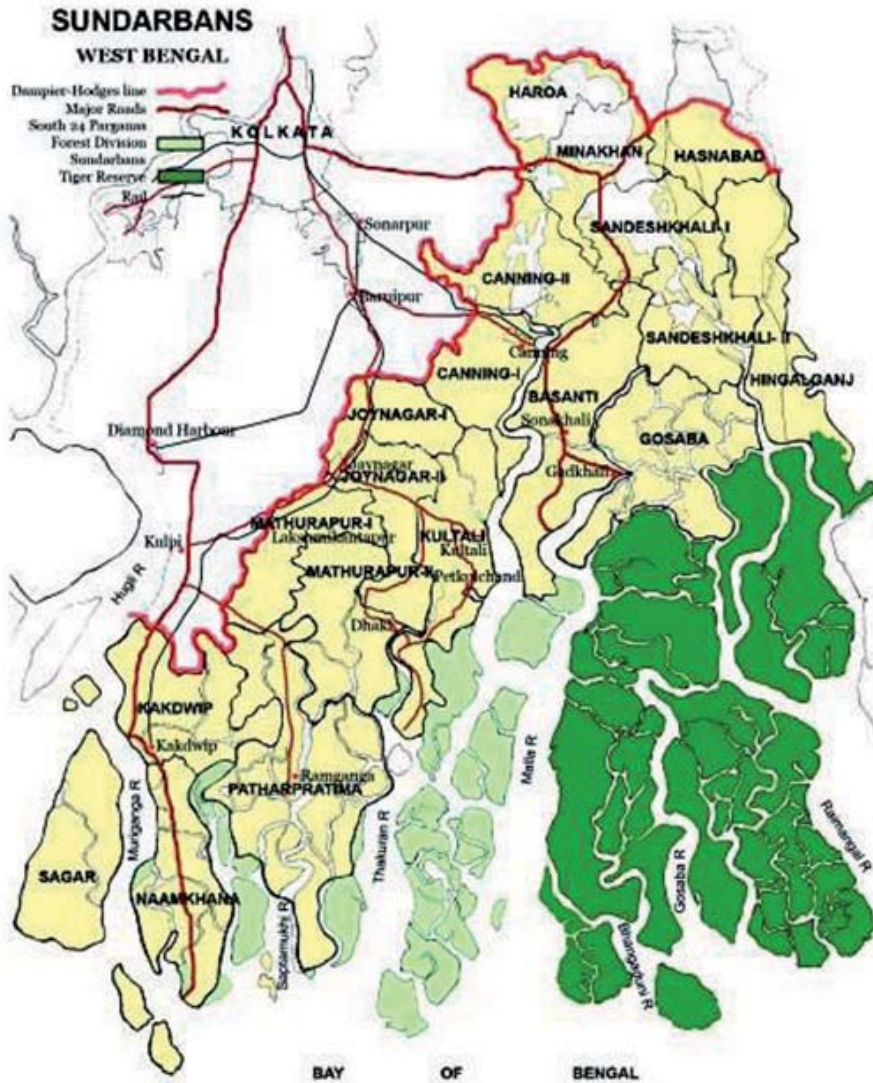
The fertile alluvium of the Ganges-Brahmaputra delta promoted population growth. As population increased and the peasants fanned out for more land, this clearing of the forested areas continued over extensive tracts of South Bengal along the main rivers and their countless distributaries.

From all indications, while the freshwater or mildly brackish ambience was attractive to the cultivator, the brackish and tide-ruled estuarine tracts of the extreme south tended to attract wax and honey collectors, fishers, and all those who needed the vicinity of the coast—e.g., traders and buccaneers.

In Bengal, the first emissaries of the early modern West were the Portuguese. During the 1530s, the Portuguese settled in Satgaon, on the confluence of the river Saraswati and Bhagirathi-Hooghly. They soon became a major power in Bengal. For about a century, the southern part of Bengal, particularly the estuarine tracts, remained under the effective control of the Portuguese pirates and freebooters.³⁴ Moreover, Burmese/Arakanese pirates infested these areas and added to their woes. Consequently, even the hitherto populated centres of this region of Bengal got depopulated and the jungles of the Sundarbans extended even beyond its northernmost borders, indicated for West Bengal by the Dampier-Hodges Line.ⁱ See Map 3.

ⁱ An imaginary line, passing through 24 Parganas South and North districts, which indicates the northern-most limits of estuarine zone affected by tidal fluctuations.
http://www.sundarbanbiosphere.org/html_files/faq.htm

Map 3: The Dampier Hodges line



The treaty of 1757 between Mir Jafar and the East India Company ceded to the latter the *Zamindari* rights of 24 Parganas.³⁵ When the Company acquired the *diwani* or civil administration of Bengal in 1765, “the Sundarbans extended much further north than at present. Even in the vicinity of Calcutta the country was largely an uncultivated waste, especially to the east, where the forest approached to within about seven miles of the town.”³⁶

East India Company and the forest³⁷

While the ordinary cultivator proved reluctant to venture into the dangerous Sundarbans, the British, from very early on, saw the region as a frontier zone—lands outside actual civil, criminal, and revenue administration. They, therefore, were keen to bring the Sundarbans under cultivation and convert them into revenue-paying assets. Attempts to reclaim the Sundarbans first began in 1770, with Claude Russell, the Collector-General, in what became the ‘24 Parganas’ district³⁸, as this area was close to Calcutta, the main seat of British power. Russell granted leases to incentivize farmers. The leases allowed lessees an initial period free of rent, until they should have made some progress in cultivation, and fixed an ultimate rate of about Re. 1–8 per acre on all the lands that might be found reclaimed on subsequent surveys. The lessees, egged on by these incentives (and, no doubt, by the lure of forest resources) made considerable progress, and the neighbouring *zamindars* also busied themselves in promoting cultivation, so that during the next 40 years the country was cleared almost upto Sagar Island in the south, and Port Canning to the east. The next effort was by Tilman Henckell, the Judge and Magistrate of Jessore, who, with Warren Hastings’ approval, and after roughly defining the forest boundaries, granted some 150 leases in 1785.³⁹

The scheme failed due to opposition from all the neighbouring *zamindars*. Consequently, by 1792, the lessees had all disappeared except 16. In their case, the scheme was modified and the lessees developed into *talukqars*, their lands being called Henckell’s *taluqs*.⁴⁰

Around 1810, various schemes appear to have been floated for the improvement of the Calcutta Port. One was to reclaim Sagar, another to construct wet docks at Diamond Harbour. In 1816, it was even proposed to construct a canal, some 75 miles long, from Calcutta to Channel Creek.⁴¹

To map, measure, and manage

These schemes, from revenue to navigational, rendered surveys necessary. The surveying of deltaic Bengal began in 1810. Lieutenant W.E. Morrieson surveyed the Sundarbans (exclusive of the sea face), from the Hooghly as far as the river Posur, during 1811–14, and his brother Captain Hugh Morrieson corrected the results in 1818. This was an arduous job and has been the basis of all subsequent maps of the Sundarbans.⁴²

In 1814, the Court of Directors of the English East India Company, directed that settlements should be concluded with the actual occupiers

for lands already brought under cultivation, while holding out reasonable encouragements for further reclamation. Hence, an attempt made during the years 1814–16 to re-measure the grants already made and to revise their rentals. This, however, met with only partial success. Anyway, the British authorities clearly perceived the advantages that the State might gain from the opening up of the Sundarbans. Hence, a law was passed in 1816 (Regulation IX of 1816) sanctioning the appointment of an officer to deal with the Sundarbans to be styled the “Commissioner in the Sundarbans”, with all the powers and obligations of a Collector.⁴³

On enquiry by the Commissioner it was found that encroachment and reclamation had been steadily and continuously carried on by the lessees, *zamindars*, and other authorized persons. These occupiers held all the new land brought under cultivation without payment of any revenue to the government. They resisted the operations to extract revenue from them. In 1817, the government expressly declared in a law (Regulation XXIII) that the Sundarbans was the property of the State, and asserted the State’s right to revenue of lands now included within the boundaries of estates for which a settlement had been made. Nevertheless, there remained legal complications and confusions regarding the government’s right to extract revenue from these lands.⁴⁴

In 1821, the Sundarbans office was reconstituted. It was also reinforced by a survey party under Ensign Prinsep, with the wider object of demarcating the State lands from private estates. However, the *zamindars* claimed that all the land, up to the sea, belonged to them, but, at the same time, refused to indicate the borders of their holdings. The only course, therefore, was to survey all the lands that had been brought into cultivation during the previous 30 years. Prinsep surveyed the line of forest from the river Jamuna to the Hooghly in 1822 and 1823 and, with the aid of the Morrieson map, divided all the forest lands between the rivers into blocks. Since these areas were not previously settled, and had no names, the blocks were numbered and called “lots”.⁴⁵

Until the mid-19th century, the entire thrust of British policy towards the Sundarbans was extracting economic benefit, mainly land revenue. Hence, the drive was to get the land settled as far as possible. There was no forest policy worth the name and no real question of conserving or preserving forests.

Thus, attention in the 1820s was directed to the claim of the State to demand revenue both from recently reclaimed lands and from the forest.

Resumption (*i.e.*, the establishment of the right of the State to demand revenue from lands that pay no revenue) was not an easy matter, on account of the intricacy of the claims, the paucity of trustworthy documents and the fabrication of false papers. However, the government was insistent. By 1828, the State had recovered all the lands and forests in the 24-Parganas. That year a final declaration of the rights of the State over the recent cultivated lands and forests was made in Regulation III, which laid down—“The uninhabited tract known by the name of the Sundarbans has ever been, and is hereby declared still to be, the property of the State; the same not having been alienated or assigned to *zamindars*, or included in any way in the arrangements of the Perpetual Settlement. It shall therefore be competent to the Governor-General in Council to make, as heretofore, grants, assignments and leases of any part of the said Sundarbans, and to take such measures for the clearance and cultivation of the tract as he may deem proper and expedient.” It also enacted that the boundary of the Sundarbans forest should be determined by the Sundarbans Commissioner and indicated through accurate survey.⁴⁶

Dampier and Hodges

William Dampier was now appointed Commissioner and Lieutenant Hodges Surveyor, their jurisdiction being extended over the whole of the Sundarbans in Khulna and Bakharganj. They defined and surveyed the line of forest from the Jamuna (where one end of Prinsep’s line was) up to the eastern limit of the Sundarbans, during the years 1829 and 1830; and Dampier formally affirmed Prinsep’s line in the 24-Parganas in 1832–33. “Prinsep’s Line” and “Hodges Line” are the authoritative limits of the Sundarbans forest, while the map prepared by Hodges in 1831, from his own surveys and those made by his predecessors, has been the basis of standard maps of the Sundarbans ever since. Following Prinsep’s plan, he divided all the forests as far as the River Posur into blocks, revised the numbering to a series from 1 to 236. The aggregate area of these 236 “lots” was calculated at 1,702,420 acres, or 6,889 sq km.⁴⁷ Beyond the river Posur, now in Bangladesh, detailed surveys of the forest were undertaken much later.

Settlement

Reclaiming forests and wilderness was accompanied by getting them settled. Continuing the settlement of the Sundarbans proved to be rather difficult, even well into the 19th century. Determined to get them settled,

the government offered liberal terms. Rules for the grant of the forest were issued for the first time in 1930. Applications poured in mostly from Europeans residing in Calcutta. With the exception of some lands reserved for the Salt Department, applicants practically got gratis whatever they asked for in the 24-Parganas and Khulna. Between 1830 and 1836, 110 lots were granted over 551,520 acres. These grants were made in perpetuity at a rental of about Re. 1.8 per acre, and nothing was payable during the first 20 years. However, it was stipulated that one-fourth of the area should be rendered fit for cultivation within five years, failing which the grant would be forfeit.⁴⁸ However, after the first eager competition, applications petered out. They revived in 1839, and about half of the forfeited grants were leased again besides some 12 new lots.⁴⁹

Some of the persons who got grants were mere speculators, who did not attempt to clear their lands, but realized whatever profit they could get from the wood and other natural products, and sold the lots as soon as they could find a purchaser. In a few cases, the grantees complied at once with the condition requiring clearance, but in more than one-third of the lots, the difficulties and losses of the grantees proved insuperable, so that the government was obliged to cancel their grants. Those without ample capital failed most frequently. The work of reclamation required unceasing care and vigilance; it was liable to be interrupted at any moment by the desertion of the peasant tenants, and new tenants had to be engaged at heavy expense. Moreover, this was not an area that was reclaimed and settled in the usual manner. If the embankments, essential to prevent flooding by saline water, were breached, the soil was ruined with a deposit of salt. Besides, the best lots were taken up by the early applicants, and only when some progress was made in the lots bordering on the cultivated tracts was it possible for a grantee whose land lay deeper in the forest to succeed in his undertaking.⁵⁰

O'Malley, and to an extent in Pargiter and Ascoli, chronicle this history.⁵¹ Pargiter and Ascoli's revenue history of the Sundarbans makes it the only region of Bengal for which a specific regional revenue history was written. The reason for this is that converting the Sundarbans into a normal revenue-paying proposition proved a difficult problem for the British administration. However, the effort to get these regions settled continued. In addition to the drive for revenue, there were naval and mercantile concerns that looked at coastal Sundarbans in terms of docks and harbours. In any case, the efforts of the colonial government succeeded in pushing people into Sundarbans and making large tracts of the latter amenable to further settlement. By the

early 20th century, when Daniel Hamilton moved into Gosaba and began his famous “island experiment”,⁵² the Sundarbans was already home to hundreds of thousands of settlers.

Though critically analysed statistics of the period are unavailable, we do have census data, for whatever it is worth.⁵³ The 1911 census shows a total population figure of 645,189 for the Sundarbans *thanas*ⁱⁱ in 24 Parganas alone. This, within a certain margin of error, can be taken as the population of the Indian Sundarbans. Based on the areas of the *thanas* provided,⁵⁴ the population density of the entire habited Indian Sundarbans area works out to be 73 per sq km. Changes in administrative divisions makes comparison with the present Sundarbans area impossible. Nevertheless, the 1911 figure gives us an idea of extent of demographic change.

The caste profile of the settlers in the Sundarbans area can be gleaned from data provided in O’Malley,⁵⁵ despite the drawbacks of colonial caste enumeration.⁵⁶ O’Malley gives the caste-wise population across Sundarbans *thanas*. Based on this, the only two upper castes present are Brahman and Kayastha and they only comprise 3.7 per cent of the total population and 5.36 per cent of the total Hindu population. The Bagdi, Kaora, Muchi, Namasudra (or Chandal), Pod, and Tiyar occupied the lowest rungs of the traditional ritual hierarchy and are even today classified in West Bengal as the Scheduled Castes (SC).⁵⁷ They constitute 63.14 per cent of the Hindu population and 43.57 per cent of the total population of the Sundarbans *thanas* in 1911. The Kaibartas appear to be an amorphous lot in the 1911 census, because they have not been segregated into *Haliya* Kaibaras (traditionally cultivators) and *Jeliya* Kaibartas (traditionally fishers). The latter belong to the lowest category of the ritual hierarchy, while the former belong to what is today called the Other Backward Castes (OBC). In the absence of the segregation, we take the caste as a “lower caste” category in general. The Goala and Napit are also “lower castes”. Therefore, “lower castes” as a whole, including the lowest rungs mentioned earlier, constitute 91.51 per cent of the Hindu population and 63.14 per cent⁵⁸ of the total population.

That the lower caste presence is higher in the Sundarbans *thanas* is easily seen if we compare it with the ratio of the “lowest castes” to the Hindu population in the district as a whole. From the data provided in O’Malley, that works out to 55.28 per cent. Clearly, there is an increase of

ⁱⁱ Police stations

7.86 percentage points. Similarly, while the Brahmans and Kayasthas together constituted 5.36 per cent of the Hindu population in the Sundarbans *thanas*, they constituted 11.61 per cent of the Hindu population in the entire district. It is thus clear that the lower rungs of the ritual hierarchy had moved into the Sundarbans areas at a more rapid rate than the higher castes. The overwhelming lower caste predominance has continued to characterize the Sundarbans areas into the present, with significance for human development, education, and ecological footprint.

Sources suggest and present observation confirms that a considerable number of tribal people had also been brought into the Sundarbans at various phases. However, their number in the initial phase appears to have been less and the main influx appears to have been after 1911. This is because the 1911 census data for the 24 Parganas Sundarbans (which only mention district populations greater than 25,000) does not reveal their presence.

CHAPTER III: THE DEMOGRAPHY OF THE SUNDARBANS

Population of the Sundarbans

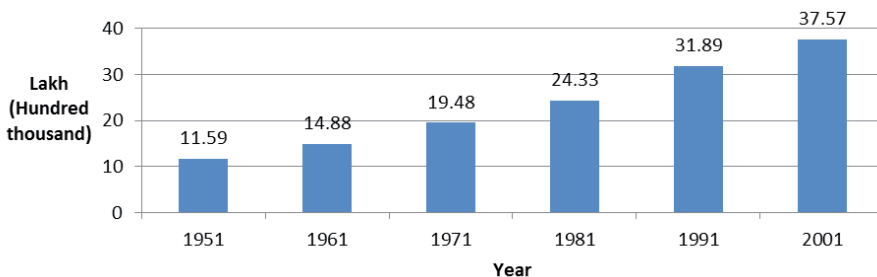
The Indian Sundarbans is spread over two districts—South and North 24 Parganas—which were created in March 1986 by splitting the district of 24 Parganas. Each district is divided into Community Development Blocks (hereafter ‘blocks’). Presently, the settled portions of the SBR are located in 13 of the 36 blocks in the South 24 Parganas and on 6 of 22 blocks of the North 24 Parganas, constituting a total of 19 blocks, referred to as the ‘Sundarban blocks’.

In addition, the SBR contains the official forested tracts, officially non-settled (there are rare cases of settlements within these tracts), under the governance of the forest department, and officially protected by various protection regimes. Yet, the natural resources of these official forested tracts also tend to come under pressure due to population increase in the contiguous revenue blocks.

From 1911 to 2001

In 1911, this region had a considerable population, which continued to grow. After Independence (in 1947), the islands saw a steady influx of migrants from adjoining districts, particularly Medinipur as well as refugees from erstwhile East Pakistan (now Bangladesh).⁵⁹ The chart below gives an idea of how the population increased in the Indian Sundarbans since 1951.⁶⁰

Figure: Population Growth in the Sunderbans Blocks



The population of the Indian Sundarbans more than trebled in 50 years—an average rate of growth of 2.36 per cent per annum. However, the rate of growth seems to have fallen significantly during 1991–2001. This reduced

rate of growth was retained during 2001–2011, without any further significant decline noticeable during that decade.

The 2001 Population

The population increase in the Sundarbans blocks has overwhelmingly been that of rural population. Census data from 2001 indicates only one Sundarbans block (Jaynagar, in the South 24 Parganas) had an urban population and that was an extremely small one (2.31 per cent of the block's population).⁶¹ The bulk of this rural population is poor, the majority of whom tend to be heavily dependent on local/natural resources for livelihood and sustenance. Hence, population increase in the Sundarbans has a direct relationship to the pressure on the Sundarbans ecoregion, including the forest, riparian, and coastal resources.

The 2011 census shows that, as expected, the population has grown. The total population of the Indian Sundarbans is 4,426,259, a 17.80 per cent increase over 2001. Urban population in the Sundarbans blocks has increased with nine of the 19 blocks showing urban populations, albeit with 6 blocks having urban populations less than 20,000 and three having urban populaces considerably less than 10,000. The census data shows that the urban population in the Sundarbans blocks is located mostly in small census towns rather than in notified urban areas. The total urban population of the nine blocks is only 11.65 per cent of the total population of these blocks and only 5.74 per cent of the total population of the ISD. Therefore, for the Indian Sundarbans as a whole, the rural population constitutes about 94.26 per cent of the total population. The total rural population of the Sundarbans blocks in 2001 was 3,752,292 and in 2011 it was 4,172,248.

In 2001, the population density of Sundarbans was effectively rural, because the entire area was rural except for a negligible urban population in one block. In 2011, the situation has changed. Though the exact extent of rural area is not known, it has not increased. In fact the rural area has shrunk. Since the rural population has increased by 11.19 per cent in 2001; the rural density must have increased by more than 11.9 per cent by 2011. Therefore, if the rural density was 822 in 2001, it is more than 920 now. Note: the average rural density for the state in 2001 was 904, deemed a very high average.

Implications

Is it appropriate to equate high rural population density with heightened assault on local natural resources? That depends on whether the local

population is compelled to fall back on the local resources in an unsustainable manner. The rural population in the Sundarbans was largely dependent on agriculture, under conditions of relative low soil-productivity. Hence, rapid population increase led to holding fragmentation, and therefore pauperization. Thus:

...with subdivision and fragmentation of landholding through generations, the landed households gradually turned marginal and could hardly sustain with agriculture alone. Consequently, fishing became the second most important occupation for these islanders. The heavy dependence on forest for the landless or marginal households is also perceptible in absence of any power driven industry in these islands. This background also explains the spatial distribution of population within these islands. Households which directly depend on forest and rivers (mostly landless and marginal), are concentrated on the banks of the rivers bordering the forest.⁶²

For example, given the fact that the overwhelming majority of the poor have no access to cooking gas, and have inadequate access to kerosene, the temptation towards wood is strong.

Rural populations in the Sundarbans blocks continue to be mostly Scheduled Caste (SC) and Scheduled Tribe (ST) communities (1,554,113 out of 4,172,248 people).⁶³ Since SC-ST populations are mostly associated with lack of social and cultural capital important in modern society, the Sundarbans blocks tend to be characterized by poor literacy and high drop-out rates.⁶⁴ The proportion of illiterates and the proportion of SC-ST are close to each other in most of the Sundarbans Blocks, and for the aggregate for the Sundarbans region.

Hence, large chunks of the population are unable to move beyond the primary sector and direct dependence on natural resources. The Sundarbans contains brackish rivers, mudflats, saltpans, and poor soils. It is harassed by cyclonic events, such as the recent storm Aila, causing brackish flood water to breach embankments and inundate villages, causing the lands to become almost barren for a time.⁶⁵ All this reduces agricultural production and explains why population increase results in great poverty. It is no wonder that significant portions of the population fall back directly on natural resources to survive. It is here that fishing acquires vital importance.

Fishers and Fisheries

Talking to fishers at the village Purandar, situated on the rivers Hogol and Matla, is an education. The group of ten fishers interviewed hail from Barisal (in present Bangladesh). Some had fled just before the war in 1971; others had come much earlier, the parents of some having come during the partition of India in 1947. Among these, those who remembered Barisal said that when they arrived here they were stunned by the fish wealth of the Sundarbans waters. Rivers, creeks, and other water bodies were abundant in Barisal but the fish were not in such abundance. For the indigent, fish was a wonderfully nutritious food source. For those who could catch in quantity, fishing yielded money. Thus, “jumping into the river” (to quote Milan Das, a fishers’ rights activist from Diamond Harbour) proved the way to sustenance for many, and even wealth for some.

The brackishness/salinity of the Sundarbans waters, as mentioned earlier, renders the soil only selectively fit for the usual crops. This accounts for the considerable attraction of the Sundarbans rivers, and the pressure on them. The present fishing population in the Sundarbans area consists broadly of three categories—migrants from Purba Medinipur, migrants from present Bangladesh, and fishers who are descendants of the first fisher settlers in the region and, who, more often than not, are fishers by family tradition. The migrants from Bangladesh (mostly Khulna, to some extent from Barisal and Chittagong) who have taken up fishing are also largely from traditional fishing families. Sundarbans fishers who are migrants from Purba Medinipur (perhaps the largest demographic component), however, are mostly cultivators turned fishers.

However, the continuously increasing pressure on the waters has begun to tell in a big way. Species are disappearing. The yield is down, manifest mostly in drastic reduction of catch per unit effort. Large and powerful mechanized boats are adding heavily to the damage. “Just too many nets” and “too many mechanized fishing boats” were reasons mentioned repeatedly by small-scale fishers. They felt that the waters were under severe strain. It was clear to the fishers that the trawlers and mechanized boats, indulging in destructive and exhaustive fishing practices, were mostly responsible for the negative impact on fish resources. “Fishing at this rate and magnitude”, particularly if it were to increase, is unsustainable for the Sundarbans, says Pranabes Sanyal, former Director, SBR.⁶⁶

It is not only the waters of course. The forest offers many essentials. The burgeoning indigent population in the outskirts of the forest is bound to

try sustaining themselves on the riches of the forest. Wood is the most ubiquitous desiderata, mostly for fuel requirements in a rural scenario without sufficient hydrocarbon options. Hence, joint forest management (JFM) is an important requirement. However, JFM in the Sundarbans has possibly not delivered what it was supposed to. Reckless tourism, with hotels coming up by cutting down mangroves on riversides and diesels leaking into the water from the untold number of tourist boats, is taking its toll. A careful study to estimate the ecological footprint of all these developments is becoming urgently necessary.

CHAPTER IV: THE FISHING COMMUNITY IN THE SUNDARBANS

The missing (almost) history of the fishing community in the Sundarbans

Fish has been the defining component of the Bengali diet down the ages. If the poor Bengali had nothing else, he had fish. This was particularly true of deltaic Bengal. “*Matsya maribe khaibe sukhe*” (catch fish and eat merrily) is a phrase that a Bengali child learned on his mother’s knee. The delta-inhabiting Bengali rural commoner was very often a fisher on the side, supplementing his diet by spearing a few fish in the pond or the river with the *khonch*, or perhaps a *khyapla* net.⁶⁷ The *bhadralok*ⁱⁱⁱ would also fish of course, but he would be more likely to use a line.

While the vast majority of Bengalis (particularly men), knew how to use a fishing line, if not a *khyapla jal*,⁶⁸ the professional fisher was a breed apart. He was the *Jeliya* or *Jaliya*, who lives by the *Jal* (net). He occupied a position much lower down in the social ladder, than, for example, the peasant; the Brahmanical *shastras*^{iv} found the fisher’s work polluting,⁶⁹ and hence placed him at the bottom of the social scale. Thus Madhava^v, in his commentary on the *Parashara Smriti*, described the washer, the worker in leather, the actor, the *Varuda* (probably the betel-grower), the *fisherman*, the *Meda*, and the *Bheel*, as the “lowest” social groups.⁷⁰ Buddhism, influential in Bengal until the 11th–12th centuries, with its emphasis on non-violence, might also have been an obstacle to improving the fisher’s status in the social scale. Finally, with the resurrection of Brahmanism in Bengal in the 13th–14th centuries, the fisher lost any chance he might have had to improve his social position.

Given the Bengali’s penchant for fish, this looking down on the fisher is hypocritical. A story in Purba Medinipur says that sometime in the 1940s, a poor peasant was ostracized among his community because he had committed the unclean act of selling fish. The peasant got off only after paying a sizeable ritual penalty. However, there was no embargo on fishing

iii <http://en.wikipedia.org/wiki/Bhadralok>

iv The term *shastra* stands for all authoritative works revered in the Brahmanical-Hindu tradition. In this context, the *shastra* refers specifically to the legal texts that prescribe standards of appropriate behaviour and dictate prohibitions and punishments.

v Madhava was a 14th century scholar who wrote a famous commentary on Parasara Smriti (an authoritative legal text in the Hindu- Brahmanical-Hindu tradition.)

as such. The embargo was on catching or selling fish as a profession, unless you belonged to the castes permitted such activity. This, no doubt, also acted as an economic mechanism for protecting members of a caste from competition from outsiders.

In short, in the eyes of the upper castes, the fisher was above the *muchi* (cobbler) or the *myathor* (the sweepers and manual scavengers) who epitomised ritual uncleanness, yet below the peasant. Hence, in the official classification of castes in West Bengal, the *jeliya kaibarta* (the most prominent traditional fisher caste) is classified as SC. So are other traditional fishing castes such as the *pod* and the *namasudra*.

If Brahmanical Hindu society looked down on professions that dealt in fish, the Islamic society in Bengal was not far behind. As Wise wrote in 1883, “all fisher castes are still regarded [by Muslims] as belonging to one of the lowest grades of humanity...”⁷¹

Hence, Bengal’s traditional fishing communities remain unsung; literary Bengal, which has produced an enormous literature covering a very wide spectrum of themes, has only three novels based on the lives of the traditional fishing communities.⁷² Moreover, notwithstanding Bengal having produced some fine historians, including quite a few with Marxist and subaltern leanings, there seems to be nothing, or nothing prominent, on the history of Bengal’s (and the Sundarbans’) fishing community.⁷³ In the case of the Sundarbans, however, one reason could be the dearth of source material.

