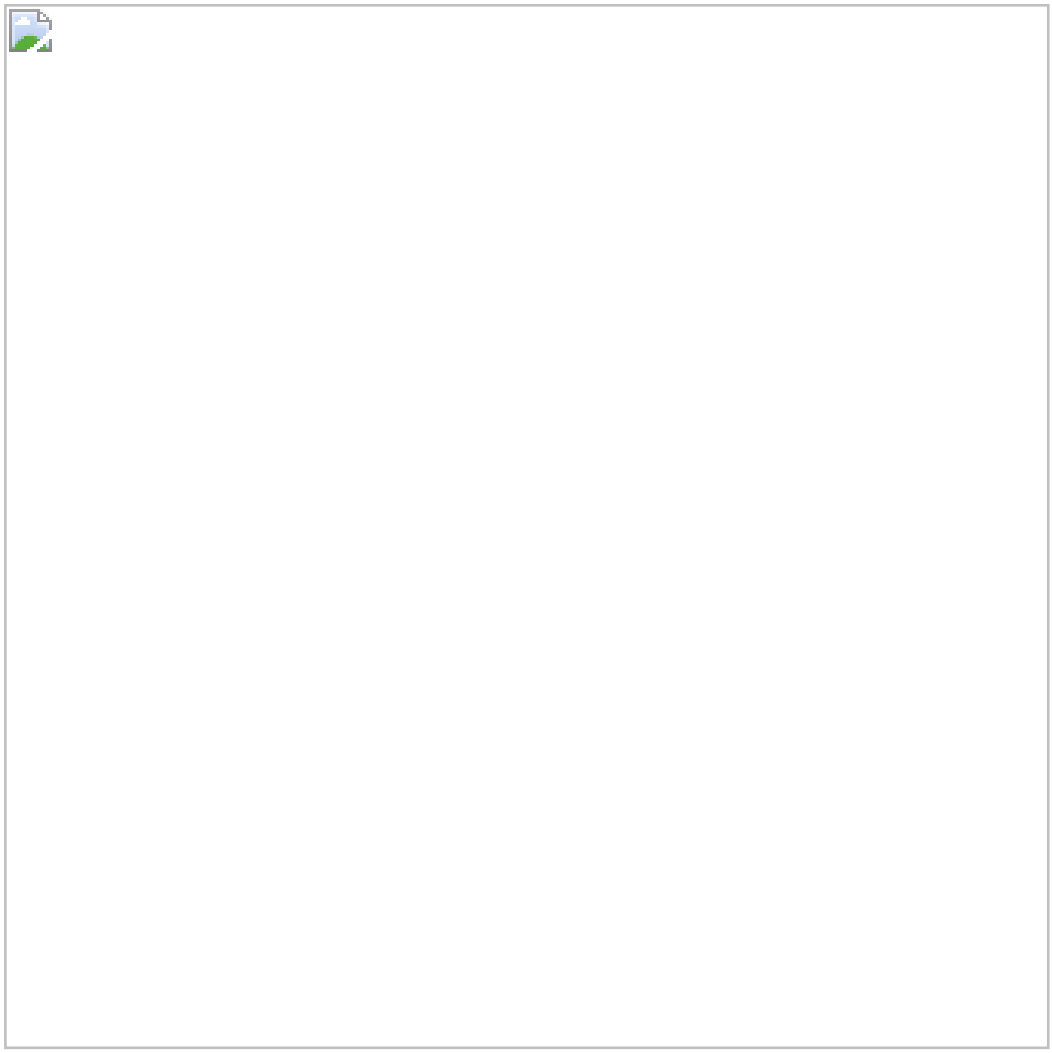

Ecopsychosocial Aspects of Human–Tiger Conflict: An Ethnographic Study of Tiger Widows of Sundarban Delta, India

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Ecopsychosocial Aspects of Human–Tiger Conflict: An Ethnographic Study of Tiger Widows of Sundarban Delta, India

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ABSTRACT

AIMS: Human–tiger conflict (HTC) is a serious public health issue in Sundarban Reserve Forest, India. HTC is a continued concern for the significant mortality and morbidity of both human and tiger population. This is the first comprehensive report on Sundarban tiger–human conflicts and its impact on widows whose husbands were killed by tigers. The study attempts to explore the situation analysis of HTC and the aftermath of the incident including bereavement and coping, the cultural stigma related to being killed by a tiger and the consequent discrimination, deprivation, and social rejection, and the impact on the mental health of the tiger-widows.

METHODS: This is a three-phase ethnographic research with a mix of quantitative and qualitative methods. In the first phase, a door-to-door village survey (3,084 households) was carried out in two villages of Sundarban, which are adjacent to the Reserve Forest, in which the incidents of human–animal conflicts and the 65 tiger-widows identified were documented. In the second phase, the 65 tiger-widows were studied to explore the ecodemography of tiger attacks and tiger-widows alongside the stigma issue by using a stigma questionnaire ($n = 49$). The stigma burden was compared with normal widows ($n = 21$) and snake-bite widows ($n = 18$). In the third phase, the psychosocial and cultural dimensions related to tiger attacks were studied by using in-depth interviews (IDI) of the tiger-widows, focus-group discussions (FGD), and participatory mapping in the community. Clinical examinations of the mental health of the widows were also carried out in this phase.

RESULTS: The mean age of the 65 widows was 43.49 ± 9.58 years. Of this, 12.3% of the widows had remarried and only 4.6% of the widows were literate. In all, 67.2% of all tiger attacks occurred as a result of illegal forest entry. The main livelihood of the former husbands of the widows were 43.8% wood cutting, 28.1% fishing, 10.9% crab catching, 9.4% tiger prawn seed (juvenile prawn), and 4.7% honey collection. The maximum number of attacks took place in the months of December (24.6%) and November (13.9%). The majority of incidences happened during the morning hours (47.7%) of the day. Of the cases, 86.1% were attacked while the person was engaged in livelihood activity. In all, 57.4% widows are recorded as living "below the poverty line". Currently, 45.5% widows earn their living by laboring work followed by forest-based livelihood activities (30%) and begging (5.2%). Tiger-widows differed significantly ($P < 0.001$) from both normal and snake-bite widows on all stigma cluster scores and the total score. Of the tiger-widows, 44% were shown to be suffering from some designated mental illness. IDIs and FGDs helped to unfold the cultural construct of stigma related to tiger-killing. This can be seen in how the tiger-widows' quality of life has been negatively impacted in the way their economic and social security, health, remarriage opportunities, and child upbringing is restricted, along with a multitude of posttrauma psychological scars, deprivation, abuse, and exploitation.

CONCLUSIONS: The study highlights the multitude of sufferings experienced by the tiger-widows including the issues of the gender aspect of HTC and the ecopsychiatric risk factors of tiger attacks combined with the background of local sociocultural beliefs and practices. It is well known that a similar problem also exists in Bangladesh Sundarban as well, in which case it may be that a strong and practical administrative strategy for sustainable alternative income generation and a balanced conservation policy with integrated participatory forest management may go to save both human and tiger. A community ecocultural mental health program involving all the stakeholders (community, gram panchayat, and forest department) and aiming to address and even eradicate the cultural stigma of tiger attack may help to reduce the stigma burden and socicultural discrimination currently experienced by the tiger-widows.

KEYWORDS: tiger-widows, stigma of tiger attack, human–tiger conflict, gender and human–animal conflict, Sundarban, conservation, ethnography, ecopsychiatry

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Introduction

Human–wildlife conflict (HWC) is a serious global problem which is causing severe harm. Alongside the loss of human life and property, there is also the very real threat to the survival of many endangered species.[1] HWCs these days are also recognized as a worldwide conservation problem as well.[2] Distefano[3] has provided us a set of contributory factors for increasing HWC worldwide, such as human population growth and subsequent encroachment into wildlife habitats, the changing pattern of land use, species habitat loss,

ecotourism, increasing livestock populations, abundance of wild prey, increasing wildlife population as a result of conservation programs, as well as the impact of climate change.

In India, as elsewhere, HWC is also posing a serious challenge and is reported across the country in a variety of forms, such as the monkey menace in urban areas, crop raiding by ungulates and wild pigs, depredation by elephants, and cattle and human killing by tigers and leopards in rural areas. There is also damage to agricultural crops and property. However, the killing of livestock and human beings is some of the worst forms of recorded human–animal conflict.[4] Human–elephant conflict is a growing problem in North East India,[5] and it is reported that between 1980 and 2003, more than 1,150 humans and 370 elephants died as a result.[6] The level of HWC in northeast India is becoming a huge conservational challenge as the incidences of conflicts between mega-vertebrates (elephants, tigers, rhinos, and buffalos) and humans are increasing largely because of the increase in human activity at and around the buffer zone areas of the reserve forests.[7] The high density of population pockets in the close vicinity of reserve forests is proving to be a key factor for HWC,[8] and this has been borne out by the reporting in India that 69% of the reserves have an adjoining population of more than three million people who are engaged in agriculture, livestock grazing, and forest product collection.[9]

The incidence of human–tiger conflicts (HTCs) is equally alarming in India. A total of 822 cases of human casualties were reported during the period of 1990–2009 from the following six states of India as: Rajasthan, 7; Orissa, 25; Uttarakhand, 51; Madhya Pradesh, 133; Uttar Pradesh, 161; and West Bengal, 445. Of these attacks, male casualties were far higher (79.8%) than female casualties (20.2%).[10] In the Gangetic delta of India, the Sundarban mangrove forest (shared both by India and Bangladesh) is well known for HTC over many decades.[11] It is reported that in Bangladesh Sundarban, a total of 401 people (about 24 people per year) were killed by the tigers, whereas 41 tigers (about three tigers per year) were killed by humans during 1984–2000.[12] The nature and main causes of HTC in Sundarban is somewhat different to that usually seen in HWC, namely, in most of the cases, this is not due to tiger raiding but conversely humans raiding into the tiger habitat, ie, the overlapping of tiger and human spaces.

To the local resident, the tiger and Sundarban are almost synonymous,[13] and this landscape has a long sociopolitical history of HTCs.[14] Tiger attacks in the communities around the Sundarban Reserve Forest (SRF) and also during forest exploration are a constant threat.[15] A significant proportion of population from the villages of Sundarban depends on the resources found in the forest, and it is during their livelihood activities while in the forest that they can become the victim of tiger attacks. Human–animal conflicts, especially tiger–human encounters, are a regular event in Sundarban, and every year, about 40 people are attacked by tigers.[16] Most of the forest goers are landless poor people, the husband being the only breadwinner of the family and should he suffer an untimely death, the widow is then thrown into deep poverty and hardship. In a society where widows are already stigmatized and as a result of this have low social security and status, the tiger-killings have added further suffering to widows, and this is because of the local strong cultural stigma relating to such deaths. Currently, there are about 3,000 such widows in Sundarban.[17] The present paper attempts to highlight some of the damaging impact of HTC in the Indian Sundarban, in the context of local cultural landscape, namely, the hidden and human dimension of HTCs. Hidden impacts of HTC mainly include the impact on the survivors in terms of health, both physical and psychosocial, disruption of livelihoods and food insecurity, and opportunity and transaction costs of conflict.[18] Human dimensions involve peoples' values, beliefs, attitudes, social norms, and behavior related to wildlife relationships including conflicts, controversies, and conservation.[19] This is the first comprehensive psychosocial report on these widows, who are locally named as *Bag-Bidhoba* (tiger-widow), in two Mouzas (**1**) adjacent to Sundarban Tiger Reserve (STR), India.

The Land and the People

Sundarban bioreserve. Sundarban is the world's largest prograding delta at the mouth of three great rivers, the Ganges, Brahmaputra, and Meghna, which converge at the basin of the Bay of Bengal. It covers an area of 10,284 km^2, of which 41.5% is in India and 58.5% in Bangladesh (Fig. 1). The forest extends over 200 islands, separated by 15 major rivers and 400 interconnected network of tidal waterways that support the largest tidal mangrove forest in the world. The name Sundarban (Beautiful Forest) is derived from the mangrove tree *Heritiera fomes*, which has spectacular yellow-orange flowers, and is locally called *Sundari*.

The Indian Sundarban (Fig. 2) lies between 21°31' to 22°53'N and 88°37 to 89°09'E and comprises 19 community development blocks – 13 under South 24 Parganas and 6 under North 24 Parganas district (covering 190 Gram Panchayats [GPs] in 1,064 villages with a total area of 9,630 km^2) of West Bengal state. The Sundarban bioreserve is one of the most important biodiversity (both aquatic and terrestrial) treasures of the world with approximately 84 different mangroves and mangrove-associated vegetation as well as over 1,500 species of fauna.[20] It is the largest tidal halophytic mangrove reserve in the world, and UNESCO declared Sundarban National Park a World Heritage site in 1987 (Bangladesh Sundarban in 1997). In 1989 it was further designated as a Biosphere Reserve under the UNESCO Man and Biosphere Programme. The Sundarban Biosphere Reserve, which covers 9,630 km^2 and includes 5,400 km^2 of nonforest area, covers the delta south to the Dampier-Hodges line and includes the SRF, Tiger Reserve, and human settlements.

Sundarban tiger reserve. Established in 1973, it covers an area of 2,584.89 km^2 (forest cover 1,680 km^2 and water cover 905 km^2) and is located a little south of the Tropic of

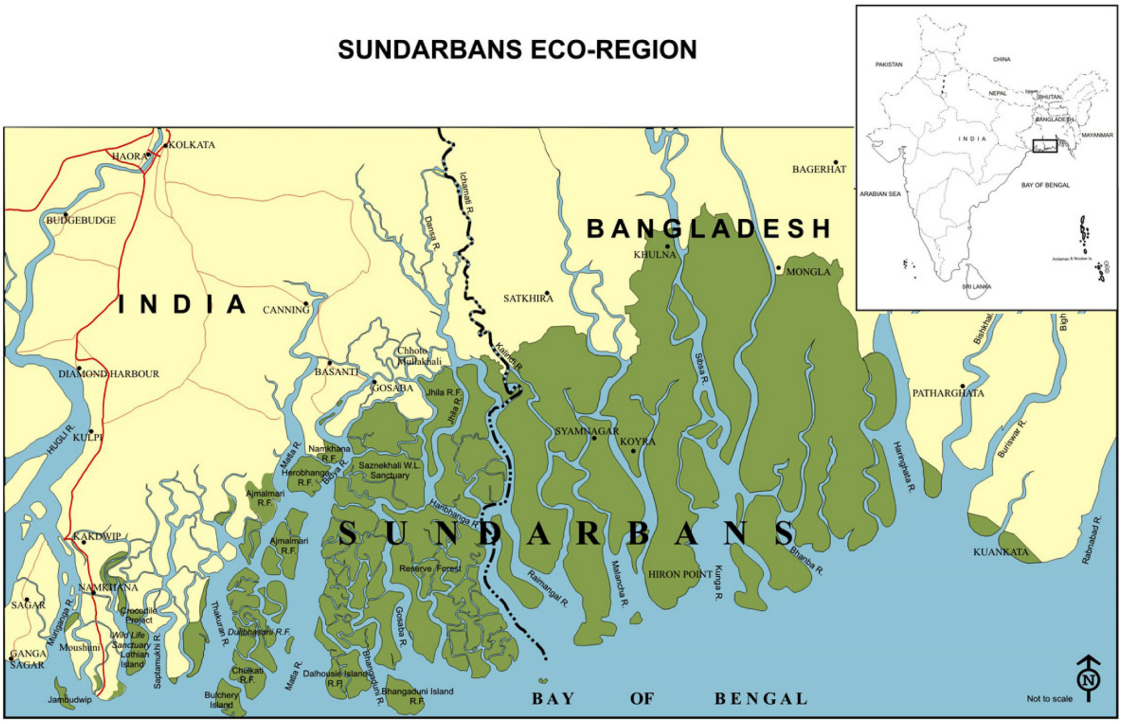

Figure 1. The combined Sundarban.

