HUMAN-WILDLIFE CONFLICT: THE CASE OF THE ROYAL BENGAL TIGER

A Dissertation

by

AMIT KUMAR GHOSHAL

Submitted to the Graduate and Professional School of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Chair of Committee,	Michael A. Schuett
Committee Members,	Kyle M. Woosnam
	William Alex Mcintosh
	James Lindner
Head of Department,	C. Scott Shafer

December 2021

Major Subject: Recreation, Park, and Tourism Sciences

ABSTRACT

Sunderban is the largest estuarine delta with one of the highest human-wildlife conflicts in the world, ascribed to the aggressive Bengal tigers' tempestuous interactions with the resident communities. Anthropogenic interactions with their vagrant decisions and activities in and around the mangrove forests play a critical role to exacerbate the ghastly human-tiger fatalities. Encroachments next to the forests, prey depletion, and tiger killings, overwhelmingly threaten the extirpation of the Bengal tiger. Human incursions into the forests for foraging and tiger straying outside the forests for livestock predation, both result in tiger conflicts while reducing tiger tolerance levels. The eradication of the tiger (a keystone species) threatens the destruction of the unique Sunderban ecoregion. Despite multiple studies, very little is known about the psycho-social, socio-political, historical, cultural, and physical complexities that the peripheral area residents foster with various stakeholders and tigers. Their interactions often undermine the ecosystem integrity, the increasing vulnerabilities of humans and wildlife, and the aversion of the system to the destructive human presence has hardly been understood. This study has attempted to explore and understand the stakeholders' views that have influenced the relationships over time. Qualitative research was used to capture and interpret the participants' thoughts, feelings, and behaviors that dominate the various constructs and complexities of the unique relationships. Social constructivism paradigm was used to construe the subject knowledge through discussions and interactions with the societal members. The emphasis was not on formulating conflict mitigation strategies but on understanding the conflicting dominant undercurrents, competing interests, and operational paradoxes. While it is irrefutable that humans and tigers must be

disjoined to ensure peaceful coexistence, it is argued that measures must be formulated to address the sustainability and distributional equity to protect this unique ecosystem.

DEDICATION

My dear loving parents Dr. Amiya Kumar Ghoshal, MD, (dad) and Dr. (Mrs) Piku (Snehalata) Ghoshal, (mom), had always believed in the saying that '*you can never be overdressed or overeducated*' (quoting Oscar Wilde). Adopting the Sanskrit saying that '*education is the most precious wealth in the world that no one can take away or steal from you*,' my family had always instilled the value of education on the forefront of our upbringing over the other mundane matters of life. It was their vision, inspiration, guidance, and support that have allowed me to make the arduous, long, yet fruitful academic and professional journey. My parents and sister Ms. Mita Ghoshal have always actively supported and motivated me during my first Ph.D. and all the educational ventures that include a B.S., LL.B., MBA, and MTA that I had studied. My parents, especially my mom, have always remained the most influential person and source of encouragement in my life.

I dedicate my second Ph.D. to the loving memory of my parents and to my sister, who continues to support me today. As the first person of my generation in the USA, may this groundwork in academia be the foundation of many towering achievements for the successive generations to accomplish.

Though I know that my parents in heaven are smiling and blessing my achievement, I so fervently wish that they were physically present to witness my Ph.D. graduation. I deeply miss them.

ACKNOWLEDGEMENTS

Returning to academia after an industry career would have been arduous without the continued support, guidance, and mentoring of many professors and the valuable resources provided by Texas A&M University. However, my deepest gratitude and appreciation especially goes to my committee chair, advisor, and mentor, Dr. Michael A. Schuett, whose expertise, competencies, insightful ideas, and advice have brought this dissertation to fruition. Thank you for your patience, insights, and mentorship that have steered me in the right direction throughout my doctoral studies. I am incredibly fortunate and blessed to have you as my adviser. My sincere gratitude is due to my doctoral committee members - Dr. Kyle Woosnam for the guidance, mentorship, and motivation as my professor; Dr. James Lindner for his continued counsel to develop qualitative research skills in the class and during the project writing that has immensely helped me in completing the current research and to Dr. W. Alex Mcintosh for his mentorship and readiness to assist always during the research process. My sincere appreciation is also due to Dr. Brandy Kelly-Pryor, Dr. Tazim B. Jamal, Dr. James Petrick, and Dr. Giselle Mora Bourgeois for their initial guidance and mentoring in enriching the framework for this research.

My sincere gratitude goes to Dr. Rasheeda K. Richardson, Dr. Suzanne M. Droleskey, who have guided and worked with me as a Graduate Teaching Consultant at the Center for Teaching Excellence at TAMU. Ms. Ginessa Payne and Dr. Brandon Cooper have always assisted me in facilitating the ELP sessions at TAMU. I am privileged to receive formal-informal mentoring from RPTS Professors Dr. Scott Shafer, Dr. Gary Ellis, Dr. Amanda Stronza, Dr. Corliss Outley, Ms. Susan Scott, and Dr. Lou Hodges, to whom I am obliged. I appreciate my colleagues Dr. Linda Lelo, Dr. Tek B. Dangi, Dr. Aby Sene-Harper, Dr. Michael (Mike)

Petrillo, and others from the RPTS Department for being good companions and sharing their ideas and expertise. Thanks also go to the staff of the Department of Recreation, Park and Tourism Sciences and especially Mrs. Debbie A. Barnes, Ms. Irina Shatruk, Ms. Ann Williams, Ms. Clara Aguilar, Ms. Kathy Junek, and Ms. Clarice Fulton and Applied Biodiversity Science for making my time at Texas A&M University a great experience. You all have given me a pleasant work environment. My acknowledgments are also due to the Graduate Professional Student Council (GPSC), now GPSG, its past Presidents, and the Executive Body from whom I have learned the administrative and functional intricacies of Texas A&M University as the Legislative Chair.

Finally, I extend my love and most profound gratitude to my friend and sister, Ms. Mita Ghoshal, and to Dr. Raktima Bhattacharya for their encouragement during my doctoral studies and for always believing in me. I share this achievement with you both. Thank you for being there through the most challenging times of this endeavor with your unconditional love and admirable patience. You all will forever remain a pillar of strength in my life. Words cannot express my love and gratitude to my late parents Dr. Amiya Kumar Ghoshal and Dr. (Mrs) Piku Ghoshal, for tirelessly providing me their loving guidance and accepting my imperfections with love and patience. You both will always be missed dearly and will forever remain in my heart as a beacon of love, hope, and selflessness.

CONTRIBUTORS AND FUNDING SOURCES

This research work was supervised by the doctoral dissertation committee consisting of the Committee Chair and Advisor, Professor Michael A. Schuett, and committee members Professor Kyle M. Woosnam, and Professor W. Alex Mcintosh of the Department of Recreation, Park and Tourism Sciences at Texas A&M University, College Station, Texas, and Professor James Lindner of Agriscience, Career and Technical education at Auburn University. The research work for the dissertation was conducted by the student independently under the guidance of the Committee Chair and the other members of the committee.

Funding Sources:

The Student-Media Grant Program from the Center on Conflict & Development, TAMU (USAID Funded and distributed by the Howard Buffett Foundation), has supported the graduate research together with multiple other grants and fellowships, assistantships, and merit scholarships awarded by Texas A&M University. The dissertation contents are solely the author's responsibility and do not represent the official views of the funding agencies.

NOMENCLATURE

BLC:	Boating License Certificate
CBNRM:	Community Based Natural Resource Management
CCS:	Community Conservation Service
CWM:	Community-Based Wildlife Management
FPG:	Forest / Village Protection Group
Govt Officer:	West Bengal & Bangladesh Forest Department managers
HPI:	Human Poverty Index
HTC:	Human Tiger Conflict
HWC:	Human Wildlife Conflict
NGO:	Non-Governmental Organization
PA:	Peripheral Areas
VO:	Voluntary Organization

GLOSSARY OF NON-ENGLISH WORDS

Bagh:	Tiger
Bidhoba:	Widow
Bidhoba Palli:	Locality (village) where the widows reside
Bon Bibi:	Sunderban Goddess, protects the forest visitors from tigers
Boulay:	Traditional expert with supernatural powers
Bowali /Kathure:	Wood loggers and thatching leaf collectors
Brata:	Fasting for divine fulfilment of a prayer
Bund:	Earthen embankment

Dakshin Rai:	Tiger-God of the Sunderbans
Gunin:	Oracle (who can predict the future)
Jele:	Fishermen
Junglee:	Forest dweller, negative connotation of socially backward
Kobiraj:	Local medicine men dispensing traditional medicine
Kumir:	Estuarine crocodile
Mowali:	Honey and wax collectors
Palli:	Locality or place of dwelling
Panchayat:	Elected village council; last level of local self-government
Shah Jongli:	Goddess Bonbibi Brother; fights to save innocent villagers
Shami-khego:	Woman that eats her husband (derogatory metaphor)
Shramdaan:	Donation of voluntary labor
Surpanch or Pradhan:	Elected chief of Panchayat
Vahana:	Ride (transport mode)
Yamaraj:	The God of death

GLOSSARY OF NON-ENGLISH PHRASE

Jeikhane bagher bhoy, sheyikhane shondhey hoye: Fear of the tiger beckons the darkness

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CHAPTER I

INTRODUCTION: HUMAN-WILDLIFE CONFLICTS IN THE SUNDERBAN

1.1. Sunderban Background

The Sunderban Forest Reserve, a UNESCO World Heritage 'Ramsar Site' (ecological importance) is a National Park/protected area that consists of an uninterrupted stretch of freshwater mangrove forests from the south-eastern regions of West Bengal into the southwestern and southcentral regions of Bangladesh. The world's largest estuarine delta is at the lower end of the Gangetic Plains and consists of low elevation islands of vast saline mudflats, crisscrossed by the tidal waterways of the Ganges-Brahmaputra-Meghna rivers and its tributaries, draining into the Bay of Bengal. The Sunderban forests are characterized by the 'Sundari' (Heritiera fomes) mangrove trees with bayonet-like roots (pneumatophores), sticking out above the marshy land along with the shrub-like 'Golpata' (Nypa fruticans) and the impenetrable 'Goran' (Ceriops decandra) trees, standing between 1.8 meters and 3.6 meters high (Chaudhuri et al., 1994; Gopal et al. 2006; Iftekar, 2008; Khan, 1977). This ecosystem, spread between India (40%) and Bangladesh (60%), is endemic to the critically endangered Royal Bengal Tiger along with other critically endangered, vulnerable, and already extinct species.

The forest, separated into the core or inviolate areas, buffer zones, and fringe / peripheral areas (PA) is shared by the marginalized residents and the Bengal tiger. While access to the core forests is strictly for the forest employees, guards, and permit holders, the PAs and occasionally the buffer zone, are opened for human habitation. Historically, the forest ownership belonged to the kings, though the locals had unlimited access for living, livestock, collection of forest products, and harvesting of wild animals. To meet the increasing demands for food and other

forest produce like timber and honey, the British colonizers relocated tribal labor from different parts of the country to clear the forest and use the highly fertile land for agriculture (Chowdhury et al., 1994; Vyas, 2012). Hunting tigers and other wildlife were for sport and guest entertainment, restricted to the colonizers (Rangarajan, 2001). The tiger loss in the Sunderbans is due to the anthropogenic actions of poaching and retributive killings, habitat destruction, and prey depletion (Barlow, 2009).

Figure 1

Map of Indian Sunderban *(inset India geographical position)*

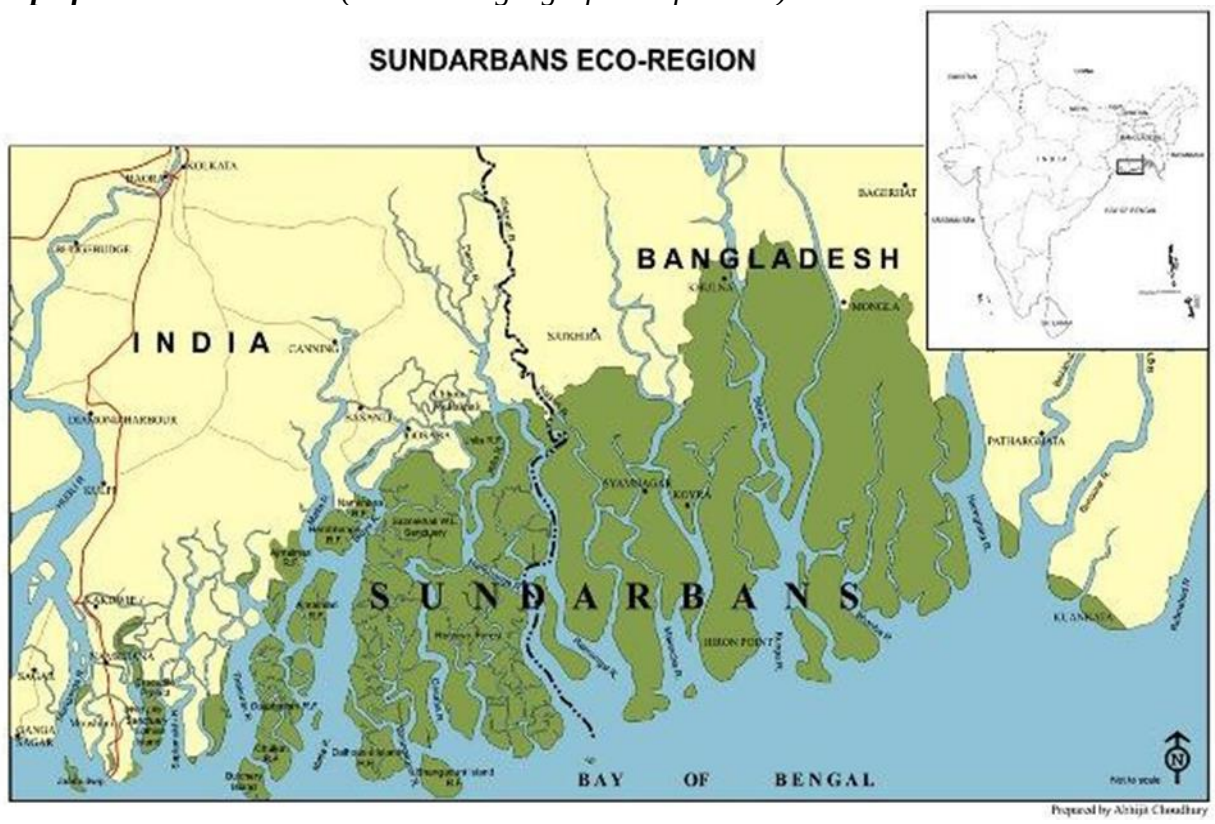


Figure 2

Map of Bangladesh Sunderban *(inset Bangladesh geographical position)*

Tempted by offers of habitation and forest harvests, the resident labor communities chose to stay back around the forests after the colonizers departed. Though some residents emigrated for work, the immigrating populace from the neighboring areas outnumbered them by far. Settlers continue to illegally cross to the Indian side (post-partition) for improved livelihood, leading to massive encroachments next to the forests. (Chowdhury et al., 2016). The resident population comprises a religious mix of Hindu (major Indian religion), Muslim (local and from Bangladesh), and other religions and tribes. The Bangladesh Sunderban has a religious majority of Muslims (Bangladesh major religion) a Hindu minority, and a mix of tribes and other religions (Barlow, 2009).