Rennell’s^{vi} journal, which provides important geographical evidences on Bengal during the 1760s, repeatedly refers to boats plying between the Sundarbans on the one hand, and other parts of Bengal, e.g. Dhaka and Jalangi, on the other.⁷⁴ Rennell is silent on what the boats carried. Since there are no records of settlements in the Sundarbans during that period, it is likely that the boats brought in timber and other forest produce, e.g. honey. This account of accessing the Sundarbans suggests that in all likelihood, fishers living close to the Sundarbans entered the forested waters to fish. Rennell’s account relates to a period when colonial governance was in its infancy. The Sundarbans came to be inhabited on a large scale only after the colonial government in Bengal had acquired a degree of maturity. Unfortunately, substantial accounts of fishing in Bengal during this period are lacking.

vi [http://en.wikisource.org/wiki/Rennell,_James_\(DNB00\)](http://en.wikisource.org/wiki/Rennell,_James_(DNB00))

Fishing in Sundarbans in the Colonial period

W.W. Hunter, however, provides an account of fishing in the Sundarbans during the 1860s–70s:

The right to fish in the navigable channels of the Sundarbans is public, and no revenue for it is now collected on behalf of Government. In 1866, Government put up to auction the rights of fisheries in all the Sundarban rivers for a term of five years, but liable at any time to resumption after six months' previous notice. 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; and it was then finally decided that the Government had not the right to farm out the fisheries in tidal waters to private persons. Sundarban grantees, however, farm out the fisheries within their estates. The Commissioner of the Sundarbans instances the case of one grant of about 2335 acres, of which 770 acres were leased out as fisheries; and mentions another case in which a grantee realized £90 a year from the fisheries in his estate. I condense the following account of the mode of fishing in the Sundarbans from Mr. Westland's District Account of Jessore:⁷⁵

The trade is plied in all the northern rivers of the Sundarbans, and also in some of the more remote ones within the forest tract. The favourite engine consists of a large bagnet suspended on two long bamboos stuck out at one side of the boat. Sometimes the boat, with net thus expanded under water, is driven slowly against the current. Sometimes otters are tied by a rope to the boat, and trained to plunge about on the sides of the net, so as to frighten the fish into it. The fisherman then raises the net quickly by standing on the inside ends of the bamboos, and thus gets all the fish that may be in it. Another common method (rather applicable to marshes than to rivers) is as follows: On the surface of the swamps, large patches of weed called *dhap* are formed, which, on the subsidence of the waters, sometimes float out of the marshes, and so down stream. These patches the fishermen fix by placing stakes round their circumferences, and then leave them for a day or two. The fish congregate beneath them, and the fishermen, by drawing a net round the place and removing the weeds, catch them in large quantities. On the borders of shallow rivers, branches of trees are also placed in the water for the same purpose, namely the attraction of fish to one place. On the muddy banks of

tidal rivers, little branching twigs are placed to attract prawns, which cluster about the twigs in great numbers and are easily caught. The fishermen in the marshes often carry in their boats an instrument like a long broom, with spear-heads in place of bristles. When they pass a big fish, they this dart this collection of prawns at it, and usually succeed in bringing it up impaled on one of its points. This, however, is not regular, but only a supplemental, mode of fishing; that is to say, men do not go out to fish solely with this weapon. On narrow shelving banks a round net is sometimes used. The fisherman goes along the bank, watching till he sees a place where some fish are lying. He then throws the net in such a manner, that before touching the water it has spread out into large circle. The edges of the net are heavily weighted with lead, and falling on all sides of the fish, imprison them. Cage fishing, by means of fixed engines of wicker-work, is also common. Every little streamlet, and even the surface drainage of the fields and ditches, show arrays of these traps placed so as to capture fish. The same method is used, but on a larger scale, in shallow and sluggish rivers, where, in many cases, lines of wicker-traps may be seen stretched across the river from bank to bank. Cage-fishing is, of course, inapplicable to deep and rapid rivers. Another plan for capturing fish is by attracting them at night by a bright light, and trapping them. The methods above described are used by single fisherman, or by a few men together. The fish, however, have sometimes to stand more formidable batteries, when a party goes out with nets or cages, and laying a large trap, drives into it many hundred fishes at a haul.⁷⁶

The varieties of fish most commonly found in the Sundarbans are as follows: *Bhetki*, *bain*, *kai*, *bhola*, *saul*, *banspata*, *magur*, *kain magur*, *parisa*, *tengra*, *pangas*, *selanda*, *bhangan*, *chingri* or prawns, *mochachingri* or cray fish, *chuna*, *ilsa* or *hilsa*, *chitra*, *gangtora*, *pairachanda*, *med*, *gagra*, *patka*, *poa*, *singi*, and *puti*. The fish less frequently met with are: *Khorsola*, *rui* or *rohi*, *katla*, *chela*, *gutia*, *sankach*, *kauta-thuti*, *mrigal*, *kakila*, *bamli*, *lata*, *tapsi* or mango-fish, *kalibaus*, *air*, and *boal*. Turtles, tortoises, crabs, and oysters are also found in the rivers. The Commissioner states to me that he has no means of ascertaining what proportion of the Sundarban population live by fishing, boating, or other industries. All the poorer classes, however, employ themselves in fishing and as boatmen or woodcutters, as a subsidiary means of livelihood in addition to cultivation. The well-to-do husbandmen confine themselves to tilling of the fields, and have not other occupation than agriculture.

The Present Fishing community in the SBR

Are all poor fishers?

We have seen that Hunter wrote in the 1870s: “All the poorer classes” in the Sundarbans area “employ themselves in fishing and as boatmen or woodcutters, as a subsidiary means of livelihood in addition to cultivation.” He adds, “The Commissioner states to me that he has no means of ascertaining what proportion of the Sundarbans population live by fishing, boating, or other industries.”

Not much has changed in the 140 years since. We still do not know how many people residing in the SBR are fishers. However, the comment that all the poorer classes are fishers/boatmen/woodcutters can be misleading.

The deterrents to fishing

Discussing occupational choice in the Sundarbans, A.A. Danda describes how, in addition to the social aversion to fishing as a profession, dominant in Hindus and Muslims alike, a factor operated in Sundarbans to encourage even traditional fishers to turn away from fishing:

...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 cultivation.⁷⁷

Speaking of the Sundarbans at present, Danda further writes:

The Muslim and Hindu (non fishing castes) alike still display the aversion towards fishing and only in dire straits do they take to fishing.⁷⁸

This appears to have been a major factor in preventing poorer classes from moving into professional fishing on a large scale. Nevertheless, economic compulsions and social changes have caused a change. Danda wrote in 2007:

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.⁷⁹

This is truer now. Caste-based aversions are declining rapidly. For example,

In the ISD caste and religious identities are not found to be a strong determining factor of access to opportunities possibly for two reasons,

(i) land reforms and land distribution undertaken by the state government, and (ii) rapid physical changes along the edges of the islands. It is common to find caste fishermen to be marginal farmers and caste farmers to be fishermen.⁸⁰

However, there are other deterrents to taking up fishing as a profession. Fishing, in rivers and seas, is a more risky occupation than agriculture or any other usual land-based occupation. In the Sundarbans, it is more so as the tide-ruled rivers, the river mouths, and the coastal waters of the Sundarbans delta are quite hazardous. In addition, the Sundarbans waters are home to varieties of sharks and crocodiles that often attack humans. Moreover, the most lucrative fish catches are to be found in the forest areas, the home of the Sundarbans tigers, which attack humans readily (fishers constitute the most numerous occupational group among tiger victims).

There is another deterrent—economics, which is, of course, not specific to the Sundarbans. Serious fishing involves an investment; a boat, or at least a net. While loans are possible, credit from public institutions are extremely difficult to procure and local private credit can be had only at exorbitant rates.

Fishing nevertheless

However, for some the economic compulsions are greater. Often, despite lacking a boat or net, fishers work as crew for remuneration. Women in the Sundarbans might simply get down in one of the local creeks with a *handi*, and fish with their hands or they might take a small bag net and get into the local river. The cheapest, yet profitable, low-investment fishing is catching *bagda* (tiger prawn) seeds in the rivers. That is why tens of thousands of women risk their lives and health, wading chest deep in the Sundarbans waters. However, the numbers have dwindled in the last few years as, on the one hand, the catch has declined, and, on the other, the hatcheries have conquered the market. Yet, the practice continues to an extent. Not only women, but men old and young try, if nothing else, to supplement their income by stepping into the river for *bagda* seeds.

The two sorts of fishing

Fishers depend on fishing as the main source, or one of the main sources of livelihood, or it could be a supplementary income, contributing say up to 20 per cent. The occasional fishers, normally fish with gears such as *khyapla*, small bagnets, or merely a small *handi* attached to the waist. The small bagnets are most often used for catching *bagda* seeds, which is why they are

often referred to as *minjal* (seed-net), though they are also used to catch shrimp and small fish. Note: “fish” includes not only the shrimp, but the ubiquitous, nutritious, and eminently marketable crabs.

There is no reliable catch statistics for the Sundarbans area. There are no consolidated figures between the Forest Department (who provide boat licence to fish inside Sundarbans tiger reserve and reserve forest area) and Fisheries Department (who manage the fisheries in marine side of Sundarbans). However, fishers are unanimous that catch per unit effort has become less than half in the last two decades or so, and many fishers are of the impression that overall catches have also declined substantially. This, lately, has been a disincentive to taking up fishing as a profession. However, the situation seems to vary across the Sundarbans.

Counts and conjectures

Is it at all possible to make an estimate of the number of artisanal capture fishers in the SBR?

The most reliable large-scale headcount of people is by the Census of India. Unfortunately, the only two occupational categories it deals with are agriculture (subdivided into cultivator and agricultural labourer) and household industry. The rest of the occupations are clubbed under “other”. These categories, in their turn, are subdivided into “main” and “marginal”, while the “marginal” has the subdivisions of 0 to 3 and 3 to 6 months. Then, each is divided into male and female. It is impossible to locate fishers in all these categories, without making certain arbitrary assumptions.

However, the website of the Department of Sundarban Affairs, under the section socio-economic profile, states, “A total of 478,770 people are estimated to fish in the Sundarban including the adjacent Bay of Bengal. Of these, 144,171 are active fishers.”⁸¹

Unfortunately, in spite of repeated visits to the department, further clarification could not be had. The department indicated they were unclear as to the source or veracity of the data. Nor could they explain what the term “active fishers” denotes. Professor Amalesh Choudhury, one of the expert members of the Sundarbans Development Board, felt that the figure 478,770 would be in the vicinity of the actual number, but was unable to explain how the Board arrived at the specific figure. He agreed that the issue called for investigation.⁸²

The other source of data is the *Marine Fisheries Census 2010, West Bengal* which provides data across villages, blocks, and districts. Picking out the

data for the Sundarbans blocks and putting them together, we arrive at the following figures:

TABLE 1: Marine Fishers across the Sundarbans Blocks

	Fisher families	Traditional fisher families	Fisher population
In Sundarbans Blocks of North 24 Parganas	8384	6395	36438
In Sundarbans Blocks of South 24 Parganas	35345	23497	175768
Across the Sundarbans Blocks	43729	29892	212206

In addition the census provides the number of adult members who are involved in *actual fishing* or *collect fish seed*^{vii, 83}.

TABLE 2: The number of marine fishers in the Sundarbans

	Actual fishing		Fish seed collection				Total
	Full time	Part time	Full time		Part time		
			Male	Female	Male	Female	
N 24 Pgns	6495	2827	18	16	22	86	10634
S 24 Pgns	28730	8697	1862	2344	769	2551	44953
Sundarbans Total	35225	11524	1880	2360	791	2637	54417

Though useful, this data is limited to marine fishers. Large numbers of fishers in the Sundarbans blocks fish in the estuarine rivers and creeks, either in the STR area or in the general forested and non-forested areas. They have not come within this survey.⁸⁴

There is also a problem of certain villages with marine fishers not being covered in the census. For instance, Basanti block, with the rivers Matla and Bidya, both of which open out to the sea only some forty kilometres away from the southern reaches of the block, has a large fisher population. During

vii Here, the definitions, which the first volume (that on India) provides, are as follows:

Actual fishing: Adult male members in the family engaged in fishing activities full time or part time. **Fish seed collection:** Adult male/female members in the family involved in full time/part time fish seed collection

this study, a field visit to a major fishing settlement, Purandar, located on the Matla and Hogol was undertaken. Here, speaking to fishers, it was clear that there were many marine fishers in Purandar, and of course elsewhere in Basanti. Yet, Basanti is missing from the census list. Similarly, Canning-I and Gosaba have not made it to the list. It is difficult to believe that these blocks, home to large fishing communities, do not have populations associated with marine fishing, while Budge-I and II, situated relatively further away from the sea, have been counted.

How many of the marine fishers are artisanal fishers, employing small country boats, and traditional netting practice? Unfortunately, the census does not answer this question. It provides figures for “traditional fisherfolk” but it defines traditional fishers as those *who are fishers by birth and fishing is their traditional occupation*.⁸⁵ “Traditional occupation”, in this context, evidently denotes “ancestral occupation”. While this is an important categorization, it does not preclude the importance of knowing the number of people who fish using essentially traditional and artisanal methods. The survey provides information regarding number of crafts. However, both mechanized and country boats have different sizes, and often in boats of the same size the number of crew members varies across localities. Therefore, it is impossible to arrive at figures of fisher population involved in mechanized and non-mechanized fishing activity from the number of crafts.

Finally, the census assumes that marine fishers are all adult males; female involvement in the actual act of fishing is non-existent or insignificant and that women only engage in collecting fish seeds. To be fair to the census, marine fishing on boats is an overwhelmingly male affair. However, fishing in the sea is not confined to action from boats. Off the coast near Bakkhali, husbands and wives can be seen walking into the sea at ebb tide and stringing small *chhandi jal* (gillnets).

Assuming that the Marine Fisheries Census, notwithstanding some areas that it failed to cover, is correct in reporting on the areas that it has covered, which is most of the Sundarbans areas, then, the number of marine fishers in 2010, including those who collect seeds, would be more than 54,417. Similarly, the marine fisherfolk population would be more than 212,206. In order to get the actual total number of fishers (marine + inland), we must add the marine fisher population in Basanti, Canning-I, and Gosaba (and possibly elsewhere, that the survey has possibly missed) and the estuarine fisher population.

Inland fishing

An estimate of the number of boats used in artisanal inland fishing, which would have helped in estimating inland fisher population, is also unavailable. This is because the majority of country boats that artisanal fishers use are not registered with the fisheries department. Even the few that are registered often do not renew their licences, making it difficult to know whether the once registered boat is presently in operation. However, an educated guess can be made as to the total number of people in the SBR who:-

1. Have fishing⁸⁶ as a major occupation or at least one of their major occupations
2. Have fishing as a significant part-time occupation
3. Are engaged in scouring the rivers for *bagda* seeds and occasionally fish.

To fish in the tiger reserve, the State issues boat licence certificates (BLCs). Currently, in the STR, there are about 700 BLCs in use (actually slightly more, but the exact number is unclear). Therefore, we can take 700 as a base figure. Now, for every boat with appropriate BLC that enters the STR, there would be some five boats without BLC. Given the vast area of the STR (2585 sq km) and a perimeter of some 300 km or more,⁸⁷ it is impossible to ensure compliance. True, boats from afar might not enter deep into the STR, but they enter nonetheless. In addition, boats from Bangladesh enter the STR every day and indulge in both fishing and occasional robbery. Thus, there are at least 4,200 boats operating in the STR (700 with BLCs and some 3,500 without). With five persons per boat (the standard average for the STR), some 21,000 fishers operate in the STR. Incidentally, fishing community leaders, when asked, readily say that 20–25,000 fishers operate in the STR.

Outside the STR, the SBR has two components. The first is the reserved forest area of some 1,675 sq km. Here there are 3,700 boats with Reserved Forest BLCs (the BLCs for the Tiger Reserve are called Tiger BLCs). However, here the fishers are not that confident about the proportion of non-licensed boats to licensed ones. Moreover, many of these boats steal into the STR when they can. Hence, there is an issue of overlap. The other component is the area outside the reserved forest, which amounts to about 5,370 sq km. Therefore, if the number of fishers in the highly restricted area of the STR is 20,000 or more, then the number of inland fishers in the rest of the SBR is likely to be several times that much. Therefore, we might possibly be looking at a population of some 100,000 inland fishers fishing on a regular

basis in the entire SBR. Therefore, the total number of fishers (marine + inland) would be in the region of 1,50,000. The average family size in the Sundarbans area is 4.63.⁸⁸ However, we cannot multiply the number of fishers with 4.63 to get the number of people directly dependent on inland fishing, because the number of fishers would include couples. Hence, a multiplication of the above kind would involve double counting. Therefore, we cannot form a reasonable estimate of the total population directly dependent on fishing.

A study gives the following estimate of the number of people directly and indirectly dependent on fishing: “The livelihood of nearly 2 million people is linked with the non-agricultural sources, which mainly include fishing and allied activities from the rivers and creeks as one of the major sources of income.”⁸⁹ This, however, is a vague estimate, and no source of the information is cited. Another statement reads: “Millions of people are dependent on the Sundarbans ecosystem for their livelihood through fishing and the collection of honey, firewood, and timber.”⁹⁰ Once again, there is no indication of the source.

This, however, is not to say that the information is incorrect. That the poor and unemployed reach out for the natural resources and that the most important natural resource is fish are basic facts about the Sundarbans. This has been repeatedly observed.⁹¹

Falling back on Census 2011

While the population numbers for the rural blocks of the Sundarbans are available in the latest 2011 Census, there is nothing about fishers in the census categories.

TABLE 3: Rural Working Population of Sundarbans Blocks

Cultivator	Persons	Male	Female
Main	200,536	186,824	13,712
Marginal (3-6 months)	54,812	37,385	17,427
Marginal (0-3 months)	20,745	11,829	8,916
Agricultural Labourer	Persons	Male	Female
Main	320,361	292,574	27,787
Marginal (3-6 months)	264,682	183,293	81,389

Marginal (0-3 months)	99,293	57,338	41,955
Household Industry	Persons	Male	Female
Main	44,364	25,999	18,365
Marginal (3-6 months)	44,977	13,183	31,794
Marginal (0-3 months)	19,200	4,732	14,468
Other Work	Persons	Male	Female
Main	352,375	296,242	56,133
Marginal (3-6 months)	114,227	68,462	45,765
Marginal (0-3 months)	33,868	17,755	16,113

The Census does not include fishing under cultivation, agricultural labour, or household industry. Obviously, it comes under “other work”.

Regarding the Sundarbans, almost all observers tend to agree that fishing is *the* major occupation after agriculture. Based on the census figures for the “other work” category, we can make an estimate of the number of people involved in inland fisheries.^{viii} Marginal cultivators or agricultural labourers are not likely to possess boats; however, they work as crew. However, a net

viii Obviously, the situation is not the same for all blocks. Gosaba, visibly, has a considerably larger population engaged in fishing, than for example, Jayanagar-I. Therefore, taking a modest proportion, of say, 20 per cent, of those engaged in “other work” (as their main profession) to be fishers, would not be an overestimate. Since in “other work” (main), women are already a smaller proportion, about one-sixth of the total, there is no need to make any adjustment for the female figures. Indeed, in the Sundarbans area, women are far better represented in fishing than in cultivation. The total no. of persons employed in “other work” (main) is 352,375. Twenty per cent of that is 74,075. In the Sundarbans region, those who are marginal cultivators and agricultural labourers often try to make their ends meet by fishing. If they are unable to procure boats (a most likely event) or even nets, they join as crew. So by adding the household industry marginal workers to the reckoning, a total of 503,709 is obtained. Since fishing is not included in the marginal workers in “other work” category, the entire marginal worker population should be counted. This amounts to 651,804. Twenty per cent of which is 130,361. Therefore the total comes to 200,836. By deducting the marine fishers (estimated earlier) from this number, the number of inland fishers can be had. This figure would include full-time, part-time, and marginal fishers. It would be difficult to suggest a fishing-dependent population from this figure, as it would possibly include a considerable proportion of married couples. Therefore, a simple multiplication with average family size is not warranted. The total working population in the rural areas of the Sundarbans blocks is 1,569,440. We find that 41.53 per cent of this number, or 651,804 persons, are marginal workers. They take on any job they can get, which includes fishing, transport, construction, road repair, or any work provided under the National Rural Employment Guarantee Scheme (NREGS) of the Government of India. There is also migration out of West Bengal mainly from this stratum.

suffices; and even without a net one can join up with a team going out to fish. In addition, particularly for women, there is always the option of hitting the local creeks and channels with elementary gear for *bagda* seeds, shrimps, and crabs.

Thus, the entire community of rural poor, particularly those living close to rivers, creeks, canals, etc, are real or potential fishers, adding their numbers to those are fishers on a more regular basis. This provides a clue to the possible extent of stress.

CHAPTER V: THE RISE OF MODERN FOREST GOVERNANCE IN INDIA

Forest destruction during the colonial era

Forest destruction did not begin with the British rule. Population increase, the general expanse of agriculture through reclamation of forest lands, shifting cultivation practices, etc. led to loss of forests. However, all these proceeded gradually. The British, however, attacked timber on a scale that was unprecedented in Indian history. Extensive tracts of Indian forests were lost to provide timber for the ships that “ruled the waves” and, later, to provide for the ever expanding network of rails with wooden sleepers.⁹²

The demand for conservation

By the 1830s and 1840s, the idea gained ground in official circles that the long-term economic interests of the Empire would be hurt if the forests in India (and Burma) were not conserved. Influenced by scientific opinion in Europe, some British officials argued for forest conservation in terms of soil, climate, and other environmental concerns and even lobbied for support among scientists in Britain.⁹³ However, in general, the economic aspects of the forest, *i.e.* the latter’s value in terms of timber and other produce, tended to have greater appeal. Conservation was viewed in terms of *scientific management*, calling for personnel specially trained in botany, forestry, and silviculture. It was felt that neither the poor commoner nor the private capitalist could have the knowledge or the moral fibre necessary for conservation.

Ideally, private timber interests had to be prevented from having a say in forest governance. Community rights were also a nuisance, best discarded; but they might occasionally need to be recognized on grounds of political expediency. The best route towards pure scientific conservancy was through denying private parties (whether mercantile or communitarian) rights over the forests. This could be ensured by bringing the forests under absolute State ownership.

Forest legislation

This dictated the creation of a forest department dedicated to the conservation of forests^{ix}. Efforts towards that end began in the 1850s and

ix Cleghorn and Gibson had already worked in that direction. Brandis, who came to Burma in 1856 and entered the Indian forestry scene in 1862, was soon summoned to offer his expertise in

matured in the 1860s. By 1870, the basic framework for a forest service manned by scientifically trained personnel was in place.⁹⁴

Secondly, the reigning discourse dictated the enactment of a law that would ensure state-ownership of and control over forests. The first step in that direction was the Forest Act of 1865. It appeared, however, to lack the necessary teeth for keeping the forests out of the reach of private parties and communities. After a great deal of discussion and debate, a new forest law came into being—the Indian Forest Act of 1878.

The Indian Forest Act of 1878 was eminently successful. It asserted the colonial state's claim over the forests of India and the state's right to declare any piece of forest on government land as reserved forest and deny private persons (and communities, which, in this context, were seen as no more than collections of private persons) rights over that land and the flora, fauna, minerals and other resources therein, in whole or in part. (It is interesting that the Madras Presidency government refused to implement the Act because they felt that the Act denied traditional rights of the common people. However, their resistance did not ultimately succeed.)⁹⁵ The law of 1878, in essence and almost in all its details, was retained in its 1927 incarnation, which, in its turn, was retained by the independent Indian nation-state without substantial modifications.

The legal framework and the institutional structure (the imperial forest service) proved its worth by converting large tracts of natural forests and grasslands into reserved forests. This resulted in a tremendous rise in the government's income from the forests.

A great impetus to the working of forestry towards the maximum development of industries came from the setting up of the Forest Research Institute at Dehradun in 1906, which played a vital role in forest research in India. By far the most notable service performed by Indian forests was towards the war effort. By the end of the war, most of the utilizable larger Sal trees in the Himalayas “had been felled in all the more accessible areas. By felling in six years a volume that should have lasted fifteen to twenty years, or even longer, tremendous inroads were made into capital.”⁹⁶

While the imperial government benefited, tens of millions of peasants and all those who depended directly on the gross ecological produce were

creation of a properly equipped forest service. Brandis, aided by Cleghorn from 1864 to 1867, and with support from the highest echelons of the Indian government, organized the various provincial forest departments.

dispossessed and impoverished. No wonder, anger against colonial forest policy played a considerable role in anti-colonial movements in India.⁹⁷

This is not to deny the considerable and often historical achievements of colonial forest policy. (The same is true of national forest policy.) However, this was a policy that had no room for either popular needs or popular initiatives.

Forest Policy in Independent India

Colonial forestry practices had reduced the villagers and forest-dwellers to a miserable state and even led to severe damage of the Indian forests during World War II. Therefore, one might have expected that the Government of the 'sovereign democratic republic' of India⁹⁸ would recognise the unjust and undemocratic nature of colonial forest governance and set itself the task of making amends. This would seem to have been natural because the forest wrongs suffered by communities played a substantial role in the freedom movement.

Yet, that did not happen. The reasons for this are not far to seek, but shall not be explored in the present report. The National Forest Policy Resolution (1952)⁹⁹ of the Government of India opens with the bland assertion that 'the fundamental concepts underlying the existing policy (as enunciated in the colonial Resolution of 1894) still hold good.'

In its Report of 1976, the National Commission on Agriculture looked into the surviving rights of local population, called the '*Nistar* rights', to collect forest produce for domestic and agricultural purposes, and suggested that all unclassed and protected forests should be constituted into reserved forests at the earliest possible, in order that *nistar* rights could be extinguished as far as possible in the manner provided in the forest law.

The Commission further declared: Free supply of forest produce to the rural population and their rights and privileges has brought destruction to the forests and so it is necessary to reverse the process. The rural people have not contributed much towards the maintenance or regeneration of the forests. Having over-exploited the resources, they cannot in all fairness expect that somebody else will take the trouble of providing them forest produce free of charge.¹⁰⁰

Meanwhile, another major piece of legislation, which gave further strength to the conservation governance of Indian Forests, had been passed in 1972—the Wildlife Protection Act (WLP). This Act further stiffened the attitude of the elite and officialdom towards the commoner's use of the

forest. The Act, for example, in Section 5 (1) empowers the following officers with the power of search, entry, arrest, and detention:

- Director of Wildlife Preservation, Government of India.
- Any officer authorized by the Director of Wildlife Preservation.
- CWLW of the state.
- Any officer authorised by the CWLW (refer to the notification and order of the State Government).
- The Honorary Wildlife Warden, where the powers under Section 50 have been conferred in any state...on the person.
- Any Forest Officer: A Forest Officer is the person appointed under clause (2), section 2 of the Indian Forest Act, 1927 or under any other Act for the time being in force in a state. It is, therefore, important to refer to the respective state Forest Act, which defines a Forest Officer of the respective state.
- Police Officer of the rank of Sub-Inspector and above.

The bulk of the power was concentrated in forest officers. Thus, while ‘any’ forest officer could take action for an offence against the Act, only a police officer of the rank of sub-inspector and above is authorized to take action. The amendment in WLPA 2002 “broadened the definition of forest officer by including not only forest officer as defined in the Indian Forest Act, 1927, but also in any other law”.¹⁰¹

The Forest Rights Act (FRA)

The historical wrongs regarding use of forest resource did not go unchallenged. Both the colonial state and its successor post-colonial state were confronted by overt and covert resistance from communities living in and around forest areas. The historical wrongs inflicted on the common people, the bulk of whom belonged to the communities living in and around forests, were formally recognized only in 2006, in the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (hereafter FRA). It is important to note that the FRA recognizes that the rights of these communities include the responsibilities and authority for sustainable use, and conservation of biodiversity and seeks to address the long standing insecurity of tenurial and access rights of forest dwelling peoples including those who have been forcibly relocated by State development projects.

CHAPTER VI: MODERN FOREST GOVERNANCE AND THE SUNDARBANS

Conservancy: Bengal lags behind

Over a millennium, the forests of Bengal had gradually fallen in the face of population increase and the relentless advance of agriculture. However, the Sundarbans gave way before a reclamation drive that was different from earlier reclamation drives in that it was massively state-sponsored. While, in the 1840s and 1850s, forest officers in Madras and Bombay were considering conservancy and the government was becoming aware of forests as vital sources of revenue, the situation was quite different in Bengal, particularly with regard to the Sundarbans. Here, the predominant goal was reclamation and deriving revenue from agriculturally productive villages.

The first steps towards conservation

The importance of forest conservancy crept into Bengal in the early 1860s and decisively entered the picture with the appointment of Dr. Wilhelm Schlich as Conservator of Forests in 1872. The first definitive stroke of conservancy was played in 1875, when, on Schlich's advice, some stretches of *sundari* (*Heritiera fomes*) forests in Bagerhat and Khulna (both in present day Bangladesh) were declared reserved forests. Soon more forests were converted to reserves in Khulna and Satkhira (again, in present day Bangladesh).¹⁰² Reservation in what is now the Indian Sundarbans came much later.

However, after this first phase of activity, the foresters either did not press for reservation with sufficient enthusiasm, or found the government reluctant. Therefore, no further reservation was carried out in the Sundarbans for a long time.¹⁰³ The reasons for this lack of enthusiasm seem to be: first, the timber resources of the Sundarbans—trees like *sundari*, *posur*, *gawran*, *genwa*, *bain*—seemed to be less valuable in terms of national and international markets [which were more attracted to teak and *Sal* (*Shorea robusta*), timber that the Sundarbans did not have]; and, second, reclamation seemed to be inevitable in the face of Bengal's burgeoning population. Indeed, the second issue seems to have been decisive in notifying areas of the Sundarbans forest. We see that large tracts were placed under the 'protected forest' rather than 'reserved forest' category. As per the 1848 Act, the 'protected' category allowed caretaking by the forest

department, while setting up a far less restrictive regime and even allowing for population inroads into forest areas. Thus, Brandis wrote in 1879 (in connection with converting some 1925 sq miles of forest in 24 Parganas and Jessore into protected forests):

The land included within these protected forests will, under definite rules, *be available for the extension of cultivation*, but Government retains the control of the forest growth upon it, until it is actually cleared and brought under the plough. The same revenue will be paid upon the wood and timber exported from such lands as is paid upon the wood and timber exported from the remainder of the protected forests.¹⁰⁴ [Author's emphasis]

Reservation comes to the Namkhana and Basirhat ranges

So far as the Sundarbans in 24 Parganas is concerned, resolute efforts to conserve came late in the day, and lacked sufficient enthusiasm until the late 1920s.¹⁰⁵ As population increased, much of the original area was deforested. The Government excluded colonized areas in the Namkhana Range from protection and leased them out for the purpose of cultivation; and the boundaries of the remaining protected forests were fixed by notification no. 4457-For., dated 9 April 1926.¹⁰⁶

Soon the forest department felt that rigid control was necessary for the maintenance of the protected forests in the Basirhat sub-division of the 24 Parganas district (Basirhat Range). In the given legal environment and tradition of forestry, serious conservation could only proceed through reservation. Therefore, these were constituted into *reserved forests* under notification no. 15340, dated 9 August 1928. The boundaries of the remaining protected forests (Namkhana range) of the district, with the exclusion of the colonized area in the Mahisani Island, were refixed by notification no. 10523-For., dated 9 August 1929. Due to fresh colonization in the Mahisani and Patibania islands, a further exclusion was made from the abovementioned protected forest under notification nos. 1024-For., dated 20 August 1935 and 5174-For., dated 2 May 1939. The residual protected forests (Namkhana Range) were finally declared as *reserved forests* under notification no. 7737-For., dated 29 May 1943, with the result that the whole of the existing forest of the Division was reserved.¹⁰⁷

Information on forest management plans and their implementation can be had from Franklin Presler's article, *Forest Management in the Sundarbans*, and also the relevant section of Pranabes Sanyal's article on *Forest and Wildlife Management* in the Sundarbans.¹⁰⁸

The Shrinking of the Sundarbans

Given that the Sundarbans had given way before population pressure and reservation came rather late to the Sundarbans, it is little wonder that the forests continued to shrink during the colonial period.