Cancer between 21°32'–22°40' N and 88°05'–88°10' E. It has three designated zones: *core* or *wilderness zone*: 1,330.12 km^2; *primitive zone* (inside core): 124.40 km^2; *subsidiary wilderness zone*: 241.07 km^2, and *buffer zone* (1,255 km^2) (Fig. 3). The area supports the subcontinent's largest population of the critically endangered species of Royal Bengal Tigers (*Panthera tigris tigris*), which are well known for their reputation as man-eaters and are also well known for their long-distance swimming and extraordinary migrating behavior from island to island (even between India and Bangladesh), expert climbing, and ecoadaptive behaviors with dynamic intertidal habitat change (amphibious life).[21] A recent camera trap count shows the number of tigers in the region at 103, ie, 20 tiger per every 20 km^2 of the STR.[22] The north-west side of the STR is surrounded by many villages (0.22 million people are living in 66 mouzas within only 2 km of the Tiger Reserve buffer zone), thus making the reserve ever more vulnerable to ever increasing biotic interference in the form of livelihood forest explorations, illegal fishing, timber smuggling, and poaching.[23]

The official record shows that on average 10–15 people are annually killed by tigers in the STR.[24] In Bangladesh Sundarban, there are generally thought to be anywhere between 335 and 500 tigers (2004 count and annual monitoring since 2007),[25] and on average, about 80 people are killed annually by tigers.[26] Straying of tigers into the close vicinity of fringe villages is also raising the potential for HTCs[27] and indeed is now becoming quite frequent in both the Sundarbans. In Indian Sundarban, the annual mean frequency of tiger straying is 15.8 during the period 2002–2009.[24] In Bangladesh, between July 2008 and 2010, tigers visited human habitats 123 times, of those, five died from retaliatory killing, while 51 people and 36 livestock were killed by the tigers.[28]

Study block. Gosaba block (Fig. 4) is at the extreme eastern corner of the Sundarban region close to the international border with Bangladesh. It is the last inhabited island before reaching the deep Sundarban forest. It is located at 22°16' N 88°80' E and has an average elevation of 13 feet from the sea level. It has 14 GPs, democratically elected local self-government units, of which 8 GPs are facing the STR buffer zone (and partly the Core area). They are separated by the Gomdi, Gomor, Sajina, and Melmel rivers. The 2001 census showed that it has a population of 222,764 (male 113,827 and female 108,937). Gosaba is the most poor and underdeveloped block in Sundarban and has a significant proportion of its population living out an existence on forest resources.

People and livelihoods. Sundarban is one of the poorest and highest population density regions of South Asia, with an estimated 8 million people (India and Bangladesh combined) dependent on its fragile ecosystem. The population of Sundarban is heterogeneous, with a high influx of immigration from other parts of India and Bangladesh. This unprecedented population growth in the region (from 1.16 million in 1951 to 3.76 million in 2001) has not only reduced the amount per capita of cultivable land but has also created both overcrowding and high rates of unemployment. In addition to the challenges facing the people of this region and the subdivision and fragmentation of landholding either through property division or climatic destruction (land erosion), the

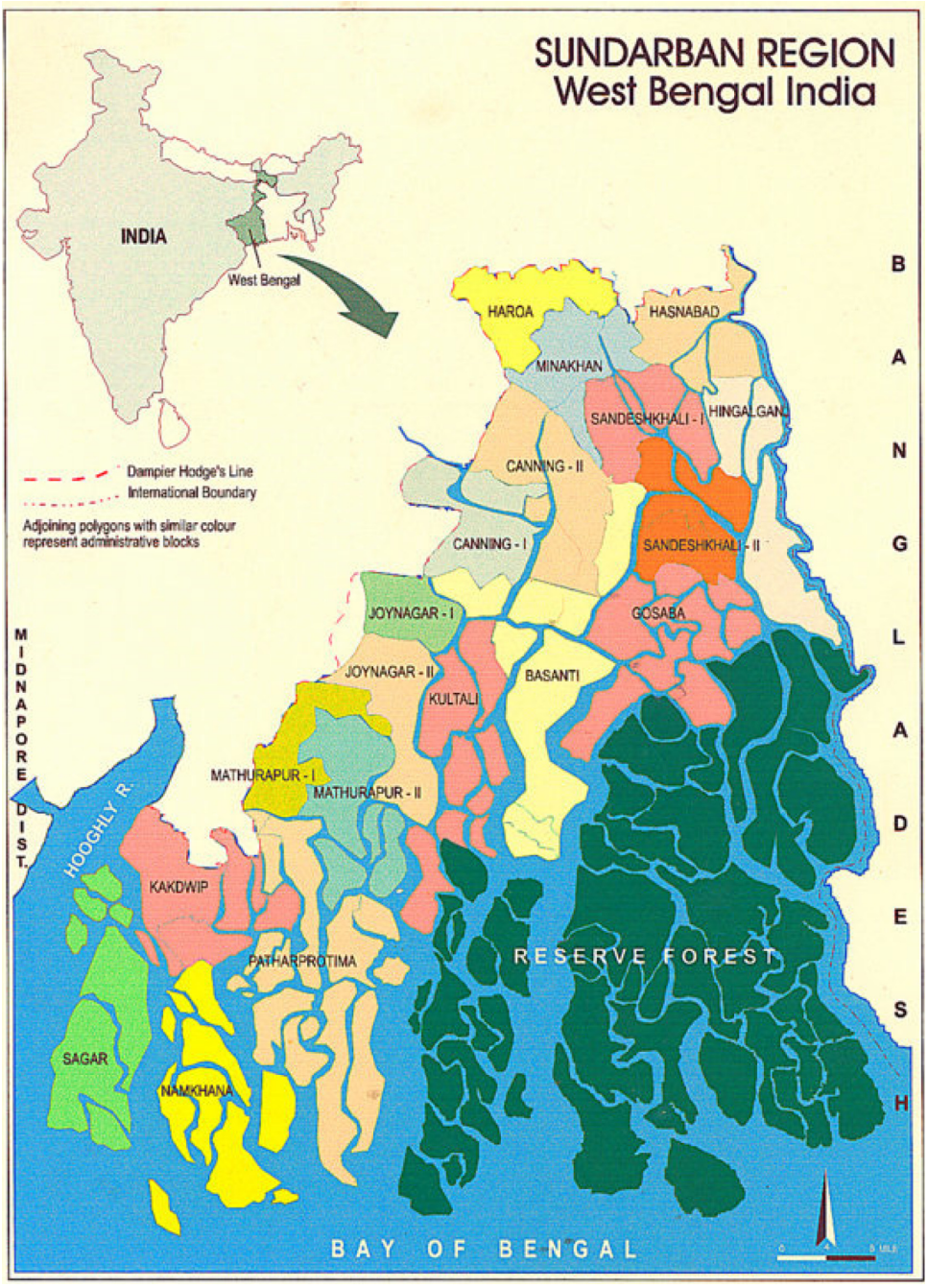

Figure 2. Indian Sundarban (not to scale).

landed households have gradually turned marginal and were no longer able to be sustained through agriculture alone. In fact, the agricultural land area, measured in 2009, had shrunk from 2,149.615 km^2 in 2002 to 1,691 km^2, a loss of 246 km^2. As a consequence of this, fishing and other forest-based living have become the occupation for these islanders.

The people of Sundarban live in an ecologically vulnerable environment. The area is prone to cyclones, and often supercyclones will occur.[29] It is monsoonal and low-lying with many human settlements located alongside the waterways and coastline. The man-made river embankment (3,500 km) serves both as a flood defense wall and also to protect the agricultural land and human settlements from diurnal tidal surges. The mean tidal amplitude of Sundarban region is between 5.22 mm and 3.14 mm/year, which is much higher than the national average of 1.06–1.75 mm/year.[30] The embankment built to hold these tides back often ruptures and pushes saline water on to the agricultural land. This causes serious damage to crops, property, and the lives of inhabitants, often leading to internal displacement, social vulnerabilities, and livelihood crisis.[31]

Hindus are the predominant religious group in the region, followed by Muslims, and 36.5% of the population belongs to a scheduled caste and tribe. Seventy-eight percent of the economy and 65% of workers are dependent on agriculture (mainly

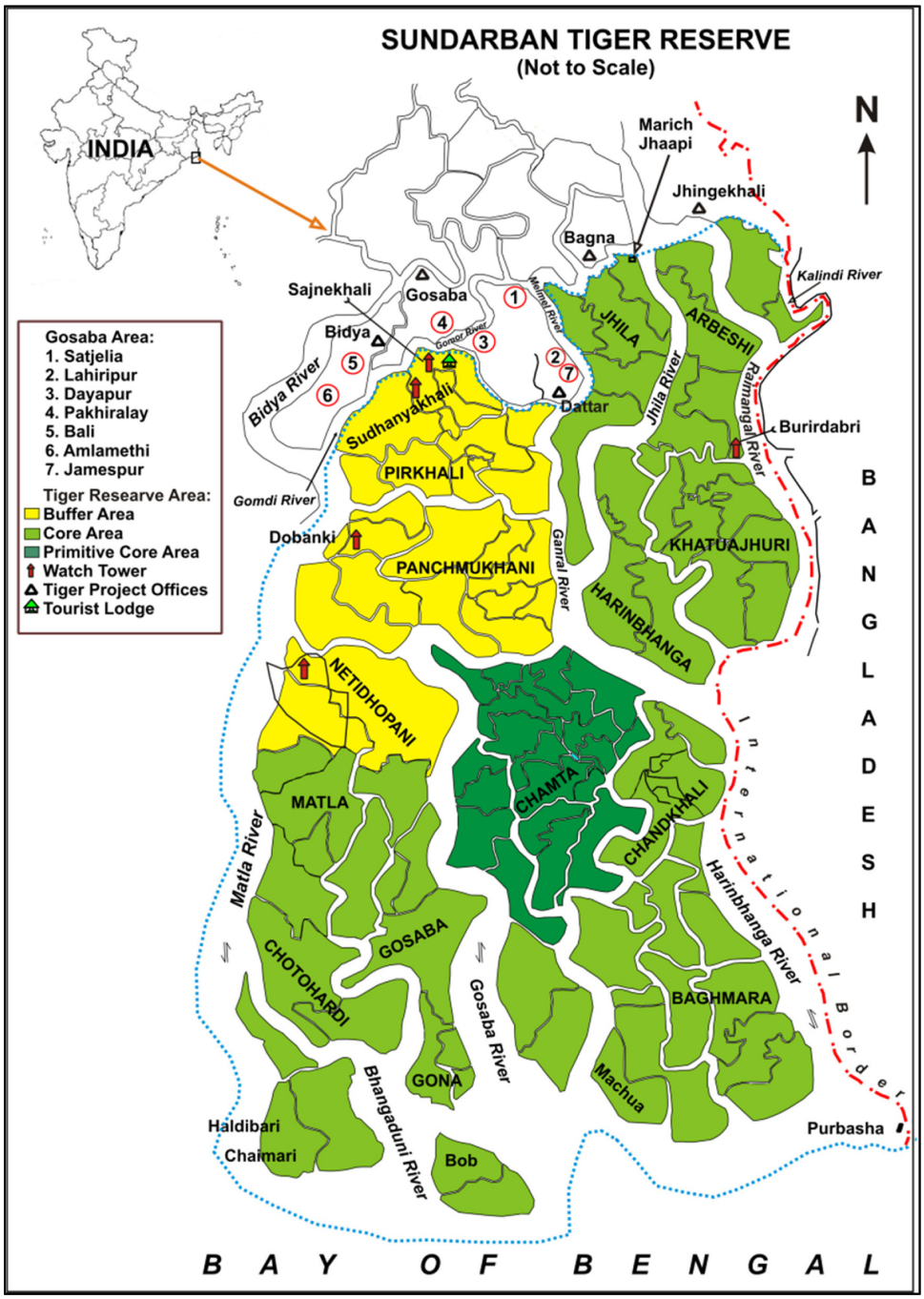

Figure 3. STR with study mouzas (1, 2).

rain-fed mono-cropping). Of the workers, 50% are landless agricultural laborers and marginal farmers. This high percentage of landless agricultural laborers substantiates the level of poverty in the region. It has exerted a negative impact on the economy of the fringe population as well. More than half of the workers (52.3%) in agriculture and fishing are daily-wage laborers. Agriculture is hard and risky work with low cropping intensity because of the high salinity to be found in the soil, irrigation constraints (only 12% cultivable land is irrigated), frequent seasonal variations, and climatic incidents resulting in crop failure.[32,33] During the agricultural lean season, more people resort to forest-based livelihood activities (fishing and collection of prawn seeds and honey) and subsequently risking their lives to man-eating tigers, crocodiles, and sharks. Low prey-density and physical disability also encourages tigers to stray into the fringe villages (Fig. 5), which precipitates both livestock killing and HTC (**2**). During the years 2004–2006, the villages that evidenced tiger straying (more than once) is marked in Figure 2 (no. 3–7).

Sundarban then is a severely underdeveloped region with a very poor quality of life for its inhabitants.[34] Forty percent of the population of South 24 Parganas district lives within the

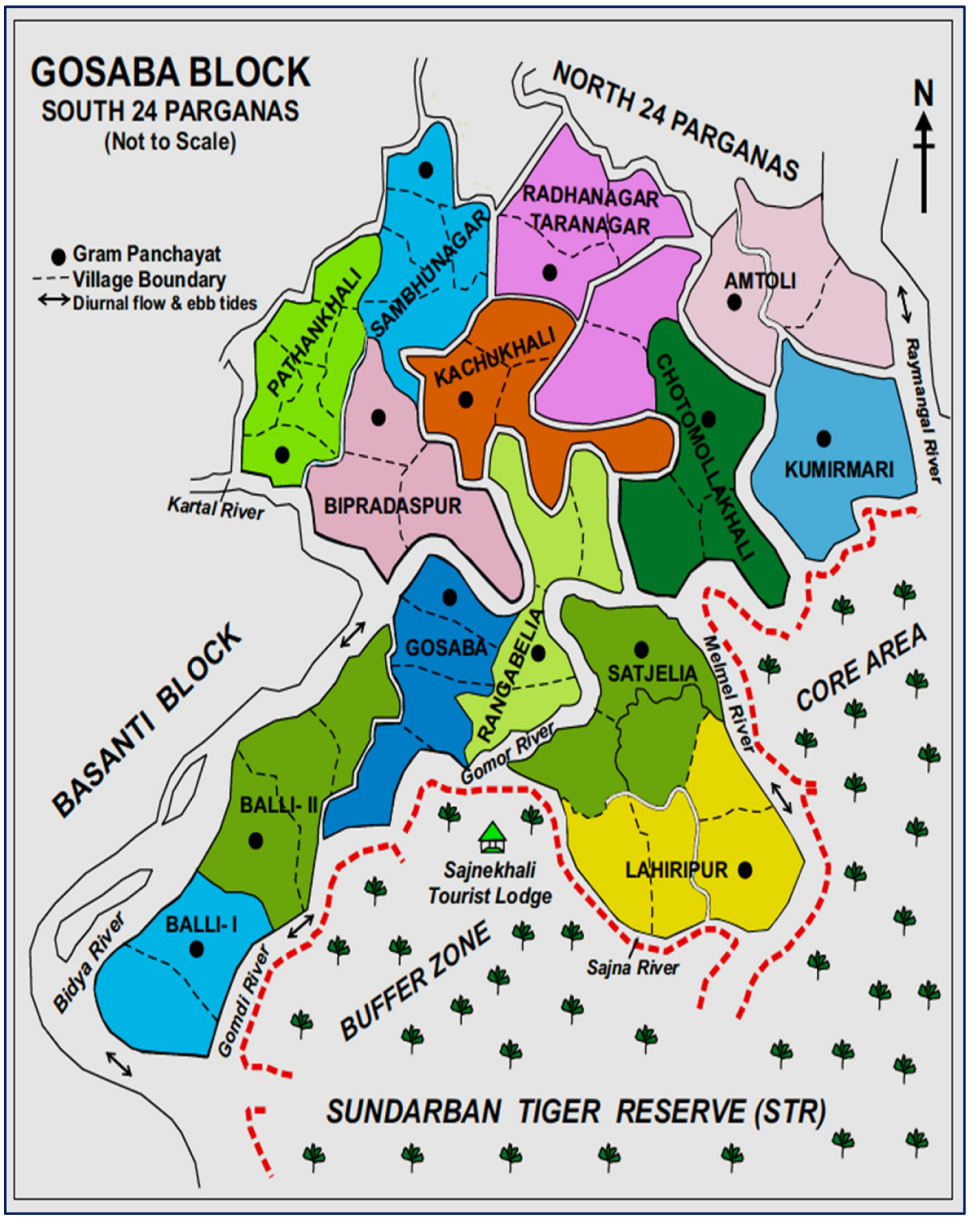

Figure 4. Gosaba Block with study mouzas – Satjelia and Lahiripur.