1.2. Resident Challenges

Most of the villagers in the Sunderban are impoverished with nominal education and meager income-earning prospects (Vyas, 2012). The under-developed villages provide scarce employment opportunities that range from agriculture to shrimp farm labor. Lacking formal education, the PA women are excluded from the already deficient job opportunities and try to supplement household income by weaving nylon nets for the forest fencing. Occasionally, women with some startup capital resort to local area fishing and running small businesses. Fishing and forest harvesting require licenses (Boat License Certificate or BLC) since creeks and honeycombs are in and around the forests (Vyas, 2012). The out-of-bounds forest areas statistically have the highest human-wildlife conflict rates, resulting in death or injury (Vyas, 2012). Compared to the honey collection, fishing is a less risky occupation. However, fishing is allowed in only 50.3% of the forested area. All fishermen vie for the same catch, which necessitates forest harvesting for survival (Vyas, 2012).

In the peripheral villages, lack of employment, education, development, healthcare, and other basic facilities, create challenging livelihood options. Agricultural labor is untenable since the villagers do not own land and the landowners living in the cities hire them only during planting or harvesting seasons. The alternate income derived from non-traditional resources like tourism seldom trickles down to the local villagers. The postcolonial exclusionary practices adopted by the government have stopped the villagers from their ancestral rights of forest harvesting (Barlow, 2009). Subsistence hunting is delegitimized and is considered poaching. Boating License Certificates (BLC) were not issued after the mid-1950s, coercing the fishermen to either rent the licenses at exorbitant rates from the current license holders or fish in the creeks illegally.

The desperate situation compels them to accept their fate and travel to the core forests for the riskiest occupation - honey and golpata (thatching leaves) collection. A four or five-day honey collection earnings can easily exceed the annual income, making it highly lucrative for the villager (Vyas, 2012). In the event of a wildlife attack, the meager yet consequential compensation is provided only to licensed forest entrants or their dependents. Other fatalities due to tiger and wildlife conflicts go unreported due to the dread of punitive fines imposed for the acknowledged unauthorized forest entry (Helalsiddiqui, 1998; Jagrata Juba Sangha, 2003; Khan, 2004). The futility of the ire against the officials translates to retributions against tiger/wild animals. Since almost all human fatalities in the forests are due to the tiger, it is perceived as the biggest threat, though crocodile fatalities are also substantial (Vyas, 2012).

Human-tiger conflicts (HTC) can be mitigated by apiculture near the forests to address the concerns of superior honey quality made from the nectar of wild Sundari flowers found within the forest. Pisciculture in the villages can also reduce HTC; however, it entails high investment and startup costs (Vyas, 2012). Forest products such as wax, golpata, crabs, and shrimp fry, are tough to replace. The economic problems of the PA villagers lead them into the core forests, occasionally resulting in fatal tiger encounters. One of the persistent conservation problems in the Sunderban is the retributive killing of the straying tigers. Tiger victim families of the PA villages are highly apprehensive of the tigers. Retributive tiger killing occurs before the arrival of the immobilizing team to avenge the tiger victims and periodic loss of livestock (Vyas, 2012).

The PA villagers are in a perpetual endeavor to survive and are neither acclimatized nor adept in dealing with multiple, diverse issues simultaneously. The constant problems faced by the villagers foment a sense of frustration. The tiger-related injuries and fatalities severely test

their limited resources. It creates a volatile situation that seeks the singular possible retributive release – to removes the tiger from the problem mix. While the villagers understand the importance of the tiger to the ecosystem and their lives, the tiger-related problems coalesce to a climax that obliterates reasonableness, inducing a tactless, detrimental response of killing the tiger. Human economic interests also continue to threaten the extinction of the species. Wildlife poaching has metastasized into custom poaching with the increasing demands for specific tiger body parts in China and other southeast Asian countries. The traditionally successful conservation strategies of worldwide PAs have failed to yield significant results for the Sunderban Bengal Tiger.

Scientists have opined that if the tiger population reaches below a certain threshold, it might be impossible to revive the species. Currently, there are more captive tigers in the U.S. zoos than in the Sunderban wilderness (WWF Shutting down tiger farms report), possibly as a gene pool conservation strategy. PA villagers can assist in reducing the incessant tiger killings, given their direct involvement in the HTCs. The need for PA community participation seems to be the last-ditch effort to conserve the critically endangered tiger. Social and cultural norms created historically through economic, political, and environmental factors incorporate generational co-existence to provide a sliver of hope for the endangered tiger. Even with this knowledge, a challenge exists. The geomorphological situations of the Sunderbans are different than most global and local PAs. Some PAs have historical communities that have lived and interacted with the wildlife through ages, giving both parties vital knowhow of co-existence with minimal conflicts. In contrast, the Sunderban PAs remain isolated from the human population due to their highly inhospitable terrain and a clearly defined forest area, separated by wide rivers. In addition, most of the PA residents are not historical inhabitants but migrants with little or no

history of co-existing with the tigers. This lack of mutual familiarity causes HTCs, detrimental to both humans and tigers. Survival necessities have compelled the residents to seek alternative assurances that have altered the traditional cultural and religious practices.

It is imperative to understand the existing situation based upon the present and historical relationships to mitigate the HTCs. This will also protect the majestic tiger species but also the vital mangrove forests and the ecosystem from being adversely impacted. A holistic examination of the PA community - stakeholder relationships was performed to understand their mutual relationships, the tiger involvements, critical issues that deal with the ecosystem, and their interplay to mitigate the HTCs.

1.3. Need for the Study

There is a considerable body of literature examining human-wildlife conflict in various parts of the world. Most of this conflict is focused on large carnivorous predators and humans. However, the problems of HTCs between the PA communities and the tigers of the Sunderban forests is different. As the largest contiguous mangrove delta with periodic hurricanes and floods, the Sunderban poses a different geo-morphological challenge. The tiger is an endemic species in these forests. Comfortable in the marshy Sunderban forests, the tigers are excellent swimmers, used to living in swamps and marshlands flooded daily by the tidal waters. The tigers can survive on saline and fresh water, available locally. Unlike other predators, the Sunderban tiger targets humans as prey, escalating the HTCs to a new level. The village populations consist of transient migrants periodically coming from Bangladesh to the Indian side for better pecuniary prospects, provide different perspectives when compared to the local PA residents. The migrants encroach on the available land next to the forests, thus, exacerbating the HWC. Unlike other

large carnivores of the world, tigers are a highly reclusive species, and their elusiveness tends to often dampen the tourists' excitement and question the popularity of the Sunderban as a tourism destination. This in turn, does not align well with the villagers' revenue expectations from tourism activities.

Very few research studies have closely examined the relationships of the residents with the Sunderban forests and its wildlife from an integrated perspective. Existing studies have tended to focus on either the Sunderban forests of India or Bangladesh, but not at both locations concurrently. This may be due to the assumption that tigers from both parts of the Sunderbans belong to the same species and hence, their behavioral patterns in divergent locations will be similar (Singh et al. 2015). However, the phenotypic characters of the tigers could be different; importantly, given the background, social, and cultural disparities of the PA communities of both countries.

This research had investigated the relationships in the Sunderban forests of India and Bangladesh simultaneously, between the PA villagers and the wildlife, the colonial effects and the role of the tiger in these relationships including the changes that have impacted the relationships over time.

1.4. Purpose of the Study

The purpose of this study was to examine the social, economic, cultural, and historical relationships between the Sunderban PA villagers, the other stakeholders, and the wildlife of the Sunderbans. It examined the behavioral differences of the villagers and tigers in the Indian and Bangladesh Sunderbans and explored ideas to mitigate the human-wildlife conflicts (HWC) in both locations.

1.5. Research Questions

The research questions that guided this research study are:

Research Question 1 (RQ1):

(a) What are the societal, cultural, and historical relationships between the peripheral Sunderban villagers and the Sunderban ecosystem?

(b) What is the role of the tiger in these relationships?

Research Question 2 (RQ2):

What factors have influenced these relationships over time and how?

CHAPTER II

LITERATURE REVIEW

2.1 Global Protected Areas

Historically, wildlife and humans have lived together. Humans have lived in the forests, utilized its products for food, shelter, traditional medicines, and developed traditional knowledge about the forests and its inhabitants (Murombedzi, 2003, Songorwa et al., 2000). Humans and wildlife were interdependent on each other for their survival; this meant that the overuse of natural resources did not occur. Conservation was the key to survival. Additionally, it was essential to have a proportional carnivore and herbivore population for a sustainable and balanced ecosystem. However, the human population living in the PA areas kept on increasing, to negatively impact the forests. Woodroffe (2000) has indicated that this human population explosion in the PAs did have impacts on the local carnivore population by way of increased consumption of the forest resources though some scientists disagreed with the assertion. Linnell et al. (2001) contended that humans did not interfere with the lives of carnivores and their prey.

The harvesting of bush meat was balanced out by natural spurts of increases in the herbivore populations and had minimal impacts on the food sources of the carnivores. However, it is undisputed that the population changes beyond a certain threshold point creates natural pressures on the ecosystem and disrupt the ecological balance. It also increases the human-wildlife conflicts since both humans and wildlife compete from the same food sources. The incessant influx of the transient populations from across the Bangladesh borders along with the

migration of the marginalized populace from the nearby towns to the Indian Sunderban PAs exacerbates the human-wildlife competition for the dwindling survival resources.

While it is debatable whether the historic fringe communities actually understood the ecological balance and allowed a gestation period for replenishment of the consumed resources or controlled the depletion by limiting its use, it is clear that the existing resources were sustainably harvested (Matowanyika, 1991; Murombedzi, 2003; Songorwa, 2000). Tribes took care of each other by joint cultivations, sharing bush meat and managing ecosystems by allowing nature to replenish and desist cultivating the affected land parcels (Mbaiwa, 2005; Songorwa et al., 2000). Communities (clans) controlled increasing food and land competition by creating social groups with diverse talents and forcing them to settle in distant land parcels (Child et al., 2015; Murombedzi, 2003; Owen et al., 1994; Songorwa et al., 2000). Floods, fire, and natural events also have historically caused human relocation to take place for survival. Anthropocentric pressures shifted from the immediate PA vicinity, that benefitted the ecosystem (Murombedzi, 2003, Songorwa et al., 2000).

To minimize the individual inequities of harvesting, the entire community participated in agriculture, hunting, trading, and sharing livelihood (Matowanyika, 1991; Murombedzi, 2003; Songorwa et al., 2000; Western, 1994). Communities hunted, gathered forest produce, built houses, and managed the environment sustainably (Murombedzi, 2003; Schoffeleers, 1979). Specialized social groups managed agricultural fields, livestock, fishing, hunting, and activities that affected the economic interests of the community (Matowanyika, 1991; Murombedzi, 2003, Schoffeleers, 1979; Songorwa et al., 2000; Western, 1994). Some historians conclude that the historical communities knew sustainable crop management techniques to manage eco-conservation (Schoffeleers, 1979). Others argue that the community leaders, unaware or

unperturbed by the sustainability issues, merely harvested wildlife depending on its availability and in accordance with their local beliefs, customs, and taboos (IIED, 1994; Songorwa et al., 2000; Western, 1994).

Globally, the local beliefs, customs, and traditions are observed to be construed to favor wildlife preservation. Demonstrated evidence included inculcating tolerance for the livestock predating animals, restraining the killings of crop predators, deter overharvesting for sustenance and prohibit retributory or carnivore-phobia killings. Wildlife protections were enforced by local beliefs, customs, and traditions, highlighting comparative individual and community benefits of condoning the predators' livestock depredations. The northern Ethiopian tribes living next to the wild hyena habitations, have historically experienced livestock depredations. However, the Islamic villagers believe that the hyenas kill the evil spirits and thus, their indulgence of killing the livestock must be excused. The villagers feed the hyenas with the leftovers from their own meat consumption resulting in steep declines in the hyena related livestock depredations (Baines-Rock, 2013). Similarly, Tibetan monasteries had prohibited snow leopard killings despite enduring huge livestock losses due to its predation. As Buddhists, the monasteries preached complete nonviolence towards the snow leopards given that these are wild animals (Li et al., 2013). However, the same deference was not provided to the depredating wolves, presumably because it was not a charismatic carnivore (Bhatia et al., 2017).