The Sundarbans shrank dramatically. While exact figures on the extent of shrinkage are not available, one can arrive at a rough estimate. William Hunter, notes in the first volume of his *Statistical Account of Bengal* that, in 1873, the Commissioner of the Sundarbans had reported 7,532.5 sq miles as the extent of the Sundarbans, a figure which included cleared and more or less cultivated lands falling within the districts of 24 Parganas, Jessore, and Bakharganj.¹⁰⁹ Since the main process of settling and cultivating began in the early 19th century, this figure could be considered to denote the extent of forests at the beginning of the 19th century. Allowing for a margin of overestimation of, say, 15 per cent, a reasonable estimate of forested area at the beginning of the 19th century would be 6,550 sq miles, or almost 17,000 sq km. (Hussain & Acharya take a somewhat lesser figure, of 16,700 sq km).¹¹⁰ The Surveyor General in 1871 supposedly measured the actual forested area and found it to be 5,570 sq miles, i.e. 14,426 sq km. Therefore, at least 2,500 sq km of forests were lost between the beginning of the 19th century and 1871.

The process continued, though by the 1870s, the forces of conservancy had begun to operate, which resulted in reservations, creation of protected zones, and creating and trying to implement working plans. Nevertheless, the historical process reclamation and colonization could not be fully checked and Sundarbans forest went on shrinking. 10,217 sq km (5,955 sq km in Bangladesh and 4,262 sq km in India) is the usual figure that is quoted for the total extent of the Sundarbans forests today.¹¹¹ Thus, the total area of the Sundarbans forest is about three-fifth of what it was at the beginning of the colonial rule.

Indian Sundarbans—A history of governance up to Independence

TABLE 4: The Indian Sundarbans—Timeline of Forest Governance before 1947¹¹²

Year	Regime	Import	Legal Basis and other Comments
1875	Sundari Forests in the Bagerhat subdivision (494 sq miles or 1279 sq km) and in Khulna (382 sq miles or 989 sq km) were declared reserved forests.	An entire series of activities were prohibited or made subject to permission.	The Forest Act of 1865, the provision relating to <i>reserved</i> forests. Although the portion referred here came to belong to East Pakistan, rather than India, after 1947, its reservation is being mentioned because this was the first tract of Sundarbans to be declared as <i>reserved</i> .
1878	By Notification dated 7.12.1878, Section 28, the entire Sundarbans in the 24 Parganas district (consisting at that time of the Basirhat and Namkhana ranges) declared as Protected Forests.	Brought within the care and supervision of the forest department. However, reclamation/colonization not prohibited.	The Forest Act of 1878, the provision relating to <i>protected</i> forests.

1926	As population increased, much of the original area was subsequently deforested. It was excluded from protection and leased out by the Government for the purpose of cultivation; and the boundaries of the remaining protected forests were fixed by the notification no. 4457-For., dated 9 April, 1926.	Excluding already lost areas from nominal 'protection' was a means by which the Forest Department was defining and marking its estate.	Under provisions of the Forest Act, 1878, Section 29.
1928	The entire forest area of the Basirhat Range constituted into reserved forests by notification no. 10523-For. dated 9 August 1929.	An entire series of activities were prohibited or made subject to permission.	The Forest Act of 1878, the provision relating to <i>reserved</i> forests.
1929	The boundaries of the remaining protected forests (Namkhana range) of the district, with the exclusion of the colonized area in the Mahisani island, were refixed by the notification no. 10523-For., dated 9 August 1929.	Once again, excluding already lost areas from nominal 'protection' was a means by which the Forest Department was defining and marking its estate.	Under provisions of the Forest Act, 1878, Section 29.

1935 & 1939	Due to fresh colonization in the Mahisani and Patibania islands a further exclusion was made from the abovementioned protected forest under notification nos. 1024-For. dated 20 August 1935 and 5174-For. dated 2 May, 1939.	As above	Presumably, under provisions of the Forest Act, 1927.
1943	Finally, by notification no. 7737-For. dated 29 May 1943, the remaining protected forests (Namkhana Range) were declared as <i>reserved forests</i> .	It was clear to the Forest Department that the remaining forests in the Namkhana needed reservation for protection from colonization. With the entire remaining forests in the Namkhana range reserved, and the Basirhat range already reserved in 1928, the whole of Sundarbans in the 24 Parganas forest division, namely, the whole of the Sundarbans that would come under the independent Indian state, was reserved.	Under provisions of the Forest Act, 1927, pertaining to Reserved Forests.

After Independence in 1947, the Sundarbans was divided into two. The greater portion, almost two-third of the whole, went to East Pakistan. The rest remained in India, in the State named West Bengal. A working plan was developed for the period 1949–50 to 1958–59, and was called the

First Working Plan. It was a kind of continuation of the earlier Chaudhury Plan for the Indian Sundarbans.¹¹³ This was the regime of governance that operated in the Sundarbans prior to 1973. It seemed to have largely failed in protecting the Sundarbans and its resources. Something happened in 1973, which created a sea-change in Sundarbans governance.

The Sundarbans Tigers

Panthera tigris tigris has no natural preference for human flesh. Yet, on many occasions the tiger has attacked humans, not only due to some chance provocation but as targeted prey. Eastern India, particularly deltaic Bengal, stands out in that here tigers have preyed on humans with much greater frequency; creating the image of deltaic Bengal as an unsafe place of *jawle kumir dangay bagh*.¹¹⁴

A couple of hundred years ago, tigers were not confined to the halophytic jungles. Then large stretches of the Sundarbans freshwater swamps still existed and stretched from the upper reaches of the 24 Parganas and Jessore to Khulna and Bakharganj, and tigers roamed these forests. Their main target was of course the forest fauna. However, they complemented their diet with domesticated bovines and, occasionally, their human owners. There is no record of the frequency of predatory attacks on humans. However, oral tradition records predatory tiger attacks even in freshwater regions of Barisal, Jessore, and 24 Parganas. However, the tiger, though dreaded, was far from being as common a threat as venomous snakes. Thus, non-halophytic Bengal did not worship any deities concerned with tiger attacks (except for some *pirs* who were worshipped by those specifically venturing into the jungle). On the other hand, there was, and continues to be, an extremely important folk deity who protected against snakes. In the areas north of the halophytic Sundarbans, the tiger was feared, but was also respected, and often admired for its power and majesty. There was the notion that the tiger was a noble beast that bothered no one unnecessarily. Folk usage even occasionally referred to the tiger as *mama*, the maternal uncle, generally peaceful and gentlemanly, and only fearsome when roused.

The Sundarbans was, of course, a story of a different order. Few ventured there. Those who did, and increasingly more did with the British incentives to opening up these mangrove jungles, brought back plenty of tales of dreadful crocodiles and lethal tigers. Here, strangely enough for Bengal, the snake seemed to be less perilous.¹¹⁵ Deities became necessary, to protect the feeble humans in these perilous forests.

The rise of the Global Tiger

The tiger was fortunate to have for its spokesman the famous hunter—Jim Corbett. This hunter and nature-lover was also a gifted writer. He contributed immensely to giving the tiger a wonderful press. Soon, the tiger’s charisma surpassed that of any other animal.

It is in this situation that, in the 1960s, wildlife enthusiasts started expressing deep concern about the severe population decline among a large number of wildlife species, of which the tiger was indubitably the most charismatic. Tiger skins were traded openly all over the world. In 1969, the British-Indian animal-lover Anne Wright was horrified to see shelf-loads of tiger skin being sold in the Kolkata New Market. She reports that at that time Kolkata was the hub of wildlife trade and shops in the New Market provided abundant evidence of wide and unchecked poaching.¹¹⁶ Prodded on by the tiger enthusiast, Kailash Sankhala, the International Union for Conservation of Nature and Natural Resources (IUCN), in its 10th general assembly held in New Delhi in 1969, adopted a resolution “in view of the grave threat to the tiger populations”. This resolution (number 15) recommended a moratorium on the killing of tigers, and suitable steps to save them, which included stopping the illegal trade in tiger skins, and made a specific request to the Government of India, presumably because it was the country with the highest tiger population.¹¹⁷

Wright reported her horror at the trade based on the large-scale murder of tigers in her 1971 article, *Doom awaits tigers and leopards unless India acts swiftly*, published in the New York Times, creating a major impact.¹¹⁸ Soon after, the tiger census was conducted in India in 1972, and came up with a figure of 1827 for the whole of India. This came as a shock, and confirmed the apprehensions of people like Sankhala and Wright, for, an estimate suggested that the number of tigers in 1900 had been about 40,000.

In response to the IUCN’s recommendation and request, the Indian Board for Wildlife initiated action for protection and asked states to ban tiger hunting for five years. However, the international conservation community was not reassured. In 1972 Guy Mountfort, an influential trustee of the Worldwide Fund for Nature (WWF), met the (then) prime minister, Indira Gandhi, urging her to save the species from extinction. Gandhi set up a group of specialists to study the situation and create a plan. Chaired by Karan Singh, a keen conservationist, this task force submitted its report in August 1972. This is how the blueprint for India’s tiger conservation, the Project Tiger, as it came to be known, emerged. This train of events also led to the creation of the WLPA of 1972.¹¹⁹ The Act gave wide powers to

the State to protect flora and fauna both inside and outside forest areas and played a major role in biodiversity conservation. It also rode roughshod over people's rights, with no intention of involving the people in the process of conservation. Later amendments tried to correct these aspects of the Act.

Initially, Project Tiger was conceived for six years—April 1973 to March 1979. Its objective was “to ensure the maintenance of a viable population of the tiger in India and to preserve, for all times, such areas as part of our national heritage for the benefit, education and enjoyment of future generations”. After considerable deliberation, the task force decided to begin with eight viable reserves, representing different ecosystems where the tiger could be protected in perpetuity. The Sundarbans did not feature among the initial set of tiger reserves (TR). It was added, when the project was formally launched in 1973. The foreign advisors from IUCN suggested to the task force that “the best method of protection of the tiger was to have large areas of at least 2,000 sq km, with similar contiguous areas so that a viable population of about 300 tigers in each such area can be maintained”. The advisors also said that the “idea of continuous blocks of 2,000 sq km is to rotate such units by opening one of the units for periodic controlled shooting”.

When the Project Tiger was launched, it was no more than a wildlife management scheme focusing on the tiger. It had no legal teeth. The tiger reserves were given a protective cover by converting them into wildlife sanctuaries (WLS) or national parks (NP). Yet, such WLSs and NPs, whose legal basis was the WLPA 1972, were created in forests used by people either staying in them or in their vicinity. The restrictions associated with these protected areas caused tremendous suffering for these people, who, naturally, often became hostile to this manner of wildlife protection. This was recognized, albeit somewhat unsympathetically, in a 1983 report, which said about the attitude of these people that “In their precarious existence, enforcement of restriction in wildlife reserves triggers antagonism”. Later, in order to humanize the WLPA, it was amended several times from 1991 to 2003.

The amended WLPA required settlement of rights prior to notification of sanctuary or national park and stipulated that “Till rights were settled, the State had to make alternative arrangements for fuel, fodder and minor forest produce for people living in areas declared as a protected area (section 18a (2))”. However, all these proved to be no more than legislative good intentions.

As the 2005 Tiger Task Force^x report says, “What is shocking is that, till date, very few protected areas have completed the process of recording the rights of people, let alone completing the process of acquisition of those rights and compensating people who live there. The practice has been to turn all people living within protected areas into outsiders and illegal users of their own lands. In the name of conservation, what has been carried out is a completely illegal and unconstitutional land acquisition programme.” This explains the context of the FRA 2006. Indeed the last amendment to the WLPA (concerned with formalizing Tiger Reserves) sought to make such reserves more consonant with the rights of scheduled tribes and other forest dwellers, supposedly in the light of the FRA. This amendment came in 2006. Unfortunately, as we will have occasion to examine later in this chapter, the Sundarbans forests, both the Tiger Reserve and other forest areas, were kept out of bounds of the FRA.

x The Tiger Task Force was set up in 2005 response to the Sariska crisis, when it was realized that a so-called Tiger Reserve had lost all its tigers. This body was allotted the task of not only investigating the causes of this crisis but developing a comprehensive plan for conserving tigers, which would involve incentivizing the local communities towards helping in tiger conservation.

TABLE 5: The Indian Sundarbans—timeline of Governance from 1973

Year	Regime/ Governance/ Administrative event	Legal Basis and other Comments	Import/Relevant Details
1973	The STR is born via a Government Order, dated 23 December 1973, creating a core area and buffer area. ¹²⁰	The STR, its core and buffer were not legal entities as they were not declared as a WLS or NP. Whatever legal protection the STR enjoyed, derived from its being a part of a Reserve Forest. However, the STR, from its inception, was accompanied by a regime of restrictions, which marked it out from the rest of the Reserved Forest area.	STR - 2585 sq km, with a Core Area of 1330.1 sq km, covering Mayadwip, Chotohardi, Gosaba, Gona, Matla, Chamta (Compartments 4–8), and Bagmara (compartments 2–8) blocks. Of this, the included compartments of Chamta Block (124.40 sq km) defined as ‘primitive area’, to be strictly preserved. An additional area of 241.07 sq km, in Arbesi and Khetuajhuri blocks defined as subsidiary wilderness zone. The rest of the area to the east and north of the wilderness zone defined as <i>buffer zone</i> . ¹²¹ Of the total 2585 sq km of the STR, the land area is 1600 sq. km. and water area is over 985 sq km. ¹²² However these figures are subject to significant variation.

1976	The Sajnekhali WLS created within the STR, through notification no.5396-For, dt. 24.06.1976, covers the Pirkhali and Panchamukhani forest blocks and an area of 362.80 sq. km. This WLS was considered an integral component of the buffer zone. ¹²³	Sanctuary notified under WLPA, 1972, Section 18	No killing or removal of wildlife (including fish) and restrictions on entry. Grazing permitted, though this is of little significance in the Sundarbans.
	Haliday Island WLS, with area of 5.95 sq. km was created via Notification No.5388-For dt.24.06.1976. However, this is located outside the STR. ¹²⁴	As above	As above
	Lothian Island WLS, with area of 38 sq. km, was notified (final notification) via Notification No.5392-For, dt.28.06.1976. Also outside the STR. ¹²⁵	As above	As above
1977	The Core Area of the STR was made a WLS. ¹²⁶	As above	As above

1984	The Core Area of the STR was made a NP by Notification no. 2867-FOR, dt. 4 May 1984. ¹²⁷	NP notified under WLPA, 1972, Section 35.	Restrictions same as that of the WLS with the added prohibition on grazing.
1987	Sundarbans National Park designated as a UNESCO World Heritage Site ¹²⁸	Initially, designation based on natural properties criteria III and IV. ¹²⁹ Presently, designation retained on the basis of IX and X (based on new list of criteria). ¹³⁰	Official recognition of the site as heritage for humankind and, hence, deserving of global effort of preservation.
1991	The Costal Regulation Zone (CRZ) Notification (dated 19.02.91) issued by MoEF.	CRZ issued under the Environment Protection Act 1986 designated, in effect, large tracts of the Sundarbans as CRZ-I, zones worthy of utmost restriction.	Remains no more than a writ, with almost zero implementation.
2004	Conference of Parties (COP) 7 of the Convention on Biodiversity (CBD) introduces and formalizes the category of Marine and Coastal Protected Areas (MCPA) in February 2004.	All parties, including India, were bound by this international covenant. Hereafter, the Sundarbans NP came to be recognized as an MCPA. However, no special legal provision was created for MCPAs per se.	No special protection seems to have emerged from this categorization. The official protection of coastal, marine, and estuarine flora and fauna had begun prior to this categorization.

2007	<p>The Core Area or Critical Tiger Habitat of the STR established through notification no. 6028-For., dated 18.12.2007 under Section 38V of the WLPA. This area was to consist of the areas included in the previously declared STR, plus additional areas, resulting in the following cluster: Mayadwip (1-5), Chotohardi (1-3), Gosaba (1-4), Gona (1-3), Matla (1-4), Chamta (1-8), and Bagmara(1-8), Netidhopani (1-3), and Chandkhali(1-4).¹³¹</p>	<p>STR acquired a legal basis. For, WLPA, 2006 introduced certain sections, including the key section 38 V, which recognized the creation of TRs, which were accepted as including the Core or Critical Tiger Habitat areas and Buffer of peripheral areas.</p>	<p>At one stroke, the area of the core of the STR increased from 1330.1 sq km to 1699.62 sq km. However, the legal regime in different parts of the Core area varies. As the 'Status History' Column in Table 6 shows, the regime in the areas declared Core in 1973 is that of NP (under WLPA 1972), while that in the areas declared core in 2007 is that of Reserved Forest (under Indian Forest Act, 1927.)</p>
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2013	West Sundarban WLS declared by notification no. 1828-For., dated 11.09.2013. Situated in the South 24-Parganas, covering 556.45 sq. km., comprising of almost the whole of Dulibhasani block and the whole of Chulkati block is the largest WLS in the Sundarbans. ¹³² Situated outside the STR.	Under the WLPA, 1972, Section 18.	Stringent restriction on killing or removal of wildlife (including fish) and restriction to entry. However, grazing permitted.
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The STR regime and the Fishers

As per the fishers' testimony,¹³³ the year 1973 was a watershed. With the coming of the Project Tiger, the fishers gradually became aliens in the waters that for generations had been their second home. The new regime did not come about in a day. The basis was established in 1973. However, all aspects of implementation and enforcement took about a decade to fall into place.

A detailed narrative related to various aspects of the plight of the fishing community under the STR regime may be read with profit in the narratives by Chatterjee, and Patel and Rajagopalan.¹³⁴ All the BLCs, both within and outside the STR, were based on boat registration in the Reserved Forest area, a practice which goes back to the notification of the reserved forest in the Sundarbans (1928 and 1943). Apparently, the issuance of BLCs for fishing in the STR and in the reserved forest areas was decided on the basis of identifying the boats and the areas they fished in.¹³⁵

In a reserved forest area of 4262 sq km, some 2585 sq km, or about 61 per cent, has been made over to TR. Of the remaining 1677 sq km, only some 44 sq km (Lothian and Haliday WLS), was protected as sanctuaries under the WLPA until September 2013.

As seen above, the STR was the result of an administrative order, without any legal basis at its inception. It was only by converting areas of the STR into a NP and WLSs under the WLPA 1972 that the STR was accorded legal protection, over and above what accrued to it for being part of a Reserved Forest.

Table 6 provides the blocks and compartments of the entire STR from 1973 to the present. All 15 forest blocks of the STR are located within the South 24 Parganas district. The yellow and blue indicate areas that were declared as Core Area in 1973 and 2007 respectively. With the 2007 additions, the whole of Chamta and Bagmara Blocks became part of the Core. However, while the original Core was protected under WLPA 1972 as a NP, the newly added areas are Reserved Forests (RF).

Algebra of Exclusion

The basic STR equations are as follows:

- (1) $STR = CORE + BUFFER$ and
- (2) $BUFFER = WLS + EXPLOITABLE AREA$

From (1) we get

- (3) $BUFFER = STR - CORE$

From (2) we get

- (4) $EXPLOITABLE AREA = BUFFER - WLS$

Now, applying equation (3) to equation (4) we get

- (5) $EXPLOITABLE AREA = (STR - CORE) - WLS$

However, $EXPLOITABLE AREA = LAND AREA + WATER AREA$

Therefore,

- (6) $EXPLOITABLE AREA FOR FISHING = EXPLOITABLE AREA - ITS LAND AREA$

TABLE 6: Sundarban Tiger Reserve¹³⁶

Sl. NO.	Block/P.S	Forest Block	Compart-ment	Area (in acre)	Area (in hectare)	Status History	Protection Regime
1	Hingalganj	Matla	1-4.	43564.61	17630	Core in 1973	NP
2	Hingalganj	Chamta	1-3.	23801.15	9632	Core in 2007	RF
			4-8.	30732.45	12437	Core in 1973	NP
3	Hingalganj	Chotahardi	1-3.	43408.94	17567	Core in 1973	NP
4	Hingalganj	Gosaba	1-4.	42435.34	17173	Core in 1973	NP
5	Hingalganj	Gona	1-3.	34355.01	13903	Core in 1973	NP
6	Hingalganj	Bagmara	1	6004.65	2430	Core in 2007	RF
			2-8.	66626.92	26963	Core in 1973	NP
7	Gosaba	Mayadwip	1-5.	67548.62	27336	Core in 1973	NP
8	Gosaba	Netidhopani	1-3.	22980.77	9300	Core in 2007	RF
9	Gosaba	Chandkhali	1-4.	38526.14	15591	Core in 2007	RF
10	Gosaba	Pancha-mukhani	1-5.	43653.57	17666	WLS in 1976	WLS
11	Gosaba	Pirkhali	1-7.	45902.22	18576	WLS in 1976	WLS
12	Hingalganj	Arbesi	1-5.	37172.01	15043	General ¹³⁷ Buffer	RF
13	Hingalganj	Jhilia	1-6.	30428.51	12314	General Buffer	RF
14	Hingalganj	Khatuajhuri	1-3.	32719.17	13241	General Buffer	RF
15	Hingalganj	Harinbhanga	1-3.	28879.16	11687	General Buffer	RF
	Total Area			638739.24	258489		

By the mid-1980s, all three WLSs had been formally in place under the WLPA 1972. Of the 1,677 sq km of forests outside the STR, only some 44 sq km, under Haliday and Lothian WLSs, was out of bounds for fishing. The remaining area was treated as Reserved Forest; open for fishing. It was mostly business as usual, similar to the situation before 1973. BLCs were issued to fishers, who after taking the necessary permits and paying the fee for firewood, could carry on fishing in the Reserved Forest Area outside the WLSs. The main casualty of the new regime was the livelihood of the fishers fishing in the zone that became the STR. A quick look at the figures in the table and Map 4 reveals:

- A. The area of the STR is equal to 2584.89 sq km (usually written as 2585 sq km). Of this, about 1600 sq km is land area and the rest, 985 sq km, is water area.¹³⁸ [The respective areas would vary with the tidal level. These figures are expected to reflect the situation at mid-tide.]
- B. The first Management Plan demarcated the STR into the *Wilderness Zone* or *Core Area* comprising an area of 1330.089 sq km, usually written as 1330.10 sq km. Here, no “forestry operation”, including fishing, honey, shell, and *golpata* collection was permitted.¹³⁹
- C. The remaining area, in the north and east of the Core Area, was designated as *Buffer Zone*. The area of the Buffer was 1254.9 sq km. All “forestry operations”, including woodcutting, fishing, and honey, wax, shell, and *golpata* collection were permitted.¹⁴⁰
- D. After the formalization of Sajnekhali Bird Sanctuary and the Core Area as WLSs in 1976 and 1977 respectively, the area in the STR off limits for fishing was equal to the area of the Sajnekhali plus the Core Area, which amounted to 1692.51 sq km. Therefore, the area within the STR available for fishing was about 892.38 sq km. This amounted to 34.52 per cent, about one-third of the total STR. These figures include the land areas. Actual water areas are lower. Now, the water area of the STR is about 38.104 per cent of its total area. If we assume that the proportion of water to land in the fishing-permitted zone is the same as the STR average, then the actual water area available to fishers would be about 340 sq km.
- E. In December 2007, the Core Area expanded with a leap, acquiring the expanse of 1699.6 sq km (written as 1700 sq km in the general references). This was a 28 per cent increase, at one go.

The permit¹⁴¹

A fisher having a BLC and a seasonal pass for fishing in the STR has to get a fishing permit before fishing in the STR. This permit is usually issued for 42 days on payment of the cost / charges for firewood to be consumed on the fishing trip and has the following information inscribed on it—

- i. Name and addresses of the crew members accompanying the holder of BLC on the boat.
- ii. Life insurance policy number of the fisher
- iii. Description and number of fishing gears and other equipment carried with the boat.
- iv. Amount and cost of the firewood taken on the boat by the holder of BLC from STR authorities.

While some 3,700 licences had been issued for an area covering 1,633 sq km (1,677 minus 44) of the non-STR reserved forest, only some 923 seem to have been issued for less than half the area, the 892.38 sq km of fishing-permitted area within STR.¹⁴² 923 seems to be far less than the actual number of boats that must have been going into the STR then. However, there is no way of corroborating this, since records of that period, except for the BLC lists, do not appear to be available.¹⁴³

The estimates of the number of fishers in the Sundarbans area discussed earlier indicate that the above number is much lower than what is required at present. Of the 914 BLCs that are traceable, some two hundred odd are inactive (on account of non-renewal due to death, change of profession, etc.), so the number of active BLCs is a little more than 700.

However, there is another aspect of the matter. Many BLCs today are held by people who do not fish, evidently because many who were fishers at that time moved away from the profession. Yet, there was no process of transferring these to other legitimate fishers without BLCs. Many of the latter, consequently, are forced to borrow these BLCs on rent at exorbitant rates of Rs. 30,000/- or more annually. The practice is illegal, for the BLCs are non-transferable and may only be mutated in favour of blood-related kin and / or to genuine fishermen. The foresters know this. However, they tend to close their eyes to this practice because they know the deeply flawed nature of BLC-ownership. The fisher, on the other hand, in order to afford the BLC-rent, is forced to borrow from the usurer at high rates of interest,

or take advance from the *aratdar* (wholesaler), who then acquires substantial claim on the catch. The system, thus, is gravely unjust and prepares the ground for exploitation.

However, given the inadequate number of the BLCs, large numbers are forced to fish in the STR without any BLC to show. Usually, it is not easy to catch such fishers, who develop the basic survival ability to evade forest patrol boats. If caught, however, they suffer great harassment. Their boats and nets are seized; they are physically assaulted and deeply humiliated. They suffer everything silently and try to get away with paying a bribe, if they have the necessary wherewithal, hoping for better luck the next time around.

Successful evasion of the forest patrol may just be a case of jumping from the frying pan into the fire. As soon as the fisher learns that a patrol boat is coming his way, he desperately tries to escape. Usually, the best way is to push the boat into a narrow creek heavily shaded with mangrove. Yet, that is precisely where he places himself at the mercy of the tiger. According to fishers, most fisher deaths in the recent past have occurred due to the fisher's desperate attempts to escape the forest patrol.¹⁴⁴

The forest administration also comes down heavily on the fisher with a BLC, if he is found fishing in or passing through the Core Area or the Sajnekhali WLS. Before going into this in detail, one would need to examine the expansion of the Core—now described as the “Core or Critical Tiger Habitat of Sunderban Tiger Reserve”.¹⁴⁵ The expansion of the ‘Core and Critical Tiger Habitat’ of the STR not only justifies the expansion, it ostensibly serves the purpose of legitimizing the Tiger Reserve. For, it is based on Section 38V of the WLPA 1972, an amendment belonging to the cluster of insertions to the WLPA 1972 introduced through the Wildlife Protection Amendment Act 2006, the sole purpose of which is to provide Tiger Reserves with a legal foundation.

The story of the expansion of the Core seems to have begun more than a decade ago. The earliest reference seems to be in the *Integrated Coastal Zone Management Plan for West Bengal*, published in December 2001, which suggests with respect to the various management zones in the STR:

Classification of area into core zone and categories of buffer zone:

The proposed core area will comprise the following blocks: Chamta, Netidhopani, Matla, Chhoto Hardi, Goashaba, Mayadwip, Gona, Bagmara, Chandkhali, comprising an area of 1699.50 sq.km. This area will be free from all exploitation activities. Within core area Chamta 4, 5, 6, 7 and

8 compartments over an area of 113 sq.km area will be treated as primitive area. This area is the central island of the Reserve, free from external disturbances since long. The buffer zone of 885.27 sq.km is to be divided into a “Recuperation zone” of “Sajnakhali Wild Life Sanctuary” over 362.33 sq.km. and a “multiple use zone” of 522.94 sq.km.¹⁴⁶

This (see Table 6) is exactly the Core or Critical Tiger Habitat of STR declared in the notification of 18 December 2007. Since the chapter in which the passage occurs has been written by a noted forester and Sundarbans forest expert, Pranabes Sanyal, one assumes that this proposed zone demarcation was done on the basis of necessary scientific study pertaining to the needs of tiger conservation. Yet, the chapter does not refer to any such study, though Section 38V of the WLPA, on which this demarcation depends, requires such habitat to be established not by mere fiat, but “on the basis of scientific and objective criteria”. Whether such “scientific and objective criteria”, an expanded “core or critical tiger habitat” has been established in the Sundarbans.