boundary of the Sundarban Biosphere Reserve. Population density has increased from 934 per km^2 in 2001 to 1,082 per km^2 in 2011. The population of Sundarban, especially those of the island blocks around forests (Gosaba, Basanti, Kultoli, Patharpratima, and Namkhana), are also, when considered against the Human Development Index, the most backward in terms of most of the components of the Index (0.55 in contrast to 0.62 of the district). The stark underdevelopment of Sundarban is also further reflected in the facts that 44% of the population is living below the poverty line (BPL) (**3**) and 87% of the people suffer food insecurity, 60% households have no access to safe drinking water, 70% of the families live in thatched mud houses, and 47.6% household have no land.[35] The level of literacy (77.1% state, >35% in Sundarban) and per capita income of the Sundarban resident is accordingly much below the state average. Rural Household Survey conducted in 2005 showed that in South 24 Parganas district more than 400,000 households are BPL and thus making the poverty ratio (% of household) to 34.11%, which is far above the state as well as national poverty ratio. In all the 13 blocks of Sundarban, the poverty ratio is above 30% and that for Gosaba is 38.03%.[36] The infrastructural facilities are extremely poor, there is no industry, the communication and transport networks are very poor, and electricity is almost nonexistent in this region (only 17% households have grid connectivity). Health care is poor and inadequate,[37] and nearly 33% of the population do not even have access to primary health care.

For all these reasons outlined above, the dependence therefore of the fringe population in Sundarban on ecoresources is high. Of the 4.1 million people live in Sundarban[38]

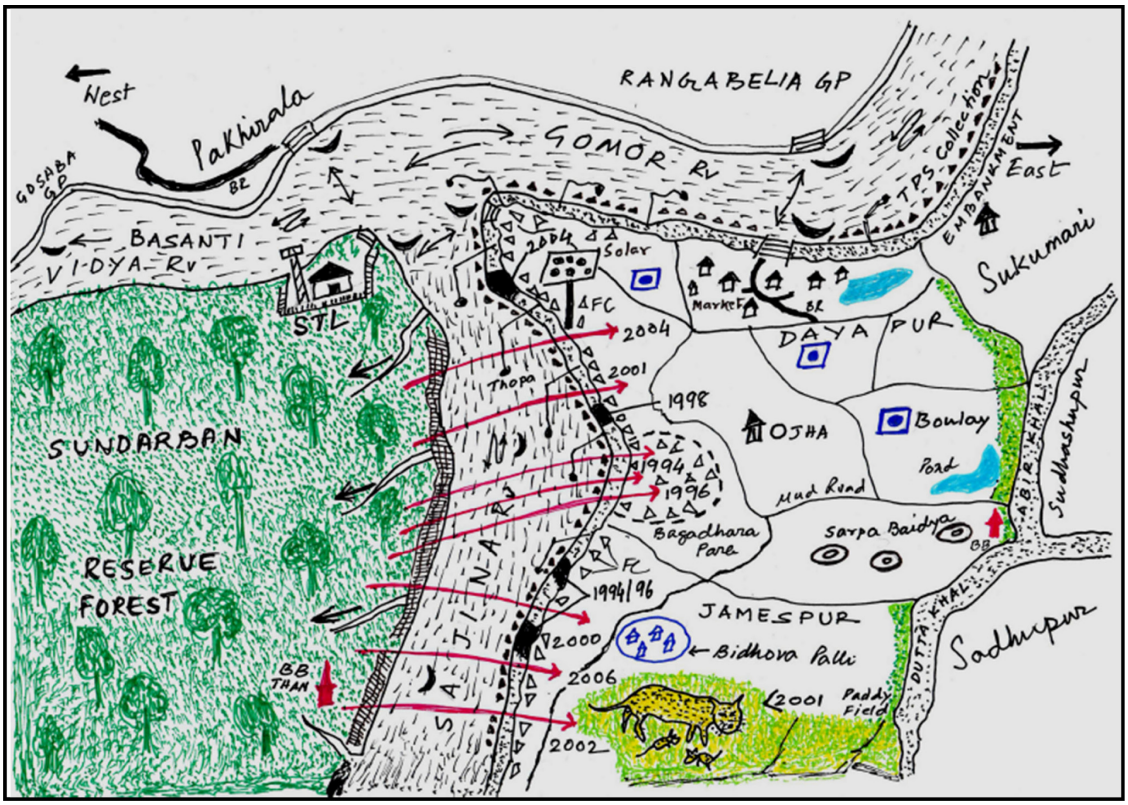

Figure 5. Participatory mapping of ecostress in Dayapur-Lahiripur area, Gosaba.

(3.5 million in Bangladesh), 32% depend on the resources of Sundarban mangrove forest directly or indirectly. The main forest-based livelihood groups are described below.

Fisher folk. Micro-fishing (catching fishes in creeks and rivers) and macro-fishing (in the sea) are the main livelihood activities for communities living in the fringe area of the forest and also along the coastal line, respectively. They are locally called *Jele* (fisherman). A total of 478,770 people fish in the Sundarban including in the adjacent Bay of Bengal, of which 144,171 people are active fishers living in 282 fishing villages. The total catch from the Sundarban is estimated to be at 276,000 tons per year.[39] Around 2,069 km^2 of the water tracks inside the Reserve Forest are used for river fishing, using traditional methods. Motorized fishing boats are prohibited within the STR.[40] Fishing is always accompanied by occupational dangers, either from tiger or crocodile attack or from climatic events.[41]

Wood cutters and firewood (Golpatta – *Nipa fruticans* and Hental – *Phoenix paludosa*) *collectors.* Locally they are called *Kathuria* and *Kathkurani*, respectively. The annual average timber collection from SRF is about 120,000 quintals. Officially, approximately 5% of the population is involved in wood collection; usually a team of 6–10 wood cutters are lead by a *Boulay* into the forest. A *Boulay* is a man with traditional expertise, one who knows the art of keeping the team out of danger in the forest; they are also believed to have supernatural powers to protect the work area so that tiger cannot enter into this *enchanted territory*. By their chants, they are said to control a tiger's movement and force them to remain confined within a fixed circular space or to shut their jaws by uttering their magic spells (*mantra*).

Honey collectors. (from the beehives of *Apis indica*). This is a seasonal group activity. Usually a team of 8–10 members is lead by a *Moulay* (also called *Moule* or *Mouli*) into the forest. *Moulays* are those indigenous people known for their traditional wisdom and expertise. They are also especially skilled persons in identifying good beehives (by observing the flying directions of bees) in the dense forest, and they are skilled in beehive cutting and the honey collection technique. As with the *Boulay*, the *Moulay* is also believed to possess supernatural powers to prevent tiger attacks by their rituals and chants.[42] Honey collection is highly dangerous as it takes place directly in the tiger habitat (Fig. 6). About 3% of the population is involved in this activity, and on an average, 200 quintals of honey and 1,000 kg of wax are collected annually.[43] Because of the high risk to life from tiger attacks, snake bites, and climatic hazards, recently many of the *Moulays* have been moving away from their traditional practice and are now moving on to other livelihood options.[44] Both *Boulays* and *Moulays* are magico-religious people in the same traditional manner of a forest Shaman or *Fakir*.[45] They are seen as guardians during any forest trip and are highly respected in the community.

Crab collectors. The estuarine mud crab *Scylla serrata* (locally called *bada-kanckara* – mangrove crab) is an edible species distributed across the mudflats of the Sundarban forest and has a good market demand, both locally and internationally.[46] Consequently,

Figure 6. A Moulay of Pakhiralaya village, who survived a tiger attack in the SRF, showing the mark of the attacks.

there are many crab fisheries in and around Sundarban and they are running a lucrative trade.[47] The crab collectors are often taken by tigers when they are concentrating on their catch.[48]

Shell collectors. Locally they are called *Chunari*. Snails, clams, and giant oysters are distributed around the forest floor and mud flats. These mollusks are also of ecological importance to the mangrove in converting leaf litter into detritus. Their shells are used by people for preparing lime, shrimp, and chicken feed. Both live and dead shells collected.

Tiger prawn seed collectors. This mainly involves women and children who are locally called *meen-dhara* (juvenile-prawn catcher). One survey[49] of 3,252 tiger prawn seed (TPS) collectors in 1,917 households among 11 Sundarban villages showed that 74% of collectors were female while 26% were male. They collect prawn seeds from brackish water for a lucrative on-the-spot earning of about Rs. 50–100 (USD $ 1–2) per day per person. Shrimp exports alone constitute 75% of the total marine products to foreign markets from West Bengal, and the collection of juvenile prawns has become a major income source with estimates of up to 200,000 collectors involved within the Sundarban. It is now estimated that 1,500–3,000 million prawn seeds are collected annually,[39] feeding a large demand for prawn seeds from the neighboring shrimp aquaculture industry. The extensive TPS collection for the corporate business network has created an ecological disaster in the region and has resulted in the severe depletion of local shrimp and other fish populations.[50] With the seed collectors continually working in waist-deep water, they are prone to shark (Indian dog shark, *Scoliodon laticaudus*, locally called *Kamote*) and crocodile (*Crocodylus porosus*) attacks. TPS collection near or inside the SRF also always carries a high risk of tiger attack.

The STR issues over 3,700 Boat License Certificates and seasonal passes to individuals, allowing them entry into the forest for a permitted activity in a designated area. Illegal trips into the forest are locally called as *Black* trips. Locally, the islanders will also refer to all animal attacks as an *accident*. On average, over 10,000 villagers will enter the STR each year clandestinely for their living. Their deaths go unreported because any forest entry without permission is a criminal offense and subject to penalty and legal proceedings. On a legal trip, if death results from a tiger attack (outside the core area), the family is supposed to receive some compensation from the Forest Department. There is, however, no compensation for crocodile or shark attacks and snake bites. There are some local agencies (Janata) who will offer life insurance policies on the deposit of some regular monies. However, the entire claiming procedure is very complicated and often corrupt, and in most instances, the claim remains unmet or the family is cheated of their claim.

Bonobibi and the Tiger God. The people of Sundarban, both Hindus and Muslims together, have a strong faith in the folk cult of *Bonobibi* (the Queen of the forest), as the guardian deity of the forest together with the Tiger God under the name *Dakkhin Ray* (Lord of the South). The iconography of *Bonobibi* differs as to the faith of the followers: The Hindu idol is wearing *shari*, a crown, and garland, carrying a club and *trishul*, with a baby and riding a tiger (Fig. 7). Sundraban islanders perceive *Bonobibi* as the unified symbol of the forest and the people, and she stands beyond any caste, class, and religion.[51] In each Sundarban village, there is a sacred *Bonobibi* shrine or *Than*, and at different entrance points to the SRF, there are idols of *Bonobibi* to be found. The *Bonobibi Puja* is a big social festival throughout Sundarban and is celebrated in December every year.

Before entering the forest for fishing, harvesting honey, or wood cutting, it is obligatory to offer *puja* and pray to the Deity asking to keep them protected from tigers. Invocation of the Tiger God is also a mandatory ritual for safe passage throughout the Sundarban forest territory. His idol shows him as a young man kneeling down on the tiger, his mount. While inside the forest people will never utter the word *Tiger*, but to show reverence, they will refer to them as *Bara Miah* (Big Uncle), *Boro-Babu* (Big Mister), or *Boro-Thakur* (Big Lord). It is believed that *Boulays* and *Moulays* possess their supernatural powers of protection because they have been blessed with the divine power of *Bonobibi* and *Dakkhin Ray*.

Figure 7. Bonobibi idol at Gosaba village.

Manasa. She is a four-armed icon ornamented with snakes. Manasa is the cult Hindu folk Goddess of snakes and protector from snake bites, and in almost every home in Sundarban, there can be found a sacred altar with a *Manasa shrub* (a Sij plant of a cactus family *Euphorbia* genus). The health burden (both mortality and morbidity) caused by snake bites, both poisonous and nonpoisonous, is high in Sundarban. However, snake bite is seen as an occupational hazard mostly by honey collectors, and women who are engaged in TPS collection in the rivers, streams, and estuaries are especially prone to snake bites.[36] People will usually seek traditional treatments from the indigenous magico-religious healers, such as the *Sarpa-Baidya* (snake-bite healers), *Ojha* and *Gunin*, which are to be found throughout the Sundarban region. The people of Sundarban have deep faith both in these folk deities to keep them safe and order their lives, and this is reflected in their day-to-day cultural rituals and social discourses.[52]

Materials and Methods

Study area. The study was carried out in three hamlets (Kathuriapara, Jalepare, and Bidhabapara) in Satjelia and in two hamlets (Bidhan colony, Jamespur) in the Lahiripur mouza of Gosaba block. Both the villages are situated on the Melmel riverbank opposite to the core area of SRF (Fig. 8).