The communities discovered newer ways of protecting the wildlife and the local ecology of the neighboring forest. On discovering the burgeoning demand for bush-meat in expanding families, the communities devised ways to mitigate illegal hunting by introducing the 'notions of sacredness' (Matowanyika, 1991; Songorwa et al., 2000). Hills, pools, imposing trees, caves, streams, falls, and rapids were invisible supernatural entities, thus, objects of prayers

(Binsbergen, 1979; Bond, 2014). Indigenous groups related to nature (land, forests, rivers, ponds etc.) and wildlife as religious manifestations. Myths and legends indicate that when people offer prayers and revere forests, the animals, land, rivers etc., will be blessed (Fortman et al.,1992; Katel, 2014; Li, 2013; Lynam, 2006; Schoffeleers, 1979; Soud et al., 2012; Steinmetz et al., 2014). Forests were considered to be an integral part of human lives with an intimate relationship, since almost all the human necessities were fulfilled by the forest next door (Bond et al., 2014; Rickenbach et al., 2017). Rivers were also considered as sacred in Africa and Asia; the community treated the rivers with reverence and care (Matowanyika, 1991). Religious dictates articulated earth philosophies and community leaders wielding power and authority, used them to issue and enforce inherently sustainable directives (Akama et al., 2011; Blackburn et al, 2016; Murombedzi, 2003; Schoffeleers, 1979; Songorwa et al., 2000). Forests and wildlife were considered an essential part of life for the community and its destruction was thus, not tolerated (Ikeda, 2004; Katel, 2014; Li, 2013; Lynam, 2006.).

2.2. Colonial Era

The advent of the colonial era changed the whole landscape. The colonial rulers discovered the sport of hunting big game and enthusiastically indulged in it. This included hunting of big carnivorous and herbivorous species, traditionally protected by the supernatural myths and legends of the communities. The notions of sacredness disappeared since the wrath of the supernatural did not affect the wildlife hunting colonial rulers (Matowanyika, 1991; Murombedzi, 2003; Songorwa, 2000). Colonial powers with their eco-imperialism policies destroyed the local culture (Akama et al., 2011). This continued for an extended period when the colonial powers considered hunting as their right and even invited their friends from their home

countries to partake in the sport hunting. When the colonizers realized that they had decimated the wildlife populations, it was too late. The policy of sport hunting encouraged the locals to hunt, even though they were prohibited to participate, so they resorted to poaching (Matowanyika, 1991; Songorwa, 2000). Blaming the local indigenous populace for the wildlife depredations, the colonists introduced exclusionary practices to prohibit the locals from entering the forests, while continuing to sport hunt covertly. They professed that the indigenous population were ignorant of the sustainability practices and must be coerced to follow western scientific conservation practices for protecting the wildlife (Steinhart, 2006).

Access to the forests for the traditional forest-produce gathering or harvesting bush meat, was banned due to the eco-imperialistic exclusionary practices (Lynam, 2006; Matowanyika, 1991; Murombedzi, 2003; Songorwa et al., 2000; Western, 1994). Lack of forest access for the traditional subsistence harvesting, encouraged illegal forest harvesting and poaching (Child et al. 2015; Rickenbach et al., 2017). Unfortunately, most of the wildlife were located in the undeveloped colonized countries for the eco-imperialistic, exclusionist policies to be applied (Matowanyika 1991; Murombedzi 2003; Songorwa et al., 2000; Western 1994; Wikramanayake 1998).

After the end of the colonial rule, the local governments of the major wildlife-associated countries, continued to follow the exclusionary practices. The general belief in the modern scientific system of conservation, overrode the traditional knowledge of sustainability gained through centuries of cohabitation with the wildlife near the forests. Deceptive heritage interpretation and commodification of culture, provides stereotypic attitudes (Akama et al., 2011; Kirshenblatt-Gimblett 1994). The local PA communities having historically enjoyed the rights of access to the forests, felt disempowerment and disenfranchised (Akama et al., 2011; Ntuli et al.,

2017; Rickenbach et al., 2017). It is widely believed that with the decades of imposed exclusionary practices and the movement of the local communities in search of livelihood options over time, the traditional knowledge of sustainability and conservation were eventually forgotten.

2.3. Contemporary Peripheral Area Communities

The current residents of the peripheral villages are a transient marginalized group, trying to eke out a living. Certain professional poachers use this opportunity but are not reported by the PA residents due to their anger over the governmental policies (Biggs et al., 2017; Brosius, 2005; Matowanyika, 1991; Songorwa et al., 2000). Wildlife populations have declined due to unsustainable development, resource abuses, land degradation, unsustainable land use practices, anthropocentric pressures, and climate changes (Okello et al, 2004; Tucker et al., 2009). Unequal distribution of benefits by the administration to the marginalized PA villagers creates distrust and antagonism in the community (Akama et al. 2011; Scheyvens 2002). Livestock depredation in marginalized communities increases retributive wildlife-killing justification by the communities (Ikeda, 2004; Kabir, 2014; Katel, 2014). Predatory wildlife causes livestock depredations, which is economically hard for the marginalized communities; they resort to retributive killings by trapping or carcass poisoning (Ikeda, 2004; Katel, 2014; Lynam, 2006). Some PA communities justify tiger killings by indicating that the populations would have exploded, but for the killings (Ikeda, 2004).

2.4. Communities and Conservation Practices

Post-colonial government policy makers are cognizant about the impacts of community participation in conservation of the forests and the wildlife. Including the local community in the

conservation efforts are proven to be more effective than blindly continuing the exclusionary policies (Akama et al, 2011). Living in the forest vicinity, locals have gained a perspective on the behavioral patterns of the wildlife and can suggest pragmatic solutions for mitigating negative human wildlife interactions. PA residents participate to manage poaching while benefitting from the conservation of endangered or threatened species. (Brosius, 2005). However, there are different ways of PA volunteer participation in the Indian and Bangladeshi Sunderbans – one that involves the non-participative cooperation and the other with active participation of the PA youth, respectively.

Remedial policies called Community Conservation Service (CCS) exist for non-participatory forest management. The CCS program involves educating the community on conservation issues of the planned programs developed by the forest departments. The CCS program does not allow active participation of the villagers in managing the forests but restricts them to merely providing pertinent information about the forests to the foresters and supplying manual labor services (Barrow et al., 1995). In return, the forest department provides the community with developmental funds accruing from the wildlife revenues/external funds for building roads, schools, and hospitals. The rationale behind this method is to reduce the dissatisfaction of the community for excluding them from the accrued forest benefits. It makes them more accountable for reporting illegal endeavors in the forests and deters them from participating in actions that exacerbate unauthorized activities.

Community-Based Wildlife Management (CWM) is another participatory management practice (Songorwa et al., 2000). This approach involves the PA villagers cooperating with the forest management, sharing power with the government, reducing exclusive government authority over forests and wildlife, and empowering villagers. The proponents of CWM insist

that with the watchful community being involved, the responsibility is shared and managed to create better policies and enhance enforcements (Murphree, 1993). Though some governments share enforcement duties with PA resident groups, they refuse to relinquish complete power over the forests (Li, 2013; Songorwa et al., 2000). The CWM is not for the individual families; it is for single or multiple groups of PA villages. In addition, it is not for local people to subsist on the forest resources or for cultural, moral, spiritual, religious, or aesthetic purposes. CWM serves to protect biodiversity through economic benefits or revenue collection from tourists and sport-hunters from affluent countries, based on the principles of 'wildlife must pay its way' (Hill, 1996; Kelso, 1995; Liebenberg, 1994; Western, 1994). However, the community-based forest management practices in the Sunderbans, does not involve the PA residents to collect or manage funds. Also, the Sunderban forest policies place an absolute ban on all kinds of hunting in or around the forests.

The policies of CCS and CWM have yielded varied results. In South Africa, Tanzania, Kenya, and other African countries, the local communities have worked with the forest employees to develop plans that overshadow the pecuniary gains of killing the lions. It is now believed that a live lion, comparatively, brings in more revenue to the community than a dead lion. Tourism and other community-based businesses have developed, and the cases of HWCs and poaching have declined. The forest services are proactive and losses of livestock /crops due to wildlife depredation are compensated adequately (villagers get more value than the actual cost of the livestock) (Biggs et al., 2017; Brosius, 2005). In countries with low-income opportunities, the local communities continue to be reminded of the traditional cultural taboos against killing wildlife.

The colonial past which had seemingly destroyed the traditional conservation knowledge, had failed to completely wipe out the information passed on through generations. Matowanyika (1991) concluded that European colonizers endeavored to replace the ethnographic and environmental management practices of the African Shona tribes with the western ideas of environmental management. Tribal institutions did not disintegrate since they had 'basic and fundamental differences' in perceptions with the colonizers and believed that their ancestral traditions were better suited for the situation. The notion of taboos restricting the consumption of a particular kind of bush-meat at a certain time, is a boon for the endangered wildlife (See list of the taboos in Appendix A). Some countries still have the exclusionary policies, which restricts the communities from accessing the forests. Though the feasibility of the various types of wildlife management is being debated, it is universally accepted that community participation is quintessential in sustainable wildlife conservation and management.

2.5. Sunderban and Global PA Communities: The Disparities

Though community participation in the Sunderban wildlife management is important, the situation is different from the other local and global PAs. This situation can be attributed to the geo-morphological conditions that exist there. In many global PAs, tourism resources have been used to conserve the ecosystem and its wildlife. Promoting tourism for wildlife conservation in the Sunderbans cannot be equated with practices in African or other global regions. Tigers are stealthy hunters, and they start hunting at dusk, which continues into the night. Tiger viewing is the ultimate tourist attraction; however, the tigers are elusive during the day, so sightings are mostly infrequent.

While the allure of finding the tiger in their natural habitat is an attraction, it is a dangerous challenge which neither the government nor the tour operators are eager to accept. Access to the forests is limited to boat travel in the neighboring rivers, that reduces the risk of tiger attacks. The marginalized villagers cannot afford and are not provided adequate financing to initiate and maintain tourism infrastructure. Existing tour company revenues barely trickle down to the PA residents Thus, the solutions from the global tourism perspectives, do not apply to the Sunderbans (Ghosh, 2014).

The Sunderban PA area populations have historically co-existed with the tigers, next to the forests. PA villagers have historically utilized forests for their food, shelter, medicines, etc. (Barlow, 2013; Vyas, 2012). The populace of the Sunderban PA villages consist of manual laborers brought in by the colonists from other tribal Indian belts for clearing the forests for agricultural use. Later, the labor decided to settle down in the PA of the forests (Barlow, 2013; Vyas, 2012). The inbound migration into the PAs continue today, albeit by way of migration from Bangladesh and other parts of India for better economic and sustenance options. Incessant migration has led to the encroachment of the PAs, right next to the forests. The PA population is intrinsically transient in nature, in contrast to the local communities of other global PAs, that have historically inhabited the area for centuries. Thus, the migrant PA populations did not inherit the traditional conservation practices from earlier generations to reduce HWC. However, they have used their knowledge gained from living in other forested regions of India and Bangladesh, prior to their Sunderban migration.

Eco-imperialistic and exclusionist policies continued to be practiced in the Sunderbans of India and Bangladesh (Barlow, 2013; Mukherjee, 2003; Saif 2016; Vyas, 2012). Though the governments want to use participatory (CWM) and non-participatory (CCS) forest management

policies for ensuring community involvement, they did not want to relinquish their powers over the forests (Barlow, 2013; Vyas, 2012). Forest access continues to be prohibited for the community, though it has failed to resolve the outstanding issues of the Sunderban (Barlow, 2013; Mukherjee, 2003; Vyas, 2012). The human deaths due to tiger attacks had reached an all-time high of 15 human fatalities a year in 2010-11 from zero deaths in 2006-07 (Vyas, 2012). Similarly, the tiger straying numbers was at an all-time high of 35 tigers in 2009 from two tigers in 1991 (Vyas, 2012), pointing to the HWC challenges that continue to persist.

Community participation seems to be the last hope for finding a solution to the human-wildlife conflicts in the Sunderbans since all other management policies have failed to yield the desired results. It also includes the concerns for the community rather than merely focusing on the wildlife conservation issues. The exclusionary policies have created a mistrust of the forest guards in the mindset of the PA residents. Having enjoyed forest rights historically, they feel disempowered and disenfranchised with the current policy of mistrust (Barlow, 2013; Reddy et al., 2016, Saif, 2016). While the government continues to guarantee improvements, local infrastructure development hardly occurs (Mathbor, 1997; Saif, 2016). This exacerbates the feelings of helplessness in the PA communities. The decision makers are not always aware of the ground situation and yet, try to impose unrealistic community goals that adds to the frustration (Hendrichs, 1975; Khan, 2004). Such actions alienate the locals who do not trust the forest guards, and are exploited by poachers, and other undesirable elements.

On the brighter side, the PA villagers acknowledge the importance of tiger existence to the survival of the community and the forests (Barlow, 2013; Hendrichs, 1975; Reza et al., 2002). The forest, its wildlife, and particularly the tigers are deeply entwined in the local Sunderban culture (Ahmed, 2009; Barlow, 2013; Karanth 2003; Mukherjee, 2013; Saif, 2016;

Vyas, 2012). Despite their comparatively short historical relationship to the Sunderbans, the migrated locals revere the power of nature and the tiger. Tigers are a major part of folklore, paintings, and handicraft for the villagers living in and around the PAs (Reddy et al., 2016). Traditional culture provides respect to the powerful tiger, the PA villagers, and the wildlife that respect their mutual boundaries and limitations (Barlow, 2013; Karanth 2003; Vyas, 2012). Similar to the global traditions of linking the wildlife to local beliefs, customs, and taboos, India, Bangladesh and its neighboring countries had adopted rituals and traditions in order to protect its wildlife from being hunted to extinction.