Now fishers are not allowed to fish in the core area and the sanctuary area. So the area in which the fishers may fish now amounts to:

STR Area - (Present Core or Critical Tiger Habitat + Sajnekhali WLS)

Or $2585 - (1700 + 362) = 523$ sq km (in round numbers).

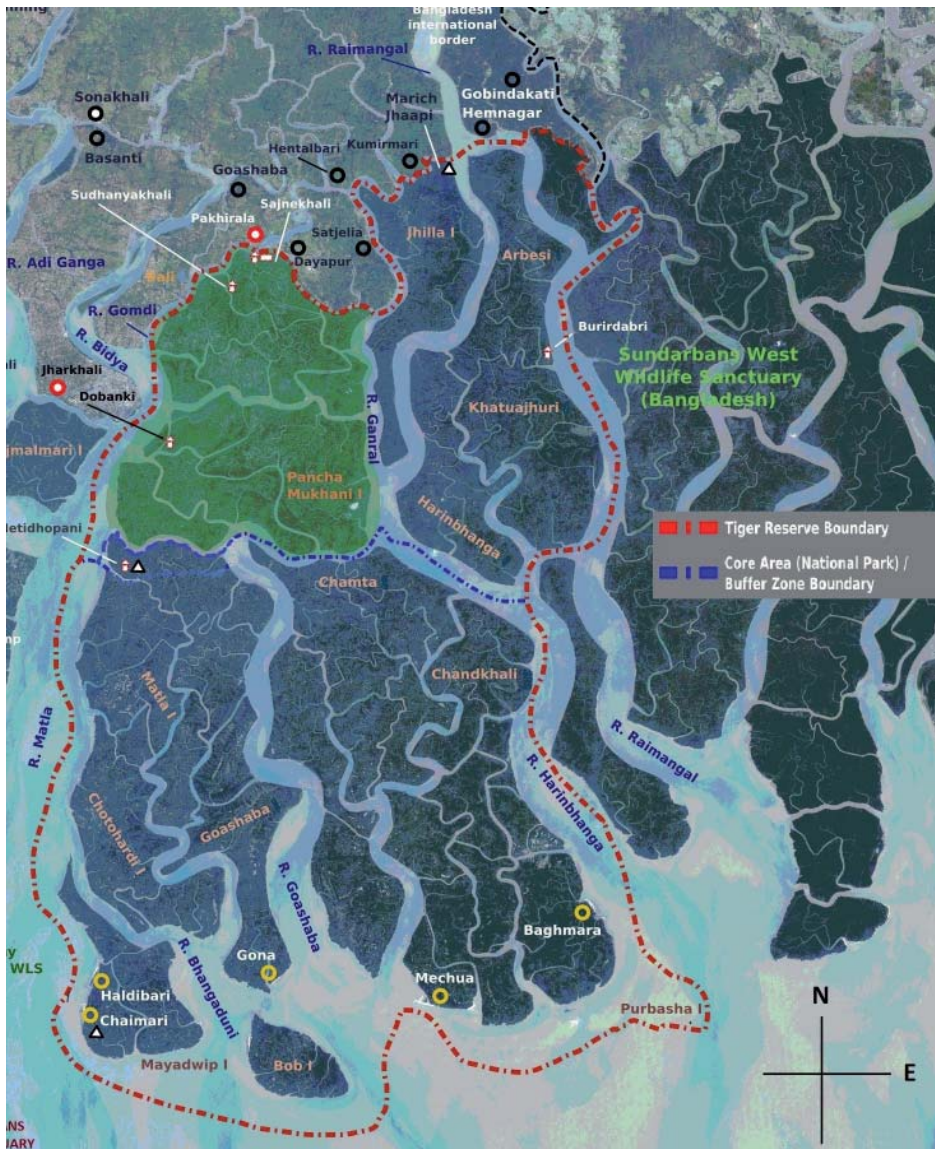
Once again, applying the proportion of water to land for the whole STR to this stretch, fishers have some 200 sq km of water area available to them for fishing. Actually, a look at the map reveals that the buffer, located in the northern portion of the STR, has less water area than the core, which is located in the south, where the rivers open out as they proceed to the sea. Thus, while the actual number of fishers has increased, the fishing area has radically shrunk.

In addition to not being allowed to fish, fishers are not even allowed to enter these areas. The fishers need to enter these areas for two reasons, first, they need to pass through these areas from one permitted fishing point in the STR to another; second they might need to enter a creek in a core area or sanctuary to seek shelter from storms. There is no law that actually prevents them from going into the core or sanctuary areas on the above grounds, and, indeed any such law would be *ultra vires*, given the fundamental right to life enshrined in the Constitution.

A look at Map 5 shows that the portion of the buffer open to fishing lies in the north-east portion of the STR (north of the deep blue dotted line and east of the Sajnekhali WLS [green patch] and is confined to Jhilia, Arbesi,

Khatuajhuri, and Haribhanga forest blocks. The major difficulties are that placing the whole of the fishing permitted zone in one geographical locale causes problems for the fishing community, large sections of whom reside far away from this area; also, large chunks of the fishing-permitted zone are located precariously close to the Bangladesh border, causing the fishers to be subjected to piracy at the hands of river-pirates from Bangladesh.

Map 5: The STR



The other problem is that the forest administration does not allow innocent passage through the core, although this is expressly allowed under the WLPA, at least for fishing boats without mechanized means of propulsion. If a fisher from the Jharkhali area (east of the Sajnekhali WLS) or further south wishes to go to the fishing permitted zone near Harinbhanga, the simplest route would be through the Sajnekhali WLS and/or the core area. Since the forest officials do not allow this, he would have to skirt the Sajnekhali WLS along Bidya and Gomdi on its west and north. Having arrived at River Ganral, he would row down. Or if the forest guards prevent his movement towards south, he would continue northwards and follow the circuitous route of bypassing Jhilia. The southward route runs along a river that skirts Sajnekhali, yet the forest guards often stop fishers from using it, as many fishers have borne testimony. Yet there is nothing in the law that prevents anyone from merely passing through any forest area.

What about fishers elsewhere, for example those in Satjelia and Gosaba, closer to the buffer areas of Jhilia and Arbesi? They do frequent these areas. However, many fishers in the Gosaba-Satjelia area tend to aim for the southern margin of the Harinbhanga forest block, which is close to Chamta and Chandkhali forest blocks and has substantially better fish yield. In fact, Chandkhali, and some other southern areas close to Harinbhanga belonged to the buffer only some six years ago. Thus, fishers have a natural inclination of approaching close to their earlier haunts. At present, the buffer area south of Harinbhanga forest block is precariously narrow, with the Bangladesh border to the east and the core area to the south. Now, with the Core area forest blocks Chamta, Chandkhali, and Baghmara reaching to the Bangladesh border, the Harinbhanga river mouth has become inaccessible to the fishers. For many fishers, violation is now a precondition of survival.

Of fines and other afflictions

Over time, the incidence of fines seems to have been on the increase. This seems to be the case particularly after the expansion of the core. This is borne out by Chatterjee's 2009 and Patel and Rajagopalan's 2011 studies.¹⁴⁷ Here it must be borne in mind that

Fine, to an ordinary fisher, is money confiscated. It may or may not be taken against proper receipt. Even when receipted, the money taken is not indicated as 'fine' but as 'compensation'.¹⁴⁸

Fishers in two widely separated places (Amlameti in Gosaba and Canning) reported fine amounts of Rs. 8,000–10,000, annually.¹⁴⁹ Besides fines/compensations, which are monetary exactions, the foresters may also

confiscate fish catch, boats, nets, fishing permits, BLCs,¹⁵⁰ and “punish” the fishers by throwing away drinking water and the ice kept for preserving fish.

Then, there are fines imposed for imaginary violations. For example, a fisher reported that when they were fishing in the river using a *berjal* (Drag Shore Seine) they were apprehended by a forest patrol boat. The officer said that the fishers were not allowed to use this method of fishing, although it has been in use for long and there are no orders or notifications to this effect. Yet, the officer went ahead and fined them.¹⁵¹

However, what fishers tend to resent the most is humiliation—coming in the form of abusive language and physical assaults. The fishers report that offensive attitude and behaviour has been on the increase over the last 15–20 years.

Yet, not every forest official or forest guard misbehaves; some are polite, even courteous, and try not to make the fisher’s life more difficult than it already is. Unfortunately, such officers are few and far between.

Prohibitions notwithstanding

It is a fact that fishers cannot make even their humble ends meet by fishing purely in the buffer areas. This is because even taking the total number of fishers in the STR as just 20,000, the water area available per fisher in the buffer zone would be 100 sq m. This is no more than a square of side measuring some 10m. In addition, some parts of the fishing-permitted zone are substantially less productive and some parts of the buffer are vulnerable to river piracy causing the fishers to avoid these areas. Further, the border patrol and forest officers discourage close approach to the border. Given the situation, the fishers are compelled to invade the core areas. They say that they were less likely to do so if they were allowed to fish at least in the area that is a recent (December 2007) acquisition to the Core.

FRA in the Sundarbans?

The FRA 2006 empowers scheduled tribes and other traditional forest dwellers with a wide range of forest rights. These include:

- right of ownership, access to collect, use and dispose of minor forest produce which has been traditionally collected within or outside village boundaries;
- other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant)

and traditional seasonal resource access of nomadic or pastoralist communities.¹⁵²

Subsequently, the Ministry of Tribal Affairs (MoTA), the nodal ministry for the FRA, issued a notification containing the following clarification:

2. This Ministry has received references from certain States seeking clarification about the implications of the phrase “primarily reside in and who depend on the forests or forest lands for *bona fide* livelihood needs” appearing in sections 2(c) and 2(o) of the Act as to whether this would cover the Scheduled Tribes and other traditional forest dwellers who are not necessarily living inside the forests but are depending on the forests or forest lands for their *bona fide* livelihood needs. This issue was also raised in the meetings of the Secretaries of Tribal Welfare / Development Departments of the States on the implementation of the Act held on 18th–19th February, 2008 and 16th May, 2008 in New Delhi.

3. The matter has been examined in consultation with the Ministry of Law & Justice and it is clarified that the implication of using the word “primarily” is to include the STs and other traditional forest dwellers who have either habitation or patches of land for self-cultivation for livelihood and would, therefore, be primarily spending most of their time either in temporary makeshift structures or working on patches of land in such areas irrespective of whether their dwelling houses are outside the forest or forest land. *Therefore, such Scheduled Tribes and other traditional forest dwellers who are not necessarily residing inside the forest but are depending on the forest for their bona fide livelihood needs would be covered under the definition of “forest dwelling Scheduled Tribes” and “other traditional forest dwellers” as given in sections 2(c) and 2(o) of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.*¹⁵³ [Emphasis added]

The above would appear to place the rights of fishers on a secure footing. Nevertheless, the FRA 2006 has not been implemented in the Sundarbans. However, this report will abstain from further analysis of this issue.

The Foresters' Views—Report of two conversations

The author met Mr. Pradeep Shukla, Director, SBR on 20.12.2013 and discussed a number of issues regarding the protection regime in the Sundarbans. The discussion naturally included the problems faced by the fishers.

Mr. Shukla ruled out the application of the FRA in the Sundarbans because Sundarbans “has no forest dwellers” (without apparent awareness of or notwithstanding the MoTA clarification cited above). However, he admitted that law did not prohibit ‘innocent passage’ through protected areas. Yet, when asked why the forest officers and guards prevented fishers from passing through protected areas, he denied that they did. That, of course, ended the conversation at that point. Mr. Shukla also agreed that most of those who owned BLCs were not fishers. He said that the department was open to the idea of substituting the BLCs with registrations for genuine fishers and permits to them to enter the forest. However, he also said that he did not know how much time that was going to take nor was he sure whether the number of permits could be increased to accommodate the large number of genuine fishers who were forced to fish in the STR without any licence or permit.¹⁵⁴

The other person with whom discussions were held, on 25.10.13 and 16.12.13, on various issues related to the Sundarbans was Dr. Pranabes Sanyal, former Director, SBR, and a noted authority on the subject. Dr. Sanyal seemed to be aware that forest officials often prevented fishers from passing through protected areas. He agreed that such practice had no legal foundation. He cited one incident where forest guards were preventing fishers from passing through the Sajnekhali WLS, when his intervention settled the matter in the fishers’ favour. He also disapproved of the attitude of viewing the fishers as ‘problems’ and ‘enemies’. He felt that the present administration must be more sensitive to people’s needs. He felt that the fishers, at least the great majority of them, were appreciative of the need of protecting the forest. He felt that the fishers should be made integral components of forest administration—on the principle of “participatory governance” that had yielded such excellent results elsewhere.

Fishers fishing in the non-STR Sundarbans Forest Areas

The study has concentrated on the STR, as it is here that the forest administration appears in all its power and regulatory might, and the problems of the fishers are greatest. However, the fishers outside the STR are also troubled by forest officials. All fishers fishing in the reserved forest areas outside the STR are required to use boats with “forest BLCs”. Like the “Tiger” BLCs, these also need to be renewed each year. In addition all fishers in the estuarine and coastal tracts of the SBR are required to get their boat registered under the Fisheries Directorate, through the Assistant Director of Fisheries (Marine) office situated at Diamond Harbour. This applies to fishers inside and outside the STR.

In addition to registering their boats, the fishers are also required to procure a fishing licence. Unlike boat registration, which is a permanent thing, the fishing licence must be renewed every year. Further, fishers must always carry a logbook in their boat, whenever they go out to fish. Whenever a group of fishers go out on a fishing trip, they must make entries in the logbook, recording the date and time of journey, the name and number of fishers in the team, the amount of fuel oil, the water and ice being carried, etc. On return, they must record the details of the itinerary, the number of fishers who have returned, etc. Since most fishers are hardly literate, fishing union activists take charge of making these entries. Once in a week or two, the logbook must be taken to the local Fisheries Extension Officer (FEO) for official scrutiny and recording.

Although registration for the small-scale fishers (artisanal) is free, most fishers do not know this and think that registration and licence renewals entail large fees. This has led to large number of vessels being unregistered.

On interviewing the fishers at Purandar and Dakkhin Chandanpiri, it was learnt that the forest administration no longer renews BLCs and had stopped issuing permits for fishing since 2009.¹⁵⁵ Fishers, therefore, were fishing without permits. Fishers at Kultali also reported non-renewal of BLCs. The forest department guards and officials do not necessarily prevent the fishers without non-renewed BLCs or permits from fishing but ask for such documents as registration, annual licence, or logbook. Those without them are subjected to questioning. Fishers in the L-plot area, in particular, reported increasing altercation with the forest officials and guards. Fishers from this area have been fishing in the Thakuran River in the vicinity of the West Sundarbans WLS that was notified in 2013. However, the fishers knew nothing of the notification.

The non-STR forest area open for fishing is:

Total Reserved forest Area – STR area, that is $4262 - 2585 = 1677$ sq km

With the coming of the West Sundarbans WLS, the total forest area under the Sanctuaries in the non-STR amounts to $556.45 + 43.95 = 600.4$ sq km.

Therefore, legally speaking, only 1077 sq km of non-STR forest area remains open to fishing.

Administering the SBR

After 1947, the Indian Sundarbans Delta fell entirely within West Bengal. The West Bengal government, burdened in the initial decades with severe economic and political problems, accentuated by the massive influx of migrants from East Pakistan (now Bangladesh), failed to attend to the specific requirements of the Sundarbans region. Awareness of the specificities emerged in the early 1970s leading to certain developments. These are summarized as follows:

1. 1973—the Formation of the SDB

Through a Calcutta Gazette Notification, dated the 7th of March 1973, the Sundarban Development Board (SDB) was formed to take care of the region covered by the police-stations of Kakdwip, Namkhana, Sagar, Pathar Pratima, Mathurapur, Joynagar, Kultali, Canning, Basanti, Gosaba, Haroa, Minakhan, Sandeshkhali, Hasnabad, and Hingalganj.¹⁵⁶ The entire area under the Dampier-Hodges Line was brought under the SDB. While the Project Tiger was to help in taking care of the forest and the wildlife, the SDB was created to take care of the developmental and other human needs in the Sundarbans area.¹⁵⁷ The SDB was set up under the Development and Planning Department of the State of West Bengal.¹⁵⁸

2. 1989—Notification as a Biosphere Reserve

The Government of India notified the area south of the Dampier-Hodges Line as a Biosphere Reserve (BR), through Notification No. 16/6/84-CSC dated 29 March 1989.¹⁵⁹ The SBR was set up under India's National Biosphere Programme, launched in 1986, which, in turn, was launched under UNESCO's Man and Biosphere (MAB) Programme, initiated in 1972. This region is bounded in the following manner: the Hooghly River in the east, the Dampier-Hodges Line in the North, the India-Bangladesh border in the west, and the Bay of Bengal in the south. The SBR is divided into three

zones: i) Core zone—National Park and Notified Tiger Reserve; ii) Buffer zone—the WLSs, the Reserve Forest, and part of South 24 Parganas Forest Division; iii) Transition Zone: the civic areas of the North 24 Parganas and South 24 Parganas (i.e. those outside the Forest Division).¹⁶⁰ However, the distinct legal basis of the BR remains unclear. Hence, the legal basis for its governance, in so far there is any SBR governance per se, rests on the WLPA, the forest laws and notifications, and the entire panoply of environmental laws.

3. 1994—the creation of the Sundarban Affairs Department

In 1994, the West Bengal Government formed a separate Sundarban Affairs Department. The SDB was brought under this department.

4. 1995—formation of the Inter-Ministerial Committee

In 1995, an inter-ministerial committee on the Sundarbans was formed, named the Policy and Planning Committee, with MIC Development and Planning as chairperson. The committee includes the MICs of the Departments of Sundarban Affairs, Finance, Transport, Tourism, Fishery, Public Works, Health and Family Welfare, Forest, Public Health, Engineering, Power, Agriculture, and Irrigation and Waterways. It also includes the *Sabbadhipati* of North and South 24 Parganas *Zilla Parishads*, and the District Magistrates of North and South 24 Parganas. The Secretary of Sundarban Affairs is Member-Secretary of the Committee. The creation of the committee implied that the State-Government recognized that the Sundarbans area, i.e. the area between the Dampier-Hodges Line and Bay of Bengal, called for multi-pronged and inter-departmental management.

5. 2001—the formal global recognition of the Biosphere Reserve

In 2001, the UNESCO included the SBR area in the global network of Biosphere Reserves under its MAB programme, clearing the way for international support and funding.¹⁶¹

Joint Forest Management (JFM)

In the 1990s, the World Bank-funded Joint Forest Management (JFM) project came to the Sundarbans. Pranabes Sanyal explained in his interview that the joint forest management was initiated in 1995 in Sundarbans.¹⁶² Forest Protection Committees (FPC) were formed with local participation to

manage a dedicated forest area with the technical and minor financial inputs from the Government. They are allowed to harvest the non timber forest produce (NTFP) like honey, medicinal plants, fruits etc. The major forest produce is harvested at the end of the felling cycle and 25 per cent of usufructs are distributed to the FPCs.

In case of management of Sanctuaries and National Parks, the dedicated forest area is managed by Eco-Development Committees (EDC). In case of EDCs no usufruct of major forest produce is allowed. Alternate employment is arranged in lieu of participation. Till 1998 10 FPCs and 12 EDCs consisting of 10,000 families have been formed in the STR and 21 FPCs consisting of 8300 families in 24 Parganas Forest Division.

Taking the average family size to be 5.68 (the 2001 average across Sundarbans blocks) we get the number of beneficiaries of JFM in the Sundarbans to be 103,944. The total rural population across the Sundarbans blocks in 2001 was 3,752,292. However, only people residing close to the forests would have been able to take advantage of the EDCs and FPCs. Given that we have not worked out the total population of the villages adjoining the forests (a minor research project in its own right), it is impossible to assess what percentage of this population have been covered under EDCs and FPCs.

The present official JFM numbers for the Sundarbans would appear to be as follows:¹⁶³

TABLE 7: EDCs and FBCs in the SBR

Name of P.A./	Number of EDC	Number of FPC	Total (EDC + FPC)	Number of EDC members	Number of FPC members	Total members (EDC + FPC)
Sundarban Tiger Reserve	14	11	25	4483	4065	8548
24-Parganas (South)	0	40	40	0	24664	24664

Unfortunately, at present, all the above are no more than numbers. For, many villagers report that most EDCs and FPCs are not really functional. Some even accuse the forest department of using the JFM schemes to create a constituency of support among the villages, resulting in the creation of a section of villagers who act as supporters and informants of the forest

department. There are also serious accusations that these committees are not created democratically, through village elections, but are handpicked by forest officials.

A fundamental problem is that the SBR has been unable to command a specific set of policies with legal teeth that can address the economic, social, and environmental problems of the SBR and develop a sustainable environmental policy for it. There have been recommendations.¹⁶⁴ Very few of the good ones have been implemented. As Prof. Amalesh Choudhury commented,¹⁶⁵ the SDB, responsible for the welfare of some 4.4 million people and a region of specific and often unique environmental-economic requirements, mostly concentrates on building of roads and related infrastructure.

Thus, in the end (and after decades of endless discussions, analysis, and promises) there is no realistic policy framework for addressing the multiple, yet intrinsically linked issues of ecological degradation, overpopulation, forest protection, pollution, tourism, livelihood, people's rights, and participatory management, let alone a comprehensive programme of climate change and disaster management.

CHAPTER VII: FISHING COMMUNITY IN THE SUNDARBANS—BELIEFS AND KNOWLEDGE AS MEANS OF COPING

Living and Knowing

The grand saga of settling the Sundarbans has been told to an extent. The difficulties of living in the *bhatir desh*, and ways of coping have also been told, if not in histories, then in accounts of individuals, as in Shibsankar Mitra's *Shundorboner Arjan Sardar*, or in fictional narratives, which often serve better than formal histories in capturing lives and times. Yet, one major area at least remains inadequately explored, that of local traditional knowledge.

Local knowledge is largely locality-dependent. The longer a community has been staying in an area, the deeper its store of knowledge is likely to be. Communities inhabiting an environment down countless generations develop intimate knowledge of the terrain, plants, animals, insects, wind patterns, birds, and so on. One must remember, however, that people who live in natural surroundings do not automatically learn things about their surroundings that naturalists would consider important. Rather, they tend to learn things that they consider important and useful.

Yet, we know of no community living in what we call the Sundarbans for more than 200 years. In fact, most humans who live now in the Indian Sundarbans area would seem to have settled during the last one hundred years. That is not much time, if we consider cultural continuity in the subcontinent as a whole. Therefore, the Sundarbans' culture is young. The antiquity of occasional archaeological findings in the Sundarbans can be deceiving. There seems nothing in the present Sundarbans culture that can relate to those antiquities in terms of anything beyond co-location.

However, the Sundarbans has been a harsh and intolerant mistress. Her demands on her subjects have brooked neither reluctance nor delay. The subjects have had to learn her ways and wiles on the pain of extinction or immense hardship. Thus, only a few generations have had to learn what, perhaps, in milder circumstances, would have required several more. Hence, there exists a corpus of Sundarbans-specific knowledge.

Belief¹⁶⁶

This is one area that has attracted substantial interest.¹⁶⁷ There is a good reason for this. Like all culture-areas, religious belief in Bengal has uniformities and variations. By the late 18th century, all regions of Bengal had a broadly common set of deities. A locality would often have a deity of its own, but there would be an effort either to declare the deity as the local manifestation of a major deity or relate it to one such deity. Only the so-called *adivasi*^{xi} peoples had belief matrices that were distinct and resisted ‘Hinduization’.

However, the Sundarbans area produced a set of deities¹⁶⁸ that were distinct. The most prominent among them are *Bonbibi*, *Dakkhin Ray*, *Shah Jangoli*, *Kalu Ray*, *Barakhan Gazi*, and *Narayani*. Of these, the most famous are *Bonbibi* (the superhuman and immensely powerful matriarch of the forest and protector of humans) and *Dakkhin Ray* (superhuman personification of the power embodied in the tiger). The tales associated with these deities have been so widely told as to make repetition unnecessary. However, some features of these deities, their mode of worship, and their constituency, would be relevant to our concerns:

1. These deities do not reside in heaven. It is not always clear where they reside, but the idea seems to be that they are somewhere in the Sundarbans.
2. These beings are superhuman rather than divine. For divinity, besides its other aspects, is a matter of divine kinship—of being related to other gods and goddesses. Not only are the Sundarbans deities unrelated to other deities in the usual Hindu pantheon, they are, or were, humans who acquired miraculous powers through their practice of magic or holiness / divine grace. Note also that *Bonbibi* and *Shah Jangoli* are clearly of Muslim pedigree; so is *Barakhan Gazi*; and Islam does not encourage the idea of gods and goddesses in addition to the omnipotent only God.
3. These beings are manifestations of power—to protect, destroy, or prohibit—rather than of sacredness. This is not to say that these beings are not considered sacred; rather, this is to suggest that one usually worships these deities to seek protection and success and not spiritual elevation.

xi <http://en.wikipedia.org/wiki/Adivasi>

4. The worship of these deities does not require the presence of priests; any believer can worship them.
5. Though shrines have been constructed to these deities, their worship does not necessitate shrines; they may be, and often are, worshipped in the open air.
6. Their worship is conspicuously trans-communal; anyone can worship them.

The deities specific to the Sundarbans, i.e. *Bonbibi* et al., have been of special importance to those who go into the forest—mainly the fishers (for they go into the forest most and stay the longest) and also honey-collectors (many of whom are also fishers). It is for them the specific terrors of the forest—the tiger, the crocodile, the unpredictable storms, etc.—hold special meaning. Thus, it is they who hold the Sundarbans deities in special regard as sources of protection. The settled areas in the Sundarbans pay more importance to the conventional deities—e.g., *Kali*, *Shitala*, *Manasa*, *Shiva*, and *Radhagovinda*. Similar to many other Bengal districts, *Shitala* and *Manasa* seem to enjoy particular regard—the first is the goddess of a host of nasty diseases, including smallpox, and the second is the goddess of snakes. The fishers in both the forested and non-forested areas of the SBR often also worship *Ganga* (who, for them, is the deity personifying the rivers and the sea) and the five *pirs* (*panch pir*).

What the forest-goer needed was protection from a whole spectrum of natural hazards. His religion, thus, concentrates on the science and art of procuring this protection—calling out to and propitiating the deities who would render this service. The religion, hence, is extremely practical, with little scope for spirituality or mysticism.

Yet, although one worships *Bonbibi* not for spiritual transcendence but for the protection she provides, her worship has aspects that might be seen to verge on the spiritual. *Bonbibi* not only protects the forest-goer; as the lady of the forest, she is the protector of the forest and its inhabitants. Thus, if one going into the forest wishes to earn the lady's protection, he must not harm the forest and its dwellers. The fisher, of course, must kill. However, he is allowed only to kill fish, and not harm the forest in any way. Moreover, attached to the upholding of non-violence is the idea of eschewing greed of any kind and espousing equality. This state of mind is held to be pure, and purity of mind and that of the body is the essential prerequisite for *Bonbibi*'s protection.¹⁶⁹ All this might be seen as promoting a regimen of practical spirituality. Perhaps this is the reason that the traditional fishers in

the STR, continuously confronted by injustice from the forest department, do not show the militancy that rural Bengal has often shown.

The cult of *Shakti* dominates Bengal. Hence, one is not surprised that the forest-goers of the Sundarbans found themselves a protecting mother. What one could find surprising is that one did not consider *Kali*, *Tara*, or *Durga*, or some such manifestation of the Supreme *Shakti*, adequate for the role. The primary explanation seems to be that the Muslims who came into the Sundarbans found a completely new deity, without any Hindu connections, more acceptable. In fact, this explains providing the matriarch with Islamic parentage and connections,¹⁷⁰ perhaps in a somewhat later period of her evolution as a deity. It is surprising that the Muslims accepted a mother-goddess at all and one who was offered a Hindu manner of ritual offering, a *puja*. The Hindus, in their turn, accepted *Bonbibi*'s Muslim parentage without flinching. Bengal, like other parts of India, has a rich tradition of syncretism. However, nowhere has syncretism achieved the union that the Sundarbans has succeeded in forcing on its subjects. This is not to say that there is not a subtext of communal tension in the Sundarbans religion. However, the syncretic fusion has largely succeeded in keeping it in check.

The basic facts above are well-recorded in published sources. However, during long talks, the Sundarbans fishers never referred to the religious element in their lives unless in response to a specific query, or, rarely, by way of passing reference. This could imply that the traditional ritual and beliefs are losing the centrality that they may have enjoyed sometime in the past.

At least one author has noticed some kind of erosion of belief, though with respect to the *gunins*—the local magicians.¹⁷¹ She reports that dependence seems to have declined. Her investigations reveal that the fishers feel that the *gunins* nowadays do not obey the rules carefully, which is why their powers have declined.

Annu Jalais, however, has noticed a transformation of beliefs. For example, she found the increasing popularity of *Kali*, in her violent and destructive aspects, among certain sections of the population who braved the wilderness—poachers and the women collecting prawn seed.¹⁷² Another aspect of local belief is the strong faith in Fate—*bhagyo* (literally one's *lot* in life). Amallesh Choudhury recounted how, when he would find fishers relaxing in a boat lying in a narrow creek in the Core Area, where they had also stayed throughout the night, and ask them how they dared, they would simply say that it was a matter of *bhagyo*; one would die in the jaws of a tiger or crocodile or live, depending on one's Fate. This is belief. However, it can

also function as a philosophical principle, encouraging both an attitude of courage and/or a detached view of things.

Belief and knowledge—making the distinction

This report has distinguished between knowledge and belief. However, in actual life, knowledge, techniques, and the so-called belief-system components are intimately, often inextricably, intertwined.