Study design. Primarily an ethnographic method was followed in this study. Ethnography is an anthropological research method that aims to understand people within their social and cultural contexts.[53] It attempts to study the cultural system in terms of local context, processes, and meaning of events and experiences within the cultural system. It involves both *emic* and *etic* perspectives of a cultural phenomena.[54] Ethnography is a collection of qualitative research methods that focus on the close observation of social practices and by individual or group interactions help to develop an insight how and why a social process occurs and influence others.[55]

A mix of both quantitative and qualitative methods were used in this research, and the primary aim of the study was to explore comprehensively the nature and extent and impact of human–animal conflicts in the Sundarban village's proximity to the SRF. Two villages (Satjelia and Lahiripur) were selected, and in five hamlets, a door-to-door survey of 3,084 households was carried out, along with focus group discussions (FGDs), participatory mapping, and in-depth interviews (IDI) of index cases (65 widows); the data on human–animal

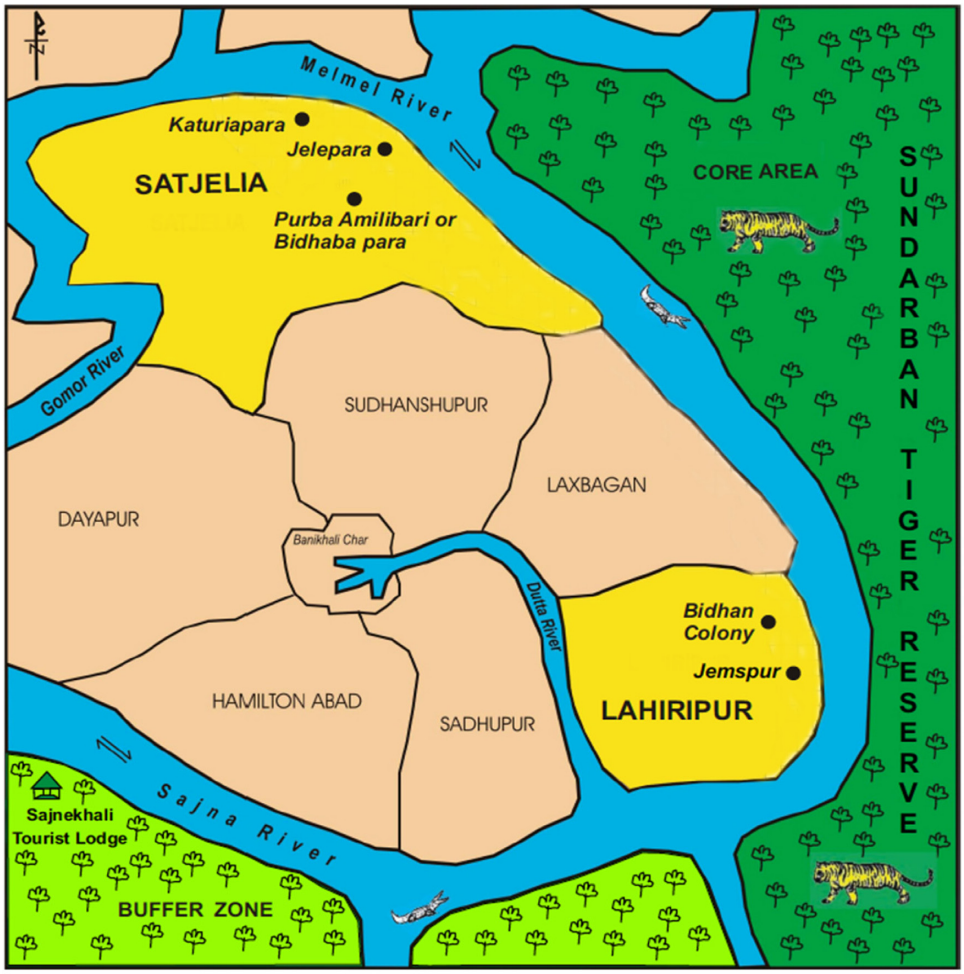

Figure 8. Study mouzas and hamlets.

conflicts have been reported earlier.[56] The secondary part consisted of an in-depth study of the particular stigma suffered by 49 widows (those who were willing to be interviewed), whose husbands had been killed by tigers (32 were from Satjelia and 17 from Lahiripur) and had been identified in the previous survey, which was primarily a quantitative study done by using a Stigma questionnaire. Clinical examinations of the mental health problems suffered by 54 widows (those who were willing to be examined) were also carried out. Concurrently, in the third part, an ethnographic study was conducted on these 54 widows. This was to complement the information already received in parts one and two, but also to highlight the related stigma and local psychosocial issues in relation to the tiger killings. The number of widows studied varies in different steps as some of them declined to be interviewed or examined. This study was conducted in the period 2005–2007. The study protocol was approved by the Ethical Committee of State Health System Development Project, Department of Health and Family Welfare, Government of West Bengal. This research complied with the principles of the Declaration of Helsinki.

In-depth interviews. An ethnographic case study approach was adopted for these interviews. The research team stayed within the community and attempted to blend in with the target population. In this way, it was possible to gain local sociocultural insights from the community through both participation and observation and to note the key informant's guidance and to explore local tacit knowledge. The interviews were detailed and lengthy and were conducted over several sessions in 2–3 days. The purpose of the interview and any confidentiality matters were explained to all the widows. All the widows to be interviewed gave written consent (by thumb impression) for the interviews to be recorded and transcribed at a later point. Several long sessions (2–3 hours) of IDI with the widows at their cottages, or in the community was done, in which the focus was on the details of the tiger attack incident and its aftermath including the grief and bereavement process, any resulting stigma and social discrimination issues, and the state of their current health and livelihood assets. They were all encouraged to give a spontaneous and detailed account of their stigma-related life events and all were very cordial and open-minded. They documented the community's discrimination and their experiences frankly and in a heart-touching way. The assessment of their current economic status was done by using a three-point scale: (1) monthly income below Rs. 300 (US$ 6); (2) between Rs. 301–500 (US$ 7–10),

and (3) Rs. 501–1,000 and above (US$ 11–20+). Six IDI were also recorded by willing *Boulays* and *Moulays* (three each) and another two IDI from the *Sarpa-Baidyas*.

Focus group discussion. Two FGDs with tiger-widows (groups of 10) were held, and two more were held with villagers (mixed groups of 10 people: wood cutter, TPS collector, honey and crab collector, apiary keeper, *Boulay*, *Sarpa-Baidya*, fisherman, primary School teacher. and Panchayat member). One each in Satjelia and Lahiripur was conducted to frame the Stigma questionnaire and to gain practical insight into the problem of HTC in the area, as well as the community attitudes toward tiger attacks, and also included some participatory mapping. The selection of the FGD participants was done on the basis of suggestions from the key informant and also their willingness and agreement to signing (or thumb impression on) the consent form. The FGDs were tape-recorded and then later transcribed.

Stigma measurement. There is no reference to stigma assessment related to animal attacks in any of the literature. The conceptual framework for devising the Stigma Scale in this study, therefore, was taken from the model of HIV Stigma, Scale of Berger et al.[57] and used the related dimensions from the recent stigma literature,[58–60] the detailed findings of which were reported elsewhere (under publication). After repeated discussions about the issues related to each item in the four FGDs, these were then framed according to the local situational and cultural context. The final scale, in the vernacular thus was made up of 28 items distributed in six clusters. Responses were elicited in a four-point Likert scale from *Disagree* (0) to *Strongly Agree* (3). The stigma score ranged from 0 to 84 with higher scores indicating greater stigma. In order to be able to draw a comparison, two groups of widows were taken as follows: 32 normal widows, whose husbands has died either normally or from physical diseases and were identified from Satjelia, Lahiripur, Dayapur, Sadhupur, and Gosaba Panchayat area (Fig. 2), 21 of them consented to be interviewed on stigma-related issues. Twenty-four widows whose husbands had died from snake bites in the same villages were identified, and 18 of them consented to be interviewed. An effort was made to keep a similar age range of the comparison groups with that of the index group.

Participatory mapping. It is an important tool in qualitative research and is a useful method of communication. Theme-based maps help to depict local knowledge and information concerning a local problem. It helps to explore community perception and their experience of their environment and also enhances stakeholder involvement in the research process.[61] In this study, 20 participatory maps were drawn on different issues; for example, the known spots of tiger entry on the river bank and different ecological stresses (Fig. 5), the straying tiger attack (Fig. 12), the location of the *Sarpa-Baidya/Ojha*, and the widow hamlets in the village (Figs. 5, 11). All these map narratives provided a rich and useful vein of information about the community's perception of HTC set in the context of their local ecocultural landscape of Sundarban, which helped to develop an *emic* insight about the ecopsychiatric relation between the people and their environment.

Mental health assessment. A mental health assessment of the widows was an integral part of this research protocol, and a detailed mental state examination was carried out for each consenting widow and, based on their psychological distress and specific mental symptoms, a psychiatric diagnosis as per Diagnostic and Statistical Manual (DSM-IV) guideline[62] was given where applicable. This was performed jointly by a professor and consultant psychiatrist (ANC) together with a senior psychiatry postgraduate trainee (AB).

Ethical approval. The study protocol was approved by the Ethical Committee of Department of Health and Family Welfare, Government of West Bengal, and Gosaba Block Panchayat Samity (1).

Results

Ecodemography of tiger attacks and tiger-widows: *Age*. Ages noted here are the best approximations as given by the widows and their relatives or neighbors. The mean age of the 65 widows was 43.49 ± 9.58 years.

Remarriage. Eight widows (12.3%) had remarried. The mean age was 34.25 ± 7.70 years, and the mean time interval of remarriage was 3.75 ± 2.12 years.

Literacy. All were illiterate, except for 3 (4.6%) who could read, write, and sign their own name.

Forest entry. Out of 64 incidents (one was a house attack), 43 (67.2%) had illegally entered the forest (*Black* trips) and only 21 (32.8%) of these incidents had occurred on legal trips (had relevant Forest Department Registration pass).

Livelihood activity. The husbands of the 64 widows had died while following their livelihood activities as follows: wood cutting 28 (43.8%), fishing 18 (28.1%), crab collection 7 (10.9%), TPS collection 6 (9.4%), honey collection 3 (4.7%), and fuel wood collection 2 (3.12%).

Tiger attack Months. The maximum number of attacks 16 (24.6%) took place in the month of December, this was followed by 9 (13.9%) in November, 8 (12.3%) in April, 7 (10.8%) in January, 7 (10.8%) again in March, 5 (7.7%) in October, 4 (6.1%) in September, 3 (4.6%) in May, 2 (3.1%) in June, 2 (3.1%) in August, and 1 (1.5%) each in July and February.

Attack time (65 cases). 31 (47.7%) occurred during the morning (up to midday), 24 (36.9%) occurred during noon and the afternoon (12–4 pm), and 10 (15.4%) in the evening and during the night (5–10 pm).

Activity during attack. Of the 65 victims, the larger majority, 56 (86.1%), were attacked by a tiger while they were engaged in their livelihood activity. Of the victims, 4 (6.2%) were attacked during their sleep, the remaining 5 (7.7%) people were each on different activities at the time; eg, running after seeing a tiger, while resting after honey collection, washing after dinner at home, or while micturating on the river bank and then coming suddenly face to face with a tiger attack while walking in the forest.

Attack. It is known from the study of tiger's attacking behavior in Sundarban that they mostly attack from behind a person and attempt to bite the neck in the first instance,[63] and it is no different in this study. From the 65 cases, the attack had come from behind in 58 (89.2%) of the cases. Three victims (4.6%) were attacked from the side, two (3.1%) had been attacked face to face. Very atypical ways of attack were also noted, namely, an attack on the hand (1.5%) and an attack on left thigh (1.5%), which were recorded by two individuals only. An estimate derived from the narratives collected indicates that at least 4 (6.2%) tigers were also injured during combat.

Retrieval of victims. The victims' bodies were missing in 41 (63.1%) incidents. Only 24 (36.9%) bodies were recovered; of those, 6 (25%) mauled bodies had been snatched from tigers and 18 (75%) of the bodies were recovered from the jungle only after the tiger had left (within an average distance of 3–8 km from the spot). Only a very small number, 9 (13.8%), of the bodies recovered were available to the family members at home. Of the 24 bodies that had been recovered, 14 were brought to and left outside the home: 10 had been buried (7 in the jungle and 3 on the river bank), 3 were cremated (2 in the jungle and 1 on the river bank), and 1 was floated on the river. Of the nine bodies taken home, six were cremated and three were buried.

Compensation. Of the 64 recorded incidents, 21 people (32.8%) had been attacked and killed on a legal trip, of which only 7 (33.3%) of the victims' family received any compensation from the Forest Department (this ranged from Rs. 2,000 to 7,000 including in one case where only some clothing had been received, but no money). From the *Janata* (insurance agencies), of 61 potentially eligible claimants (of which one incident had happened at home, one had not renewed his/her insurance with their *Janata*, and in two cases there had been no *Janata* service available to them at that time), 17 (27.9%) had bought private insurance through *Janata*, and of these, only 6 widows (35.3%) received any payment (which ranged from Rs. 10,000 to 25,000). In 3 (17.6%) cases, the monies due to the victims' families were forfeited or they had been cheated out of it by others.

Residence change. Four widows (6.1%) had moved after the incident to another village or district.

Current economic condition. Among 54 widows, 31 (57.4%) of them were extremely poor and living well below the poverty line. In all, 23 (42.6%) widows were just above the BPL. A total of 58 (89.2%) widows had no land, and only 7 (10.8%) widows had a very small amount of land (4 ± 1.53 Bighas; 1 Bigha = 1,600 square yards).

Current occupation. Among 57 widows (Table 1), 17 (30%) are engaged in some forest-based livelihood activities, 26 (45.5%) are engaged in various labor-based jobs, 11 (19.3%) are not working (being looked after by their sons and daughters or other relatives), and 3 (5.2%) have to earn their living by begging.

Stigma assessment. Results from a one-way analysis of variance indicated significant differences in stigma scores between different widow groups (Table 2). Tukey's post hoc comparisons indicated that tiger-widows had significantly higher scores compared to both normal and snake-bite widows on all stigma clusters and total score. Stigma did not differ

Table 1. Current occupation of the tiger-widows ($n = 57$).

CURRENT PRIMARY OCCUPATION	*N* = 57 (%)
TPS/Crab collection	9 (15.8)
TPS and Paddy collection (**4**)	3 (5.3)
TPS Col and Pig grazing	1 (1.8)
Prawn catching	2 (3.5)
Fuel Wood/Crab collection	1 (1.8)
Fishing/Crab collection	1 (1.8)
[Forest-based living]	***17 (30.0)***
Day labour	10 (17.5)
Maid servant- town	7 (12.3)
Maid servant- local	4 (7.0)
Agricultural labour	3 (5.2)
Cattle grazing	2 (3.5)
Begging	3 (5.2)
Nil	11 (19.3)

Table 2. Difference in stigma scores among widow groups.

STIGMA CLUSTERS	TIGER WIDOW (*n* = 49) MEAN (SD)	NORMAL WIDOW (*n* = 21) MEAN (SD)	SNAKE-BITE WIDOW (*n* = 18) MEAN (SD)	*F*	*P*
Self-stigma- Fear	11.16 (3.71)	7.19 (3.04)	8.56 (2.85)	11.25	0.024
Self-stigma- Negative feelings	16.31 (1.89)	10.52 (1.77)	10.39 (2.76)	86.17	0.001
Disclosure	5.86 (3.65)	0.43 (0.92)	0.17 (0.70)	42.61	0.013
Discrimination	17.33 (2.42)	12.38 (3.15)	13.33 (2.05)	34.51	0.036
Community attitudes	10.39 (2.26)	4.76 (2.99)	4.47 (1.84)	62.16	0.014
Spiritual dimension	4.65 (1.39)	0.57 (0.87)	3.39 (0.77)	87.82	0.012
Total score	65.90 (9.85)	35.86 (8.01)	40.06 (7.05)	108.38	0.001

significantly between normal widows and snake-bite widows, except for the spiritual dimension score where snake-bite widows had significantly higher scores.

Current mental health. The mental health condition of the 54 widows showed that 24 (44.4%) were suffering from a designated mental illnesses, of which most were major depressive disorders (MDD) including recurrent MDD (14.8%), dysthymic disorder (11.1%), and Post-traumatic Stress Disorder (PTSD) (5.5%). In all, 11 (45.8%) widows who had been diagnosed with a mental illness agreed to receive treatment. Funding for appropriate initial treatment was consequently given from the research fund. Table 3 shows the diagnostic

Table 3. Mental health problems of the tiger-widows (n = 54).