2.6. Religious Community Connections to the Tiger

Tigers are considered a part of the religious deities and harming them is considered a sin (Ahmed, 2009; Barlow, 2013; Karanth 2003; Mukherjee, 2003; Saif, 2016; Vyas, 2012). There are folklores about Goddess Bonbibi, the tiger goddess, revered by all the religious groups linked to the forests and reside in the PAs. Forest harvesters seldom enter the forest without paying homage to the tiger goddess (Ahmed, 2009; Barlow, 2013; Chaudhuri et al., 1979; Mukherjee, 2003; Reddy et al., 2016; Saif, 2016; Singh et al., 2015; Vyas, 2012). Notions of sacredness are also seen in other religious communities of India and Bangladesh that consider the wildlife associated with the gods, as a cherished creation. Destroying them is a sin and will incur the wrath of gods, thus, PA residents are overtly tolerant of the wildlife (Ikeda, 2004; Katel, 2014; Li, 2013; Lynam, 2006).

The Buddhist monks of Tibet, Bhutan, Nepal, and other Himalayan communities (Rinpoche and Khenpoche) live around the PAs and patrol the monastery's areas and the nearby hills for any signs of detrimental human activities against wildlife or nature (Li, 2013). The

monks preach tolerance and non-violence to their followers during their dealings with nature and the wildlife. Those found breaking the non-violent codes are either chastised or reported to the authorities (Ikeda, 2004; Katel, 2014; Li, 2013). In other PAs of India, the tiger is considered as a family member (brother) which motivates the community to tolerate the occasional livestock predation (Aiyadurai, 2016; Li, 2013). The journal articles from various geographical regions of the world including India and Bangladesh, highlight the historical existence of informal norms and taboos that had controlled the forests and the wildlife, rather than the formal governmental restrictions (Colding et al., 2001). Ecologists have termed it differently as the human dimensions of conservation and ecological management (Carpenter et al., 1998; Lubchenco, 1998). Furze et al. (1996) has mentioned that over 5000 distinct societies had traditional beliefs and taboos that has greatly contributed to the wildlife and ecological conservation of the area. However, scientific conservation studies have neglected such contributions (Alcorn 1995; Robbins 1998) and have focused on the different aspects of formalized park protection (Gadgil, 1998; McNeely 1993).

Similar to India and Bangladesh, many countries and religions have historical relationships with the PA and tiger. However, the predatory loss of livestock overrides the pre-existing human-tiger relationships, inciting the local villagers to act retributively that results in the killing of the endangered tiger (Ikeda, 2004). Migrating populations with no historical attachments to the forests have often indulged in sustenance hunting (McGann, 2013). The lure of abnormally high returns from the sale of tiger body parts in China and Southeast Asia, motivates the marginalized villager with his intricate knowledge of the forests, to assist the tiger poacher. The financial gains also lead them to poach for bush meat, thereby reducing the ungulate numbers, that forces the tiger to stray out of the forests for food. On the other hand,

reducing the tiger and other predatory wildlife numbers below a threshold level, causes the prey numbers to rise, leading to other problems like overgrazing (Allendorf, 2010; Katel, 2014; Lynam, 2006). Various factors including encroachment, ungulate depredation, easy livestock availability at the edge of the forests, poverty of the villagers etc., have caused the balanced co-existence between humans and tigers to be destroyed (Barlow, 2013; Saif, 2016; Vyas, 2012). Though tigers have historically co-existed with the humans in other parts of India and the world, the Sunderban tigers are not used to human presence in the forests due to the geographical inaccessibility (Barlow, 2013; Mukherjee, 2003; Vyas, 2012). The PA villagers participate in their daily livelihood activities with the constant fear of the tiger on their minds (Barlow, 2013; Chaudhuri et al., 1979; Mukherjee, 2003; Saif, 2016; Singh et al., 2015; Vyas, 2012). It has been universally acknowledged that community outreach programs reduce the poaching activities in the forests (Steinmetz, 2014). Positive community participation will assist in mitigating the HTC along with increased tolerance for livestock and crop depredation. Utilizing the cultural history of the community will also assist in gaining their cooperation.

CHAPTER III

METHODS

3.1. Theoretical Framework

3.1.1. *Understanding Stakeholder Relationships*

The post-colonization era witnessed the involvement of the local communities and the perceived stakeholders during policy formulations. However, a cohesive, pragmatic, and effective mitigation strategy remained elusive lacking reconciliation and improvised integration of social, cultural, historical, and other factors with macro and micro implications for everyday life. This research explores the HWCs of the Sunderbans forests, specifically between the PA residents and the tigers, manifested amongst the stakeholders with relationships in the area that has shaped the current HTC scenario. A comprehensive understanding will provide pathways for effective governance and long-term sustainability. Though quantitative methods provide the occurrence, location, time, and other broad details, they cannot extrapolate the narratives of the study participants and their stories to shape the feelings, thoughts, experiences, and social contexts that predict the HTC phenomena. Qualitative research methods analyze new methods of inquiry, placing greater emphasis on storytelling and participant-stakeholder-researcher relationship in the narrative research. Hence, it was adopted to integrate the under-represented dimensions of the relationships and construct a cohesive world view.

This section describes a framework to develop and integrate the missing dimensions while bridging the practiced and recommended approaches. There is a need to formulate long-term, effective conflict management strategies that can identify the social drivers while including

the history, geography, social relationships, culture, education, religion, wealth, risk perception, and vulnerabilities (Fraser-Celin ((2018; citing multiple authors)). Wildlife conservation scholars have often argued that HWC involves human-human conflicts over the management of the forests and the PA areas, the appropriateness of certain wildlife habitations, the value of the wildlife, the conservation/development goals, and pathways (Fraser-Celin, 2018). Occasionally, wildlife is the peripheral player pulled into the debate of wildlife management by individuals with contrasting values. The actual causes of the conflict often lie more deeply in cultural, historical, political, and sociological factors (Rust et al., 2016). Fraser-Celin et al. (2018) has aptly pointed out that the HWC is not a conflict between humans and wildlife but a conflict of humans over wildlife management. HTC research needs to examine and interpret the meanings of the tiger to the PA society and stakeholders. The theoretical framework in this study will include the knowledge from past research to make sense of the current results (Kivunja, 2018).

3.1.2. ***Examining Human-Tiger Relationships***

Different wild animals have diverse images in the minds of the PA residents, based upon a specific animal targeted by some residents as the major problem. The thoughts and actions of the PA villagers ultimately decide the course and resolution of the conflicts, if any. While individual-level factors affect the behaviors of the PA residents involved in the HTCs, cultural and historical factors account for the differences between people in diverse social and cultural conditions (Manfredo & Dayer, 2004). Peterson et al. (2010) argued that HWC as a term depicts wildlife as a conscious human adversary to distract human groups involved in the conflict and the sociopolitical systems that produce the environments where conflict occurs.

Carter et al. (2012) has indicated that most research focused on the human dimensions of wildlife conflicts involve human attitudes towards predaceous wildlife. For the marginalized set of people teetering on the brink of financial ruin, the loss of human lives or livestock is devastating for the victim families. Mired in superfluous evidentiary red-tape formalities, the compensation promised by the forest department for harm or loss of human lives or livestock losses due to the tiger conflicts is largely denied or at best delayed. The compensation is often the survival lifeline for the impacted families. When the forest service practices of mitigating the human-tiger conflicts prove ineffective, the guards solicit protections for the tigers either by community participation or by legal enforcement.

Bearing the consequences of the tiger attacks, the victims are rightfully frustrated. The lack of feasible solutions for reducing HTC results in further reduction in the community tolerance towards the tigers, which leads to tiger killings. Multiple researchers have pointed out that the underlying tensions between the human groups over the wildlife interactions dictate their attitudes and the need for identifying and reducing the conflict drivers (Dickman, 2010; Gusset et al., 2008; Herda-Rapp & Goedeke, 2005; Madden, 2004; Madden & McQuinn, 2014; Marshall et al., 2007). Others have indicated that unresolved human frustrations against the government, wildlife authorities, and conservation agencies tend to target wildlife as a scapegoat for anger, resentment, and feelings of powerlessness (Hemson et al., 2009; Madden, 2004). Researchers have also suggested alternate nomenclature for the scholarship that include human-wildlife coexistence (Madden, 2004), human-human conflicts (Marshall et al., 2007), biodiversity conflicts (Marshall et al., 2007), and conservation conflicts (Pooley et al., 2016). The term 'human conflict over wildlife' thus aptly describes the conflict between people with different priorities, beliefs, attitudes, experiences, and socioeconomic needs (Madden, 2004).

Other stakeholders that include the forest guards view the tigers differently. They view it as an endangered keystone species to be protected. They construe tigers to be beautiful animals, scary but predictable. The NGOs view the tigers as a dangerous and potential threat to the PA residents living next to the forests yet must be protected. The PA residents construe the tigers as a part of their daily lives - neither lovely nor occasionally, worth shielding. The above contradictions indicate that understanding human-tiger conflicts cannot come from a select set of respondents holding divergent individualized views but must include diverse opinions and ideas from different residents and stakeholders with unique social, historical, and cultural perspectives. This research will create a knowledge base with the potential to improve the understanding of human-tiger conflict in the PAs. This research adopts the social constructionist framework to analyze the different knowledge of tigers from distinct stakeholder groups and examine how it translates to varying perceptions and behaviors regarding HTC in the Sunderbans. The social constructionism framework seeks to identify the understandings of everyday life that shape stakeholder interactions with the natural environment. However, to get an accurate perspective of the issue, mere assimilation and accommodation of new knowledge obtained from individual respondents is insufficient and is occasionally biased with personal priorities. Thus, information must be collected from social interactions and learnings, co-constructed, and transmitted by the social phenomena of language, to create knowledge structures. Social constructionism extends human understandings and behavior towards the tiger and wildlife beyond the binary opposition between residents and nature.

3.1.3. ***Framework Rationale***

PA residents assign different meanings to the wildlife around them to reflect their antagonism towards their social, political, economic, cultural, and historical circles. It is also a reflection of their competition for land-use activities and development directions. Social constructions allow the elements of nature to be understood through culture, experience, and beliefs and are synonymous with the meanings (Herda-Rapp & Goedeke, 2005; Scarce, 1998). Competing social constructions of the identity of a species reveal how an animal can be highly valued and granted legal protection while being hated and a vilified pest simultaneously (Hill, 2015). Competing tiger constructions also reflect conflict over their management (Goedeke, 2005).

This research sought to comprehend the various kinds of relationships that exist amongst the PA residents, the forests with the wildlife that includes the tigers along with the stakeholders, intricately related to the Sunderban ecosystem while clarifying the following questions: what do tigers mean to the various PA residents and the stakeholders, how and why social constructions emerge, the implications of these meanings, and whether tigers be protected? Social constructionism clarifies the disparate agendas, priorities, values, and feelings that contribute to the human conflict over the tigers. These human dimensions are often the underlying yet overlooked drivers of conflict. It is thus imperative to create a comprehensive understanding of the meanings of the tiger to the residents and stakeholders for establishing a viable strategy to mitigate HTC. Such approaches indicate that the social worlds are created and interpreted by the residents and other stakeholders and not merely acquiesced. Social constructionism demands everything is constructed, understood and that learning is enhanced by consciously building knowledge structures, irrespective of the circumstances.

As a ‘learning-by-making’ process, social constructionism uses participants' diversity for elaborating and constructing richer, multifaceted understandings. It analyzes different symbolic meanings assigned to the tigers, their social importance, and how varied groups use such constructions to articulate an environmental problem, critical in understanding the HTCs occurring in the Sunderbans (Papert et al., 1991; Hill, 2015). It assists in developing integrative plans to address the disconnect among the conflicting sectors in the Sunderbans. Future governmental agencies can investigate competing social constructions of wildlife during the early stages of policy adoption and implement the understandings into conflict mitigation processes for early conflict resolutions (Scarce, 1998). Social constructionism enables the researcher to interpret the broader processes, systems, experiences, and beliefs amongst social groups provoking HTC and its implications (Herda-Rapp & Goedeke, 2005). The framework of social constructionism helps to uncover the interplay of the myriad of relationships in the Sunderbans and aids in comprehending the unique HWCs of the region.

3.2. Data Collection

3.2.1. ***Study Area***

This research seeks to understand the various kinds of relationships that the peripheral Sunderban villagers have with the ecosystem and its apex carnivorous prey, the Royal Bengal Tiger. It includes the socio-economic, socio-cultural, religious, and other historical relationship which has manifested themselves over time to create a peaceful coexistence with the majestic tiger. Factors influencing the relationships over time and the role of the tiger to foster them are also of interest. In order to investigate these factors and relationships, there was a need to talk with, discuss, and extrapolate the ideas of the villager and their families with firsthand

information of the tiger, the human conflicts, and their perspectives on the conflict issue. Sunderban is the largest mangrove forest and boasts of holding the maximum number of tigers in the wild. Thus, Sunderbans is the ideal location for the research study.

Data collection was conducted from November to January 2016 in purposively selected eleven villages of the Indian Sunderbans and five villages of the Bangladesh Sunderbans. Though most peripheral villages next to the core areas have occasional tiger conflicts, some PA villages have statistically higher rates of tiger straying and resulting conflicts. There is a direct relationship between the tiger straying out of the forests and human-tiger conflicts. The selected villages for the study had the highest incidences of HTCs. The villages selected for this study in the Indian Sunderban forests were in the Canning II /Gosaba Range of Indian Sunderban - Sajnekhali area (Dobanki, Burirdhabri), Pakhilarala, Chandankhali, Pirkhali, Panchmukhani, Netidhopani, Sudhanyakhali, Chamta, Baghmara, and Harinbhange villages (See detailed map in Appendix C). The identified villages in the Bangladesh Sunderbans were in the Khulna Administrative Unit - Bagerhat, Chandpai, Dacope, Mogla, and Sarankhola (Detailed map in Appendix D). Sunderban forested areas, designated as core forest regions, buffer regions, and peripheral regions, created to protect the humans and wildlife living next to each other from interactional conflicts. While the core forest areas are exclusive wildlife habitat areas and out of bounds for the villagers, the buffer and peripheral area access are permitted for the local villagers to gather forest resources. Hunting in all forms is restricted in all areas. Fishing in the creeks next to the forests is prohibited, while the other waterways are allowed with special permits issued by the forest services. Fishing licenses or Boat License Certificate (BLC) were last issued around 50 years (1973) ago and continue to be passed on through generations, restricted by blood lineage. Though the semi-affluent families have migrated to the cities, they have retained their licenses

and rent them to the Sunderban villagers at exorbitant rates, creating animosity amongst the resident villagers (Vyas, 2012).