Knowledge

One could classify knowledge into three categories:

- i. Inborn instincts
- ii. Acquired skills
- iii. Knowledge that may be reported, described, codified and analysed through human language¹⁷³

This report shall be dealing mainly with the third category of knowledge, with some references to the second category.

Of herbs

The Sundarbans settlements grew up from scratch, often far away from whatever medical support that existed in rural Bengal. Large parts of the Sundarbans are still administered by quacks. The nearest medical centre is very often three to four hours travel and many settlements have been exposed to polio-vaccine, modern antibiotics, antihistamines, and anti-inflammatory drugs only in the last two decades, and even that imperfectly. Hence, the settlers have been forced to fall back on local resources.

Take, for example, the mangrove plant *Acanthus illicifolius*. It was known in traditional Ayurveda as *sabachara*, as a drug with multiple uses, ranging from skin disease to rheumatism.¹⁷⁴ In the Sundarbans, however, the leaves of the plant are used for treating tiger-bites.¹⁷⁵ Sanyal mentions other significant medicinal uses of local plants:

- Bark of *Rhizophora* is used to treat fractures
- Bark of *Bruguiera* is used to treat minor cuts
- Juice of *Sonneratia* is used to treat bleeding piles

- Latex of *Excoecaria agallocha* is used to treat skin rashes
- *Sonneratia* fruits help digestion.¹⁷⁶

Some plants of the genus *Sonneratia* would appear to have some interesting non-medical uses. *S. apetala*, locally known as *keora*, is a very common Sundarbans tree. Its ripe fruits have a sour taste and are often used to make a kind of chutney. Similarly, the fruit of *S. caseolaris*, locally known as *chak keora*, is cooked as a condiment or for preparing curries.¹⁷⁷

Sanyal, however, mentions some other traditional uses of local flora e.g.

- *Salicornia brachtiata* on burning produces soda ash
- *Aegialities rotundifolia* on burning produces high grade salt
- *Nypa* palm leaves for roofing and petioles for alcohol and fruits are edible
- *Achrosticum aurium* tender leaves are used as a vegetable.¹⁷⁸

Knowledge Specific to Fishing

Our main focus is on the traditional artisanal fishers in the SBR, i.e. those that use traditional country boats, either oar driven, or using one- or two-cylinder engines.

These artisanal fishers, like any other demographic group, may be classified in various ways. One such classification is between those who fish in the sea and those who fish in the estuarine rivers. Those who fish in the estuarine waters may, in their turn, be divided into three groups: those who fish in the STR; those who fish in the reserved forest, but not in the STR; and those who fish in rivers and creeks outside the forest areas.

In terms of knowledge and skill, there is some difference between those who fish in the sea and those who fish in the rivers. Among those who fish in the rivers, differences in skill are less well-defined and depend on a number of factors—for example, whether the fisher usually fishes in relatively untroubled areas or in areas particularly prone to tiger or crocodile attacks and other threats.

Of Mud and Slush

The first thing that the dweller of the archipelagic Sundarbans learns is to move on and through mud and slush. For the city dweller, this can be an unbelievably difficult and humiliating experience.

In the skill of easily walking the mud, the fisher is a past master. This is something that the fisher's child learns before she learns even to swim; to walk or slide down a muddy bank without losing balance. Before one learns to be impressed with the fisher's skill in timing the tide or casting the *bebundi* net, one is astonished by the casual ease with which he hops from one boat to another and then up the muddy bank, never breaking stride, never slipping, and avoiding the upturned mangrove root-ends just waiting to pierce the sole at a single misstep.

Of Tides and Times

The Lunar Day and Month

The lunar calendar is of importance in different societies and religions, possibly originating in the nomadic ancestry of various peoples. For example, the lunar calendar is important in Islam, possibly due to its desert-nomadic-mercantile background. This is also possibly the reason of the importance of the lunar month in ancient Vedic culture. The Rigveda clearly indicates the pastoral and nomadic/semi-nomadic character of its authors, who would naturally attach great importance to the waxing and waning of the moon.¹⁷⁹

Like the pastoral nomads, the moon could be of tremendous importance to the hunter-gatherers, particularly if they hunted or gathered in coastal or estuarine waters.

The moon's phases, its waxing and waning as counted through lunar days (*tithi*, as they are called in Bengali, and Sanskrit), determines the strength of the tide, which in turn determines the size of the harvest, other things remaining the same. The fisher, who looks forward to strong tidal action, keeps track of the *tithi*.

The Fisher's Life, through a lunar month

The lunar month, as per the Indian tradition, has two basic divisions—*Suklapaksha* (bright fortnight) and the *Krishnapaksha* (dark fortnight). The former is the period beginning from the new moon (*amavasya*) which continues until the moon waxes to a full-circle (*puṇnima*). The *Krishnapaksha* begins soon after this and during the *Krishnapaksha* the moon wanes until it disappears completely on the new moon day. Each of these fortnights (*paksha*) is divided into 15 lunar days. Therefore, a complete lunar month has 30 lunar days.

The first day of each *paksha* is the *pratipada*; the second day is *dvitiya*; the third day is *tritiya*; and so on until the 15th day, which is the *puṇnima* or

amavasya as the case may be. The length of the lunar month is 29.53 solar days. No wonder, a lunar day is not exactly 24 hours. However, what is less obvious is that it could vary from 19 to 26 hours. As to why this is so, we shall omit here. It is just important here to note that because of this there is no obvious way of knowing the lunar day exactly. Therefore, in determining a lunar day it is best to consult a *panjika* (almanac), which the fishers often do.

The artisanal fishers' concern with all this is on account of the fact that the strength of the tide is determined by the lunar day. They give the following names to different parts of each *paksba* (lunar fortnight), the names indicating tidal strength. The names are as follows:¹⁸⁰

TABLE 8: Fishing phases of the lunar month

Suklapaksha, bright fortnight	Krishnapaksha, dark fortnight	Nomenclature
1 st to 5th lunar day	1 st to 5th lunar day	<i>Gawnmukh</i>
6th to 9th lunar day	6th to 9th lunar day	<i>Marani</i>
14th lunar day to the 2 nd lunar day of the next <i>paksba</i> (<i>krishnapaksha</i>)	10th lunar day to the 3 rd lunar day of the next <i>paksba</i> (<i>suklapaksha</i>)	<i>Bawrogawn</i>

The point of these divisions is that during the *gawnmukh*, the tide is very strong. The rivers and creeks are full and the fisher expects very good catch, while during the *bawrogawn*, the tide is at its strongest, with expected consequences for catch. However, during the *marani* (literally 'dying') the tide is almost nominal. This is when the fisher takes a holiday or does other work. On the other hand, this is the time for the *bagda* seed collectors. The waters are calm and low, there is a little less chance of *kamot* or crocodile attack, while the seed catch is not affected by the weaker tidal pressure.

The difference between the two fortnights comes out in the case of the *bawrogawn*. The dark fortnight's tides are stronger and the powerful swells and the good period begin from the 10th onwards. However, nowadays, with the catch per unit effort having come down, fishers leave their homes on the 10th or 11th lunar day during *Suklapaksha* also.

All this is common knowledge to one who knows about Sundarbans fishing. Normally, fishers are preoccupied with fishing during *bawrogawn* and getting them to do something else is out of the question. However,

while trying to organize a workshop at L-Plot, we found the fishers insisting that they would have the workshop on the full-moon day (16 January), on which they would not be fishing. The reason was that they fished near the mouth of Thakuran and used gillnets of small mesh size (25–50 mm). Here, on the full-moon day (and also on the new moon day), the tide is so strong that their net of small mesh size, placed athwart the tidal current, would be irrevocably torn.

The need to time the tide

It is also important to know the time of the tide on a particular day. One major reason is of course the embankment-protected human existence in the islands. When the tide rises, it becomes clear how precariously poised the human habitations are in many of the islands. The river flows at a level higher than the embankment-protected land. No wonder people in the Sundarbans fear the combination of a cyclone and a spring tide^{xii}. The wind-driven tidal waters would scale the embankments or tear them asunder and spell the temporary death of the land, which would need at least three monsoons to get rid of the crop-killing salinity.¹⁸¹

Secondly, the main means of transport across most areas of the SBR, and particularly in the more southern islands, is across the water. Yet, due to increasing siltation, the watercourses, particularly the shallower ones, are often not navigable during ebb tide. In many of the creeks, navigation even for small boats is possible only when the tide is high. Thus, the time of the tide plays an essential role in the Sundarbans.

This is true for everyone who travels, but is particularly true of the fishers, who are dependent on the tide for two reasons, they need to take their boats out more than anyone else; and they need the tidal current for fishing.

Timing the tide—the general and the specific

Nowadays, of course, one can get the tide tables for the major stations on the internet. Many newspapers also publish daily tide predictions for specific locales. However, the time of the tide is absolutely locality-specific. It varies with longitude, with the distance from the sea, and various other factors.

xii Spring tide is the tide at or soon after the new or the full moon, when the difference between the high and low water is greatest. The situation is just opposite at *neap tide* (occurring during the first and third quarters of the moon), when the difference between high and low water is least.

Tides govern everyone's life over large tracts of the SBR and whole of the island of Sundarbans. This is not only along the coast, but across the entire estuarine landscape.

The term *tide*, in the technical sense, denotes the vertical movement of water (the swell or the reverse) caused by the gravitational effects of the sun and moon. Tidal current, however, denotes the horizontal movement of water—in seas, bays, and rivers, caused by the vertical movement of tides. The tidal current is said to be a **flood current** when it is coming from the sea to the shore. It is called **ebb current** when it is coming from the shore and returning to the sea (i.e. the tide is going out). The point between flood and ebb (or ebb and flood) currents, when there is no horizontal movement, is called the slack. The point where vertical changes stop as the tide reverses is known as the stand. This, i.e. the stand, is not the same as slack water; this is a tidal (vertical) occurrence, not a tidal current (horizontal) occurrence.¹⁸²

Further, it might help us to bear in mind the following:

The tidal swell on the sea at the river mouth initiates the process of a mass of water traveling up the river, as *tidal current*. It gradually travels to points higher up the river's course. This takes time. For, even in a bay or inlet, where the water is not flowing out to the sea, the water in the bay resists the *flood current* and the latter takes time to go further inland. In a river, where the water is flowing out to the sea and opposing the flood current in the process, the flood takes *still more time* to travel inwards, and points higher up in the river's course may experience high tide hours after it has been experienced at the river's mouth. Normally, the river is relatively sluggish at the mouth, and the tidal current overcomes the river's flow and pushes inwards. However, the strength of the river's flow varies—across rivers and across seasons. This and several factors, for example, the local geomorphology, the twists and turns in the river's course, whether there are other channels and flows that act on the tidal current, etc., contribute towards determining the time of the tide in a particular place. Hence, the tidal experience is eminently local. Thus, newspapers and radio programmes announcing tide forecasts for certain stations, for example Garden Reach, Sagar, or Diamond Harbour, might not be of use to persons in other locations, unless they know from experience how much to add or subtract from the announced time.

One fundamental thing needs to be borne in mind for the tidal phenomena of the SBR. Tides here are semi-diurnal—i.e., roughly speaking, there are two high tides and two low tides in 24 hours.¹⁸³ The following comments on tidal variations in the Indian Sundarbans estuary are also relevant:

In these intertidal deltaic zones, the tidal speed and tidal rise also fluctuates much depending upon the position of the delta, depth, width, curve and constriction of these river stretches or canals; these tidal speed also depend on freshwater supply and tidal phases or lunar phases. As such, the tidal thrust in the eastern part is less than the western part; these are due to the regular supply of the upstream flow in the eastern part. These tidal waves move from the west to the east and during the time of the high tide tidal thrusts are also variable from west to east, viz., the high tides on the mouth of the River Hooghly of India are 45 minutes advance than the Kutubdia Island and Passur river (Hiron Point) of Bangladesh...¹⁸⁴

How do the fishers time the onset of the tide? From experience. A look at tide tables, say for Garden Reach or Diamond Harbour, would indicate to anyone that the time of the High Tide and Low Tide follows the lunar days in a simple pattern. For example, if, in a particular place, the tidal swell attains its *stand* at 9 AM on a particular lunar day, e.g. the ninth lunar day (*navami*), then the tidal swell will attain its stand between 8:30 AM and 9:30 AM on the next *navami*, i.e. in the next fortnight. Thus, the fishers in a particular place can tell the approximate time of the tide simply from knowing which lunar day it is. Additionally, the fishers know that the time of the high or ebb retrogrades by (usually) half an hour to one hour every day, depending on the lunar day. These are the two basic rules of the thumb that the fisher follows.

The tidal current is important for two reasons. One, of course, is simply navigational. The fisher tries to use the ebb and flood flows in his favour. The second relates directly to fishing—to placing his net in the sea or the river. The net is placed athwart the tidal current. Therefore, it is tremendously convenient to do so at the point between the flood and the ebb, or the ebb and the flood, i.e. the slack period. In the case of the *behundi* net it becomes extremely difficult to put it in place when there is a current. Once they know the *tithi* (which, nowadays, they know from the *panjika* or almanac) the fishers can estimate the time of the slack, from their rough estimate of the local tidal high and low. Once they are on the water, of course, they can correct their estimate from their own observation of the state of the water. Hence fishers don't need to time the flood and ebb to the exact minute. They only need a rough idea.

The fishers, however, do not need the tidal slack *per se*—they only need water that is still or extremely sluggish—to fix the net. Here, the river's natural flow is of significance. Still water at a particular point in a river occurs when

the tidal current just offsets the opposing flow—whether that be the river’s natural flow or any flow generated by the wind. Therefore, the still water tends to be obtained not exactly at the tidal slack, when the tidal current ceases, but when its strength just offsets the river’s natural flow. This is some time before the flood current ceases. It is evident that this is achieved at different times for different rivers. All this would also apply to sea fishing—given the various currents in the sea.

The river fishers often fish close to their homes. This is true, for example, for some fishers at Dakkhin Chandanpiri, on the Saptamukhi River. These fishers often need to know, or be able to estimate, the time of the high and low tides on the river at one place or places relatively close to each other. However, many fishers fishing in the general forest areas and the STR, notwithstanding their use of non-motorized country boats, often travel to fishing sites 30 to 40 km away. Thus, they need to know or estimate the time of the tide for an entire range of possible fishing sites.

The above applies with greater frequency to the sea fishers. The large majority of the crafts that go out to the sea are motor-powered. Of these, those with single-cylinder engines do not venture beyond 15 km. However, the double-cylinder engines easily venture beyond 30 km. Both the categories, particularly the latter, avail of several fishing locales at various distances from the coast, with different tide times.

The Weather

Tides have their origin in the cosmic force of gravity, acting over astronomical distances. However, water currents are also caused by meteorological factors. Changes in weather may cause or be associated with changing wind-speed. The onset of gale might change the pattern of currents in the sea, causing a change in the pattern expected at a given time. Sea-fishers are particularly open to the possibility of meteorological change. The phrase *haawaa ghouré jawa* (the turning of the wind) expresses sudden change in weather.

Navigation

The aspects of navigation in the SBR are too varied to cover in depth here. However, it might be useful to record some basic features of navigation to which the *majhi*, or pilot of the artisanal fishing boat, resorts.

Finding the way

Finding the direction is not much of an issue in the rivers. Here, the fisher learns to identify the fishing locales and the routes. They learn to identify the various landmarks on the way, although these could be somewhat less reliable in the extremely mutable Sundarbans than elsewhere.

Finding direction becomes a real issue at sea, when one may lose sight of all landmarks after an hour ride in a single-cylinder engine country boat. Nowadays, all fishing boats going out to the sea, even those manned by the most illiterate fisher, use a compass. Nevertheless, as we found out from direct experience, the fisher is by no means wholly dependent on the compass.

On asking, we found them perfectly confident in locating the direction. The means they employ are as follows:

1. On a normal sunlit day, they have the sun to guide them; they are keenly aware of the annual north-south oscillation of the sun, which makes finding the direction easier. Nevertheless, once the sun has climbed nearer the zenith, determining the direction could get tricky, and this is when one needs to resort to other measures
2. Both in the day and night, one could refer to the sea-currents, including the tidal current
3. In the night, of course, the moon helps
4. During the evening and dawn on a moonless night, one depends on the Venus—as the morning and evening star; the boat navigators are aware of the *Saptarshi* (The Big Dipper) constellation. However, the constellation is visible only for a part of the year in the tropical latitudes. The fishers seem unaware of the Pole Star (this is not unnatural as it is not a very bright star, particularly in these latitudes)
5. On a cloudy day, in addition to observing the currents, they observe birds, which, at certain times, are known to fly in particular directions.

There is no denying that the wide use of compass has made a very important contribution to the sea fishers' navigational repertoire. There, finding direction is not equivalent to finding the way.

Reading the water and listening to it

The fisher reads a great deal in the water he fishes in. He can see the currents, eddies, and the possible areas of risk and danger. The fishers can detect the fish shoals by the change of the colour of the water.

As mentioned earlier, the Ganga-Brahmaputra delta is prograding because of the continuous barrage of silt. The Bengal fan, the underwater silt deposits, spreads outwards from the coast. No wonder, the waters of the coast of Bengal are full of underwater silt-banks. They are generally less problematic for the light dinghy. However, they can be dangerous for the slightly larger and heavier boats, particularly when loaded. How does the fisher detect an invisible bank? He does so by sight! The waters atop a bank exhibit a pattern of wave formation which is different from that of the surrounding water.

What happens when the navigator is navigating in the dark? He listens. Once again, the waves breaking atop a bank sound different from the waters further away. The navigator of the fishing boat or the experienced fisher notices most of the visible and audible signs without much conscious effort. He does so automatically and reflexively. This is where information and knowledge has become easy habit and skill. Often, he might be hard put to explain how he sensed a change in the current or the presence of a levee ahead.

The fishing trip off Sagar

The fishing trip off Sagar Island was on a 2-cylinder engine driven country boat. It carried a compass. However, it did not carry a GPS instrument (only trawlers and boats with 6-cylinder engines carry them),

We were returning in the evening. The general direction was due north. An hour and a half after sunset it became rather dark. It was the eleventh lunar day of the dark fortnight, so the moon wasn't available for illumination or guidance. During the day, the boat could make use of an occasional buoy for determining the position. However, this was not possible in almost pitch darkness. The phosphorescent wave crests and the dim stars glimmered but did not illuminate.

The navigator only looked at the compass once in every ten minutes or so. He also occasionally looked at his watch. I was lying on my back looking at the sky, mostly watching Cassiopeia, my favourite direction-finder. Time and again, I would see it rotating through an angle, indicating that the navigator had changed direction. An hour and a half later, we saw the lights of Sagar Island ahead of us. How did the navigator, Sheikh Suleman's uncle, find his way?

Finding the way was not only about following the compass in a certain direction. For, the boat could not afford to travel in a straight line. As we have seen, the coastal waters off the Bengal coast are populated with underwater silt-banks. One had to change direction occasionally. This could lead to losing the way, even with the compass, for the latter indicates only direction and not position.

Back to finding the way

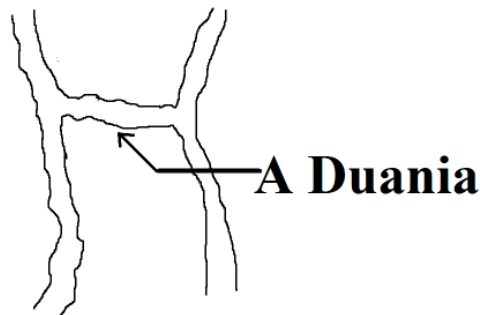
As the box above illustrates, finding the way for the artisanal fisher is a matter of estimating the position by the following means. Even in the dark the navigator knows in which direction he is going. He is aware of the speed of the boat (this is estimation, for there is no speedometer attached to the engine). Thus, timing his travel, he is able to estimate the distance covered, and, therefore, his position. When he has to change direction, he estimates the distance travelled in the new direction in the same way as before and makes suitable adjustments to correct his course in the aftermath. The silt-banks that make him change his direction, also act as location-indicators.

This manner of sensing the way in the pitch dark is astonishing and is the result of hard-earned experience.

In the Rivers

As mentioned earlier, in the Sundarbans rivers, locating the direction and finding the way is through landmarks. The main issues in navigating this silt-laden archipelagic network of waterways would seem to be knowledge of times of tides and tidal currents at various points in the riparian network so as to take advantage of them in reaching one's desired point; and knowledge of which creeks are navigable to what extent when the tide is in ebb, so as to avoid getting stuck.

The tidal currents in the Sundarbans are complicated by the fact that each channel is connected with more than one channel. Therefore, often a channel experiences tidal currents flowing in from two points in their flow. This occurs particularly in the case of the *duania* or *duno*, which is a channel connecting two major streams.



If both these streams have coinciding tide times then the tidal current could be entering the *duania* from both ends. This would lead to the tidal current in the *duania* to be either extremely sluggish or even still. Thus, one who is riding a tidal current into the *duania*, would find himself pulling harder at his oars to proceed. Conversely, one could use the differing tide times at two ends of the *duania* to enter riding a flood current and exit utilizing the ebb current. All these are of particular importance to fishers using non-motorized crafts, which is a sizeable section of Sundarbans fishers fishing in the forest areas as well as all those fishing in the STR.

Netting the fish

In the techniques described by Hunter (cited in Chapter III), the one employing otters is definitely the most striking¹⁸⁵. This technique, however, is not used in the Indian Sundarbans. Hunter tells us that he has provided the above account based on Westland's District account of Jessore (which is now in Bangladesh). In fact, the coastal (Sundarbans) tracts of Jessore later became two independent districts—Satkhira and Khulna. This method is still employed in the districts of Khulna and Narail (in the Khulna division) in Bangladesh.¹⁸⁶ The other techniques that Hunter describes are the same or are similar to the techniques employed in the Indian Sundarbans. In what follows, I present a very brief account of the nets used in the Sundarbans area (forest, non-forest estuarine waters, and the sea-coast).

The main fishing nets used in the Indian Sundarbans are:¹⁸⁷

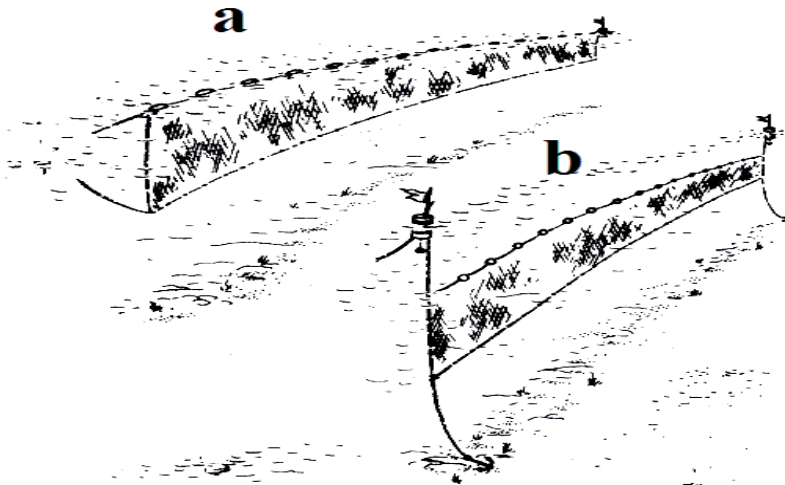
1. *Galsba* or *Gaysha* (term used in STR area); also called *Cbhandi* (in the western parts of the Indian Sundarbans) [Gillnet]
2. *Beonti*, *Beundi*, or *Behundi* [Fixed Bagnet]
3. *Berjal* (Drag Shore Seine)
4. *Chawrpata* and *Khalpata* [Shore stake nets and Channel stake nets]
5. *Khyapla* or *khyaola* [throw net]

What follows is a brief depiction of the nets. Information on *chawrpata*, *khalpata*, and *berjal*, are mainly from Chatterjee's account,¹⁸⁸ supplemented with field data.

The Nets

Gillnets, fixed athwart the flow of the water, can be placed so as to drift with the current (floating gillnet) or kept anchored (fixed gillnet). [a and b in the diagram below.]

Gillnet¹⁸⁹



The *galsha* or the gillnet dominates in the STR area. The fishers there reported that gillnet accounted for about 60 per cent of the major net use, while other nets made up the remaining 40 per cent. The gillnet was introduced in the Sundarbans area and the sea coast in the early 1970s and are used to catch a wide variety of fish, depending on the mesh size. The earlier ones were made of chord net. Now, however, the transition to monofilament nets is underway. The fixed ones may extend to a hundred metres more and the floating ones to a few thousand metres (the really long ones are used in the sea). The mesh size is usually between 12 and 25 cm. However, smaller and larger mesh sizes are by no means unknown.

The *behundi*, or the bagnet, is an old fishing gear in Bengal. It is used not only in the Indian Sundarbans, but also in Bangladesh Sundarbans and by the coastal fishers operating on the Purba Medinipur coast. In the western parts of the Indian Sundarbans, the *behundi* is exceedingly important. While there is not sufficient data for a statistical breakup, it can be said that the *behundi* dominates artisanal fishing in the Saptamukhi River and in sea-fishing off the Sagar coast. Towards the east, the gillnet acquires increasing prominence. It

plays a substantial role in the fishing in G-Plot and L-Plot, both on the Thakuran River and in sea-fishing. The idea is to place the net in such a manner so that the mouth of the bag is athwart the current, which sweep the fish into the bag. The fisher tries to have the net in place during still water, when it is easiest to put it in place, either at the beginning of the flood or the ebb. Bamboo sticks are used to open the mouth; once the current starts flowing into the bag, the pressure on the sticks causes the maw to open at its full.

The *berjaal* (Drag Shore Seine) is the oldest kind of net used in Sundarban, according to the fishers. The net length varies from 4-5 metres to hundreds of metres and about 4-7 metres in width. The mesh size is 10-15 mm. Two ends of the net are anchored at a distance on the river embankment. For small nets, people get into the water and pull the net (having sinkers and floaters) deeper into the water, so as to form a kind of semi-circle with the inner curve towards the bank. Then, once the net is considered to be in place, it is gradually pulled to the bank. For, the longer nets, boats are used to get the net in place. Earlier, the nets used were not so long. The advent of monofilament nets and scarcity of catch has caused the lengthening.

Chawrpata and Khalpata (Shore stake nets and channel stake nets) are also old varieties of nets that are commonly used to take advantage of huge tidal water level variation in the Indian Sundarbans. The *chawrpata* is placed on the river bed close to the embankment. It is lowered at the beginning of the ebb current. Just before the ebb current begins, when the water is still, the net is raised, thereby catching the fish going out with the receding water. The *khalpata* is placed at the mouth of a channel or creek. These nets are lowered just before the flood current comes from the river into the channel. Once the current ceases and the channel is as full as it is going to get, the net is raised. After some time, the water flows out with the ebb current. Due to the immense tidal variation in the Sundarbans, particularly in the Indian side, the creeks are depleted at ebb. The fish, who have failed to go out with the ebb current, due to the net at the river mouth are now stuck in the very little water and can be caught with relative ease. Both the *chawrpata* and *khalpata* nets can easily extend to hundreds of metres. The mesh size usually varies from 20 to 40mm. However, in many places, nets with smaller mesh size are used either singly or in combination with nets with larger mesh size.

The *Khyapla* or *khyaola* (throw net) is used at the individual level. Hunter has described the basic technique in the 1870s and it remains unchanged: "On narrow shelving banks a round net is sometimes used. The fisherman

goes along the bank, watching till he sees a place where some fish are lying. He then throws the net in such a manner, that before touching the water it has spread out into large circle. The edges of the net are heavily weighted with lead, and falling on all sides of the fish, imprison them.”

The fisher does not always throw the net from the bank. He often throws it while standing in the water. Large numbers of women, fishing in the canals and creeks near their homes, use this net. There seem to be two ways in which this net is thrown. In some areas the fisher throws it from the head level, often rotating it a bit to ensure a further and wider cast. In other areas, they throw it from the waist level.

Of boats and their making

‘Dinghy’ is now an English word. It originates from the Bengali (also Hindi, occasionally Urdu) *dingi*. The Bengali term *dinga*, stands for a slender country boat. The *dingi* usually denotes a smaller version of the *dinga*.

In the Sundarbans, the *jete dingi* or fisher’s boat is made out of local timber. This is the craft that the traditional fisher uses, whether for inland-fishing or sea-fishing. Those fishing in the STR cannot use motors. However, those outside the STR nowadays try to procure a small single-cylinder engine if they can afford it. The craftsmen¹⁹⁰ are usually local, although there is a tradition of procuring boats from the famous boat-making hub at Balagarh, in Nadia.

Khirish (*Albizia saman*) is by no means a mangrove, but a tree that is common enough in South Bengal, including the Sundarbans area. Its wood is durable, easily workable, and of middling density (0.6 gm/cm³). It is considered to be a reasonably good boat material. The boat ribs are made out of *babla* (*Vachellia nilotica*). It gives a wood that is very durable if water-seasoned, is very tough, and quite dense (relative density >1). The main problem afflicting the wooden boats in the Sundarbans rivers and, of course, in the sea is that saline water is hostile to most wood and to iron nails, screws etc. Moreover, the *nonapoka* in the saltwater bores through the wood and is highly destructive of boats in the long run. From the description of the *nonapoka* that we got, it could be one of the many varieties of marine wood borers. In fact, the fishers could be talking about more than one species. Unfortunately, time constraints did not permit further investigation in this area.

Boat-makers naturally had great fondness for the teak (*Tectona grandis*) or the *Sal* (*Shorea robusta*). However, teak was out of reckoning for making

country boats and even the *Sal* was too expensive for making common fishing boats (*it* was only used for making boats for the government departments). It was only a relatively well-off fisher who might, occasionally, be able to afford an *erap* (keel) made of *Sal*.