SL. NO	AGE (YRS)	MENTAL HEALTH CONDITION (DSM IV CODE)	REMARKS/HUSBAND'S FOREST ACTIVITY DURING TIGER ATTACK
1*	53	Major depressive disorder (296.2x3)	Husband was a *Boulay*. Wood cutting, Illegal trip.
2*	39	Major depressive disorder (296.2x4)	Husband was a day labor, but started wood cutting for income and in the 3rd trip killed, illegal trip.
3*	55	Major depressive disorder (296.2x3)	2-days fishing trip, on the first day killed, legal trip.
4*	38	Major depressive disorder due to general medical condition (296.3x2)	High blood pressure, arthritis, peripheral neuropathy, back pain, gastrointestinal problems. Wood cutting, illegal trip.
5*	44	Recurrent major depressive disorder (296.3x3)	Younger son has schizophrenia. Prawn fishing for a day, illegal trip.
6*	42	Recurrent major depressive disorder (296.3x3)	One son is deaf and dumb from birth. Fishing, legal trip.
7*	44	Recurrent major depressive disorder (296.3x3)	Elder brother, a *Boulay*, was in the team. Honey collection, legal trip.
8*	27	Dysthymic disorder (300.4)	Accidental homicidal death during fight with the attacking tiger. Fuel Wood cutting, Illegal trip.
9*	41	Dysthymic disorder (300.4)	Husband survived first tiger attack 3 yrs ago. Wood cutting, legal trip. *Janata* money forfeited.
10	51	Dysthymic disorder (300.4)	One daughter committed suicide by hanging (Dowry torture). Wood cutting, illegal trip.
11*	53	Dysthymic disorder (300.4)	H/o Major Depressive Disorder and self-harm attempt by hanging, driven out from family by in-laws. Received Rs. 12,000- purchased homestead land which was washed away by embankment rupture during *a Bhara Kotal* (cyclonic high tide). Crab collection, legal trip.
12	48	Dysthymic disorder (300.4)	Infertility, social stigma. Fishing, legal trip.
13	54	Dysthymic disorder (300.4)	One daughter committed suicide by pesticide ingestion (same day). High guilt and OCD symptoms (cleaning and washing). Wood cutting, illegal trip.
14*	44	Recurrent major depressive disorder with chronic PTSD (296.3x2/309.81)	Fear of jungle, avoids any forest or river-based activity. Fishing, legal trip.
15	56	Chronic PTSD (309.81)	Flashbacks of mauled body; avoids any forest activity. TPS collection, illegal trip.
16	42	Chronic PTSD with complicated grief (309.81)	Confronted the tiger attack with husband. Fishing, illegal trip.
17*	56	Chronic PTSD (309.81)	Flashbacks of mauled body; avoids any forest activity. Wood cutting, legal trip.
18	40	Generalized anxiety disorder with chronic PTSD (300.02/309.81)	High religiosity, H/o *Kamote* bite during TPS collection in river 6 yrs ago, since then avoids river and forest activity. Fishing, illegal trip.
19*	32	Generalized anxiety disorder with phobic symptoms (300.02)	Overprotective toward two young sons, avoids any forest or river-based living activities. Fuel wood collection, legal trip.
20*	32	Chronic somatoform pain disorder with psychological factors (307.80)	H/o two severe physical assaults: once sexual molestation by a group of drunkards and another by a shop keeper on allegation of stealing money. Wood cutting, illegal trip.
21*	38	Chronic somatoform pain disorder with both psychological and general medical condition (307.89)	H/o back trauma due to fall while carrying a paddy bag. Fishing, illegal trip.
22	46	Undifferentiated somatoform disorder (300.81)	H/o dog bite (twice), snake bite. Crab/TPS collection, illegal trip.
23*	38	Prolonged bereavement and grief (V62.82)	Attacked while running away after seeing the tiger, reached almost to the boat. Fishing, illegal trip.
24*	46	Depressive disorder NOS (311) with prolonged bereavement and grief (V62.82)	In-house attack (during washing hand after dinner in the courtyard at night).
25	31	Posthumous child	High social Stigma ('bad name'), child was ridiculed. Wood cutting, illegal trip.
26*	34	Posthumous child	Husband was a *Moulay*, high social Stigma, child was ridiculed. Honey collection, legal trip.

Note: *Below poverty line; H/o = history of, Sl No. 25 and 26 were not included or counted under mental illness diagnosis.

distribution along with some relevant psychosocial findings and life events.

Discussion

There are currently 245 million widows in the world, of which 42.4 million are from India, ie, 10% of the India's female population.[64] The lives of widows can generally be seen to be an example of gender discrimination; cultural and religious marginalization; and physical, sexual, and economic abuse and exploitation. In patriarchal Indian society, they lose their social and cultural identity with their husband's death and are regarded by the family and the community as a burden and liability. If the husband's death was sudden and unnatural, it also conveys social stigma and thus acts as a double-edged sword in ostracizing the widows, leading them to becoming social outcasts. The cultural stigma attached to having been killed by a tiger exacerbates an already difficult situation for those widowed women. This present study can only speak about the misery and stigma that these women are suffering. Their status as tiger-widows impacts on all aspects of their life, psychological well-being, mental health, physical health, economic security, and social identity, and it is this that this study tries to impart at least a sense of.

Psychological impact. Losing one's spouse is, without question, among the most tragic of life events. The psychological impact in terms of bereavement and grief, coping with what has happened, and the extreme feelings of emptiness, loneliness, and guilt are often gradually normalized by family and social support. Grief, it is well known, has important emotional, psychological, and physical dimensions,[65] whereas mourning is the varied and diverse social expression of grief, which can include overt expressions, loud crying, angry outbursts, repetitive uttering about the deceased, etc., all of which expressions can be immensely beneficial to the one experiencing grief. Bereavement is the objective situation of someone who has experienced deprivation through the loss of a valued person.[66] The nature and extent of grieving, mourning, and the process of bereavement which will normally follow the local cultural norms, as well as the beliefs and values and expectations of the society, are all denied to the tiger-widows in Sundarban. These processes are blocked and the widows are inhibited from displaying any normal expressions. Following are some consequences leading from a death by tiger attack that have negatively impacted the grief–mourning–bereavement cycle of some of the tiger-widows who were interviewed:

Suddenness of death. Every forest trip is potentially dangerous but at the same time people expect that their loved one will return unharmed. Tiger attack is, as they describe *an accident*. In a psychological context, it is indeed an accident, for which the wives were never prepared. The grief reaction following shock and disbelief from sudden death is more intensified since there is little or no opportunity to prepare for the loss.[67]

Stigma of unnatural death due to tiger attack and restriction on funeral rituals. Death due to tiger attack in this region is regarded as an unnatural death, and this has a deep negative psychosocial connotation in the community. There is no funeral ritual that can be observed for these deaths, unlike those observed for natural death. Instead of cremation, usually the bodies are buried, and mostly inside the forest. Death rituals and mortuary practices have age-old cultural traditions involving moral and religious values that influence both survivors and community.[68] The rituals have a significant psychological impact on the spouse and children and are considered as important last rites for peace of the soul of the deceased. They are followed by elaborate ritual purification procedures and have a specified period of mourning. Psychologically, funeral rites are performed to show respect to the deceased and to ensure the departed's peaceful crossover to the next life (and are themselves a combination of cultural norms and normal tenets of faith). They also allow for the social and cultural catharsis of mourning and grief reactions, which is generally recognized to assist the bereaved in getting over their loss. The cultural restrictions in place and the nonperformance of these funeral rituals not only exacerbates the tiger-widow's traumatic bereavement with guilt, shame, and fear, but will also negatively and emotionally impact any young children as well.

Viewing of severely mutilated body. Not many tiger-widows will get a chance to see their husband's body, but those who do describe it as the most horrific psychological experience. In all, 13.8% of the widows reported that they had seen the recovered body of their husband and were struck with extreme sorrow and terror, as the bodies had been severely mutilated and covered in blood. In some cases, the head and neck were half eaten, in others, portions of the body muscle mass were bitten off, and in other cases, the damage was so extensive that it was difficult to recognize the victims. This terrible visual confrontation had evoked a deep and long-lasting psychological impact which presents variously as fear, anxiety, PTSD flashbacks, and complicated bereavement along with strong senses of guilt, blame, and misfortune.

Psychological impact of nonrecovery of body. To see the body of your loved one or be by their side as they are dying is a very personally sensitive subject and at the same time is the expected and desired behavior of the spouse or other family members, as is seen in all cultures of the world. Unfortunately, most of the tiger-widows in Sundarban have not and will continue not to have this opportunity, as not only were they absent during the attack but in most cases the bodies were also missing. The serious psychological trauma caused by this, when combined with the fact that they were unable to perform a proper funeral ritual for the deceased, has rendered very deep repentance, guilt, and an emotional scar that remains with them for many, many years.

Suppressed grief. Most of the illegal forest workers have dual fears concerning their forest activities, ie, fear of the tiger and fear of the forest guards. The irony of the matter is that the occurrence of a tiger attack arouses extreme fear of being caught by the forest officials, with the consequent litigation

and penalty which would no doubt be imposed. Hence, the attacks and related injuries are kept secret, and this is another stress to the victim's wife. It not only adds another quantum of anxiety and suspiciousness but also complicates their grief reactions. It virtually blocks their productive bereavement[69] by preventing the inflow of social or community support at the point of crisis. This suppressed grief reaction is probably one of the reasons as to why the widows of illegal forest workers scored high on the *disclosure* cluster of Stigma scale in comparison to 'legal' intruders: 8.38 ± 1.10 versus 1.12 ± 1.11. Many said they could not cry loudly because others may come to know of the *accident* and may then inform the forest guards. Many widows even continued to be dressed as if they were still married, for weeks or months afterward because of the fear of being found. For the widows involved, these were extreme forms of psychological torture and were accompanied by heightened fear and anxiety. As one widow said: "I cried quietly within my cottage, felt extremely scared that forest guard will appear now and arrest me…. Even though I was widow I had to behave like a married women. It is not only wrong but a great sin. I had no other way out as he went in Black". A tragic example of *bereavement overload* uncovered by this study was the case where one of the daughters of a tiger victim committed suicide by ingesting pesticides upon learning of her father's death (on the same day).

Mental health. Women in Sundarban have a very poor quality of life with multiple psychosocial stressors and hardships.[70] They are poorly educated and have very limited access to resources and services. Early marriage through the dowry system (the age of female marriage is as low as 14 years with the first child then born at 16 years) is still common, and the overall male domination in society is often characterized by the husband's frequent harmful use of alcohol[71,72] and domestic violence.[73] This results in the local women dealing with unusually high levels of stress, and this is reflected in the high number of deliberate self-harmers we see among the young wives.[74,75] It is also reported that women in Sundarban are suffering from a disproportionate number of mental illnesses, notably depression, when compared to the national averages.[76,77]

The present study highlighted a high proportion of mental illness among the tiger-widows with a variety of adverse life events. In all, 44% of the tiger-widows in this study ($n = 54$) were suffering from designated mental illnesses like major depressive disorder, dysthymia, recurrent MDD, PTSD, and generalized anxiety disorder. It seems from the history of their lives, these conditions are closely related with their husbands' deaths, along with the consequent psychosocial and economic stress of widowhood. The enduring social stigma surrounding tiger killing haunts them over a long period of time and has impacted negatively and widely on their well-being, it affects child rearing, the marriage negotiations of daughters, and the physical security of themselves and their children. Analysis of attack-related events has shown some cultural vulnerability issues to be present as well, for example, in the case of one widow whose husband had been a *Boulay* and in another the victim's elder brother was a *Boulay*, who was also present in the team. Another widow's husband had been a *Moulay*. Being *Boulay* or *Moulay* and to be killed by the tiger is believed to be not only a great misfortune but also casts a strong sense of religious sinfulness as they are usually held to be the spiritual protector from such attacks. One of the widows later discovered that her husband had died not because of tiger attack but he had received severe head injuries from a fellow fisherman's bamboo strike during the fight with the tiger. She has had to suppress the truth of this homicide for obvious social reasons and as a result has suffered from chronic dysthymic mood. Another of the widows, with dysthymia, has attempted suicide by hanging. One of the widows also reported confronting the tiger as it attacked her husband and she has suffered since from complicated grief with chronic and disabling PTSD syndrome. PTSD symptoms of events like these will generally involve flashbacks of the mutilated body of their husband, fearful memories of the day of the event or the attack scene, and even subsequent avoidance of forest- or river-based activities.[78] Widows who were infertile throughout their marriage or women who subsequently gave birth to a posthumous child (which happened in the case of two of the widows) experienced chronic dysthymia and enduring social stigma as a result. Infertility is culturally considered to be a curse and childless women are severely ostracized in the community. They are locally called *banja* (a discourteous slang term) and are considered as inauspicious and are consequently not invited to weddings or community gatherings. They are also forbidden to touch or cuddle young kids of others.

Physical health. Physical health is, as we know well, strongly associated with proper nutrition and health care. Unfortunately the access to either was severely limited for our tiger-widows because of the extreme economic hardship and poverty. Those who had children to raise, often offered the major portion of the food to their children, keeping themselves either starved or semistarved. While formal physical health checks were not included as a part of this study, it was quite apparent that many widows were suffering from poor nutrition, gastrointestinal problems, and osteoarthritis (mostly back and knee joints), and a few also presented with hypertension, cataracts, skin diseases, and neurological (hearing, visual, or sensory) disabilities. During the survey period, one of the widows died from a combination of medical and neurological pathology. Sadly, acute poverty, chronic undernutrition, and social neglect are the usual contributory factors to disability and death among the widows of India. One study shows, unsurprisingly, that mortality rates in India are 85% higher for widows when compared to married women.[79]

Physical abuse. There was also ample evidence of physical abuse to the tiger-widows. Several of them were physically beaten by their in-laws, particularly by the mother-in-law (17%–31.5%) and some by neighbors (6%–11.1%) over some

domestic disputes. Four widows had been beaten by their own son and daughter-in-law and one at a place of employment. Two widows were driven out from their home as well. One widow said: "If my husband were alive, no one in this area would have dared to raise their hand to me. My husband would have killed them, if they did. But now I have no one to protect me". Loss of a husband means loss of social protection too. Another widow lamented: "After his death, one person from other village came and demanded some money, which he said my husband borrowed from him. I had no knowledge of such debt. When I declined to pay, as I had no money, he ranted abuse and even attacked me. I shouted for help but no one came to rescue me. He then took away one of my goats by force. I was so helpless. My husband would never have let this happen to me".

Sexual abuse. Sexual abuse is a very private and confidential issue in the Sundarban community. People avoid discussion of the subject, but it seems that the tiger-widows, more especially the younger ones, do suffer such humiliation and insult silently. One widow disclosed that she had received a proposal from a comparatively wealthier married fisherman of the village. He had wanted to keep her as his mistress and promised to pay her some maintenance money. This proposition seemed to her as too humiliating as well as socially forbidden, so she refused. Another widow, of comparatively a younger age, was regularly sexually harassed by her brother-in-law, probably at the instigation of her mother in-law. She had not informed anyone of it because of fear and the potential social humiliation. For the younger widows, it would seem that sexual abuse and molestation is not infrequent. There are also some reports[36] that younger women are becoming the victims of trafficking and have been recorded as *lost*.

Economic impact. The tiger-widows are, quite literally, a marginal population. Among the 53 widows, over half (56.3%) were living BPL. In actuality, this means that they are living in dire poverty. This is, of course, one of the reasons that in 67.2% families, the husbands were *illegal* forest workers as they had no money to pay for the registration fees. In all our cases, the husband was the main earner for the family, so after their death, these women were thrown into unimaginable poverty. Some of the widows have young children, and this sudden financial crisis prompted sending the children out to work to try and ensure the family's survival. For 86% of our widows in this study, their in-laws denied any financial responsibility for the widow or their children. Only 12 (22.7%) of the widows get some financial help from their own parents. Among those families of men killed while legally being in the forest, only a few received any compensation money. Others were cheated out of their insurance money by some middleman (broker). The tiger-widows, as has been said, are generally illiterate and unskilled, and so only physical labor and manual work would be open to these women as earning opportunities. Unfortunately, in this remote island there are no job opportunities existing. In all, 29.8% of the widows are engaged in some form of forest-based living and others earned a meager amount by TPS collection, cow-dung cake preparation and selling, cattle or pig grazing, or a day-labor job (paying Rs. 16–20/day). A few were fortunate to have been employed as maid-servants in some well-off families (paying Rs. 20–30/month), especially fortunate when tiger-widows are generally widely regarded as heavily stigmatized, *evil and cursed*. Thus, there are not many people even willing to employ them. It is not a surprise, therefore, that 5.2% of the widows earn their livelihood by begging. To put these women's earnings into perspective; the rate of cattle grazing is Rs. 2 per head of cattle, one widow has 10 cattle to graze and she earns Rs. 20/month (1 US$ = Rs. 50 approx.). Only a minority (10.8%) had some agricultural land, and they somehow survived by engaging in hard agricultural work.