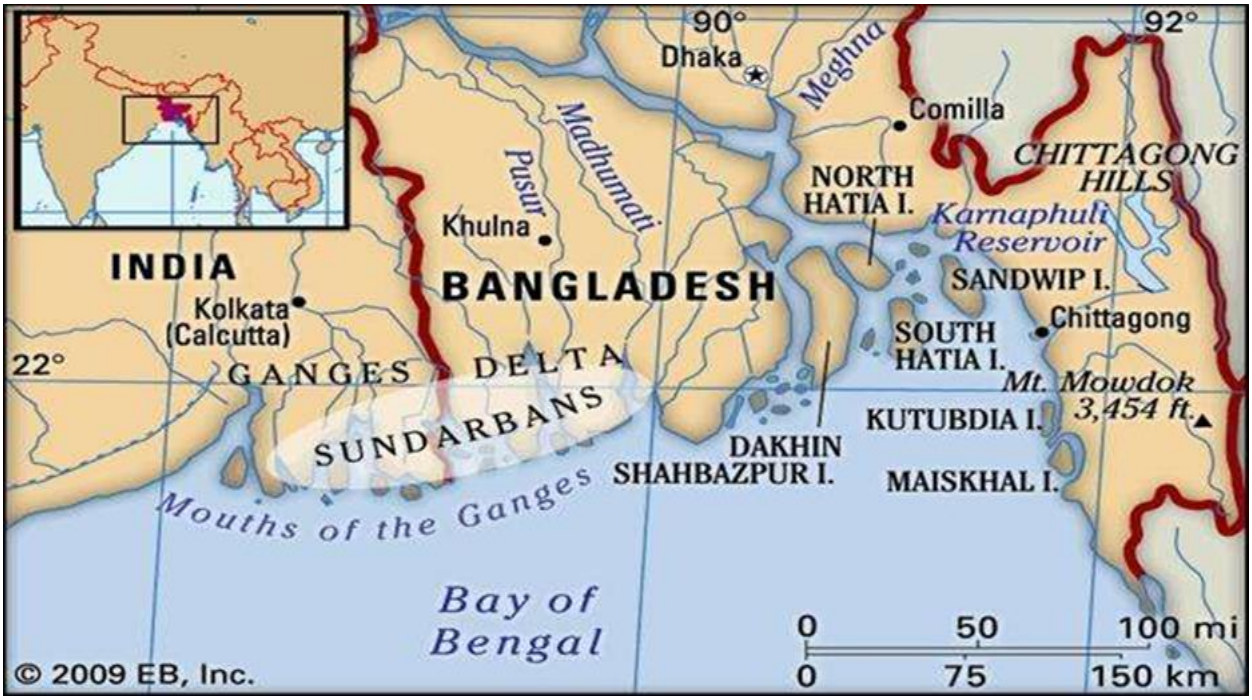
3.3. Geographical and Historical Context

The Sunderban forests have a unique history, ecology, biodiversity, and unnaturally aggressive tiger behavioral proclivities. I selected the Sunderban PA villages to examine the human-wildlife relationship, particularly with the tigers. The Sunderban is the largest contiguous mangrove forest on earth, located at the estuarine deltaic plains of Ganges, Brahmaputra, and Meghna rivers flowing into the Bay of Bengal, in the southeastern West Bengal in India and southwestern region of Bangladesh (Figures 1 and 2). Starting at a total of 16,700 km² of forest land about 200 years ago in undivided India, the Sunderbans has dwindled to 1/3rd its size with systematic overexploitation by way of encroachments, forest clearings for agriculture and grazing, timber harvesting, mineral and soil extractions, etc., since 200-300 AD. Of the total area of 10,263 km² (Giri et al. 2007), 1,598 km² is in India (approx. 40%), while 4,246 km² (approx. 60%) is in Bangladesh. Scientists have recorded 6,017 km² of the Indian Sunderbans and 1,781 km² of Bangladesh Sunderbans to have gone underwater due to global warming (Chaudhuri & Choudhury 1994; Iftekhar & Islam 2004b).

The lure of free fertile land to cultivate, free housing, and unlimited access to the forest resources had encouraged the erstwhile laborers, brought to clear the forests during the colonial rule, to stay back. Sunderban boasts of a 4.4 million and growing migratory population (Danda et al., 2011) that includes domestic and cross-border migrants from Bangladesh (for Indian Sunderban) and Myanmar (for Bangladesh Sunderban). Though rich in ecological attributes, Sunderban is extremely eco-sensitive and vulnerable to natural and anthropogenic hazards.

Figure 3

Confluence of the Rivers in the Sunderban Delta.



Pic courtesy Encyclopedia Britannica.

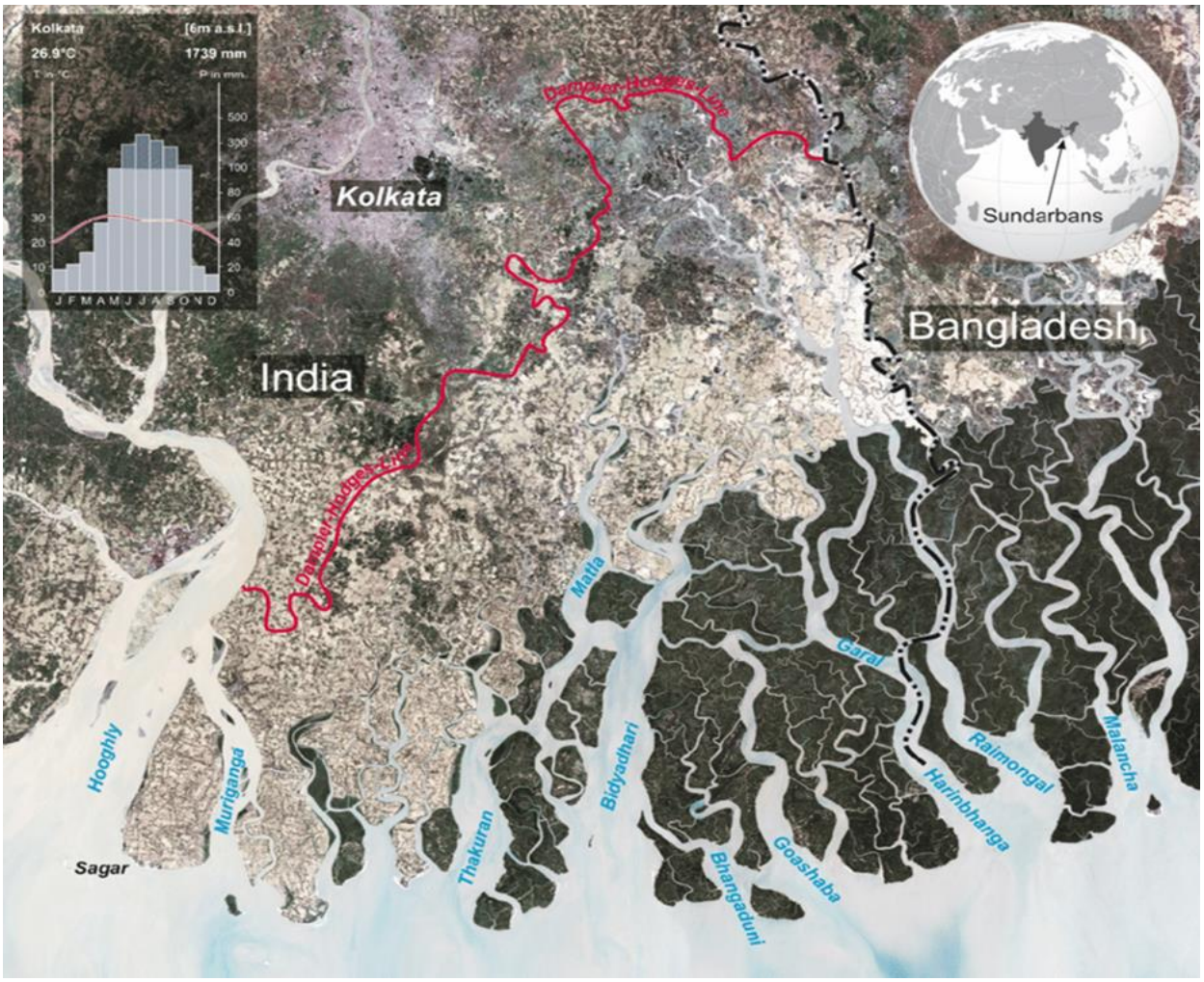
Natural challenges of sea-level rise, salination of soil and water, cyclonic storms, and flooding add to the anthropogenic induced challenges of excessive immigration, overwhelming encroachments, global warming, building upstream dams, and expansion of tidal fish hatcheries, to name a few. The expectation of simple, less competitive life, the language, food, and climatic familiarity, encourages inbound migration. Archaic, partisan, and elite-controlled power hierarchies, implicit in the forest management policies and practices of the Indian Sunderban forest, nudges the marginalized villagers further into the realms of asset inequities and poverty (Sen & Pattanaik 2019).

Colonial exclusionary policies restrict forest harvesting, further antagonizing the Sunderban village residents. Angry villagers hesitate to provide complementary information to

forest rangers regarding straying tigers, poacher presence, etc., and avail illegal opportunities for harvesting forest products. Distinctively different, the Bangladesh government conducts joint forest patrols with the villagers to benefit all parties simultaneously. Sometimes villagers are compensated for reporting tiger-straying to encourage them. Permits are issued (for 7-30 days) for harvesting honey, wax, and golpata for $2.50 - $12.00 (FAO, 1998).

Figure 4

Satellite Picture of India and Bangladesh Sundarbans (Ghosh et al. 2015).



Empathetic NGO and government actions motivate the locals to assume the welfare of the tigers. In the Wild-Team initiative, every Sunderban PA village has 'Tiger Ambassadors' responsible for alerting the forest emergency response units when a straying tiger is spotted.

Effective policies and management practices have enhanced the success of the catch-release program where the straying tigers are tranquilized and returned to the wild (FAO, 1998). Large carnivore conflict mitigation strategies that are successful in various African and South American countries have failed to address the unique Sunderban conflict issues, necessitating innovative and exclusive research.

3.4. Anthropogenic Impacts Changing Sunderbans

Human behaviors contribute to the destruction of the Sundari mangrove forests. Mangrove forests absorb atmospheric carbon dioxide that reduces global warming, threatening the deltaic islands with land erosion. It also destroys scores of fishes and wildlife that seek shelter in the mangrove creeks and forests. Destruction of the Sunderban forests threatens the survival of the critically endangered Bengal tiger along with other endangered flora and fauna. GIS and satellite data indicate a consistent reduction in the total forest cover of the Indian Sunderbans (2,246.839 km^2 in 1986, 2168.914 km^2 in 1996, and 2,122.421 km^2 in 2012). Bangladesh has an 11% forested area (World Bank reports), with a total population density of 1015 people per km^2.

While the Sunderban forests recede, human population density continues to rise, doubling between 1974 and 2011. The forest cover is shrinking at an average annual rate of 0.12% between 1983 and 1995. The average forest density is declining by 87% between 1933 and 1995 (Sen, 2010). It affects the forest dependent livelihood of over one million villagers directly or

indirectly (Giri et al., 2008) along with the 2% of the national labor force, engaged in forestry, contributing about 2% of the total Bangladesh GDP (BBS, 2014). The historic deforestations were less impactful due to the abundance of the mangrove forests. The current destruction of the mangrove forests exacerbates coastal soil erosion that reduces the fish and crustacean population in the nearby rivers. Global warming also reduces honey and wax productions due to its

Figure 5

New Encroachments in Buffer Area Worsens HTC; Forest Starts at the Tree Line

detrimental impacts on wild bee populations. Honey and wax continue to be a major source of income for the Sunderban villagers. Forest encroachments have reduced tiger territories to 7% of its historic size (https://www.nationalgeographic.com/animals/2018/11/pirates-are-killing-tigers/). Excessive forest intrusion negatively impacts the resident tiger populations, reducing their number to 74 in India (Indian tiger census 2011) and 106 in Bangladesh Sunderban forests (Bangladesh tiger census 2015). Today, there are more Royal Bengal Tigers in the U.S. zoos than in the wild (WWF Shutting Down Tiger Farm Report).

The major rivers that have historically brought alluvium to the Sunderban have changed their volume and course due to tectonic activity and human mismanagement (Allison et al., 2003). The general shifting of the rivers eastwards has caused the freshwater rivers feeding the Sunderban to lose connection with the mighty 'Ganga' river. Increasing use of freshwater by a burgeoning human population, and the construction of dams and barrages upstream, have caused the saltwater from the ocean to move further inside the Sunderban (Sarkar & Bhattacharya, 2003; Wahid et al., 2007). Saltwater destroys the farmlands, multiple freshwater trees, and fish species. Reduced tiger ranges force the dominant tigers to viciously fight for territory, exacerbating straying and HTC.