There seemed to be a consensus among experienced boatmen and fishers that certain mangrove species were ideal for boats sailing in a saline environment. We heard the names of a few species such as *Ail* (another name for *Posur*), *Bharani*, and *Chak keora*.¹⁹¹ However, age and experience seemed to vote in unison for the wood of the *Posur* tree (*Xylocarpus mekongensis*) as the best boat-making material they knew of. Boats made of *posur* timber were said to endure easily up to forty years, except for accident. Naskar and Mandal seem to concur with the opinion of boatmen and fishers when they write about *Posur* and two other black mangroves (*X. molluccensis* and *X. granatum*):

...timber of these species is fine-grained, hard and durable. These timbers are used for valuable household articles, furnitures (*sic!*) and boat building purposes.¹⁹²

However, mangrove timber was out of bounds. It was out of question in the STR, and in the non-STR areas large-sized mangrove trees that could produce suitable planks for boats have become relatively rare.¹⁹³ Large-sized *posur*, in any case, has become rare everywhere.¹⁹⁴

A description of Sundarbans' fishing techniques cannot be complete without mentioning crab catching, which is becoming more important by the day. Many fishers are taking to it on a more regular basis. A brief note follows.

There are essentially two methods of catching crabs. The major method, involving at least two persons, is with a long crabbing line on a river, with baits for crabs hanging from it. The line could stretch to almost a kilometre. The baits could be fish bones or dried cartilage. The technology is based on a basic feature of crab behaviour—to hold on to the bait and not let go. This allows the fisher (or crabber) to peel off the crabs and put them into pots.

The other method is rather individual. It involves getting the crab out of its home with a *shik*, a thin rod bent at one end.

Survival knowledge: Against kamot, kumir, bagh, and the forester

The fishers' knowledge of the terrain and experience comes in handy against the *kamot* (shark), *kumir* (croc), *bagh* (tiger) and the forester. The fisher is

most helpless against the *kamot*, which is not aiming for the whole body, but only for a limb, which it bites off and is away in an instant. The best that the fisher can do is trust his feelings and experience in avoiding waters where the possibility of attack could be greater. However, usually, it is not the boat-based fisher, but rather the river-wading *bagda meen* collector, who is most susceptible to *kamot* attacks. Fishers say that, nowadays, the *kamot* population seems to have declined considerably.

The fisher is relatively more prepared for the crocodile and the tiger. However, the fisher fishing in the reserved forest, in the STR or outside, is basically unarmed. He does not carry anything like a harpoon, and cannot carry a gun into these protected areas. For weapons, he can only use his oars, his pick-hammer for breaking the ice,¹⁹⁵ and his *dao* (curved hatchet used for cutting wood). Thus, his greatest resources are knowledge of the terrain, of animal behaviour, presence of mind, etc.

Crocodile attacks take place mostly when the fisher is in the water, in which he needs to get down for various reasons. However, the crocodile might attack when the fisher is still on land. The animal might be hiding behind a mangrove clump on the embankment. Whenever it chances to find its prey between itself and the water, it slides down the bank into the water, taking its prey with it. The experienced fisher is particularly alert when moving through such portions of the embankment. The fisher also avoids getting into the water at points which he feels might be sites of crocodile attacks. However, often the fisher has little option in such matters. The boat or the net might require him to get into the water precisely at that particular point.

Once the crocodile has its prey, then it becomes a battle for life. One good thing is that the Sundarbans fisher never works alone. There are at least two persons. Once a fisher has been dragged in, it is up to the partner(s) to aid the victim fight off the crocodile. The technique adopted depends on the depth of the water, the size of the crocodile, the experience of the partner, and indeed, the number of partners who can take the fight to the crocodile. The main effort is to make the crocodile feel that it is in trouble and must relinquish its prey. The other effort is to avoid the tail and prevent the crocodile from taking the victim into deep water. An effective, though extremely daring, technique is to strike where the crocodile is most vulnerable, its eyes.

The greatest peril for those who enter the forests is the tiger. The Sundarbans tiger is a very powerful animal (even in these days when it is suffering the

devastating physiological effects of increased salinity)^{xiii} and is a superb predator. It can silently stalk its prey, kill it without making a noise, and escape with the body of the victim often without the knowledge of others in the vicinity.

The best weapon that the fisher has is precaution. The ideal course of action would be to avoid all such situations that leave the fisher open to possible tiger attack. However, that is not an option. For, it is impossible to engage in risk-free fishing and honey collecting in the Sundarbans forests. For example, those working the *khalpata* and *chawrpata* nets and wading knee-deep in the river-mud are vulnerable to tiger attacks. Similarly, with the present method of honey collecting, it is not possible to have fool proof and risk-free situations.

The fisher and honey-collector's most powerful shield is alertness. The battle is half-won if one (the fishing team or individual) becomes aware that one is being stalked. Then it is possible to choose one's position and path with care. The fishers say that the tiger does not strike impulsively. Even when it is stalking a team, it targets only one individual and continues to seek a chance to pounce on him or her. The usual direction of attack is from behind and, reportedly, from the right hand side of the prey. Thus, when the team has become aware that it is being stalked, it can take suitable precautions. If eye contact with the tiger is established, it is important to do two things—to show no sign of weakness and try to continue looking at the tiger, preferably directly at its eyes. A tiger tends not to attack from the front, particularly when the prospective prey is staring back.

In the STR, however, the fisher fears the forest official the most. Here, all sorts of knowledge come in handy, including the personal traits of the officer in question. In most cases, however, the most useful knowledge is thorough knowledge of the area, which the fisher usually possesses, and which helps him to evade the patrol. [The desperate rush into narrow mangrove-shaded creeks (to escape the patrol) occasionally leads the fisher to his death, for these are places where the tiger usually lurks. The fisher knows this; yet, as he says, he would rather take the chance than be robbed or humiliated by the officer.¹⁹⁶]

xiii <http://indiatoday.intoday.in/story/salinity-river-royal-bengal-tiger-lose-sheen-weight/1/182549.html>

Awareness and knowledge of resources, and the management thereof

Most fishers are keenly aware of the resource crisis confronting them. They see the catch per unit effort is declining. They sense that the overall catch is also declining, although they have no means of actually measuring this. They realize that certain species have become unavailable or very rare. The sea fishers mentioned *chandani* (or *chandana*) *ilish* (*Tenualosa toli*) as having become exceedingly rare. The other species whose catches in the sea have declined noticeably are pomfret (*Pampus argenteus*), *baul* (*Pampus chinensis*), and *padre* (*Pellona* sp.). Moreover, larger sizes of *tampura* (*Setipinna phasa*) has also become rare. Fishers in the riparian waters of the Sundarbans reported that *pangash* (*Pangasius pangasius*), *chapra chingri* (*Penaeus indicus*), *baor chingri*, and *java bhola*¹⁹⁷ had become rare.¹⁹⁸

During our field visits and during the workshop^{xiv}, we questioned the fishers regarding what they felt were the reasons for declining catch and species becoming unavailable or rare. The common fishers mentioned the following reasons (the sequence below does not reflect priority):

1. *Jaal bere gecbhe*—the number of nets has increased. Fishers everywhere repeatedly mentioned that the number of those making a living out of fishing had increased several-fold and this was leading not merely to an arithmetic reduction of catch per head per unit time, but overfishing and consequent decline of catch.
2. Certain gears, occasionally used by poor fishers, lead to harmful impact on fish population. For example, mosquito nets (nets of miniscule mesh size), mostly used in collecting tiger prawn seeds, cause the scooping up of fish eggs, larvae, and fingerlings, with dreadful effects on fish population. Too much fishing with any kind of net that has very small mesh sizes would also be bad.
3. Mechanized boats and trawlers are ceaselessly foraging the coastal waters and even the rivers, scooping up catch at alarming rates and leaving the waters lifeless [as per the law of the land, the mechanized boats (powered by more than 30 hp engines) do not have permission to fish within 15 km of the coast and trawlers are not allowed to fish in the territorial waters, let alone the rivers].

^{xiv} Mentioned in nature of sources

4. The aforesaid crafts use various kinds of nets, which allow them to scoop up all kinds of catch, allowing none to escape (although they could be mainly targeting one or two species)
5. Most of the fish species are spawned in the coastal waters. Hence, overfishing in the coastal waters led to decline in fish population in the rivers.
6. Trawlers and other mechanized boats had instruments that could detect fish shoals underwater, leading them to make gigantic hauls that left the waters devoid of fish [some fishers, for example, at the workshop at Saterkona said that large-scale mechanized fishing had greater impact on fish population than mere increase in the numbers of traditional fishers].
7. Large-scale hauling causes hauling-in of large numbers of female fish, including those that are pregnant. This is terribly harmful for fish populations.
8. Reckless tourism is devastating for the Sundarbans. As the number of tourist vessels carrying tourists into the Sundarbans have increased, more juvenile fish are dying by the impact of propeller fans; one could often see a trail of juvenile fish after a vessel has passed by.
9. Plastics thrown from the tourist vessels litter the river and often adversely impact spawning grounds.
10. Pesticides from the fields get into the rivers and cause a decline in the number of fish.

If the factors indicated above continue to function unabated, then fishing in the Sundarbans has a bleak future. Many of the fishers feel that the future lies in fish- and crab-farming or other sources of employment.

The fishers also feel that time must be given to the fish population to regenerate itself; which is the reason they approved of the three-month fishing ban in the STR (1 April to 30 June). They also demanded that the ban, in order to be effective, must be accompanied by livelihood support from the abstaining fishers. They said that although many traditional fishers were forced to violate the ban due to poverty, they approved of the ban on the grounds that most fish species bred during that period. Fishers outside the STR, both riparian and marine, also felt that certain restrictions on fishing gear and fishing season were welcome.

Apart from a temporal reprieve, the fish, many fishers felt, also needed a spatial refuge. When asked whether the fishing ban in the core area of the STR should be removed, many fishers said that an area should be left inviolate so as to act as a refuge and spawning ground for fish populations. However, they felt that the enormous size of the “no-fishing” zone should be drastically reduced. Moreover, they felt that such decisions needed to be taken by the fishing community, in consultation with the concerned government departments, such as forest and fisheries. Regulation, they felt, should not come as administrative fiat, but should come more as a matter of self-regulation.

The fishers have learned and are willing to learn from anyone who is in a position to guide and advise them. Unfortunately, the opposite is not true. There is no system that permits systematic learning from them as a community and using their opinion and experience in the governance of the forests and of the SBR. Therefore, a political or administrative system that confers on them the right and obligations of resource-management seems a far cry. It, however, is one that has become urgently necessary.

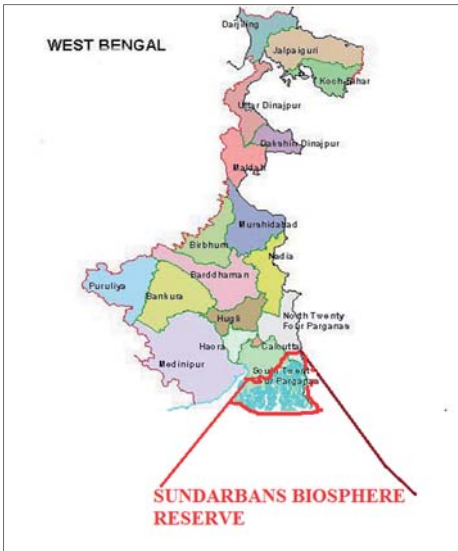
People’s Conservation

In many places in the Sundarbans, local citizens, including fishers, have been active in trying to protect the mangrove ecology, seeing in it a crucial protection against a host of environmental ills, including sea-level rise possibly due to climate change. For example, fishers in Rajat Jubilee have organized a local citizens’ initiative group, the Sundarban Rural Development Society, which has planted some *five hundred thousand mangrove saplings* during the last few years.

CHAPTER VIII: SOME REFLECTIONS ON THE FUTURE OF COPING

Sundarbans on the map

In the West Bengal map (see Map 7), the SBR occupies the lower right hand corner. In a map of India of similar dimensions, the SBR is hard to locate (see Map 8). The point of these pictures is to place the Sundarbans in perspective. Size is not necessarily an indicator of importance—ecological or otherwise. However, in the case of the Sundarbans, its size relative to the rest of the world functions as a visual metaphor of its ability to determine its own fate.



Map 7: SBR in West Bengal



Map 8: SBR in India

The stressed SBR—placing it within the wider world

The SBR is under stress. This study has hitherto emphasized on overpopulation as a severe and immediate source of stress, which it is. For, overpopulation is a factor that is intrinsic to the situation. While the average Sundarbans-dweller has very little footprint, perhaps little more than any other creature of equal mass, millions of such tiny footprints

within a finite ecological space tend to add-up to serious trouble, even without any nasty additives from outside.

Unfortunately, there are lots of additives from outside. This, again, is intrinsic to the situation. However, here we are talking of a larger situation, that of the province, the country, and the planet. We are talking of government policies or the absence thereof. We are talking of large-scale use of pesticides in agriculture, of persistent organic pollutants and heavy metals in industrial processes and consumer goods, and all these chemicals pouring in through the rivers into the Sundarbans estuary—ceaselessly, relentlessly. [What toll are these poisons taking on the tiger, the crocodile, the river sharks, the fish and crustacean species, and the long list of plant and animal wildlife that West Bengal’s Chief Wildlife Warden is committed to protect? Environmentalists express their worry over the impact of such pollution on the Sundarbans ecoregion.¹⁹⁹ Yet, the SBR administration has failed even to implement a relatively simple plastic ban more than a decade old, and it does little more than exhorting NGOs to take the initiative.²⁰⁰ This contrasts oddly with the frequent zeal with which the forest officers set upon the fisher’s “forest-offences”.] Added to this is the destruction that the trawlers and large mechanized boats inflict on the coastal and estuarine ecology.

For the Sundarbans, a low-altitude coastal site, climate change would appear to be a real threat. If experts are to be believed, the “real” *is* real and has arrived.

Forest cover change mapping indicates some serious impact of Climate Change and sea level rise. In most of the islands, dense forest seems to have grown, thanks to the sustained efforts of forest plantation. However the reduction of forest area from 2168.9 Km² to 2132.0 Km² is mainly due to two reasons , erosion and submergence and secondly, the conversion to saline blanks / salt pans, which has grown from 38.74 Km² to 74.796 Km² within this 8 years time span [2001–08]...

The increase in water area within the islands also points to a slow gradual invasion of the sea.²⁰¹

There’s more:

During the study period, both the Frequency and Intensity of Severe Cyclonic Storm has increased in the northern Bay of Bengal... During 1999 to 2005, while there were number of depressions only three could be materialized into severe and super cyclonic storms. Whereas in the

next four years, seven such cyclonic storms have been generated from the similar number of depressions...from the Northern part of the Bay of Bengal. This closely corresponds to the rise in the Sea Surface Temperature as discussed in the previous section. It appears that severe and super cyclonic storms are increasing in frequency during recent years, which creates an alarming situation for Sundarban in the perspective of Climate Change.²⁰²

All this is in line with earlier predictions, but worrying nonetheless.

Of empowerment as an ecological essential

In so far as the Sundarbans is at the receiving end of climate change and of global and national economic, industrial, and chemicals policy and practice, it is clear that the people of the SBR are not in charge of their own destiny. At this level of determination, they are as powerless as the majority of humankind. Indeed, they would appear to be more powerless than many others. For, as we have seen, they have been powerless even in the face of events and processes of a less fundamental nature—pertaining to decision-making of narrower scope.

Yet, as the Sariska debacle has demonstrated beyond doubt, keeping the people out of forest governance is harmful for the forest. Fishers realize that the mangrove ecology plays a key role in ensuring estuarine and coastal biodiversity and the fish wealth of the waters. Hence, they realize that the health of the Sundarbans is vital to their existence. Unfortunately, the government, particularly in its manifestation as the forest department, has proved incapable of realizing that fishers and honey-collectors not only have a right to the forest under the FRA but that they could play a key role in managing and protecting the Sundarbans.

Wildlife Protection in the Sundarbans and the Fisher

“They take care of tigers. They give them food and drugs that make them stronger, and injections that make the beasts more fearless and ferocious. They want the tigers to strike terror among fishers so that they will not enter the forest.” This is a complaint often heard from fishers. More temperate individuals desist from presenting the complaint in this language. However, what rankles is that not even a fraction of the care and expense that the authorities bestow on the tiger appears to be available for fishers who pursue an occupation that is as hazardous as some of the more risky adventure sports. The Royal Bengal Tiger gets royal treatment. Crores of rupees are spent in breeding the deadly crocodile at the crocodile breeding centre. The murderous *kamot* is off-bounds for the fisher; it cannot be killed or caught. Yet, the human prey of all these creatures is slapped with fines, subjected to abuse, threatened, and even assaulted for fishing in, or even just passing through, a protected area. Yet, notwithstanding all this, the fisher is not intrinsically hostile to the idea of conservation. He only demands the most basic commonsensical measure—a say in the schemes and plans that affect his life and livelihood.

The Tiger Task Force Report, 2005, repeatedly cited in this study, strongly recommended involving the people in conservation. It is interesting that the FRA 2006 was passed not long after the publication of the said report. The new act made a complete break with the tradition of forestry that had taken hold since colonial times. As we have mentioned, suitable steps need to be taken to get the principles of the new law implemented in the Sundarbans.

As we have seen, people whose lives and livelihoods depend on the natural produce develop a store of knowledge, from which conservancy measures need to benefit. Indeed, Sundarbans fishers, in consultation with environmental and rights activists, came up with specific recommendations regarding conservation. However, this is a conservation that allows them charge over their lives. The following are *some* of the recommendations pertaining to fishing in the STR that emerged from the Canning Workshop²⁰³:

- Those who are dependent on Sundarbans are responsible for the welfare and development of the same. Therefore, policies and restrictions should not be imposed from above.
- Core areas should not be confused with fishing restrictions. Core areas, in terms of tiger habitats, could be increased or decreased based on tiger ecology. However, fishing restrictions must be based on the ecology of fish resources.
- Thus, core areas should be allowed as routes and passage ways, and also resting place and shelter during calamities. Moreover, there must not be blanket fishing restrictions all over the core area; imposition of fishing restrictions and safety precautions must be based on consultation with experts and stakeholders—fishers and honey collectors.
- On the other hand, fishers and fishing should be subjected to restrictions. Fishing in breeding areas is to be avoided, irrespective of it being in core or buffer zone. However, such restrictions must come not as undemocratic administrative fiat but from the Sundarbans fishers acting in cooperative capacity.
- The three month ban on fishing, to be effective, must be accompanied by livelihood support during these months.
- The law should be strictly implemented in not allowing bottom trawling within 12 nautical miles of the sea-shoreline and in not allowing mechanized fishing of any kind within 15 km of the sea-shoreline.
- Use of mosquito nets must be banned.

Proposals

In light of the above, the following would seem to emerge as inevitable proposals with respect to fishing in the Sundarbans:

1. In a situation of stressed and ecologically sensitive natural resource base, community-based management or regulation of fishing is indispensable.
2. Such management would need to be supported by assistance from fisheries experts on the one hand and enforcing authorities on the other. Indeed, expert knowledge, in addition to the knowledge

available with fishers, would be essential in creating the prerequisite for such management—the ascertaining of sustainable yield.

3. A major thrust area of the management would be to ensure that the total fishing effort does not approach exceeding the quantum of sustainable yield.
4. Strictly disallowing any kind of mechanized fishing in the inland waters and in the areas close to the shoreline as per law

Yet, the right of the fishers to play a central role in the management of fishing activity in the STR, and the SBR as a whole, and strict implementation of restrictions on trawling and mechanized fishing, while essential, are *not sufficient* to solve the fishers' problems. In this connection, the following would appear to indicate the direction to go:

- i. Ensuring that the total fishing effort does not approach close to exceeding the sustainable yield can be finally solved only by reducing the population dependent on capture fishing.
- ii. Agriculture is not a viable alternative to fishing as most have insufficient land. Even equitable land distribution will not help as the total amount of arable land available (given Sundarbans' soil fertility issues) is not sufficient for supporting the bulk of the population. Hence, the issue of alternative employment for those directly dependent on natural produce needs to be addressed on a war-footing.
- iii. Time and again, fishers themselves have demanded viable alternatives. For example, in the Rajat Jubilee workshop,²⁰⁴ the fishers clearly mentioned the need for technical and other support for setting up fish farms and crab farms, poultries, piggeries, and goat-farms.

Manik and his family

Even a couple of years back, Manik Gayen (name changed) had travelled no further than the creeks in the Arbesi and Khatuajhuri forest blocks and along the River Raimangal. During the last year, his geography has explosively widened. He and his wife travelled to Tamil Nadu. They stayed there for six months, and worked as contract labourers in a “lohar karkhana” (iron factory). He thinks he might have to do so again.

This is in spite of the fact that Manik fished, while his wife and sister collected crabs; they also had a small field, where they grew vegetables. Their family is no exception in the Shamshegangar area. Thousands went out in search for a living, mostly outside West Bengal. Everyone attests to exodus from the Sundarbans area. The exodus consists mostly of men. It is not emigration, as such, for those who go do not take their families along. They go to find and hold a job outside. The traffic is mostly towards Tamil Nadu, Kerala, Mumbai, and Delhi.

- i. However, taking the easy way of recklessly promoting tourism is to be avoided at all costs.²⁰⁵ The Sundarbans is already suffering from the impact of short-sighted tourism. Tourism, as an option, should be of the low-impact variety.
- ii. Before taking any industrial initiative at all, *a careful study of the carrying-capacity* (for tourism and any other industrial ventures planned) needs to be carried out. This is a task that urgently needs doing.
- iii. The government should encourage and the fishers movement' should actively promote the creation of Biodiversity Management Committees, which in turn should play a role in preparing estuarine and marine biodiversity registers, so that the biodiversity profile and traditional knowledge are registered as an aid to conservation and protection.
- iv. The SBR must have a complete set of policies directed towards protecting it as a biosphere reserve. The proposal for making the biosphere reserve a separate district has already come up and is welcome. However, unless district policy and governance incorporates a keen environmental vision with decisive participatory

components, a mere administrative separation is not likely to be useful. Once that vision is present, necessary legal instruments should not be too difficult to bring into being.

Whither?

Most issues of pollution are related to agricultural, industrial, and chemicals policies at the national and international level. The same applies to the issue of climate change, which, given global trends and attitudes, is set on an irreversible course. Climate change projections paint a bleak future for the whole of archipelagic Sundarbans. Obviously, such problems cannot be adequately dealt with at the local or regional level. However, precisely because the problems have become more intractable, it has become urgent to combine action at the planetary and national level with local and regional action based on people's involvement.

ENDNOTES

- 1 The Bengal tiger (alternatively called 'Indian tiger'), the *Pantheratigris*, is the same species across the subcontinent. Hence, the so-called man-eating propensity of the Sundarbans' tiger has generated a controversy. The most reasonable explanation seems to be that in the Sundarbans region the opportunity of human-tiger interaction is far greater than anywhere else. Thus, Sundarbans tigers have greater access to humans and have learned that the human, in most cases, is an easier prey than any other large mammal.
- 2 The salinity of the Sundarbans varies across seasons and regions. The Bangladesh Sundarbans, which get a far greater supply of sweet water, are less afflicted by salinity.
- 3 Mandal, R.N., Das, C.S., and Naskar, K.R., 2010. "Dwindling Indian Sundarban Mangrove: The Way Out", *Science & Culture* 76 (7-8) 275-282.
- 4 Many mangrove species seem to have an almost magical capacity to suck up heavy metals. See Nazli, M.F. and Hashim, N.R., "Heavy Metal Concentrations in an Important Mangrove Species, *Sonneratiacaseolaris*, in Peninsular Malaysia", *Environment Asia* 3 (special issue) (2010) 50-55, at <http://www.tshe.org/ea/pdf/vol3s%20p50-55.pdf>. It may be noted that *Sonneratiacaseolaris* is a common mangrove species of estuarine Bengal and is locally known as *chakkeora*. See also Saenger, P., and McConchie, D., "Heavy Metals in Mangroves: Methodology, Monitoring and Management" in http://epubs.scu.edu.au/cgi/viewcontent.cgi?article=1614&context=esm_pubs.
 "The mangroves...perform a variety of ecosystem services. They release about 6,000 tonnes/ha of litter over the course of a year, contributing vast amounts of organic nutrients that support a range of ecosystem functions, including estuarine and coastal fisheries for ecologically and commercially important species. They also act as a barrier to the cyclones and storm surges, a role that is very important for the protection of human settlements to the north. Alterations to and removal of mangrove vegetation over time have led to a number of extirpations (local extinctions) as well as the contraction of habitat for a number of species." Danda, A. A., GayathriSrisikanthan, et al. *op. cit.*, 9.
- 5 Sunderban Mangroves, Geological Survey of India, http://www.portal.gsi.gov.in/portal/page?_pageid=127,723772&_dad=portal&_schema=PORTAL&linkId=1213 Last accessed 24.10.13.
- 6 The basic data in the table has been taken from Mandal, R.N., Das, C.S., et al. *op. cit.*
- 7 See, for example, Chaudhuri, A., Mukherjee, S., and Homechaudhuri, S., "Seasonal dynamics of fish assemblages in an intertidal mudflat of Indian Sundarbans", *Scientia Marina* 77(2), June 2013, 301-311, Barcelona (Spain), doi: 10.3989/scimar.03766.15A.
- 8 Eric Wikramanayake et al. (eds.), *Terrestrial ecoregions of the Indo-Pacific: a conservation assessment*, Island Press, Washington DC, 2002, 301.

- 9 The Ganges-Brahmaputra river system carries and deposits astonishing amounts of sediment load in the delta mouth, causing the delta to advance (prograde) slowly southwards.
- 10 Danda, A. A., Sriskanthan, G., Ghosh, A., Bandyopadhyay, J., and Hazra, S., *Indian Sundarbans Delta: A Vision*, New Delhi: World Wide Fund for Nature-India, 2011, 1.
- 11 See Das, S., *Palaeoecology of the Lower Bengal Basin, Calcutta, India, during the Late Quaternary*, Feddes Repertorium 120 (2009) 5–6, 333–342 DOI: 10.1002/fedr.200911113 Weinheim, Oktober 2009. See also, Barui, N.C., and Chanda, S., *Late-Quaternary Pollen Analysis in Relation to Palaeoecology, Biostratigraphy and Dating of Calcutta Peat*, Proc. Indian Acad. Sci. Acad. 358 No.4 (1992) 191–200. The tale seems to be a complex one. There was a drop in the relative sea level by about 100 m during the Last Glacial Maximum (LGM) around 20,000 years before the present (BP), exposing large areas of the Bay of Bengal presently under the sea. Between 14 and 7 ka (kilo annum or 1000 years) BP, the sea level rose rapidly and the sea transgressed inland into the delta. Around 9 ka BP, the coast line was 100 km inland (from its present position). At 4.5 ka, sea level was probably ~5 m above the present day sea level and came back to present level some 2 ka BP. During 9-7 ka rate of sediment supply was probably 4-8 times higher than that of the present presumably resulting from a rapid erosion of Himalaya during a phase of intensification of monsoon. However, since ~7 ka, the shoreline was continuously pushed to the south, resulting in the southward expansion of deltaic South Bengal. See, for example, Sarkar, A., et al., “Evolution of Ganges-Brahmaputra western delta plain: clues from sedimentology and carbon isotopes”, *Quaternary Science Reviews*, doi:10.1016/j.quascirev.2009.05.016.
- 12 Conversation on 20 September 2013.
- 13 Danda, A. A., Gayathri Sriskanthan, et al. op. cit. 4.
- 14 Rudra, K., *Rivers of West Bengal: A Status Report* (unpublished), 96.
- 15 The use of the term *Bhati* to the Sundarbans would appear to go back to the sixteenth century. See Blochmann, H., “Geographical and Historical Notes on the Bardwan and Presidency Divisions of Lower Bengal”, in Hunter, W.W., *A Statistical Account of Bengal*, Vol. I, Part-II, 1876. Reprint, West Bengal District Gazetteers, Calcutta, 1998, 103.
- 16 Rudra, K., op. cit. 99.
- 17 Islam M. R., Begum S. F., Yamaguchi Y. and Ogawa K. 1999. “The Ganges and Brahmaputra rivers in Bangladesh: basin denudation and sedimentation”, *Hydrological Processes*, 13, 2907.
- 18 This became evident after Aila. The Aila inundations left the soil infected with salinity and, therefore, infertile. Yet, the inundations also brought silt. In many places, once the salinity was washed away over successive monsoons, the soils became more fertile.