Stigma and discrimination. Stigma measurement showed that the tiger-widows are more stigmatized than both normal and snake-bite widows. Tiger-widows showed significantly higher stigma scores on all the clusters (fear, negative feelings, disclosure, discrimination, community attitudes, and spiritual dimension) as well as total scores (65.9 ± 9.8) than from both normal (35.8 ± 8.0) and snake-bite widows (40.1 ± 7.1) and this difference was highly significant ($P < 0.001$). It is interesting to note that in cases of tiger-widows (in contrast to other widows including normal widows), a social belief and superstition relating to tiger attack/killing is operative as a strong determinant of stigma. The construction of stigma followed a two-fold interdependent process using the backdrop of local cultural context. The first component is the deep belief and religio-spiritual faith in the cult of *Bonobibi* and the Tiger God and the second is its extension as a behavioral reflection in the form of the labeling, blaming, and consequent discrimination of tiger-widows by family and the community at large.

Spiritual dimension of tiger attack. The concept of the forest is a key element in the worldview of the Sundarban islanders. They believe that *badabon* (the Mangrove forest) is a sacred entity – a gift from God, the abode of the Goddess *Bonobibi* and the reservoir of their food and woods which are so vital for their survival. All community life in these remote disconnected, poverty-stricken islands, including rituals, customs, and psychological make-up, livelihood resources, and the forest, are interblended into a matrix of ecology, culture, and spirituality. These interactions have generated a socially accepted context of myth and supernaturalism that directs their existential worldview and value system.[80] This has helped to develop an *environmental culture* where they acknowledge their destiny with a mix of grace and threat centering around the dense and mysterious forest and rivers in which they live. This is a long-standing tradition that has been passed from generation to generation. Symbolically, the forest stands as ecomother; as one woodcutter said in one of the FGD's: "We live on forest, we should always pay reverence to Ma (Bonobibi) and the Borothakur (Tiger) in any forest activities; they will definitely keep us safe. There are many instances

when people were saved by her grace from an imminent tiger attack … tiger simply observed (the woodcutter) like a tame animal and went away silently. So we always offer prayer and puja to Bonobibi and Dakkhin Ray not only before entering forest but also pray daily during our forest activities. If THEY (high reverence) are pleased then we are safe". Another *Boulay* commented: "forest is our second mother, who provides us our food, fish, and fire-woods–forest is sacred and respectable and always cares for us, …it is by the grace of Ma Bonobibi we are living on her products, if she is pleased, there will be no danger in the forest as tigers' are her pets, but if she is angry she will destroy us". This claimed psychic interconnectedness with the forest has developed over the centuries of human habitation in the region (1770–1773 saw the first efforts to reclaim forest land in Sundarban, where people put up their settlements by clearing the deep and dangerous forest),[81] and in time, has evolved into a forest religion where *Bonobibi*, as protector, stands as the personification of the forest who offers security to them.[82] This belief is deeply ingrained in their social and cultural life.[83] The cult of *Bonobibi* and the Tiger God *Dakkhin Ray*[84] offer a strong psychological defense and dependence to overcome the daily struggle with life in the difficult terrain of Sundarban. This ethos and psychic conviction is well illustrated in the most common prayer of the forest goers: "*Otho otho Ma Bonbibi, tomar namey baralam pa/Amar ei lokjoner opor je debe gha, tarey tui dhore dhore kha*". [Arise, O Mother Bonobibi, I step forward in your name/Whoever tries to harm my people, hunt him down and eat his flesh].[85] It is appropriate to mention here that Islam and Cheunpagdee[86] depicted a similar pattern of cultural beliefs and psychic dependence on *Bonobibi* to mitigate the fear and risk related to tiger attacks from their ethnographic study in Bangladesh Sundarban fishing communities.

So any such tiger attacks tend to be perceived as threats to their religious devotion and faith because the attack is regarded as a sign that the Goddess is displeased, even enraged with the victim and denies protection from the tigers. Such attacks are then considered to be a *Divine Curse* cast upon them. This faith further generates two stigma layers: First, the widows (or the survived victim) suffer a sense of guilt and sinfulness which impacts on their posttrauma psychology immensely (internalized stigma). Second, the community, as a result of the commonly held faith, brands tiger-widows as *cursed family* (enacted stigma) and thus avoids and isolates them (social distance) as a result of the fear of the magical/supernatural contamination of a *divine curse* to others. This *avoidance* acts as a safety rule for the general population's own spiritual security. Fear of contagion (by look, touch, food, or air) has played a crucial role in creating stigma for physical and mental diseases, but here the alleged mode of contamination from a *baghe-khaowa* (killed by tiger) or *baghe-dhora* (caught by tiger) family is by supernatural means. This negative cultural interpretation with its superstitious overtone acts as a magnifier for the compounded stigma burden when added to their already precarious status as widows (Fig. 9). As an extension of this belief, and as a result of the illiteracy and superstition, many natural and normal forest or community incidents or events act as a cultural reinforcer to this belief of *divine disgrace* (Fig. 10), which in turn, of course,

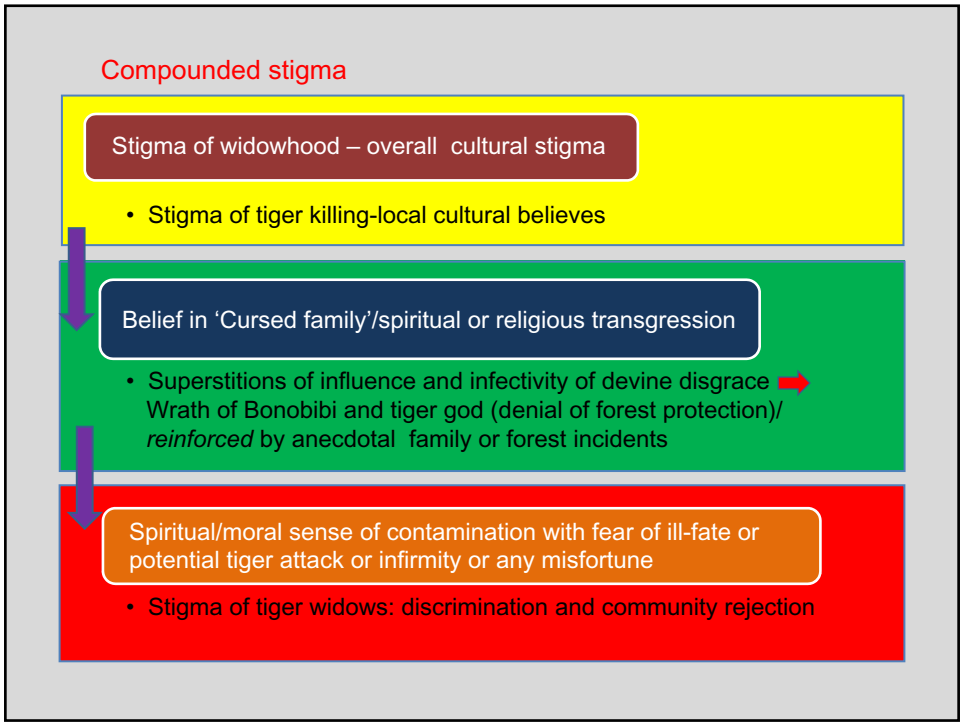

Figure 9. Superimposition of stigma of widowhood and stigma of tiger-killing.

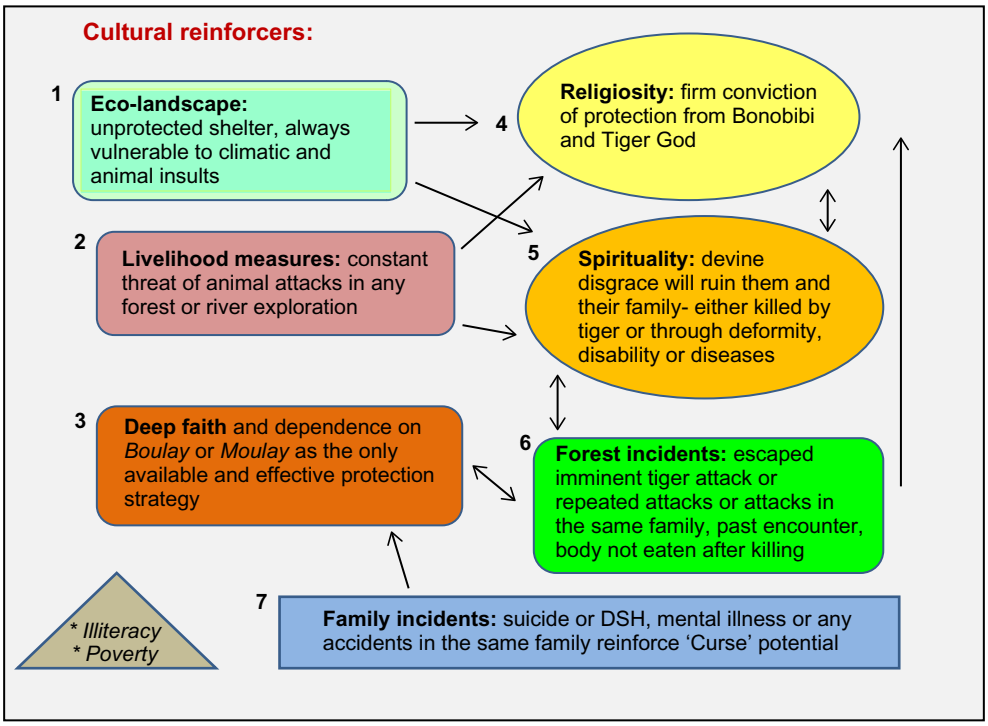

Figure 10. Interactions of cultural reinforcers of stigma related to tiger victims.

cumulatively adds to the strength of cultural stigma about being killed by a tiger.

People in this region are used to interpreting any misfortune or negative incidents (eg, collapse of a mud house, an inundation of flood water, crop failure, nonavailability of sufficient fish or good fuel wood in a forest trip, facing a thunderstorm during a forest trip, or the sudden death of livestock, etc.) in terms of a spiritual or religious explanation, namely, the forest deity is displeased with the incumbent. Any good or fortunate incidents (eg, escape from danger either inside the forest or from natural calamities or good honey or fish harvesting or birth of a baby boy, etc.) are also interpreted in the same way, but is seen as due to the grace of Mother *Bonobibi*, and the people reciprocate by offering special oblation, *puja* or prayer, to thank the deity. It is interesting to note that the strength of local cultural belief was so deep and binding that despite the death of their husbands by tiger-attack, and their own suffering as a result of this, none of the widows expressed or made any negative remarks or derogatory statement about the tigers. On the contrary, they felt guilty about some sort of probable transgression (religious or spiritual) which had evoked the displeasure and resentment of Goddess *Bonobibi* and precipitated the *accident*. The same is true about the villagers, as evidenced in the FGDs and general discussion during transect walking, although some of them had grudges and felt anger against the forest guards, officers, local brokers, and insurance agencies or boat-licensing authority and used derogatory remarks when commenting on these; but they, like the tiger-widows, never made a negative comment or remark, or used any slang if referring to tigers. Likewise, it has also been noted that many honey collectors refuse to wear the rubber mask on the back of their heads (supplied free of cost by the forest department and a trick to fool the tigers and deter the attack from behind) during their forest activity because they considered it a breach of trust with their protector, the Goddess *Bonobibi*. These are the unique cultural examples as defined by Kleinman and Hall-Clifford,[87] where they say, very rightly, that stigma is a social, cultural, and moral process: generating within the sociocultural environment, it may affect individuals or groups morally and is maintained in the "*lived worlds of the stigmatized*".

Community and family discrimination. The widespread negative cultural stigma and social perception of tiger killings lead to the tiger-widows being labeled as *unholy and evil* women. Tiger-widows are also blamed for their husbands' death by both family and community, for example, 90% of the widows had been accused of causing their husband's death by their family in-laws, especially by the mothers-in-law, who would call them *swami-khego* or *husband-eater* and viewed them as a sign of misfortune (*aw-poya*) as well as harbingers of bad luck. This labeling and blaming, as a result of the cultural stigma, leads not only to verbal, physical, and psychological abuse for the majority of the widows but also continues to subjugate them to extreme social discrimination; physical, emotional, and economic exploitation; deprivation and humiliation; and often cruelty.[88] A similar picture has been reported from the tiger-widows in Bangladesh Sundarban,[89,90] where a tragic narrative from a Bangladeshi tiger-widow[86] states that: "After the death of my husband by a

tiger attack, my miserable life started. I took shelter in my parents' home with my two kids. Working in a shrimp farm, sorting shrimps, only gives me 40 BDT (50 US cents) per day. The number of meals per day decreased; quite often I skip my meals to give some food to my children". To give these narratives a context, it is important to know that there are over 10,000 tiger-widows in Bangladesh.[91] Kazim[92] has reported the tragic life stories of social exclusion, neglect, poverty, and pitiable state of 1,000 tiger-widows in the South-Western Sundarban of Bangladesh.