Table 1

Change of Sunderban Mangrove Cover Since Last Two-and-a-Half Centuries

Year of Observation	Mangrove Forest [in km²]	% change in forest area	% Change/decade
1776	6588		
1873	6068	−7.9	−0.8
1968	2307	−62.0	−6.5
1989	1983	−14.0	−6.7
2001	1926	−2.9	−2.4
2014	1852	−3.8	−3.0

Note: Due to arguable mapping accuracy of the two historical maps, the figures for these early time slices should be deemed only as rough approximations. (Source: Ghosh et al. 2015)

Like other PA villages in the world, the livelihood of the Sunderban community is heavily dependent on extractive forest uses and natural resources that intensify during times of natural disasters (McSweeney, 2005). Though timber harvesting in the Sunderban is illegal (Sunderlin et al., 2005, 2008), mangrove trees logging continues illicitly for boat and house

constructions. For the dependent community's livelihoods to be resilient and sustainable, the management of natural resource must be adaptable to the ecological and social system fluctuations (Allison & Horemans, 2006; Chapin et al., 2010). Though excessive population growth and migration leads to degradation and depletion of natural resources (Guerin, 2007; Kesavan & Swaminathan, 2006; Midmore & Whittaker, 2000; Scherr, 2000), heightened reliance on the resources places the community in a highly vulnerable position (Ferrol-Schulte et al., 2013).

Figure 6

Hard Mangrove Wood used Illegally for Construction of Fishing Boats

Fishing boats use mangrove wood for construction, deemed illegal in the Sunderban

The Sunderban populations are primarily engaged in farming, fishing, and unskilled labor – locally and for the forest department. The rise of tourism, transport services, and business are yet to make a substantial dent in the community (Mondal, 2012). The PA villages exclusively depend (69% of the total workforce) on a monocrop (Aman paddy) (Indian census, 2011). The islands are highly vulnerable to frequent embankment failures, submergence, flooding, beach erosion, cyclones, and storm surges. In addition to these, salinization, inundation, and soil

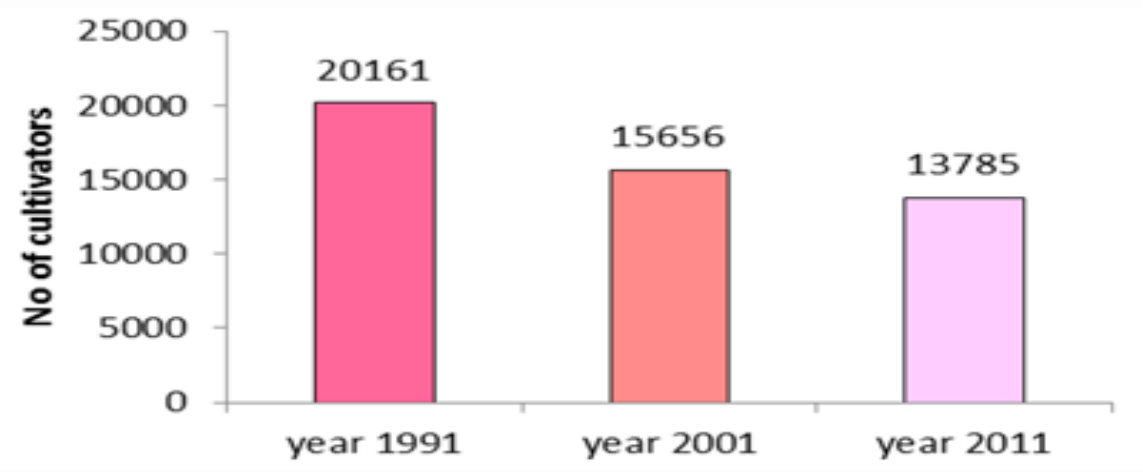
erosion leads to the sinking of the agricultural land, resulting in an irreversible material loss for the marginalized households (Hazra et al., 2017). The soil quality degradation from saline water intrusion results in reduced agricultural productivity (Chand et al., 2012; Mandal et al., 2012). The external factors like excessive fertilizer usage, irrigation deficit, heavy dependence on erratic monsoon, and lack of sweet water excessively hamper productivity (Edmeades 2003; Ali et al., 2007; Das et al., 2013). The rice production fell after cyclone Aila in 2009 from 64-80 quintals to 32-40 quintals per 1.6 acres (Debnath, 2013). Lack of permanent crop markets, insufficient storage, and excessive pressure from the middlemen contribute to reduced earnings, prompting the farmers to seek alternate livelihood means. Excluding critically stringent financial situations, traditional household females are averse to working as full-time farmers or day laborers. The income generated through micro-businesses and livestock maintenance is minuscule.

Comprising over 50% of the population, the income loss in the region tends to be substantive. Low educational skills, further intensified by the non-availability of the already saturated forest / formal jobs, lead the farmers to the informal job sector as daily labor (Hajra et al., 2016b). It points to the out-migrating community males for manual labor due to the lack of livelihood resources in the area. Agriculture-based livelihood is complex in the Sunderbans that overwhelms the cultivators who move away to lesser remunerative yet more stable options that include labor work. To sustain themselves throughout the year, the Indian Sunderban farmers move out to different parts of India for better opportunities. Rural to urban migrations often have positive impacts on the rural areas by inbound remittances (de Haas 2007; Erdal 2012; Viet 2008); it can also cause inequities within the Sunderban households (Barham & Boucher 1998; Acosta et al., 2008). Yet, the lack of education, the high degree of occupational dependency on agriculture, increase in the comparative living costs, and the non-availability of the traditional

social ambiance, coerces the migrant laborer to return home. Many desperate younger workers travel to the metropolitan cities, seeking enhanced earnings. Bangladesh has seen its share of urbanization. The following table depicts the shifting trend of cultivators from farming sector.

Table 2

Number of cultivators shifting lifestyles (Indian census 1991, 2001, 2011)



(Source: Hajra et al, 2018). DOI: https://doi.org/10.1525/elementa.196.f4

The urban population of the Sunderban has experienced a rapid increase from 7% in 1974 to 28% in 2011 (adjusted, including Statistical Metropolitan Area, Mondal, 2016). However, the number of households in the PA villages has also seen a rise in the numbers, indicating a steady inbound migration. Dependent on forest resources, inbound migrations exacerbate HTC. In 2011, the average number of residents per household was between 3.8 – 4.2 had declined from 6.0 in 1981. It was lower than the national average of 4.44 in 2011. The resident male-female ratio in the Sunderban peripheral villages averaged 1.07 million males to 1.09 females, attributed to the return of male labor from the cities.

Table 3

Increasing households in the Sunderbans from 1974 - 2011 (Mondal, 2016)

Subdivision in the Sunderban PAs	Number of Households in 1974	Number of Households in 2011
Sarankhola	12,680	64,022
Mongla	11,058	32,383
Shyamnagar	33,209	72,279
Koyra	19,524 (in 1981)	45,750
Dacope	16,846	36,597

The age group of 15- 49 years accounted for 50.1% of the population. This group was responsible for harvesting resources from the Sunderbans. The dependency ratio of 0-14 years and 65+ years was higher in the PA villages when compared to the national statistics, indicating the high percentage of emigrating male labor from Sunderbans (Mondal, 2016), leading to the female to male ratio as the highest in the nation.

Table 4

Male-Female Population Distribution in the Bangladesh Sunderban

Gender	Total Number	Percentage %
Male	7,842,533	49.99%
Female	7,845,226	50.01%
Total	15,687,759	100%

Source: Bangladesh Bureau of Statistics – Population & Housing Census 2011

Job demographics in the Sunderbans have remained consistent over the past couple of decades. There is a direct relationship between the livelihood choices and the education skills of the residents (Abdullah, 2014). The most marginalized villagers are landless shrimp farmers and laborers with minimal education levels; the immediately preceding population segment consists of non-farm workers, shopkeepers, small contractors, etc. with moderate schooling and income levels, land, and livestock ownership. The homestead pond owners are a third of the village population with slightly higher schooling levels but have a substantial higher income level and agricultural land holdings. The group of village households including forest employees and NGOs have about 10-15 years of schooling and ownership with income levels in the top quarter percentile range. The last group comprise of schoolteachers, physicians, and healthcare providers with higher education and income levels and land ownership.

The influx of unskilled migrants helps in surpassing the carrying capacity of the region. International migrations intensified by the familiarity with language, food, and culture, is supplemented with the hopes of a better life across the borders. Domestic migration occurs with villagers returning to the villages after the culmination of the outside opportunities. While population influx puts pressure on the ecosystem, it also increases HTCs. Census data of 2011 indicate that more than 12 million people (4.5 million in India, 7.5 million in Bangladesh) live in and around the Sundarbans. It also points out that an estimated 2.5 million people are entirely dependent on the mangrove forests for their livelihood (Kabir, 2007; Raha et al., 2013).

3.5. Participant Selection

'Purposeful Sampling' techniques identified the research samples with information that fulfilled the research criterion. The data gathering process included participants with negative

tiger interactions with self or family and those without such interactions to provide widely divergent perspectives from the PA residents. Patton (2002) had explained that the purpose of a stratified purposeful sample was to capture major variations rather than identifying a common core, although the latter may also emerge in the analysis. Each of the strata would thus, constitute a homogeneous sample. I chose the subpart of purposeful sampling, i.e., stratified purposeful sampling or opportunistic/ emergent sampling. I have used an iterative sample and re-sampling approach to saturate the data collection process (Miles et al., 1994). I also included snowballing techniques to identify other potential participants. The casual discussions with non-participants in informal settings had provided a divergent yet realistic perspective of the situation as observed by villagers living in the Sunderbans. The participants had never experienced negative wildlife interactions though they lived in the same villages as the study respondents. Their views were often different from the conflict experiencing interviewees. It was nevertheless a realistic perspective of the actual observed situation that provided an alternative opinion.

3.6. Interview Questions

This study explored the situations that had facilitated sustainable agriculture, a co-existential relationship with the tigers, and better wildlife management techniques (Schoffeleers, 1979), religion, community laws, and protection against the wildlife (Binsbergen, 1979; Motowanyika, 1991; Schoffeleers, 1979) (See Appendix B for the interview questions). Historical changes that created additional pressures on the land and wildlife were studied to better guide questions on PA community life issues (Mutanga et al., 2017; Pienaar et al., 2013; Stuart, 2001). The resources optimized a set of historical, religious, social, economic, and

political practices as external points of reference to better understand the human-wildlife relationship that exists today.

Data collection included individual (one-on-one) interviews, random discussions with structured (pre-set questions), unstructured (exploratory free-flow conversation) questions, and semi-structured questions (mix of structured and exploratory questions) (Pratt et al., 2004; MacMillan & Phillip, 2010; MacMillan & Han, 2011). The initial questions included age, gender, caste, religion, education, occupation, birthplace, and the period of stay in the Sunderban PA areas. It also delves into the reasons for the residents that relocated or continued to reside in the Sunderban PA areas. The interview questions were semi-structured and open-ended to elicit the thoughts and feelings of the villagers. They also assisted in deconstructing the ways that they react to situations based on the research topics. Face-to-face interviews allowed the researcher to take notes of verbal/non-verbal responses of the participants, e.g., nature of words used, facial expressions, and body language during the communication. The respondents spoke freely, answered probing questions about wildlife conflicts, and revealed everything they knew and felt relevant. The probing questions continued till no new information was available by continued probing (saturation).

Probing the economic status of study participants to shed light on their background, the questions ranged from land ownership, types of crops grown, number and kinds of livestock holdings, sources, adequacy of income, and forest dependence. Exploring the other interrelated social factors, the interview questions also examined psycho-social factors like local beliefs, customs, taboos, etc., that influenced HWC mitigation (IIED, 1994; Songorwa, 2000; Western, 1994). The questions explored their continued interactions with the wildlife, particularly the tigers and the various depredation experienced therein. They also examine their attitudes towards

the tigers, the forests, the contributions of the forest guards, and their efforts for mutual survival. These items focused on their opinions regarding the value of the forest, the tiger, and other wildlife and whether conservation is necessary or merely a modern-day farce. The last section probed ways that had allowed the villagers, and the tigers to historically coexist.

3.7. Interview Location Selection

Villages situated next to the core forest with high HTCs were selected for participants to provide enhanced perspectives on the human-tiger relationships. Entries to the core Sunderban forests are not allowed for the villagers without exclusive permits. However, the buffer areas next to the core forests allow for regulated consumptive utilization by the fringe villagers. All hunting activities in and around forest areas are prohibited. Also, fishing in the creeks next to the forests is not permitted.

3.8. Study Interviewees

3.8.1. *Villagers*

To select a purposeful sample size, I contacted the households that were known to have been directly affected by human-tiger conflict. The selection criteria necessitated that the selected respondent household has a family member or livestock killed or attacked by the tiger. Including them in the study have incorporated insights into how the loss of lives of the PA residents feature within the larger discourses of tiger conservation and forest management. Such inclusion integrates important narratives on livestock deprivation, loss of cultural capital, and stifling of socio-economic amenities in the area (Rangarajan & Shahabuddin 2006). The selected respondents also enhanced the understanding of the issues of community survival from the HTC and the death conditions of the PA residents, framed by the eco-conservation policies. The

respondents residing in the PA areas have historically experienced conservation policies and practices that have alienated the communities from their traditional livelihood practices and habitats that they have inhabited for generations. The exclusion from the forests is legitimized and enforced by the mandates of forest conservation (Sen, 2019). The traditional practices to complement the environmental and forest stewardships are ignored by the forest administration, dubbed unscientific. Dubious policies adopted as conservation methods circumvent the rights of the PA residents to forest access (Sen, 2019).