- 19 Rudra, K., op. cit., 101.
- 20 Rudra, K., op. cit., 99; also Chatterjee, M., Shankar, D., Sen, D.K., et al. "Tidal variation in the Sundarbans estuarine system, India", *Journal of Earth System Science*, 122, No. 4, August 2013, 902.
- 21 The Sundarbans Biosphere Reserve (SBR) was created under the UNESCO Man and Biosphere Programme. It is, however, not a legal entity recognized under any Indian law.
- 22 Chakraborty, D. K., *Archaeological Geography of the Ganga Plain: The Lower and the Middle Ganga*, Orient Blackswan, Delhi, 2001, 100, 147–48.
- 23 Ibid. 140, 148–9, 155, etc.
- 24 Ibid. 144 and 148.
- 25 *Sunderbans habitation dates to 3BC*, Jhimli Mukherjee, Times of India, 30 October, 2013.
- 26 Ibid. 129.
- 27 Ibid.
- 28 For a brief yet brilliant analysis of the significance of Shah Suja's rent rolls for Sundarbans, see Blochmann, H., op. cit., 103. There is also other evidence of expansion into the Bakharganj Sundarbans in the pre-colonial period. If Eaton is correct, then advancement into the marshy forests of this area had begun in the pre-Mughal times and continued through the Mughal era. Eaton, Richard M., *The Rise of Islam and the Bengal Frontier, 1204-1760*. Berkeley: University of California Press, 1993. <http://ark.cdlib.org/ark:/13030/ft067n99v9/>, Chapter 8 (the section on *The Religious Gentry in Bakarganj and Dhaka, 1650–1760*).
- 29 Pargiter writes, "Lands in the Bakarganj Sundarbans are high, embankments are unnecessary, and the rivers are comparatively sweet. These causes led to their early and wide cultivation." Pargiter, F.E., *A Revenue History of the Sundarbans (from 1765 to 1870)*, Calcutta, 1934. Reprint, West Bengal District Gazetteers, Kolkata, 2002, 81.
- 30 This appears to be a slip. For, the left bank would be the eastern bank.
- 31 Danda, A.A. *Surviving in the Sundarbans, Threats and Responses*, Doctoral Dissertation, submitted, defended, and approved at the University of Twente, Netherlands, in 2007, 28–9.
- 32 See Lower Gangetic Plains moist deciduous forests. The Encyclopedia of Earth, <http://www.eoearth.org/view/article/154305/> last accessed 13.1.2015.
- 33 Eaton, Richard M., op. cit., Chapter 8 (section on *Charismatic Pioneers on the Agrarian Frontier*).
- 34 See, for example, the discussion on the historical background, in *District Human Development Report: South 24 Parganas*, Development and Planning Department, Govt. of West Bengal, Kolkata, 2009, 4.

- 35 Ibid. 5.
- 36 This was written in the early twentieth century. See, O'Malley, L.S.S., *Bengal District Gazetteers, 24 Parganas*, Calcutta, 1914, Reprint, West Bengal District Gazetteers, Kolkata 1998, 230.
- 37 The East India Company's Rule (or Company Raj) lasted a century, till 1858. After the 1857 'Indian Mutiny', the Indian colonies came directly under the British government.
- 38 Ibid.
- 39 Ibid. 230–31.
- 40 Ibid. 231. *Taluq* and *taluqdar* are terms that have had several meanings depending on place and time. In Bengal, in the period under consideration (i.e. the eighteenth century), the taluqdar was a revenue collector whose status was below that of a zamindar. The land over which he had control was called a taluq.
- 41 Ibid. Channel Creek, whose local names are Baratullah River and Muriganga, is the channel of the Hooghly that flanks the Sagar Island on the east as it flows out into the Bay of Bengal.
- 42 Ibid. 231–32.
- 43 Ibid. 232.
- 44 Ibid. 233.
- 45 Ibid.
- 46 Ibid. Also see Ascoli, M.A., *A Revenue History of the Sundarbans*, Vol. II, Bengal Secretariat Book Depot, 1921, Calcutta, present Reprint, West Bengal District Gazetteers, Kolkata, 2002.
- 47 O'Malley, L.S.S., *op. cit.*, 234.
- 48 Ibid. 235.
- 49 Ibid. 236.
- 50 Ibid.
- 51 Ascoli, *op. cit.* *Pargiter, F.E., A revenue history of the Sunderbans from 1765 to 1870*, Bengal Secretariat Book Depot, Calcutta, 1885.
- 52 Daniel Hamilton, a businessman who had arrived in Calcutta in the early 20th century, wanted to do something for the Indian poor. He targeted the Sundarbans, where he strove to build viable and prosperous societies based on cooperatives. Many, including Amitav Ghosh in *The Hungry Tide*, have told the tale of Hamilton's vision and achievements.
- 53 Taken from O'Malley, *op. cit.* 340–41 and 366–67.
- 54 See *ibid.*

- 55 Data taken from O'Malley, op. cit., 346–47. One is surprised by the absence of the so-called tribal groups, Santhals, Mundas, etc. However, O'Malley tells us that only those castes or ethnicities have been mentioned whose total population for the district exceeded 25,000.
- 56 For a competent presentation and summary of the main concerns of the critique and its relevance, see Bhagat, Ram B., “Census and caste enumeration: British legacy and contemporary practice in India”, *Genus*, Vol. 62, No. 2, April–June 2006.
- 57 See the list of Scheduled Castes, West Bengal list, at <http://socialjustice.nic.in/pdf/scorderwestbengal.pdf> and also List of Scheduled Castes in West Bengal at the West Bengal Government portal under Citizens>Students> SC/ST certification at http://westbengal.gov.in/portal/banglarMukh/CMSPage/BMCMSPortletWindow;jsessionid=B64CE0802B2CD9B146E80F58A76382C6.node1?fileId=75&action=e&windowstate=normal&in.gov.wb.portal.MENU_ID_PARAMETER=47&in.gov.wb.portal.MENU_ID_PARAMETER=47&mode=view last accessed on 13.01.2015.
- 58 The equivalence of this figure with that indicating the proportion of the “Scheduled Castes” is a somewhat strange coincidence. It has no numerical and sociological significance. Actually, the equivalence is not perfect; it disappears from the third place after the decimal point. However, the equivalence up to the second place is strange indeed.
- 59 *District Human Development Report: South 24 Parganas*, op. cit. 298–99.
- 60 From *District Human Development Report: South 24 Parganas*, op. cit. 299, with a slight modification of the 2001 population figure, based on information in the GoI Census website, http://www.censusindia.gov.in/PopulationFinder/Population_Finder.aspx. However, certain parts of the Gosaba block received a degree of inflow from Khulna (presently Bangladesh) even prior to partition. For example, some participants in the workshop at Rajat Jubilee, Lahiripur, Gosaba reported that their parents or grandparents had come into the area in the 1930s, during reclamation. For the workshops see item VII, in **Nature of the Sources**.
- 61 See District Statistical Handbook, South 24 Parganas—2009, Bureau of Applied Economics & Statistics, Government of West Bengal, and 2001 Indian Census Data for South 24 Parganas available at the Census of India Website.
- 62 Ibid. 299.
- 63 Census of India 2011. This is not to say urban or total populations do not. We are only concentrating on the rural population here.
- 64 The Blockwise data on the website of the Department of Sundarbans Affairs, at <http://www.sadepartmentwb.org/Profile.htm> provides the relevant information. See also, the District Human Development Reports for South 24 Parganas and North 24 Parganas. page last accessed on 15.07.2014.
- 65 One hears that it takes at least three monsoons for the land to regain its fertility. The operative expression seems to “at least”. For, four years have passed since

- Aila. Yet, in many parts of the Sundarbans one finds Aila-inundated fields resisting even grass, making feeding the cattle a massive problem.
- 66 Interview.
- 67 Khonch is a kind of multi-pronged javelin attached to a long rope. It is thrown to spear fish. For *khyapla*, see note below and also discussion in chapter VII.
- 68 This is a net that one might describe using Hunter's words:
 "On narrow shelving banks a round net is sometimes used. The fisherman goes along the bank, watching till he sees a place where some fish are lying. He then throws the net in such a manner, that before touching the water it has spread out into large circle. The edges of the net are heavily weighted with lead, and falling on all sides of the fish, imprison them." Hunter, W.W., *A Statistical Account of Bengal*, Vol. I, Part-II, 1876.Reprint, West Bengal District Gazetteers, Calcutta, 1998, 19. Of course, one might throw the net while standing knee-deep in the river, as many fishers, men and women, do now in the Sundarbans.
- 69 The "pollution" possibly stemmed from the fact that the profession involved ensnaring animals and killing them. It could also be related to the rather offensive smell that attaches itself to one who deals in fish, as Sujay Jana, one fishers' rights activist suggested.
- 70 See *Parashara Smriti*, English translation, comments on verse 32, <https://ia700200.us.archive.org/6/items/ParasharaSmriti/SriParasharaSmrithiPdf.pdf>.
- 71 Cited in Deshmukh, S. V., and Choudhury, A., *Final Report of the Project 'Preparation of Guidelines for facilitating decision-making process as well as ecosystem management practices for the Sunderban Biosphere Reserve in India'*, supported by RambhauMhalgiProbodhini, Submitted to UNESCO, New Delhi, 2002, 14.
- 72 Samaresh Basu's *Ganga* appears to hold special interest for the prospective historian of the Sundarbans fishing community, because it tells of the fishers from Khulna who fished in the Sundarbans, the sea, and in the Ganga. It is a wonderful literary piece and contains vital information, including those on fishing practices and methods. It is, however, relatively recent history, as the tale pertains to the mid-twentieth century. Moreover, the main focus is the fishing on the Ganga. One might also think of Manik Bandyopadhyay's *Padmanadir Majhi*. Yet, though the protagonist Kuber is a fisher, the tale is more about human lives and the river than about the fishers as a community and fishing as a way of life. However, a recent work that would seem to buck the trend comes from Bangladesh (but published in Kolkata), on the sea-fishing *Jelia Kaibarta* community in Chittagong: *Jalaputra*, Jaladas, H., Protibhash, Kolkata, 2013. Substantial socio-economic studies on the fishing community also seem to be rare. One such work, however, is Pramanik, S.K., *Fishermen Community of Coastal Villages in West Bengal*, Rawat Publications, New Delhi, 1993.
- 73 Anthropologists, however, have occasionally attended to the Sundarbans fishers. For example, Raychaudhuri B., *The Moon and the Net, Study of a Transient Fishing*

Community of Fishermen at Jambudwip, Anthropological Survey of India, Calcutta, 1980. Raychaudhuri, however, approached his subjects more as fishers, rather than as Sundarbans fishers, though the coastal and the tidal context is important in his narrative. Also, Niyogi, Tushar K., *The Tiger Cult of the Sundarbans*, Anthropological Survey of India, Calcutta, 1996 also attends to the Sundarbans fishers' world of belief and fishing practices. Further, Mandal, D. (ed.), *Man in Biosphere: A Case Study of Sundarban Biosphere Reserve*, Kolkata, Gyan Publishing House, Kolkata, 2006 also has important references to the fishing community, fishing practices, and fishers' beliefs. A. A. Danda, op. cit., is a remarkable work on Sundarbans anthropology, providing keen insights on Sundarbans and its fishing community, on which I have gratefully drawn. The other remarkable anthropological work is of course Jalais, A., *Forest of Tigers*, Routledge, New Delhi, 2010. This work also attends substantially to the fishing community in the Sundarbans. One student of literature has considered the folk-culture of the fishers worth her attention: Ghoshal, I., *Sundarbaner Matsyajibider Jiban, Tader Lokosanskriti ebawng Lokosahityo*, Gronthon, Kolkata, 2006 is, as the name suggests, dedicated to the Sundarbans fishers. It is in a sense a pioneering enterprise. However, it appears to be weak in the analytical aspects.

- 74 Rennell, J. *The Journals of Major James Rennell, first Surveyor-General of Bengal, during his surveys of the Ganges and Brahmaputra Rivers, 1764 to 1767*, Edited by T.H.D. La Touche, The Asiatic Society, Calcutta, 1910, 26, 31, 94, 123, 123n.
- 75 Hunter, W.W., op. cit., 19.
- 76 Hunter, W.W. *A Statistical Account*, op. cit., 19–20.
- 77 Danda, op. cit., 29.
- 78 Ibid. 29 n.
- 79 Ibid.
- 80 Danda, A. A., Srisikanthan, G., Ghosh, A., Bandyopadhyay, J., and Hazra, S., 12.
- 81 Sundarban Development Board http://www.sadepartmentwb.org/Socio_Economic_1.htm Last accessed on 13.12.2013.
- 82 Conversation with Amallesh Choudhury, on 2 November 2013. Actually, we should have submitted an RTI request to the department. Somehow, it slipped our minds. We'll be doing that soon, but will not be able to make use of the ensuing information, if any, in this report.
- 83 Marine Fisheries Census, 2010, India, Government of India, Ministry of Agriculture, New Delhi, and CMFRI, Kochi, 2012, 13.
- 84 It might do to clarify further. When we speak of marine fishers in the SBR we mean fishers in the Sundarbans blocks who fish or participate in fishing activity in the Bay of Bengal. These include fishers who work in the trawlers and other mechanized boats and fishers who fish in country boats (nowadays, mostly motorized). There are also some fishers who wade into the shallow waters on their feet and use small gill nets. However, the greater number of fishers in

the Sundarbans blocks fish in the inland and estuarine waters in the SBR. These inland capture fishing areas may be divided into three broad zones—non-forest areas, reserved forest areas, and the forest areas in the Sundarbans Tiger Reserve (STR). In this work we have discussed the STR fishers in some detail, followed by the fishers in the general reserved forest areas. Here, we have very little to say about inland fishers in the non-forested tracts of the SBR.

- 85 Marine Fisheries Census 2010 India, Part I, GoI, Ministry of Agriculture, and CMFRI, New Delhi, 12.
- 86 Please note that here and in most other occasions, fishing includes crab-collecting.
- 87 As measured on a map. The imprecision is due to the fact that it is difficult to know the exact official perimeter.
- 88 2011 census data, GOI.
- 89 See, Singh, A., Bhattacharya, P., Vyas, P., and Roy, S. 2010. "Contribution of NTFPs in the Livelihood of Mangrove Forest Dwellers of Sundarban", *Journal of Human Ecology*, 29(3): 191–200.
- 90 Majumder, M., Barman, R. N. (ed.), *Application of Nature Based Algorithm in Natural Resource Management*, Springer, DOI 10.1007/978-94-007-5152-1, 178.
- 91 See, for example, Ghosh., A., *Indian islanders seek jobs, husbands outside sinking Sundarbans*, <http://www.trust.org/item/?map=indian-islanders-seek-jobs-husbands-outside-sinking-sundarbans> last accessed 13.1.2015.
- 92 Official British sources have ample references to the destruction of forests during the early period of the John Company. See Stebbing, E.P., *The Forests of India*, Vol. I, John Lane TheBodley Head Limited, London, 1922. An account of early and late colonial forestry, followed by an account of Indian forest policy since independence, which draws on Stebbing and other sources, is *The Story of Modern Forestry in India*. It is freely available on the internet, at <http://cpsindia.org/index.php/art/114-science-sustainability-and-indian-national-resurgence/d-science-and-technology-under-the-british-rule/159-2-the-story-of-modern-forestry-in-india>.
- 93 For early ecological and conservation notions among colonial officials see Grove, R. 1997. *Ecology, Climate and Empire: Colonialism and Global Environmental History*. Cambridge: The White Horse Press. 71–72. The lobbying among British scientists resulted in some support and led the British Association for the Advancement of Science to sponsor the following report: Cleghorn, H., Royle, F., Baird-Smith, R., and Strachey, R., "Report of the Committee appointed by the British Association to consider the probable effects in an economical and historical point of view of the destruction of tropical forests", *Report of the British Association for the Advancement of Science*, 1852, 97. The conservation-oriented officials were mostly from the medical service. This was not a coincidence. Scientific knowledge amongst the European officials was confined almost entirely to the members of the medical profession (Stebbing, op. cit. Vol. I, 61). Moreover, medical training of that period included rigorous training in botany, as plants and

their extracts played an important role in therapy. It may be noted that the first scientific report on Burmese forests, urgently arguing conservation, was produced by Nathaniel Wallich, a surgeon and Superintendent of the Shibpur Botanical Gardens (near Calcutta). Moreover, the first conservator of forests in Bombay Presidency, Alexander Gibson, was also a surgeon. Further, the most famous forester who preceded Brandis, Hugh Cleghorn, was a physician.

- 94 Indian foresters today often mention 1864 as the year when the Imperial Forest Department was born and the year 1867 as the year when the Imperial Forest Service was born. See, for example, *Indian Forest Service, An Introduction* at <http://ifs.nic.in/> (last accessed 15.04.2014). However, such chronology appears to be rather arbitrary. The provincial forest departments were organized broadly between 1862 and 1865 and the creation of a scientifically trained service occurred broadly during 1865 and 1870. See, for example, *One hundred years of Indian Forestry*, Vol. I, Government of India, Delhi, 1961. See also the narrative presented in great detail in Stebbing, Vol. I, op. cit. and in Stebbing, E.P., *The Forests of India*, Vol. II, John Lane The Bodley Head Limited, London, 1923.
- 95 *The Story of Modern Forestry in India*, op. cit.
- 96 Ibid. See also, Trivedi, A., *WW II and Woods of United Province: An Eco-Historical Appraisal*, 2011 International Conference on Social Science and Humanity, <http://www.ipedr.com/vol5/no1/72-H00154.pdf>.
- 97 The historian who has paid the most attention to the role of forest issues in anti-colonial movements is Ramachandra Guha. His writings are too well-known to require citation.
- 98 It is well-known that the epithets ‘socialist’ and ‘secular’ were added to the preamble much later.
- 99 National Forest Policy 1952.
- 100 Report of the National Commission on Agriculture, Government of India, New Delhi, 1976, Pt. IX, 29.
- 101 See the discussion in Dutta, R., et al., *Wildlife Law, A Ready Reckoner*, Wildlife Trust of India, 2004, <http://www.wti.org.in/oldsite/publications/Wildlife%20Law%20-%20A%20Ready%20Reckoner.pdf>, 17.
- 102 Stebbing, op. cit. Vol. 3, 193, Ascoli, op. cit., 66–67.
- 103 See, for example, Ascoli, op. cit. 66–70.
- 104 Stebbing, Vol. III, op. cit. 212.
- 105 For the various conservation plans—Schlich, Heinig, and Lloyd—up to 1910–11, see Presler, F., “Forest Management in the Sundarbans, 1875–1952”, J. Seidensticker, Richard, K., Townsend, Amy K., ed., *The Commons in South Asia, Societal Pressures and Environmental Integrity in the Sundarbans of Bangladesh*, Proceedings from a workshop held on November 20–21, 1987 in Washington, DC, The International Center, Smithsonian Institution, Washington, D.C., 1991, 159–79.

- 106 Ibid. See also *The First Working Plan for the 24-Parganas Forest Division, Southern Circle, 1949–50 to 1958–59*, Volume I, Government of West Bengal, 1952 [For Official Use only].
- 107 Ibid. 8–9.
- 108 Presler, F., op. cit., particularly pages 170–77; Sanyal, P., “Forest and Wildlife Management”, *Integrated Coastal Zone Management Plan for West Bengal*, Central Pollution Control Board, New Delhi, 2001, 96–125.
- 109 Hunter, W.W., op. cit. 1.
- 110 See *The Sundarbans—Bangladesh*, World Heritage Information Sheet, UNEP-WCMC, http://www.unep-wcmc.org/world-heritage-information-sheets_271.html, page 1.
- 111 See, for example, *Sundarbans National Park—India*, UNEP-WCMC, last updated April 2013, see http://www.unep-wcmc.org/world-heritage-information-sheets_271.html. 4262 sq km would appear to be the measure of the Reserved Forest. However, the data (in acres) for the actual forest area of the Indian Sundarbans, given by the West Bengal forest department, adds up and translates to about 4157.23 sq km. See http://www.westbengalforest.gov.in/urls_all/forest_land/24_pgs_s.html.
- 112 Data in this table derived from *Management Plan of Tiger Reserve of the Sundarbans West Bengal India*, op. cit., 8–9, and *the First Working Plan for the 24-Parganas Forest Division, Southern Circle*, op. cit.
- 113 For a brief discussion of management of the Indian Sundarbans forests, see Sanyal, P., *Wildlife and Forest Management*, op. cit.
- 114 The croc in the water and tiger on the land.
- 115 At the summit workshop on 25 February 2014, the fisher participants were specifically asked this question.
- 116 “Meet Anne Wright”, Interview by BittuSahgal, in <http://www.sanctuaryasia.com/people/interviews/8945-meet-anne-wright.html>.
- 117 Tenth General Assembly, VigyanBhavan, New Delhi, 24 November– 1 December, 1969, Volume II, Proceedings and Summary of Business, IUCN, Morges, Switzerland, 1970, 158.
- 118 “Meet Anne Wright”, op. cit.
- 119 A History of Forest Regulations <http://infochangeindia.org/environment/background/a-history-of-forest-regulations.html> last accessed 13.01.2015.
- 120 See Constitution of the Sundarban Biosphere Reserve at the Sundarban Biosphere Reserve website at http://www.sundarbanbiosphere.org/html_files/sunderban_biosphere_reserve.htm (Last accessed 13.01.2015).
- 121 *Management Plan of Tiger Reserve*, op. cit. 42–43.
- 122 National Tiger Conservation Authority/ Project Tiger <http://projecttiger.nic.in/>

- sundarbans.htm.
- 123 See Sajnekhali WLS. <http://www.wildbengal.com/urls/protected-areas-wls-sajnekhali.html>.
- 124 Annual Report 2011–12, Wildlife Wing, Directorate of Forests, Government of West Bengal, 3.
- 125 Lothian WLS <http://www.wildbengal.com/urls/protected-areas-wls-lothian.html>.
- 126 World Heritage Nomination—IUCN Summary, 452 Sundarbans (India), at http://whc.unesco.org/archive/advisory_body_evaluation/452.pdf, 48.
- 127 See *Annual Report 2011–12*, Wildlife Wing, Directorate of Forests, Government of West Bengal, 3; Patel, V., Rajagopalan, R., *Fishing Community Issues in the Sundarban Tiger Reserve (STR)*, Report, ICSF (Year not mentioned), Chennai, 2.
- 128 See, for example, information in ‘Sunderbans National Park’. <http://whc.unesco.org/en/list/452>.
- 129 World Heritage Nomination—IUCN Summary, op. cit., 48.
- 130 See Sundarbans National Park at the UNESCO portal at <http://whc.unesco.org/en/list/452> and at <http://whc.unesco.org/en/criteria/>
- 131 Notification no. 6028-4. dated 18.12.2007.
- 132 West Sundarban, at Wild Bengal portal, at <http://www.wildbengal.com/urls/protected-areas-wls-west-sundarban.html> (Last accessed on 13.01.15).
- 133 Fishers’ testimony at training workshops; for workshops see item VII in **Nature of the Sources**.
- 134 Chatterjee, P. ; *Traditional Fishers in the Sundarban Tiger Reserve, A study on livelihood practice under protected area*, DISHA, Kolkata, 2009; Patel, V., and Rajagopalan, R., op. cit.
- 135 This is based on what Pranabes Sanyal said, in his interview on 16 December 2013.
- 136 Combining data from http://www.westbengalforest.gov.in/urls_all/forest_land/24_pgs_s.html, *Management Plan of Tiger Reserve*, op. cit. 42–43, and notification No. 6028-For. dated 18.12.2007.
- 137 The significance of the term “General Buffer” is in its distinction from the Sajnekhali WLS, which is also a part of the Buffer to the Critical Tiger Habitat. However, being a WLS, it is a fishing-prohibited zone.
- 138 See, for example, Project Tiger: <http://projecttiger.nic.in/sundarbans.htm> and The Sunderbans: http://sb.bsf.gov.in/index_files/ctb_files/The%20Sunderbans.pdf.
- 139 *Management Plan of Tiger Reserve*, 1973, op. cit., 39.
- 140 Most of these collections by locals have been phased out. Golpata collection was prohibited from 1978. Hental (*Phoenix paludosa*) collection was prohibited from 1991. Woodcutting went out at some point in between. The only activities allowed

- in the buffer are fishing, including crab-collecting, honey-collecting, and wax-collecting. See, Singh, A., Bhattacharya, P., Vyas, P., and Roy, S. 2010. "Contribution of NTFPs in the Livelihood of Mangrove Forest Dwellers of Sundarban", *Journal of Human Ecology*, 29(3): 191–200.
- 141 For details, see Chatterjee, P., op. cit., 37.
- 142 BLC lists accompanying the letter from the Conservator of Forests and Field Director, STR, [no. 1891 (9)/FD/2M-39/06 dated 18.07.07]. Also see Patel, V., and Rajagopalan, R., op. cit., 6.
- 143 Pranabesanyal said in his interview on 16 December 2013 that the BLC lists for the STR were prepared in 1986, based on careful survey of actual fishing boats in the area.
- 144 The fishers in both Rajat Jubilee and Saterkana workshops emphasized on this.
- 145 Notification no. 6028-For., op. cit.
- 146 *Integrated Coastal Zone Management Plan for West Bengal*, op. cit., 100.
- 147 Chatterjee, P., op. cit. and Patel and Rajagopalan, op. cit., 47.
- 148 Chatterjee, P., op. cit. n. 1 and n. 2.
- 149 Reports of the workshop held at Saterkona, Amlameti, Gosaba CD Block (on 27 November 2013) and at Fish Market, Canning, Canning I CD Block (28 November 2013); unpublished.
- 150 Ibid. 47–48.
- 151 Report of Canning workshop, op. cit.
- 152 Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Section 3, subsections *c* and *d*.
- 153 Letter from the Ministry of Tribal Affairs, Government of India, dated 9 June 2008, to all State Secretaries in Charge of Tribal Welfare (all States and UTs except J&K).
- 154 In a meeting on 20.06.2014, the forest department assured the fishing community leaders that the extremely unjust BLC-regime (both in the STR and non-STR areas) would be discarded in favour of a more rational system where all genuine forest fishers would be given necessary permits for going into the forest to fish.
- 155 This information was reiterated at the workshops held at Namkhana and L-Plot.
- 156 Sundarban Development Board, http://www.sadepartmentwb.org/SDB_Formation.htm page last accessed on 15.07.2014; (Page has now ceased to exist). For similar information see District Human Development Report: South 24 Parganas, op. cit., p. 292.
- 157 *ibid.*
- 158 *Ibid.*

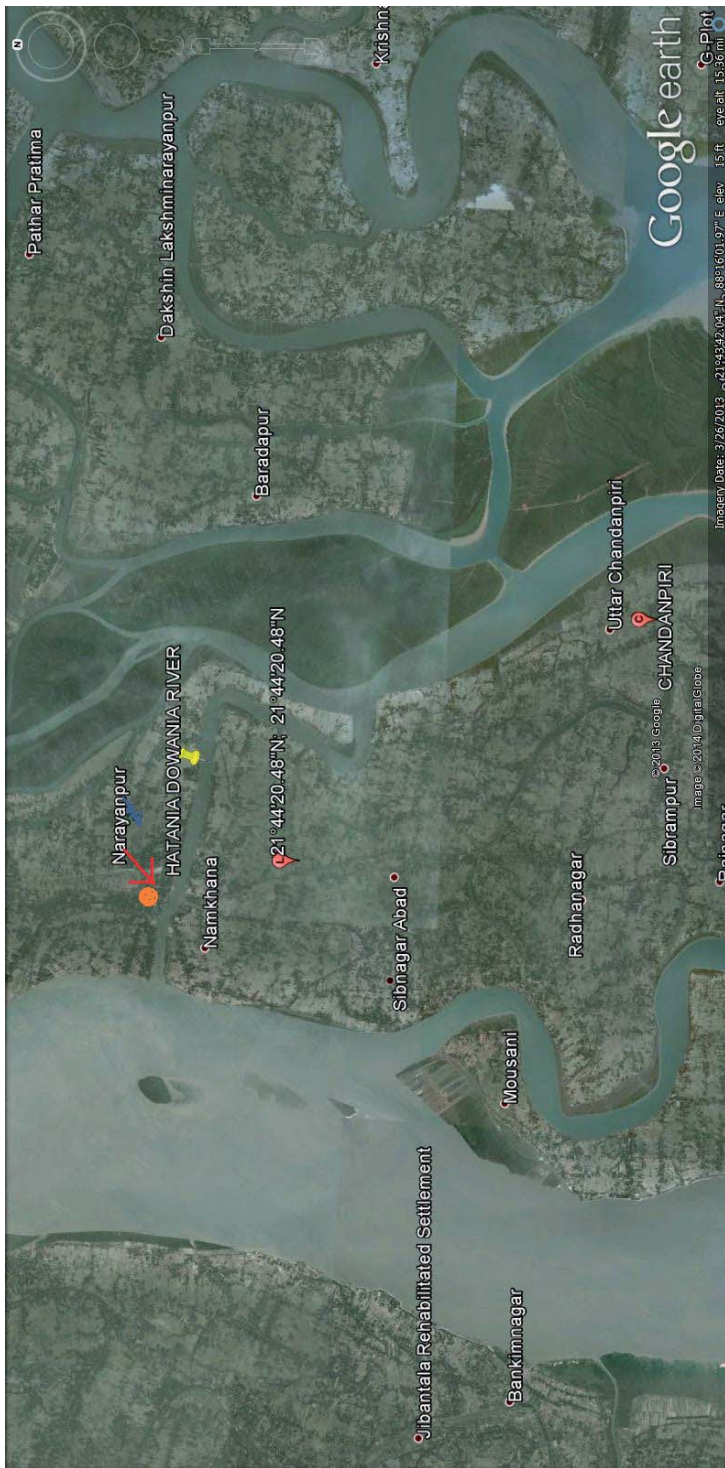
- 159 Patel, V., Rajagopalan, R., *Fishing Community Issues in the Sundarban Tiger Reserve*, op. cit. and Protection, Development, Maintenance and Research in Biosphere Reserves in India, Guidelines and Proforma, Government Of India, New Delhi, 2007, Annexure 1A.
- 160 Management of Indian Sundarban, at the Sundarban Biosphere Reserve Website, at http://www.sundarbanbiosphere.org/html_files/management_indian_sunderban.htm (Last accessed on 13.01.2015).
- 161 Regarding the legal status of a BR, Rajagopalan correctly observes “Significantly, while ‘biosphere reserves’ are not legally a PA [Protected Area] category, they are an important entity since they are formed by a Central government notification under the UNESCO-MAB programme, and are included in India’s list of MPAs submitted to the CBD.” The problem is that the “importance” and “status” ensuing from BR notification does not endow the BR with legal significance and teeth. Thus, the BR is unable to command any statute dedicated to it. This is not to downplay the importance of the BR notification, but to understand the legal meaning and significance.
- 162 Sanyal, P., *Integrated Coastal Zone Management Plan for West Bengal*, op. cit., 103–04.
- 163 Data taken from <http://www.wildbengal.com/urls/initiatives-participatory-pa-management.html>. Seems to be recent, or the latest that the forest department has. No dates are mentioned, however.
- 164 For example, Deshmukh, S. V., and Choudhury, A., *Final Report...* op. cit.
- 165 On 2 November 2013.
- 166 When I use the term ‘belief’, I mean the corpus of faith that involves the supernatural and magical. I also use the term ‘religious belief’ to denote the same thing. I use these terms casually, and merely as convenient labels.
- 167 There is plenty of material on this, largely in Bengali and to some extent in English. For factual elements of the discussion, I have drawn mostly on Ghoshal, I., op. cit. However, I alone am responsible for the analysis.
- 168 I use the term ‘deity’, for the lack of a better word, to mean an entity that is worshipped. I do not mean a god or a goddess, for reasons that will be clear subsequently in the text above.
- 169 Here, I have drawn on Jalais, A., op. cit., particularly 84–88.
- 170 Bonbibi and her brother Shah Jongoli were born to Muslim parents and were empowered by Allah.
- 171 Ghoshal, I., op. cit. It goes without saying that I am using the term “magician” not in the modern sense of an entertainer, but in the anthropological sense (à la Charles Frazer), denoting a person who works magic—a system of spells and procedures that is supposed to influence *and even shape* reality.