Generally, where widows are already ostracized in Indian society, death by tiger has added a further momentum in compounding the stigma. There are an additional set of cultural rules for the tiger-widows, they are to live in isolation, they are not to have any social discourse with male figures, they must wear white *saris* (in contrast to the colored *saris* worn by married women), they must wear no ornaments or bangles, and they are not invited to any marriage or community festival, as they stand as a mark of *unholiness* and sign of misfortune. They should not stand in the way of, or be seen by, any bride or groom on their way to their wedding ceremony. They should not come into the vicinity of, or close to, any religious performance or *puja* (prayer) and are strongly forbidden to touch any related materials or deity, as their touch will spoil the sanctity of the occasion. The existing cultural stigma and these enforced rules have resulted in tiger-widows being shunned from mainstream community life, and indeed, in some Sundarban blocks tiger-widows are living in a segregated hamlets, locally called *Bidhoba Palli* (widow hamlet) (Fig. 11), a name which very frankly reflects their outcast status and social isolation.[85] More unfortunate still is the impact of this stigma in the minds of their own children and relatives. One widow with tears in her eyes said: "I took so much hardship to raise my only son … starved, earn by hard toll of meen (TPS) collection from river under sun, rain and storm, cattle grazing in fields…. But when he got a job in the town and married a girl there, he said that they couldn't take me with them because I am the evil person who devoured her husband (pause and profuse crying) and may caste evil on his family too. So he disconnected from me completely." There are ample examples existing where even the parental family members distanced themselves from the widow after the *accident*, especially in order to avoid any financial obligation, and in some cases they also blamed the widows for their husbands' death. These cultural stigma not only enforce social isolation but also impact on their life courses as well. These families face difficulties in negotiating marriage for girl children, the dowry demand goes up as it is also believed that a tiger attack within the family may potentially lead to the development of mental disorders (in the bride-to-be), a way by which the stigma applying to the widowed mother can be extended to

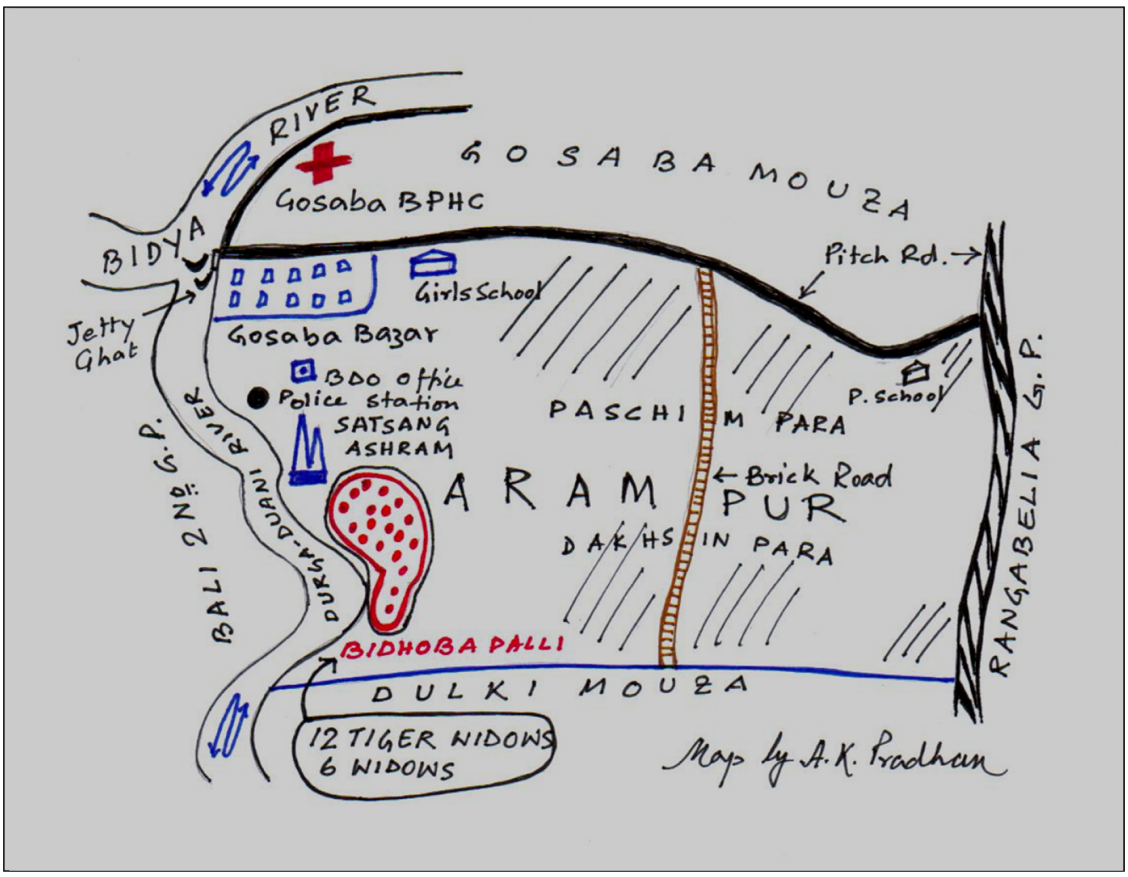

Figure 11. Participatory mapping: widow-hamlet (*Bidhoba Palli*) in Arampur village, Gosaba block.

her daughters as well. The stigma attached to the *tiger-widow* also acts as a hindrance to them where employment opportunities, such as that of maid servant, are concerned as well. Similarly, a survivor of a tiger attack, and bearing evidence of injury scars, will be regarded as a bad omen and evokes a strong sense of guilt and repentence in the mind of the victim. Like the tiger-widows, any surviving victims are also expected to avoid socialising in the community.

Remarriage. Remarriage for widowed women is virtually impossible in rural India, because of the various social and religious restrictions imposed on them.[93] The social custom and practice for widows in Sundarban does not differ from that of the broader Indian cultural context; widowhood is seen as inauspicious, and such women continue to face severe social hostility and brutality in the name of 'cultural and religious norms'.[94] Remarriage is not encouraged, and the belief that tiger-widows are cursed in being *responsible* for their husband's death places some insurmountable obstacles in the way of these women to do so. In this study, only 8 of the widows (12.3%) had remarried. Most of the tiger-widows are in their early to late 30s, and most of them have young children. The existence of a tiger-widow's dependent children, when added to the social stigma of tiger-killings, also further limits the widow's opportunities for remarriage. In such a situation, if the widow's parents take up the responsibility for the children, then there is a stronger possibility of the widow to be able to remarry, as had already happened with two of the widows involved in this study. There are however, also some widows who are so psychologically attached to their deceased husbands that they cannot consider replacing this image with another man in their life. One widow said of her husband: "I was married when I was 9 to him, who was 28 years then. He was really a muscular man, good looking, one and half-yard wide chest, tall with curly and dense hairs. He was strong and courageous, went to the forest alone, even in the midnight. He cared for me. I never saw such a stout young male ever. I never thought of marrying anyone. I accepted my misfortune – what Bonobibi punished me – (crying) I accept this punishment." This is a clear example of sanctification of the deceased[95] where the widow has idealized her former husband to the point where it will make difficult for her to find a new partner, one who would compare positively with the idealized image of the deceased.

Sundarban is not a free-mixing society where the widows have a choice in whether to engage in a new relationship. If they are young, and have no children, some will try to move toward one of the nearby towns where they can start their lives again as a maid servant or as a labourer on a construction site. However, this move is not easy, and the widow will need patronage from those in her family to assist with this. Nor is a move away always a positive experience, as widows are made to feel that working in towns equates with *being a bad woman who has lost her character*. One widow, who worked in a hotel in nearby Canning town said: "though my heart is tied with this small cottage in this village but I feel dejected to come here because people are not good, they gossip about my character. In my bad days there were none to help me, but now they are criticizing me with a bad name as I am working in the town".

Children. The tiger-widows experience tremendous economic hardships, under which they have to raise their children. Children will have to discontinue their schooling in the pursuit of working to support the family (for example, in cattle grazing or TPS collection or agricultural labor). Children of tiger-widows are also ridiculed or bullied by their peers; as one widow said with tears in her eyes, "my son was in primary class when his father was killed in a fishing trip. He was bullied in school by other classmates and they jointly ridiculed him by saying-'your father was a bad man and a sinner'. He was so upset and sad that he ultimately refused to go to school". In most cases too, both the in-laws and extended families will deny any financial help to the widow. So it becomes inevitable that the children of tiger victims are forced to drop out of school and to engage in child labor. They too, also eventually come to rely on forest exploration for their livelihood, just as their fathers did. It would be appropriate to mention here how a young son of a tiger-widow responded to us concerning the ongoing social discrimination: "We don't care who keeps on good terms with us or not. Accidents can happen to anybody, any time. We are going to the forest next week for honey collection. A search for honey is a search for tiger! Nobody knows when it will attack. One can see the live tiger footmark in the mud. It is risky but what is there to do? Who will give me a job? The forest is the only source of our living. We cannot sit idle at home to starve. If Ma (Bonobibi) wishes to keep us alive, we will, otherwise not". Brave words, however the fate of girl children is more perilous. Many widows will negotiate their daughter's early marriage (as early as the age of 10 or 12 years) not only to ease the financial burden but also to safeguard their security. Many of the tiger-widows expressed their great concern regarding the social insecurity, potential abuse, and exploitation of their young daughters.[88] It has also been reported that Sundarban girls are especially vulnerable to being caught up in being trafficked to other states of India.[96] To combat these and similar childhood tragedies, some proactive NGOs in Bangladesh have started up schools for the children of tiger victims.[97] However, the psychological effects of traumatic grief, and the profound and long-term effects on the young and adolescent children of the tiger victims, in terms of stress, feelings of insecurity, sensitivity to peer reactions, frightening and traumatic experience, etc., all remain a very neglected research area and are in need of being properly addressed with adequate support and guidance.

Lastly, there are two further important issues of serious concern that have emerged from this study, and they are the gender issue and the ecopsychiatric risk perspective of HTC.

Gendered aspect of HTC. Ogra[98] has raised a serious concern about gender issues in relation to HWC and provided a handful of observations arising from her research in Uttarakhand Forest, India. Reviewing the social science

research on the impact of HWC, she has delineated two important impacts, namely the visible cost (direct economic losses) and the hidden cost – ie, uncompensated and largely psychological or social in nature. She too has cited the evident research gap and the need to examine the *gendered aspect of conflict*, or gender issues in relation to wildlife-related problems. Research has shown that vulnerabilities to environmental hazards are strongly influenced by local cultural and socioeconomic factors including both gender and class.[99] From the feminist political ecology perspective, gender issues impose a differential control over resources, while power hierarchies and social structures like class divisions, ethnicity and man–woman relationships are seen in the context of local culture.[98] Gender–environment relationships tend to highlight specifically the differential effects of HWC borne by men and women. From her study on Human–Elephant conflict in Uttaranchal, Ogra has reported that women bear an extraordinary hidden cost as a result of these conflicts which range from an increased workload, decreased food resources, diminished physical and psychological well-being, humiliation and molestation or arrest by forest guards, and discontinuation of their children's education. All these issues can be seen to be linked with the local sociocultural and political perspectives of gender discrimination. Naughton-Treves and Treves[100] have also, in their African HWC studies, observed the same gendered sufferings and termed this as *compounding vulnerability*, with its deepest impact on the poorest households, and especially on widows and the disabled. Historically, men have been represented as the prime stakeholder in any HWC-related impact and management policy,[101] but recent research has shown that there exists a 'potential for gender differences in wildlife-related attitudes, perceptions and behavior' and thus women should now be counted as an equally important stakeholder in HWC-related events and decisions.[102] In terms of environmental justice and political ecology, Reed and Christie[103] have identified this gender inequality as a *gender gap*, given the understanding of environmental policy and practice. Studies of forest resource management in South Asia including India and Nepal have also highlighted the gender differences in social networks in environmental collective actions[104] and also stressed the usual rule of gender exclusion (of women) in participatory community institutions.[105] It is also interesting to note that not only tiger-widows are exploited and deprived of social justice as a part of gendered impact but also the TPS collectors, who are mainly girls and women, are also exploited and economically deprived by their male folk (usually their husbands, who take the money earned by their wives and spend it on paying for alcohol) and the tricky local and corporate business networks.[49,106] The direct cost of HTC is the death of the principal earning member of the family, and the passing of the responsibility on to the survivor, ie, his wife, and it is she who will bear the gendered impact of this HTC; which has been shown here to include serious and lasting psychological trauma, social discrimination, blame, the cultural stigma attached to tiger attacks, shortage of food, an increased work load, and resultant deteriorating physical and mental health.

The gendered impact of HTC does not, however, apply so well when the one left behind is the husband; it is worthwhile mentioning that we met, in our catchment villages, 7 widowers whose wives were killed by a tiger during river/forest-based livelihood activity, mainly TPS and crab collection (not reported in this paper). Two of the widowers had since died naturally, three had remarried, and two were living and working as day laborers. None of the men were subjected to any cultural stigma nor do they suffer any social disgrace and subsequent isolation; indeed, in marked contrast to the experience of widows, widowers have easy access to all social and cultural life on the island. It was also noted in the FGDs, men (husbands) whose wives have been killed by tigers are not considered as *unholy* or *cursed*, nor are they identified as a 'wife-eater'. Similarly, these men were not subjected to any prohibitive social code of conduct, nor indeed any type of social and cultural restrictions, including the possibility of remarriage and finding employment. Widowers are not ostracized and isolated, but instead are living with their family members peacefully in the community. The differential burden and multidimensional gendered vulnerability of tiger-widows after HTC as described here opens up the possibilities of new local research opportunities in the area of social justice, as well as the need for action, namely development of social support system with environmental security.[107]

Ecopsychiatry – human ecology and HTC. Sundarban offers a unique ecopsychiatric scenario (relationship between humans and their natural environment) where the ecological specificity of the region affects human lives with resultant mortality and morbidity. The focus of this study is one of the central issues experienced by the people in the locale, that of forest exploration and HTC. Other important issues affecting the region (which have fallen outside the scope of this paper) are the environmental impacts of climate change including the rise in sea level[108] and resulting effect on agricultural output (decreased cropping intensity, crop failures, increase in soil salinity), and the overuse of pesticides and the consequent pesticide-related mortality and morbidity,[109] as also severe weather events, coastal erosion, and the subsequent impact on fisheries,[110] all of which have affected not only the ecological landscape of Sundarban but also the life of its inhabitants. More and more farmers are known to be turning to a forest-based living to earn their livelihoods,[111] and the subsequent shrinking of the tiger's habitat and prey base is leading to more tigers straying into the paths and habitats of people, and consequently increased incidents of HTC.[112] From an ecopsychiatric viewpoint, there are two important issues here, namely, the reduction of human mortality and morbidity and a suitable tiger conservation program that will help to mitigate these conflicts. The proximal risk factor is the continued and dangerous human encroachment into tiger territories in order to earn a living, both legally and illegally. These livelihood activities are motivated primarily by the extreme poverty of

the people (and the very real absence of any alternative earning option) – the distal risk factor, following the tragic deaths taking place inside the forest, the affected family is then driven into deep poverty and suffers sociocultural ostracism. Inskipet et al.[113] has very rightly commented that *"Interactions between the problems experienced by villagers, including HTC, result in a complex 'risk web' which detrimentally affects lives and livelihoods and ultimately perpetuates poverty levels in the Sundarbans communities"*. There are several papers[36,86,114–116] that have detailed the grinding poverty experienced in Sundarban (India and Bangladesh both) and Al-Mahmood[117] has very touchingly commented on life in the delta as *"Racked by poverty, stalked by tigers, the people of the Sunderbans struggle to survive"*. Another study[118] found that poverty is the most dominant factor that leads to all types of forest resource extraction for subsistence in Sundarban forest and is the factor most accelerating incidents of HTCs and human death. The important demographic dynamic shown to be behind poverty in this region is population pressure and the resultant anthropogenic impact, which not only increases the chance of HTC but is also causing serious fragmentation of the mangrove ecolandscape in the tiger's habitat. We know that approximately 5,000 people are known to frequent the swamps and waterways in this region every day. In Bangladesh Sundarban,[119] the numbers reach an estimated 300,000 people, working variously as wood-cutters, fishermen, and honey gatherers and Golpatta leaves and grass collectors. Nor are these numbers static, indeed human pressure on the Sundarban forest can be seen to be rising over the years.[120] A recent report[121] shows that in the south-western fringe of Sundarban (Ramganga and Raidighi range), there are 22 villages with a population of 103,768 (average 557 persons/km^2). Here there is an extreme paucity of any livelihood opportunities, reflected by the over 60% unemployment rate, a very low level of irrigation and cropping. The combination of all these socioecological factors is continually pushing more people toward the forest. This extraordinary human pressure on the forest is resulting in further damage to the mangrove ecology and tiger habitats; to cite one such example: "during the fishing trips, the villagers resorted to honey collection on 25% occasions and felling of pasur wood on 35% occasions. They also extract fuel, dhudul and goran woods on 20%, 15% and 5% cases respectively". Islam[111] reported from Bangladesh Sundarban that a recent survey by a wildlife trust found that 80% of 400 people questioned had eaten deer meat at least once in their life, indicative of the fact that secret hunting in the mangroves is another potential cause in the reduction of the tigers' access to their normal prey; and the present authors also evidenced secret sale of deer meat in Dayapur village. This constant human encroachment (including poachers) and destruction of the forest is the cause of a

Figure 12. Participatory mapping – HTC by a straying tiger.

changing cultural landscape (human-modified environment) with a special impact on cultural geomorphology,[122] all of which have increased the risk potential for tiger straying and increased HTC (Fig. 12). In 2009, 12 incidents of tiger straying were officially recorded in which tigers attacked villagers or their livestock and 4 people were killed in tiger attacks.[123] The human dimension of this population–poverty–livelihood axis (**5**) should also be addressed in any conservation plan that includes the mitigation of HTC in Sundarban.