The research attempted to foster a balanced gender and religious representation in the sample since both tend to provide diverse perspectives to the human-tiger relationship. Gender, education, and religious differences create differential attitudes/ issues in the behavior towards wildlife (Anthony et al., 2004; Bhatia et al., 2017). The religious composition of the area includes Hindus, different sects of Islam, Buddhists, and tribal practices, amongst others. The demographic distributions highlight the existential challenges forcing the villagers to create unique religious practices for protection. Their insights provide rich data on how and why the conflicting interactions occur, the frequency of these interactions, the issues of tiger straying, and other interrelated problems. They also provide comprehensive feedback regarding the pragmatic ways of diffusing and mitigating negative interactions. The interviewees included honey and golpata (thatching leaf) collectors, fish and shrimp harvesters, laborers, shopkeepers, gunin (oracle), kobiraj (medicine men), tiger victims, teachers, and forest staff. Individual interviews lasted from 45 - 90 minutes on average per person.

TABLE 5

Categories and Number of Interviewees Included in the Research

Stakeholder	Examples of individuals/organizations	Number of respondents
Impacted Residents	Local residents impacted by human-tiger conflicts, villagers following different religions, men and women in equal numbers were used to obtain diverse viewpoints	35
NGOs	WWF, CCEC, Aid agencies, Sundarban Tiger Widow Welfare Society working in the Sunderban with knowledge of the tiger conflict situations.	20
Government Officers	West Bengal Forest Department and Bangladesh Forest Department mgmt. employees located in the regional headquarters associated with planning and orchestration	10
Forest Rangers	Forest rangers and forest department staff, posted in the Sunderban and have direct knowledge of HWC	10

To better understand wildlife conflicts in the Sunderbans, the interview sought the participant background, livelihood activities, resident community, socio-economic activities, wildlife interactions and impacts, and interactions with the forest department, obtained through structured and semi-structured interviews. Specific details of place, incidence, etc. of the wildlife conflict victims were obtained during the interview to understand the situations that led to the conflict, the lived and interactive experiences for adding richness to the findings.

3.8.2. ***Forest Guards***

The local forest officials of a particular forest area are responsible for managing specific regions of the forests under their jurisdiction. Given their experiences with the local villagers, the NGOs, and the wildlife of the area, the forest guard provided critical information to assist in understanding the operations of the region. They also extrapolated their understandings of the HTC and other wildlife conflicts. The forest officers provided the perspectives of the regulators

and the enforcers of the laws that occasionally create frictions and controversies between the PA residents and the forest guards. Within the planning committee on forest reforms, the forest guards analyze the HTC and its implications.

The guards experience the negative impacts of low wages, employee shortages, and consistent antagonism from the PA communities while trying to reside in the same community as regular citizens. They highlight the aspects that needed alterations for improving the quality of life for the PA residents and mitigate tiger/ wildlife conflicts. Their insights are also critical for accurate perceptions of NGO efficacy in the PA areas, ways to improve the conservation efforts, interaction with the other stakeholders, and assisting the livelihood and quality of life for the PA residents. The forest officials are also cognizant of the discrepancies and shortcomings of the government plans versus operations, domestic and international NGOs operating in the area, and other ground-level issues.

3.8.3. ***Government Officials***

The divisional headquarters for Indian and Bangladeshi Sunderban are in Kolkata and Dhaka, respectively. Though disjoined from the actual forest locations, the designated officers are responsible for framing policies that directly impact the PA villagers and the forest management techniques. Selecting these government officers as study participants vastly enhanced the insights into the outlooks and aspirations of the administration in managing the PA populations, the critically endangered tigers, and other wildlife, and for preserving and protecting the fragile deltaic mangrove forests from total decimation. The historical knowledge of exclusionary policies allows officers to rationalize the governmental perspectives on the efficacy of retaining the colonial practices.

The officials are often aware of the governmental perceptions of the local issues that are often disparate from reality. Their contemplation on the impacts of traditional, cultural, and social values and practices of the PA residents on the wildlife and tiger conflicts are necessary for a comprehensive understanding of the interconnected relationships that exist in the PA regions. It highlights the gaps between policies and practices ascribed to the disconnect of the officials residing far away from the Sunderban region. Since governmental policy and practice change the HWC conflict dimensions drastically, including the perspectives of the government officers involved in decision making was critically important in the contextual efforts to understand the human-wildlife issues of the Sunderbans.

3.8.4. ***Non-Governmental Organizations (NGO)***

The non-governmental organizations (NGO) of the Sunderbans are specialized local, domestic, or international organizations like the WWF, Save the Tigers, etc. in India, and the Center for Coastal Environmental Conservation (CCEC), in Bangladesh. They work in tandem with the state-run Forest Department and other community institutions to better assess and improvise the workings, either separately or in collaboration. Generally, the NGOs work in the areas of environmental conservation and livelihood generation. They also adopt collaborative approaches to redress the issues of tenure rights, equitable sharing of mangrove products and services, conflict resolutions in managing the mangrove forests, and various inequities associated with the PA residents (Dutta, 2018).

The co-management technique ensures that the villagers receive their fair share of revenues collected from the controlled extractions of forest products, the sale of mangrove seedlings raised in the nurseries, incomes from the apiculture activities through captive bee

boxes, and ecotourism facilities. The NGOs examine the effectiveness of mangrove conservation and conservation by conducting ecological appraisals. NGOs are mostly successful in their management efforts, including the rescue and restoration after the devastating cyclone Aila, as acknowledged by the forest guards and officers. NGOs perform in-depth evaluations to identify the community and environmental vulnerabilities and are best suited for providing improvised understandings of the PA residents, the environment, the wildlife, tigers, and their conflicts. The NGOs provide the perspectives of all the Sunderban stakeholders, which assists the research in achieving its objectives.

3.9. Participant Observation

Participant observation is a critical part of qualitative research where the researcher interacts with the subjects in everyday life, simultaneously collecting the unique information from participant discussions. The collected data is the rich, complex, conflictual, problematic, and diverse experiences, thoughts, feelings, and activities of humans and the meanings of their existence. Participant observation "combines participation in the lives of the participant with the maintenance of a professional distance that allows adequate observation and recording of data" (Fetterman, 1998). Multiple social researchers have addressed the issue of documenting the emotions in their fieldwork to enhance knowledge construction. Researcher Francine Lorimer discusses approaches to using emotions as data in the fieldwork. She addresses the emotions of hate (of oppressors), the emotional engagements of actually living in the field to obtain a nuanced, elegant discussion of the emotional aspects and their usefulness in data analysis. Participant observation "addresses noncognitive experiences in the fieldwork such as a sense of place, bodily experiences (called the raw moments), bodily practice, etc., to truly experience a place and incorporate space into the analysis" (Dewalt, Kathleen, book review, 2010). Participant observation is thus a valuable and appropriate tool for collecting data on naturally occurring behaviors in their usual contexts to be incorporated into the analysis.

As a participant-observer, I have met and interacted with the PA residents and participated in activities including the panchayat (local governing body) gatherings to deliberate issues and make decisions. The discussions, debates, and personal interactions help me to understand important community issues and how sympatric predator populations affect people living next to the forests and away from the forest, often in the same village. These observations were used to extrapolate the comparisons of agriculture, fishing, forest harvesting, etc., to

tourism and other labor jobs that shape the attitudes towards predators. Data collection for participant observation involved quiet, attentive listening, systematic field journaling, and recording all relevant interactions with locals and the activities that they had discussed (Dewalt & Dewalt, 1998; Bernard, 2000). The relaxed evenings were also an opportunity to initiate and listen to individual and group discussions.

3.10. Secondary Data

3.10.1. *Archived Information*

Secondary data were obtained from the Sunderban government and land records, publicly accessible sources of information, e.g., published, and unpublished journal articles, websites, compensation manuals, editorials/ newspaper publications, technical reports, etc., and provided valuable information regarding the HTC. The discussions also involved the NGOs, forest rangers, and other stakeholders in the region that authenticated participant statements of injury or impacts. This process also allowed the accidental uncovering of other valuable pieces of information (Merriam et al., 2016). Local health center records, achieved news reports, research data on conflicts, and NGO data confirmed the cases where and how the human-tiger interactions occurred and the resultant impacts of the encounters.

3.11. Data Analysis

These qualitative data were analyzed using the content-analysis approach that heavily depends on the research questions and the discussion details (Hsiech & Shannon, 2005). The initial data analysis had allowed the underlying themes from the various responses to emerge and provide a detailed analysis of the concepts (Hsieh & Shannon, 2005; Strauss & Corbin, 1998; Glaser & Strauss, 1967). The secondary data that were collected substantiated the findings of the

primary data. The descriptive interview data was transcribed at the earliest to retain the richness of these data. As a native speaker, fluent in Bengali and English, there was minimal data distortion during translation. A cursory analysis of the respondent interviews outlined recurring concepts and relevant themes applicable to individual residents along with the sub-themes specific to the individual PA communities. Similar sub-themes for all the selected PA communities were generated based on recurring concepts. A comparison of the community data revealed the underlying contextual factors and provided possible explanations for the conflicts.

To ensure the trustworthiness of the data collected, I used the reflexivity techniques as described by Lincoln and Guba (1989), where I contrasted the sub-themes with the field notes from the various sources, including participant observations, focus group perspectives, and informal discussions with the village residents at the teashop. The individual interviews were compared with the information gathered from the semi-structured/ unstructured interviews and by cross-checking the timelines provided to enhance the truthfulness of the data. Secondary data helped in corroborating the finding and gain a contextual understanding of the existing situation. Computer-Aided Qualitative Data Analysis (CAQDAS) software 'NVivo 11' has assisted in the data analysis. Finally, these data were open-coded, concepts identified, and theoretical perspectives and dimensions were extrapolated and discussed in detail. During the data analysis, the following steps guided the analytical process:

a. Developed major themes and grouped the categories under appropriate themes.

b. Established a pattern by reducing and merging related themes.

c. Created a story capable of providing a comprehensive picture of the issues discussed/answered in the interviews.

3.11.1. ***Transcription of Notes***

These data collected from the interviews, informal discussions, and observations, were transcribed at the earliest to protect and elucidate the richness of the data (observational facts, developed ideas, and reflective data). Participant observations including feelings, attitudes, and behavioral nuances were used in the interpretation. After the initial data transcriptions, I read and re-read the notes to identify categories and themes that led to a reduction, sensible interpretation, and representations to make the written text meaningful. I sought to identify gaps in the information while processing these data. The actions provided a complete, clear picture and a consistent story about the collected data.

3.11.2. ***Collect Additional Data and Continue to Observe***

The data processing highlights the missing nexus. Such missing pieces create barriers to creating a uniform picture. To avoid this, I continued obtaining information by alternating my stance between a complete observer and a participative observer. Silent listeners to the discussions within the community can assist in garnering a lot of subtle information and varied perspectives to enrich the research. It also helps to understand the various issues that continue to exist in the PA communities, which often creates dissonance in their wildlife tolerance behavior. After transcribing these data, I created summary sheets with categories and themes. This process enabled me to recollect individualized nuances and provide ideas on additional areas that need further information. After core category identification, I augmented these categories through relevant patterns and themes that delivered clarity and focus.

3.12. Coding and Reporting of Data

Coding is a ubiquitous part of the qualitative research process. It is a decision-making process that needs conceptualization based upon the various aspects such as density, frequency, size of data pieces to be coded and depends on the methodological background, the research design, questions, and the chosen data reporting applications of the study (Elliott, 2018). However, some data does not need to be coded and reported since it may have minimal or no relevance to the research question and the study objectives. As argued by Richards (2015), coding should always be for a purpose. It is never an end in itself. She further states that excess information reduces data clarity. Since text data are dense, it is cumbersome to go over them to make sense. Coding analyzes qualitative text data by taking them apart to see what they yield before putting data back together in a meaningful way (Creswell, 2015). Coding indexes or map data provides an overview that allows the researcher to make sense of their research questions (Elliott, 2018). Bryman and Burgess (1994) rightly point that there is a potential for considerable confusion regarding the meaning of coding. A mere reference of coding is ambiguous whether the writer is referring to the same procedure (p. 218). Thus, in the search for precision and clarity, different writers alternate using specific terms that refer to certain things and vice versa.

In this research, I reviewed the respondent responses chronologically, pursuing the 'code-and-retrieve' or indexing methods suggested by Richards and Richards (1994). I have tried to understand responses comprehensively, having spent time to re-read them, get to grips with the summarized data, and finally render it to something relevant and reportable. I have labeled symbolic meanings to the descriptive and inferential information gleaned from the participant responses compiled during the interviews. I tried to summarize the collected data cohesively into a broad set of comprehendible codes. I sought to eliminate the redundant and overlapping code,

thus, reducing the total number. However, when I found that the responses and documentations mention the same data repeatedly, I treated it as evidence of an emerging pattern and thus, integral research finding. I intricately re-reviewed these data to refine my codes and often break it into subcodes for a comprehensive and cohesive analysis flow. I created themes from the code or categorizations to include the participant observations findings.

Refining the code was the progressive process whereby the code, rather than these data, were analyzed, and a secondary level of code-formulation began, as indicated by Saldaña (2016). The related codes were combined to reduce the numbers and turn them into the major headings in the dissertation. I excluded the nominal codes that seem less relevant to the study. These second-level or pattern codes extract smaller materials into meaningful units of ideas that are abstract concepts, coalesces less abstract, descriptive codes (Punch, 2014; Creswell, 2013).

3.13. Trust Building

To facilitate an interview honestly and fruitfully, the need for trust-building between the researcher and the participant was mandatory. The HTC, HWC, and forest conflicts included illegal entry into the core forests, tiger poaching, human and livestock depredation, crop damages, and other conflicts. It also incorporates partisanship during issuing permits, relationships between the forest guards and PA villagers, bribery, misappropriation of funds, and other contentious issues. It is unrealistic that the participants will incriminate themselves with their admissions to an outside researcher, e.g., a city person visiting from the U.S.A. (Solomon et al., 2007; St. John et al., 2011). The participants, apprehensive of candidly discussing such issues, provided dubious data that negatively affects the research authenticity. Trust-building

activities need to start long before the interviews to make the participants comfortable and provide reliable and sensitive information.