- 172 Jalais, A., *The Forest of Tigers*, Routledge, New Delhi, 2010 118–23.
- 173 See Chacraverti, S., *Science in History*, D.P. Chattopadhyaya and Jyoti Bhusan Das Gupta (ed.) *Philosophy and Culture in Indian Civilization*, Vol. 15. *Science, Technology and Philosophy*, Part 1. *Science, Technology, Imperialism and War*. Delhi: Pearson Longman, An Imprint of Pearson Education. 2007, 12–13.
- 174 See Singh, A., Duggal, S., Suttee, A., “*Acanthus ilicifolius* linn.-lesser known medicinal plants with significant pharmacological activities”, *International Journal of Phytomedicine*, 1(2009) 1–3 ; also, Nag, B. (ed.), Sengupta, D., and Sengupta, U., *Dravyagun*, NavapatraProkashan, Calcutta, 1989, 23.
- 175 See Sanyal, P., “Forest and Wildlife Management”, op. cit., 104.
- 176 Ibid. 105.
- 177 See Naskar, K., and Mandal, R., op. cit., 424.
- 178 Ibid.
- 179 The pastoral context of the Rigvedic culture is too well-known. Therefore, citing references for this appears to be redundant.
- 180 Also see Basu, K., “Contact and Conflict in the Sundarbans Biosphere Reserve”, in Mandal, D. (ed.), *Man in Biosphere: A Case Study of Sundarban Biosphere Reserve*, Kolkata, Gyan Publishing House, Kolkata, 2006, 143–44.
- 181 In some areas, even four years have not sufficed. In many parts of the Sundarbans one finds Aila-inundated fields resisting even grass, making feeding the cattle a massive problem.
- 182 For a lucid discussion, see, for example, <http://www.lobstermanspage.net/tides/currents.html> and associated pages.
- 183 See Chatterjee, M., Shankar, D., Sen, D.K., et al. “Tidal variation in the Sundarbans estuarine system, India”, *Journal of Earth System Science*, op. cit.902.
- 184 Naskar, K., and Mandal, R., *Ecology and Biodiversity of Indian Mangroves*, Daya Publishing House, New Delhi, 1999, 200.
- 185 Hunter, W.W., op. cit., 19–20.
- 186 Feeroz, M.M., Begum, S. and Hasan, M. K. (2011).”Fishing with Otters: a Traditional Conservation Practice in Bangladesh”. *Proceedings of XIth International Otter Colloquium, IUCN Otter Spec. Group Bull.* 28A: 14–21 http://www.otterspecialistgroup.org/Bulletin/Volume28A/Feeroz_et_al_2011.html. For short films on this method of fishing, see <http://www.youtube.com/watch?v=Ha6dYkJFVZg> and <http://www.youtube.com/watch?v=lqcMYMuMmQY>
- 187 In the account on nets, I have drawn from Chatterjee, P., op. cit., 33–34, from field observations and discussions, and from other published sources cited in the appropriate places.

- 188 Chatterjee, P. op. cit., 33.
- 189 Pictures borrowed from Fishing with bottom gillnets, at <http://www.fao.org/docrep/003/x6935e/x6935e00.htm>, last accessed 19.01.14.
- 190 It is “craftsmen”; we did not come across or hear of any woman boat-maker.
- 191 I failed to get the scientific name for *bharani*. Nor did I get a chance to see a specimen. *Chakkeora*, as we have seen, is *Sonneratia caseolaris*.
- 192 Naskar, K., and Mandal, R., op. cit., 439.
- 193 Source: oral testimony and personal observation.
- 194 Source: oral testimony and Naskar, K., and Mandal, R., op. cit., 439.
- 195 As mentioned earlier, the fisher carries ice for preserving his fish.
- 196 Source: The fishers’ statements in the workshops.
- 197 We could not identify *baorchingri* (a shrimp) and *java bhola*. Nor could the fishers show us a sample.
- 198 One would wonder whether we have tried to check the subjective impressions of fishers against hard catch statistics. Official catch statistics are provided by the West Bengal Fisheries Department. Unfortunately, there is good reason to believe that the catch statistics are possibly not worth the paper they are written on.
- 199 See, for example, Danda, A. A., Sriskanthan, G., Ghosh, A., Bandyopadhyay, J., and Hazra, S., op. cit., 7.
- 200 Niyogi, S., *Stop picnics, start eco-tourism in Sundarbans: Bengal forest dept*, Times of India, 10 June 2012.
- 201 Hazra, S., Samanta, K., Mukhopadhyay, A., and Akhand, A., *Temporal Change Detection (2001-2008) Study of Sundarban (Final Report)*, School of Oceanographic Studies, Jadavpur University, Kolkata, 2010, 5.
- 202 Ibid. 57.
- 203 Held on 28 November 2013.
- 204 Held on 26 November 2013.
- 205 See the pictures and map at the end of the chapter.

APPENDIX I: LOCATIONS—FIELD VISITS, WORKSHOPS,¹ AND SOME FISHING SITES

1. Narayanpur, Visited on 18 and 20 October 2013



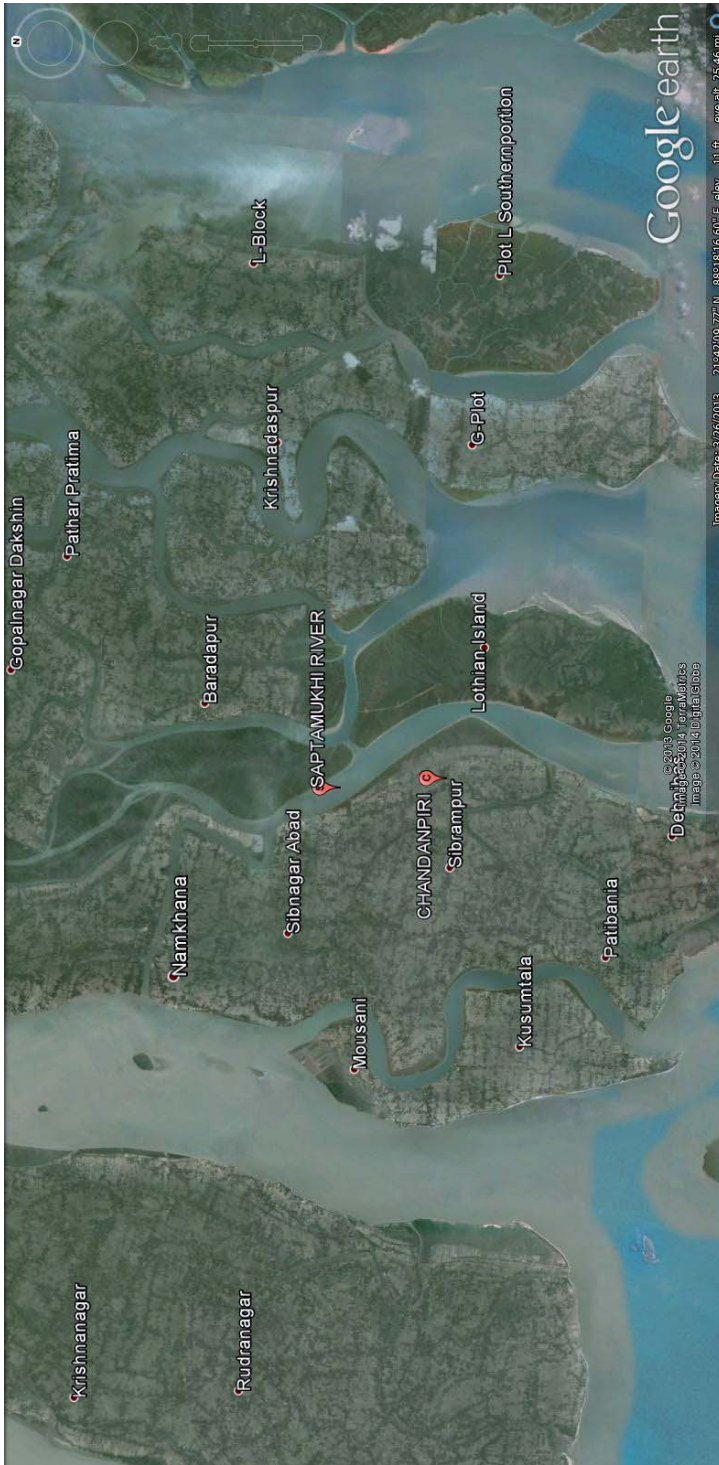
ⁱ This refers to four the out of seven workshops, the material of which has been repeatedly used in this study

2. Chandanpiri, Visited on 19 October 2013

Map 1: Chandanpiri



Map 2: Sapthamukhi River, where the fishers of Chandanpuri fish

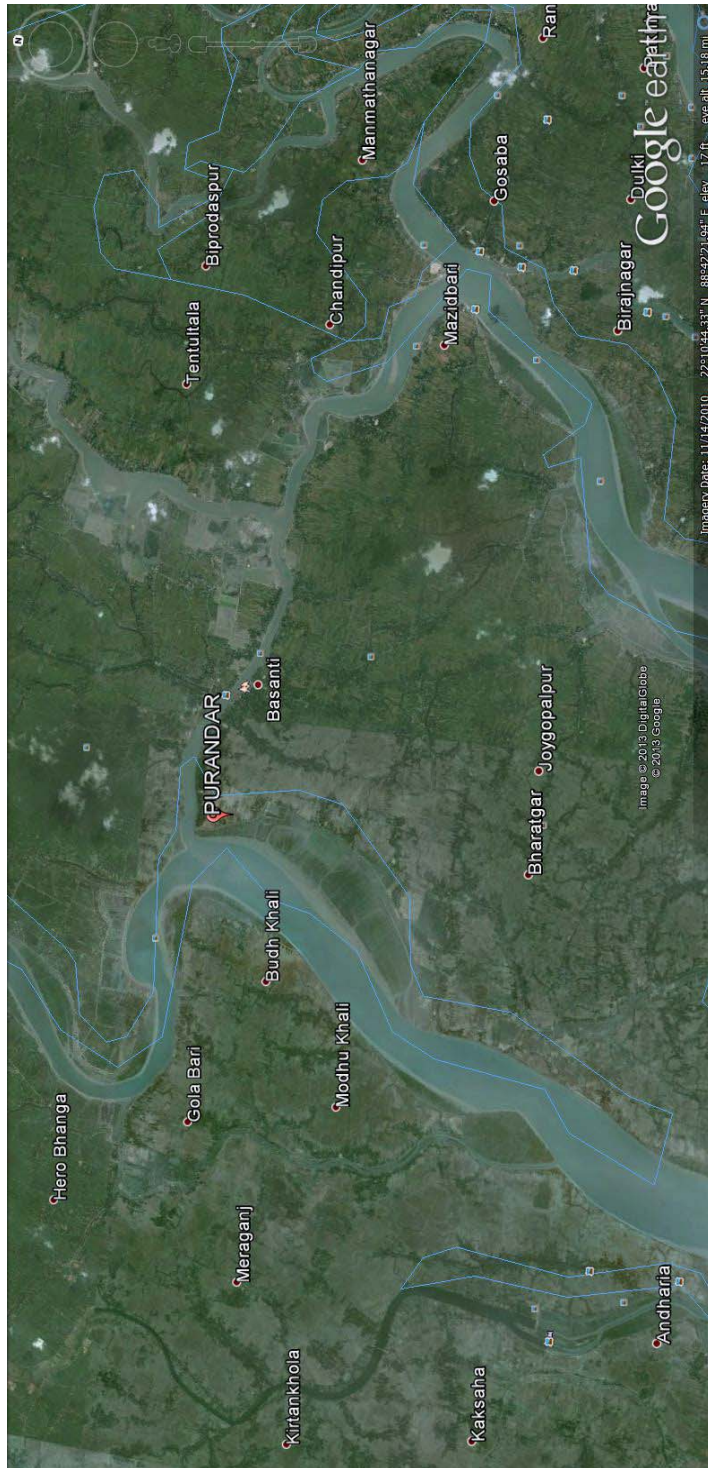


3. Purandar, Visited on 27 October 2013

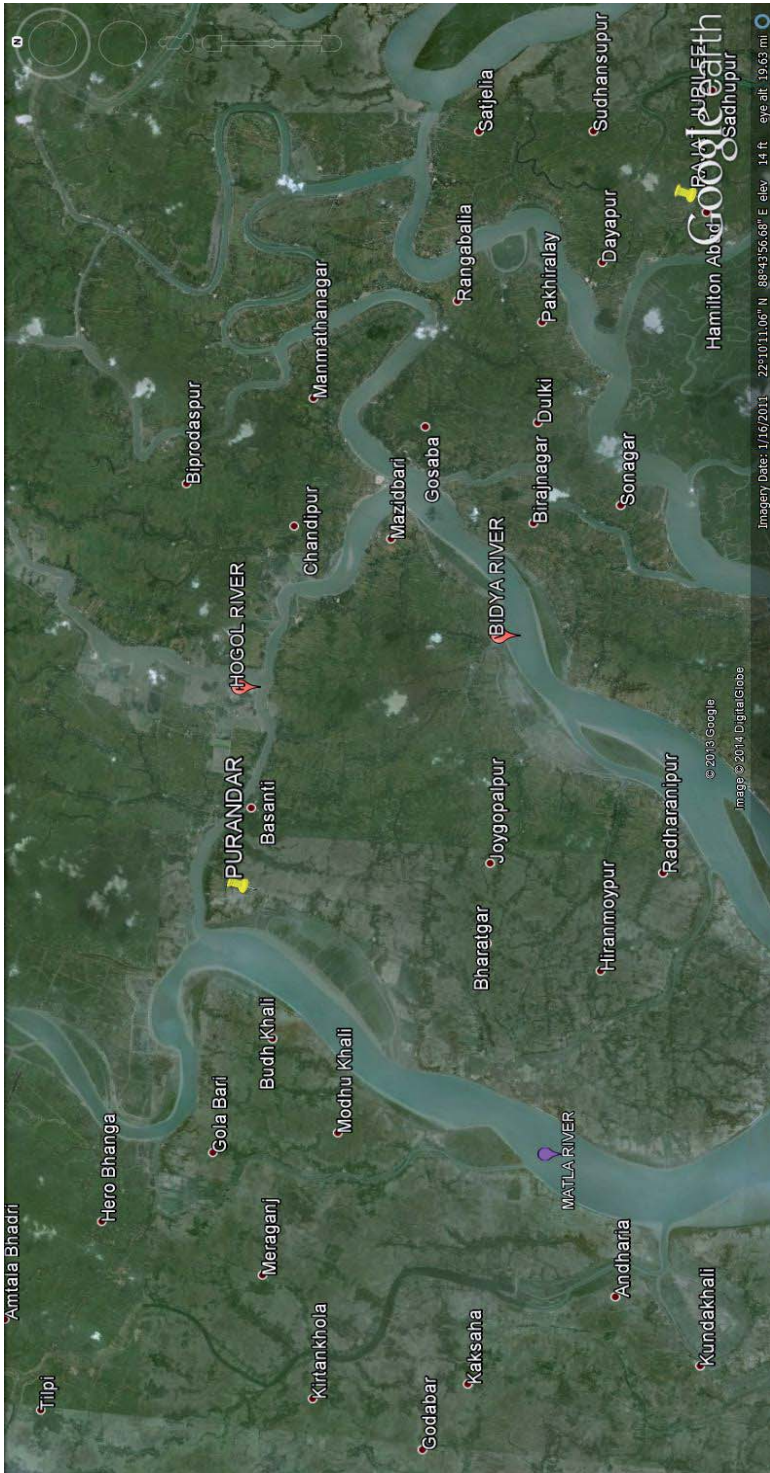
Map 3: Purandar, General Location



Map 4: Purandar, close-up



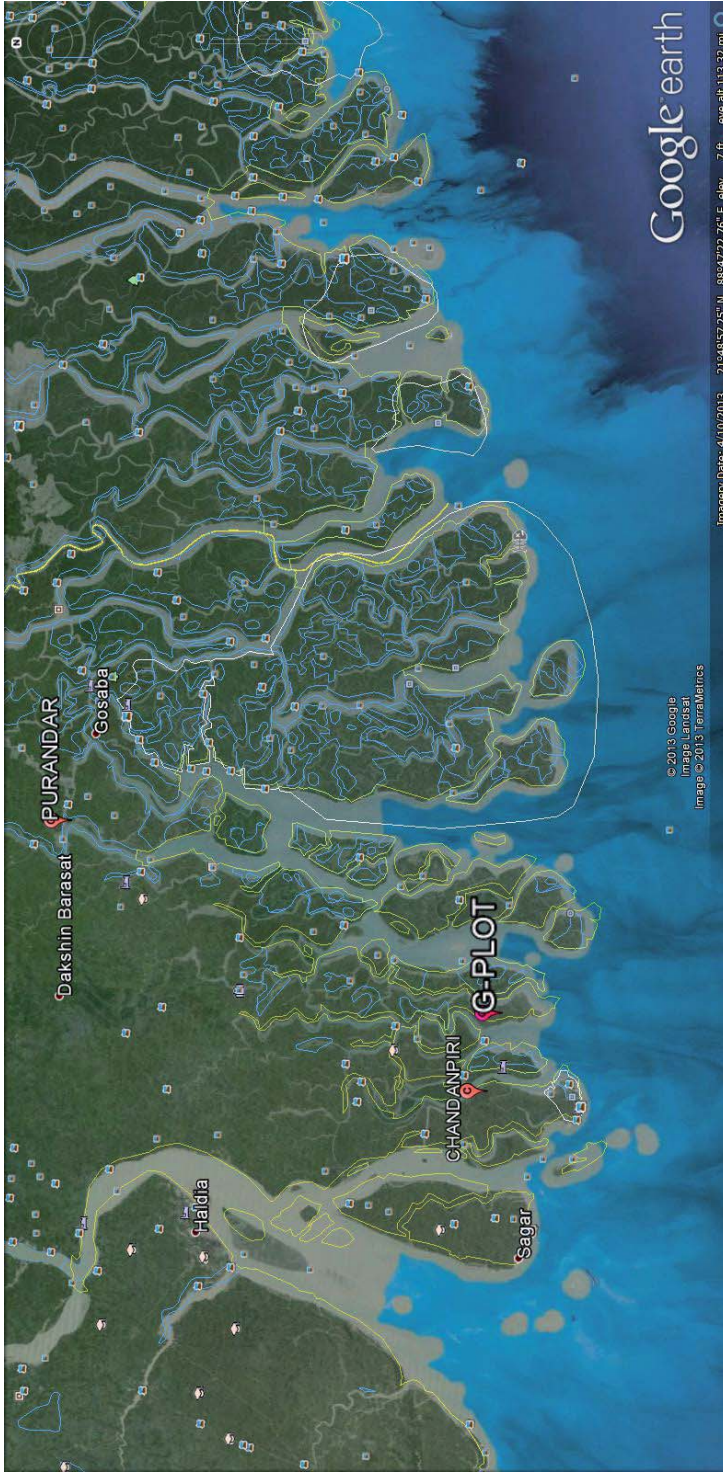
Map 5: Matla, Hogol and Bidya Rivers, where many fishers of Purandar fish



The riparian fishers at Purandar fished in the Matla, Hogol, and Bidya Rivers

4. G-Plot, Visited on 27–28 October 2013

Map 6: G-Plot: General Location



Map 7: G-Plot: close-up

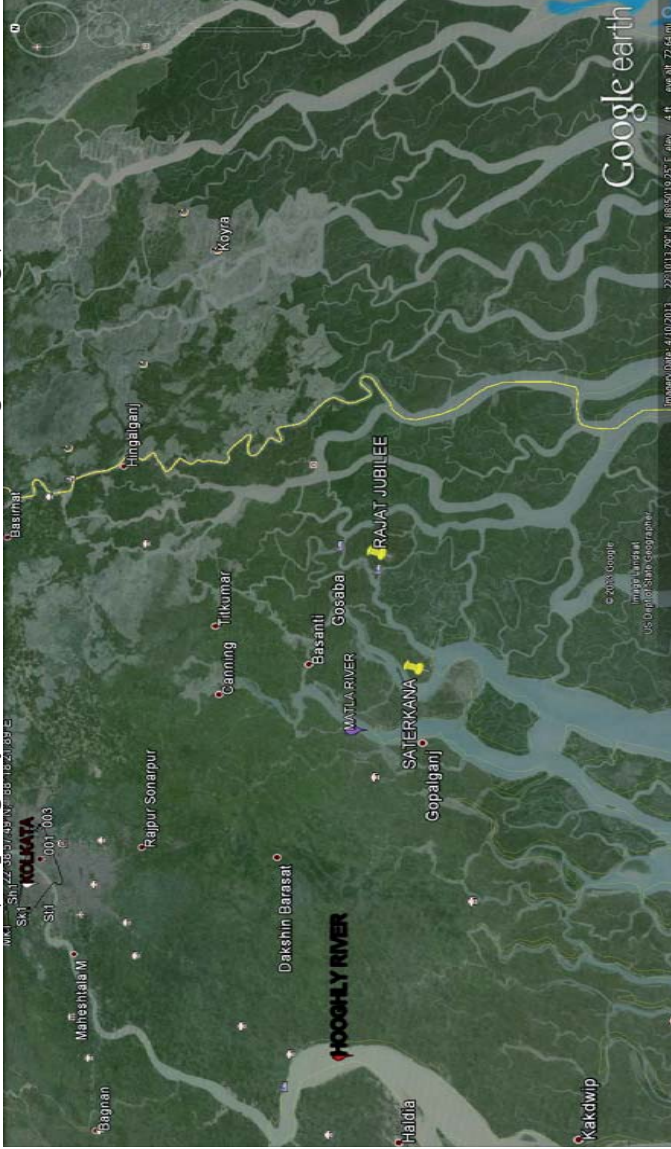


5. Sagar Island, Visited on 29 November-1 December 2013

Map 7: G-Plot: close-up



6. Three workshop sites, Rajat Jubilee, Saterkona, and Canning, Visted During 26-28 November 2013
(map slightly tilted and off-scale for larger coverage)

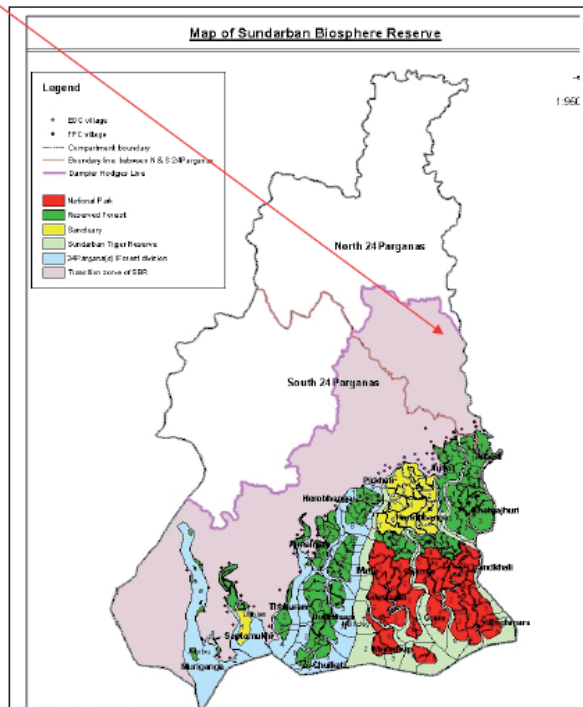
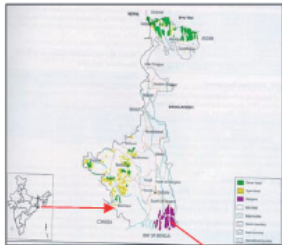


SOME INFORMATION ON THE WORKSHOP SITES

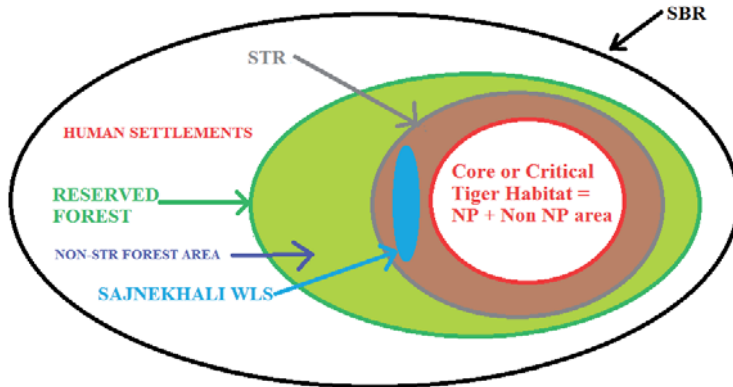
The first workshop was held on 26 November 2013 at Rajat Jubilee village in Lahirpur *gram panchayat*, located on Satjelia Island in Gosaba community development block. Saterkona village in Amlameti Area on Satyanaryanpur Island comes under the Gosaba community development block. The second workshop was held here on 27 November 2013. The third workshop was held in the fish market in Canning town, located in Canning I community development block on 28 November 2013.

APPENDIX II: SBR: BASIC MAP AND CONCEPTUAL DIAGRAM

1. Sunderban Biosphere Reserve - Location



2. Conceptual diagram of SBR, STR...



NP: National Park
 — Boundary of STR
 — Boundary of SBR

SBR = RESERVED FOREST + HUMAN SETTLEMENTS
RESERVED FOREST = STR + NON-STR FOREST AREA
STR = BUFFER + CORE + SAJNEKHALI WLS
Or BUFFER = STR - (CORE + SAJNEKHALI WLS)

Areas in which fishing is prohibited:

Core of STR/NP, and Sanjnekhal wildlife sanctuary

Areas in which fishing is permitted:

(i) Buffer Area of STR: boat licence certificates (BLCs)/passes needed, and (ii) in the reserve forest: BLCs/ passes needed

APPENDIX III: WOMEN FISHERS IN THE SUNDARBANS

A SHORT NOTE

Sundarbans is one place where the term “fisherman” can often mislead.

Here a substantial proportion of fishers are women. Moreover, quite often the woman is a boat-fisher in her own right. Take, for example, Chandanpiri.

In Chandanpiri, the fishing team very often consists of a couple, husband and wife, who take their small family boat out to the Saptamukhi River. Here, the woman is not *assisting* her husband; she is playing an *equal* role. In the picture below the woman is not helping her husband to lift the net; she is lifting the net out of the water along with her husband. I wish I had more and better pictures of the women’s role in fishing and all its implications, but I was too engrossed with the act of fishing to attend to this aspect of the matter.



The couple are lifting the heavy net out of the water

Couples not only fish together, they face together the considerable dangers of the estuarine waters. About a month before our visit to Chandanpiri (19 October 2013), a crocodile attacked a fisher of a nearby village. As the crocodile was pulling the husband under, the wife attacked the crocodile with her bare hands and struck the crocodile where it is most vulnerable, its eyes. After a violent battle, the couple succeeded in extricating themselves. The man lost a leg, but lived.

It is rare but by no means unknown for a separated woman going to the river accompanied by a woman partner.



Women accompany go to the forest in the STR also. There also they might go as an all-woman team of two or three. It is, however, not usual for a woman to stay the night in the deep forest. However, occasionally a fishing team using *khalpata* net in the deep forest might include married couples. Such a team might stay a night or two in the forest.

They are out for shrimps

The active role of women in fishing invokes some important women- and gender-issues (including the question of women's health), but we were in no position to take that up in detail in this research. One serious weakness

of this research was that we could not talk at length with the women fishers. However, that was mostly (though not entirely) because the women do not have the time: when they are not fishing they are busy with their homes.

THE SUNDARBANS FISHERS Coping in an Overly Stressed Mangrove Estuary

The fishing community of the Sundarbans are the human group most at home in the mud-slush-water-forest environment of this famous mangrove estuary. Their skills, knowledge, and technique have developed in response to a challenging environment. Yet, of the countless studies on the various aspects of this eco-region, there are exceedingly few that have studied the Sundarbans fisher in his/her ecological, historical and demographic context—as a key stakeholder in an environment under considerable stress. The present study seeks to reduce this lacuna a little. Its object is not merely to examine and analyse, but also to identify means, both tradition-based and innovative, which might contribute to protect the environment, improve economic conditions, and usher in people-based governance of resources.



ICSF is an international NGO working on issues that concern fishworkers the world over. It is in status with the Economic and Social Council of the UN and is on ILO's Special List of Non-Governmental International Organizations. It also has Liaison Status with FAO. As a global network of community organizers, teachers, technicians, researchers and scientists, ICSF's activities encompass monitoring and research, exchange and training, campaigns and action, as well as communications.