Ecoidiom of distress. It is interesting to note the ecological context that impacts the lived experience and semantics of misfortune suffered by individual or families. Tiger attack and resultant death or disability will make the affected family isolated and stigmatized in the eyes of others and they are then targeted as a *cursed family* or *baghe-khaowa* (killed by tiger) or *baghe-dhora* (caught by tiger) family or hamlet, and the widows are referred to as *bagh-bidhoba* (tiger-widow) and their isolated living clusters are termed as *bidhoba palli* – all of which vocabulary reflects segregation, avoidance, disparagement, metaphors of stigma, and degrading moral overtones. This negative labeling, with a derogatory stigma-tag, separates them from the 'normal' families, and this is a good example of how an ecolandscape can influence a cultural barrier and generate an ecoidiom of stigma. Nations and Gondim[124] have reported a similar ecological context of stigma and discriminatory labeling of children with respiratory infection and of urban mangrove dwellers (lowlanders) derided by the highlanders of Northeast Brazil ("filthy pigs, stuck in the muck" [atolados na lama]), and termed this an *ecoidiom of respiratory distress*.

Conclusion

In spite of India's considerable economic and social progress since the time of independence, the cultural oppression and social alienation of widows still remains deeply rooted in society.[125] Ostracized by family and society, thousands of widows in India take refuge, in hope of salvation, in the *Widow-Cities* to be found in the holy temples of Vrindaban, Mathura, Hardwar, Banaras, Nabbadweep, etc.[126] However, it is still the case that "Many of the 16,000 widows in Vrindavan have no choice but to beg in the street".[127] Indeed, the story of widows all over the globe can be seen to be a miserable tale of social and cultural injustice[128] that severely affects their social and economic status as well as jeopardizing their sexual, physical and mental health to an unprecedented degree.[129] The United Nations,[130] in noting their poor social standing, has very aptly said that widows are: *"Absent in statistics, unnoticed by researchers, neglected by national and local authorities and mostly overlooked by civil society organizations – the situation of widows is, in effect, invisible."* To highlight the recognition and world awareness of the ongoing misery of widows across cultures, the UN declared 23 June of 2011 as the first-ever International Widows' Day. The time must have therefore come to proactively initiate, both in the public and private domain, social reform and collective action with a view to safeguarding property rights, social security, employment, and livelihoods for widows[131] and also to frame and implement stringent legal and punitive measures to bring to an end all forms of atrocities, abuse, and exploitation of the widows.[132] The Tiger-widows of Sundarban should also be protected from

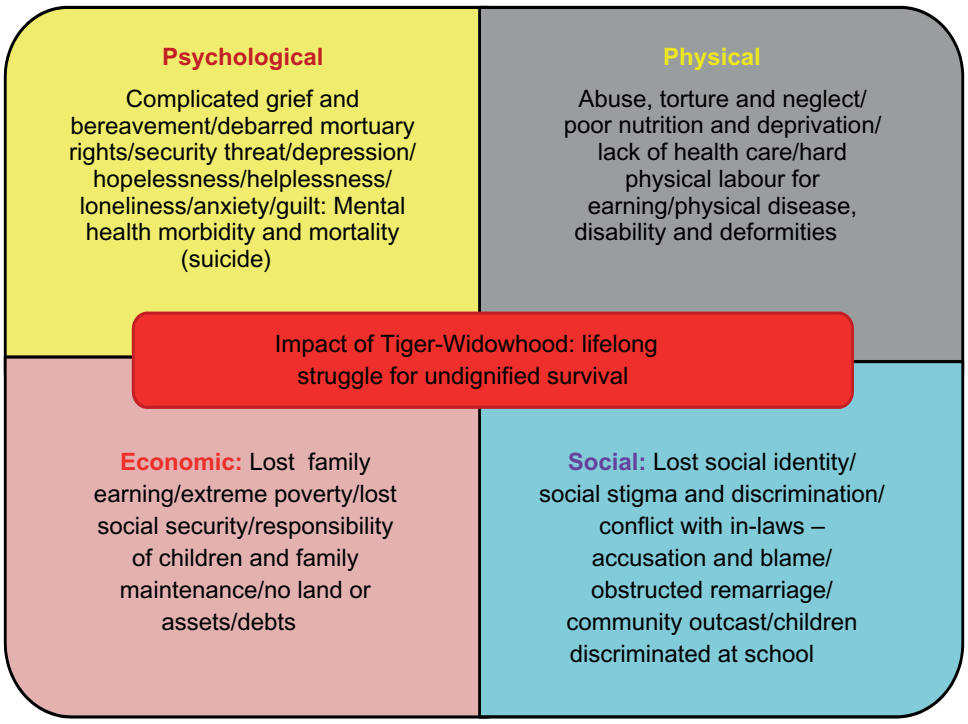

Figure 13. Impacts of tiger-widowhood.

social marginalization and receive proper compensation and social support in order that they too can live with respect and human dignity. The present study speaks to the multitude of sufferings of the tiger-widows of the Sundarban. It is a situation that affects all aspects of their lives, and leads most to lifelong suffering (Fig. 13). They are deprived of all human dignity of living, discriminated against by their families and communities, struggle to survive a profound degree of poverty, while all the while living with a multitude of posttraumatic scars and deprivation,[133] abuse, and exploitation – all of which combine in a desperate struggle to survive.[43]

It is a matter of uncertain speculation as to whether the problems experienced by the tiger-widows of Sundarban will attract any attention in a national or indeed, international forum, even given the context of increasing HTC in recent years, both in India[134] and in Bangladesh[135] (**6**) and the consequent rise in the numbers of tiger-widows in the region.[136] Increasing HTC could and should inform local conservation strategies, having as it does, seriously negative impacts on both humans[137] and tigers.[138] Local community involvement, especially their attitudes, perception and some tolerance to loss are also important factors to consider in tiger conservation measures.[139] From an ecopsychiatric perspective this is a very serious concern that will need the checks and balances necessary between two diametrically opposed universes: that of the conservation of biodiversity, and the well-being of forest dependent population. Treves et al.[140] thus very rightly remind us that "*HWC exemplifies a fundamental challenge for biodiversity conservation: reconciling local concerns for security and economic growth with international concerns for saving threatened species*". Three key issues are important here: firstly, the tiger habitat should remain undisturbed by restricting human intrusion, and this could be managed both by local human resources[11] and wildlife management.[141] Secondly, alternative, sustainable economic and social activity regeneration for the marginal populations[142] will be an important key in the plan to reduce the biotic pressure on the forest[143] and should also seek to address both economic and social security for the widows and other victims.[144] Indeed, from every angle; HTC, human loss, tiger-widows, tiger conservation and the preservation of biodiversity, we can see that a special program to create and sustain alternative livelihoods for the Sundarban islanders is both a crucial and urgent need.[145] An amicable, holistic view would provide a rational path to balance the two opposite trends, namely, the forest dependence and conservation restrictions, for which, it must be remembered, that in the long term, sustainable livelihood opportunities for the local people must be the key issue.[146]

HTC in Sundarban represents a complex and risky human-ecological interaction (Fig. 14), truly a confrontation of socio-political and biological landscapes.[147] So for both human well-being and tiger conservation, the consideration of local sociocultural factors[148] by multisectorial coordination[149] and stakeholder engagement in participatory decision-making[150] as well as participatory planning (to consider cost-effective design, wildlife specificity and selectivity and sociopolitical acceptability)[140] may help to reduce HTCs. The aim should be: "This so-called 'human-wildlife conflict' (HWC) needs to be addressed to ensure that local people do not unfairly bear the negative side-effects of conservation, becoming more opposed to it and further jeopardizing the survival of high conservation value (HCV) species".[151] Lastly, a protracted ecocultural advocacy with active community participation would help not only to address the gender–environment issues[152] to mitigate the cultural stigma against the tiger-widows but also to enhance the social acceptability[153] of the ecoconservation of Sundarban's biodiversity. Though rampant poaching of tigers (for international trade of tiger products[154]) and other wild animals in and around Sundarban forests is also a major cause of concern and is certainly leading to the loss of biodiversity,[155–157] that issue is outside the scope of this paper. All the steps mentioned above will need a coordinated, strong, and proactive administrative strategy together with a positive political will and active community participation.[158,159]

Limitations. The present study sample was not a random selection; it was a purposive sample, based on the logistics and willingness to participate. The Stigma scale though was constructed by observing relevant issues from validated scales and incorporated local inputs from four FGDs; however, details of psychometric assessments such as validity and reliability analysis was not conducted. Future research would be needed to examine these issues further and to explore the clinical utility of this scale in a study of such a special population. One example, arising indeed from our own research is that although the snake is a dangerous animal and also having mythical and folk-culture backgrounds, it is not associated with, nor match, the cultural stigma level attached to tiger attack. More in-depth research data to track conflicts should also be elicited by interviewing those people who survive tiger attacks (there are several survivors, mostly male but female also, but who all sustained injury and resultant deformity or disability and psychological dysfunction) and that would help to further understand the unique grammar of the forest (including the mitigating potentials) against the context of HTCs.[160]

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Risk factors

Demographic risk	Social risk	Ecological risk	Climatic risk	Cultural risk
Around the impact Zone: Increasing population pressure Decreasing agricultural land Nuclear family	Grinding Poverty No alternate livelihood options Illiteracy Geographical remoteness and isolation	Dependence on Forest/River-based living Eco-depletion and Biodiversity loss Encroachment of Tiger habitat (shark/crocodile habitat) Decrease prey-base/Tiger straying	Sea-level change/ Coastal erosion Extreme weather condition (cyclonic storm), flooding, changing seasonal pattern Increased Water salinity Hard agriculture Low-cropping intensity/pest attacks/crop failure	Cultural belief about forest and tiger Dependence on Boulay/Moulay as Protector Spiritual conviction on Bonobibi as Savior Cultural interpretation of Tiger attack [Poaching (Trade in tiger parts)]

Human-tiger conflicts

Human dimension (stakeholder issues)	Ecological dimension (conservation issues)
Primary conflict (inside forest): Death/disability Secondary conflict (straying tiger in locality) Death/disability; livestock looses One parent loss/lost income of family Tiger-widows: Poverty/decreased food security/ gender-discrimination and stigma/social insecurity/physical and mental health morbidity and mortality (suicides/DSH)/threat of arrest and fine/compensation issues Childhood trauma/school dropout/child labour Survived victims: Mental (Prolonged grief, PTSD Depression, Anxiety) and Physical health morbidity, Chronic disability and Loss of working capacity[78]	Increased biotic pressure on forest: Destruction of bio-diversity Fragmentation of Tiger habitat and Stress syndrome[21] of Tigers Direct/indirect conflicts- death or disability of Tiger Repeated confrontation with human may change the tiger behavior- humans become easy prey[168] Prey-base depletion and Tiger straying[169] Wild life threats Lack of community support for Tiger conservation and wildlife values Depletion of eco-resources and imbalance of mangrove eco-system

Figure 14. Ecopsychiatric risk-web in HTC in Sundarban.

Notes

1. Mauza: It is an administrative land area in a block of a district within which there may be one or more villages. In West Bengal, there is a three-tire Panchayat system (democratically elected local self-government units): each mouza is under a separate GP and all the GPs of a block are under a Panchayat Samity and all the Panchayat Samities of the district is under Zela-Parishad.
2. Between 2009–2011, a total of 58 incidents of tiger straying have been reported in Sundarban, 25% of which are from Jamespur and Patharpara villages opposite to the Panchmukhani 2, core area of STR. 12 cases of tiger straying is reported from villages near the Sajnekhali Sanctuary.[161]
3. Poverty Line: The level of expenditure (or income), below which an individual or a household cannot satisfy a certain minimum consumption level. Planning Commission of India, on the basis of the National Sample Survey- 61 round survey data on consumer expenditure published state specific poverty line – for West Bengal it is Rs. 382.82

(nearly US$ 8) for the rural and Rs.439.42 (about US$ 9) for the urban areas, per capita per month.[162]

4. Paddy collection: After harvesting of the paddy crops from the field some paddies are lost by falling into the field and these were collected and sold in grocery shops. Usually one can collect 1–2 Kg a day and 1 Kg will fetch Rs.5.
5. One important demographic input to population pressure and poverty cycle is the internal displacement and migration of people from inside and outside of Sundarban. The cause for internal displacement is the recurrent massive effects of climate change being reflected in heavy rain and storm, tidal surge, extensive flood, land erosion, total destruction of property and livestock and thus a large group of affected Sundarban dwellers lost their land and livelihood and shift from one island to another island in search for food, shelter and living and forest is the only available resource which they can extract without any hindrance.[163] For the same ecosocial reason, people from Bangladesh (*climate refugee*) also illegally migrating through the porous border.[164] This climate induced migration from Bangladesh to India and consequent environmental pressure on the fragile ecology of Sundarban is an international concern.[165,166]
6. According to Bangladesh Forest Department data: 26 tigers were killed by man and 338 human were killed by tigers during 2000–2014(Aug.) in Bangladesh Sundarban.[167]

Explanatory Notes for Participatory Maps

Figure 5. Drawn by a GP member. It shows the distribution of three tidal rivers around the SRF buffer zone; ecolandscape of the community with mud and brick roads (BR); Solar light stand to keep tigers away at night (given by Forest Department); the local market; *Jety ghat* with country boats for crossing Gomor and Sajina rivers; Crab-hook lines (*Thopa*) and TPS collection activity and Fishermen cottages (FC) along the Gomor and Sajina river banks; Forest office at Sajenakhali Tourist Lodge with watch tower within high iron fencing boundary; severe embankment ruptures (black shaded areas with years); tiger straying in different years (long red arrows towards the community); entrance paths to the SRF (short black arrows inside the forest); a marked hamlet with repeated tiger straying incidents (*Baghedhora Para*); wire mesh barriers on the forest at river bank to prevent tiger crossing; Widow hamlet (*Bidhoba Pally*) and an accidental discovery of a camouflaged straying Tigress with two cubs inside the ripped yellow paddy field during 2001 winter in Jamespur; Cottages of 3 *Boulays* and local health care providers (3 *Sarpa Baidyas* and 2 *Ojhas*) and two Bonobibi Thans (shrines) - one inside the SRF.

Figure 11. Drawn by a NGO member: Widow-hamlet (*Bidhoba Palli*) in Arampur village, Gosaba Block showing the segregated location of the widow hamlet at the corner of the mouza on the river bank. Normal widows are also living with the tiger-widows in the same hamlet. Among the 12 tiger-widows, husband of two widows were not killed by tigers but died from thunder-storm during fishing in the river within SRF. Husband of one normal widow committed suicide by hanging.

Figure 12. Drawn by a Primary School Teacher - HTC by a straying Tiger (Lahiripur): showing the tiger's entrance path from SRF (red arrows) , crossed the Sajina river, took shelter in cowshed – hiding inside the Lady's finger (Okra) garden in the courtyard, victim's position and time of attack, return path of the tiger towards the forest; neighbors' cottages and their attempt to help the victim (black arrows), received severe injury and survived after admitting in the Gosaba Block Primary hospital.

Author Contributions

Conceived and designed the experiments: ANC. Analyzed the data: ANC, AB, MKB. Wrote the first draft of the manuscript: ANC. Contributed to the writing of the manuscript: AB, RM, MKB. Agree with manuscript results and conclusions: All authors. Jointly developed the structure and arguments for the paper: ANC, AB. Made critical revisions and approved final version: ANC. All authors reviewed and approved of the final manuscript.

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