During the data collection process, to overcome the reservations of the PA participants, I arrived in the PA villages well before the interviews, stayed in the forest lodges, and occasionally in the houses referred to by the village headman. I followed the socio-cultural norms of trust-building by eating lunch with the villagers, sharing family pictures, discussing their family details, socializing, and teaching the children, discussing the education issues, assisting the family in their daily activities, etc. Confidentiality of their identity was assured to encourage the participants that have engaged in unauthorized forest entry, poaching and other unlawful activities for providing honest responses. To further convince them, the details of the above-mentioned offenses were discussed in the third person (he/she/them) without any specific reference. Assurances were given so that their source of knowledge, experience, and relationships of the illegal activity will not be sought after, directly, or indirectly. The accuracy of the admissions was sought from the same and other respondents by rephrasing questions embedded with time, place, and other verifiable factors. To further appease the concerned participants, I refrained from intrusive and specific questions regarding religion, politics, and other intrinsic personal issues. To avoid false or misleading responses, financial and other incentives were not provided to the respondents (Gavin et al., 2010) except for maybe an occasional cup of tea or some food if the interview was unreasonably long. The tea or food is a traditional gesture of goodwill.

Following the recommendations of a local expert, I did not record the conversations of the respondents that volunteered information regarding the illegal activities in the region. Using the recorder could exacerbate distrust and lead to unauthentic or outright refusal to respond. The

NGO had provided me with a local field guide. The familiarity of the respondent with the fellow resident that had vouched for my integrity allowed them to become more trusting and comfortable around me. It helped in building trust and in reducing anxiety fatigue. My interactions were effective since the participants volitionally discussed sensitive issues. None of the selected participants refused to be interviewed, indicating the level of trust-building. Nevertheless, the rigors and accuracy of the descriptions and interpretations were tested by reviewing the data multiple times, triangulating the information from different interviewees, and examining them to find common patterns (Newing et al., 2011).

On my arrival to the PA villages of the Indian Sunderbans, the forest guards and officers were highly apprehensive of discussing the wildlife conflict and forest management issues of the area. The Indian Sunderban officers had indicated their aversion to discussing the forest issues with researchers, especially with foreign scholars. A member of the Indian Forest Services (senior administrator) overseeing the area had assigned a guide to accompany me. The endorsement of a senior officer overcame the trepidations of the forest employees for confidentiality and enabled congenial interviews and interactions. Information reliability for the interviews was ensured by rephrasing the question to include the time and place of the events, further corroborated with other responses, and from available secondary data (e.g., Bangladesh Forest Department record, CITES Trade Database, newspaper articles, etc.). Finally, I had assured all the interviewees of complete anonymity. As a native speaker of Bengali, I had conducted interviews in Bengali (Bengali being the local language) to maintain consistency and trust.

3.13.1. ***Ethics statement***

All ethical guidelines for social research (Babbie, 2009) were adhered to in this study. Participation in this research was voluntary. Participants were informed of their rights of refusal to answer questions or completely withdraw from the research at any time. Participating in the study did not cause any known physical or psychological harm. Study participants have been assured the confidentiality of their data at all times. While the interview results were to be discussed anonymously with the research team, all identifiers were secured with assured confidentiality in the university without public access. Participants consented after a detailed discussion of the study. For the participants who could not read or write, verbal consent was allowed. Signature or fingerprint consent was approved to fulfill the IRB requirements of Texas A&M University. The IRB safeguard (IRB #: IRB2015-0688D) requirements were adopted that included a professor from a local university in India and Bangladesh to ensure adherence to the participant protection regulations.

CHAPTER IV

RESULTS

This multidimensional research has aspired to understand the societal, cultural, and historical relationship between the protected area villagers and the Sunderban ecosystem and the tigers. The research findings will also show the factors that have influenced the community relationships with the residents, the cultural and historical changes with time.

4.1. Respondent Profiles

4.1.1. *Villagers*

Of the total 75 participants interviewed, 35 were residents of the peripheral area villages of India and Bangladesh Sunderbans, and the rest were forest guards, forest officials, and NGOs that worked in the area. Eleven PA villages were selected in the Indian Sunderban Gosaba-Sajnekhali areas included Dobanki, Burirdhabri, Pakhilarala, Chandankhali, Pirkhali, Panchmukhani, Netidhopani, Sudhanyakhali, Chamta, Baghmara, and Harinbhange villages. These villages had the highest incidences of straying and HTC. Five villages were selected next to the core forests in the Khulna area in Bangladesh included Bagerhat, Chandpai, Dacope, Mogla, and Sarankhola, also notorious for tiger straying and HTC. Direct interviews of the selected residents impacted by the tiger conflict provided thorough understandings of the existing and historical situation of the area. Since men and women have disparate perspectives on HTC, this study attempted equal participation of men and women for a balanced outlook.

The participant interviews focused on the following areas: resident backgrounds, lifestyle, challenges, perspectives on the Sunderban forests and its management, the historical

association with the forests and social connections with the ecosystem, and the relationships with the tiger. The sample of residents had 18 men and 17 women with ages ranging from 26 – 60 years, all with direct experiences of tiger conflicts, either personally or with immediate family members. The forest officials, forest guards, and the NGOs were working in the study area for an extended time, and aware of the intricacies of the existing tiger conflicts and the problem faced by the PA residents.

4.1.2. ***Forest Officials and Guards***

The guards offered an understanding of the forests, wildlife, the tigers, and the inter-relationships between them and the local community. They also detailed the relationships between the community and the forest employees. Amongst the interviewed forest guards were four supervisors from different PAs and six forest guards each, from the protected areas of India and Bangladesh infamous for high occurrences of HTC. Though the guards had worked in various Sunderban forest areas of India and Bangladesh, their current position in the PAs had allowed them to be privy to and understand the multiple HTCs that have occurred in the area.

The forest guards and officials bring in different perspectives of HTCs in the Sunderbans. Also included in the study were government officials for understanding the forest operations and decision impacts on the PA residents. The government officials were posted in the regional headquarters, Kolkata for the Indian Sunderbans and Khulna for the Bangladeshi Sunderbans (Principal Chief Conservator of Forest and DFO in Kolkata, India, and the Divisional Forest Offices in the Khulna Range, Bangladesh). The officials provided insight into the governmental understanding of the forests, the PA, and the resident communities.

4.1.3. *Non-Governmental Organizations (NGOs)*

Twenty interviews were conducted with the NGOs directly working in the Indian and Bangladesh Sunderbans. The NGOs included eight World Wildlife Fund (WWF) India employees and one employee of MUKTI of Kolkata (Calcutta), India; nine employees of the Centre for Coastal Environmental Conservation (CCEC) of Khulna, and two employees of the Global Mangrove Alliance of Bangladesh. The NGOs pointed to their partnerships with the governments in realizing the grassroot development and empowerment goals in the rural communities. They also revealed their understandings of the HWC, livelihood, and challenges of the local communities, and a thoughtful cumulative impact on the PA villager, living next to the core areas (interview questions see Appendix B).

4.2. Relationships with the Sunderban Ecosystem

The balancing of the natural forest resources and the wildlife sustainability was perceptibly disturbed with the advent of the colonial powers and the massive influx of migrant flow into the PA villages (Dev Roy et al., 2012). Multiple factors coalesced to eventually create cascading detrimental impacts on the ecosystem that almost wiped out the endemic populations of the keystone species, the Royal Bengal Tiger. Today, the ever-growing imbalance between humans and forests resources has created a zero-sum game. This research aims to understand the attributes and practices of the PA residents - socially, culturally, and historically, leading to the current impacts.

The following sections discuss the societal, cultural, and historical interactions with fellow village residents, the forest guards, forest officials, and the NGOs working with the community, wildlife, and the forests. This study is sub-divided into societal, cultural, and

historical connections to understand the inter-relationships of the Sunderban forest. Societal relationships include interactions with the village co-residents, forest guards, government officials, and the NGOs of the area.

4.2.1. ***Societal Relationships***

The involvement of the locals as shareholders and co-participants in the eco-conservation practices is critical to promote conservation strategies and maintains balance for the ecosystem. The mere establishment of the PA alone cannot protect the biodiversity and ecosystem services in perpetuity. The fragility of the Sunderban ecosystem makes it highly vulnerable and hypersensitive to changes. The PA residents creating anthropogenic pressures must understand that they should not introduce changes that will detrimentally impact the ecosystem in the near or the distant future. The eco-friendly societal relationship must not remain constrained to the forests, the rivers, or the wildlife but percolate to develop and maintain other individual and group behavior that influence the ecosystem in the PA. Human behavior thus assumes critical importance when interacting with the ecosystem, its constituents, especially the wildlife and the tiger. Within the category of societal relationships, five themes emerged:

4.2.2. ***Forest - The Benevolent***

The residents reported positive attitudes towards the Sunderban forests, historically considered the benevolent mother, kind and protective of the humans, trees, and the animals living under her care. The residents agreed that the humans failed to maintain a sacred relationship of mutual protection, succumbing to the multitude of challenges. One of the elderly villagers lamented:

> The Sunderban forest is our mother. She used to take care of us – feed and protect us. However, we have cut down the trees, killed the wildlife, and used up all her resources. We have let her down and so we suffer today.

The residents that enter the forests, pray to Goddess Bonbibi (the tiger goddess) to save them from tiger attacks. One of the Mowali (honey collector) respondents repeated the chant, locally called pujo:

> Mother, we are going to your kingdom, kindly protect us, please see that we get a safe return, and do not fall prey under the tiger paws.

The PA residents complained about the newer generation of frustrated youth having different perceptions of the forests. They claimed that the outlook of the current generation towards the forest has undergone a massive change from a protective mother to a potential economic opportunity. Resident responses highlighted the feelings of the younger generations being disenfranchised by the earlier generations and the government that they blame for the destruction of the forests. The younger residents blame the poverty and lack of opportunity that inhibits them from moving out of the PA, thus exposing them to perceived risks of tiger attacks.

Criminalizing the historic ordinary activities within the forest include unauthorized entries, harvesting forest resources, pastoral activities etc., has created disempowerment and frustrations among the marginalized PA villagers. The demands for bribes, the enforcement activities that add pressure to the already stressed lives, stratification of local communities based on personal priorities, and restrictions on encroachments near core forests have created extreme frustrations for the PA youth. In the efforts to break free from the vicious chokehold, many PA

youth travel out of the forested areas daily or temporarily, often relocating to the city slums for livelihood options. The successful move out of the PA permanently while the dejected minority defaults back to the PA. Though the cities afford a respite of relative affluence, it is ultimately the forest area that welcomes the decrepit into her lap. The returning youth revert back to the livelihood folds of honey, wax, and golpata collection along with fishing in the creeks and rivers.

4.2.3. ***River – A Source of Life and Destruction***

The PA residents agree that their relationship with the network of rivers is complicated. While they cannot live without the riches of the rivers, its ravaging capabilities are also well known. The cleared forests lose the protection and stabilization of the tree roots and allow the soil to wash into the sea. The periodic cyclones combined with the ocean level rise due to global warming contribute to the Sunderban forests losing about 80 square miles of mangrove trees every year (Chowdhury, 2016). The periodic sliding of the riverbanks into the fast-flowing rivers of Sunderbans is a common sight. The displaced riverbanks or embankments carry the mud houses and trees that have moved to the edge of the rivers by the continued erosion. Roots of the huge Sundari and other trees lie exposed to the rivers and are the occasional victims of soil erosion by the rivers. Land erosion in the Sunderban is disastrous for the deltaic ecosystem. Soil erosion destroys the fragile Sunderban regions and the communities that depend on them. Houses built next to the rivers are frequently swept away during a cyclone or the rainy season. The dams located upstream traps the river sediments that otherwise would have strengthened the riverbanks downstream. The erosion of the riverbeds allows more backwaters to flow inland, further exacerbating the soil attrition. Scientists are also worried about the global warming impacts on the Sunderban rivers. Global warming causes the oceans to rise, allowing the saline seawater to

move upstream and contaminate the fresh river waters. The salination of freshwater makes the region uninhabitable. It is forecasted to become a huge problem if not remedied soon. The fertile soil erosion actively contributes to severe food insecurity issues. The general attitude of the residents underlines the basic eco-centric mantra of the Sunderbans that human survival depends on the subsistence of the Sunderban ecosystem.

Surprisingly, the residents justify the illegal use of the forest products that have protected the soil from erosion for various personal use. They use mangrove wood for constructing huts and fishing boats, reasoning that it does not need too many sturdy mangrove trees. The villagers continue their livestock grazing inside the core forests by crossing the dry rivulets, collect firewood, erect encroachments near the forest, are opportunistic fishermen in the creeks, and hunt the ungulates. When confronted, they occasionally justify their actions as their historical rights. Though limited seasonal permits for forest entry are issued, the residents agree that a sizeable number of villagers enter the forests illegally for collecting the highly remunerative honey, wax, thatching leaves (golpata), and other forest products. Fishing in the prohibited areas, next to the core forests, is a common sight. Shrimp, prawn fishing, and harvesting of king prawn fry or shrimp hatchlings are heavily restricted to maintain critical populations. Rivers are crisscrossed every day with shrimp boats using multiple nets, causing deep concerns regarding the maintenance of sustainable shrimp populations. Excessive harvesting of fish, shrimps, prawns, and crabs has caused massive declines to their base population, edging it closer toward the critical, unsustainable numbers.

While the Indian government has heavily restricted commercial river-cargo traffic through the Sunderbans, the government officials acknowledge that some cargo liners continue to transport fly ash and chemicals to the industries in Bangladesh, located near the Sunderban

borders. The forest rangers attribute their lack of resources to the messy enforcement, allowing holidaymakers with little or no knowledge of positive environmental behaviors to sail on river cruises plying next to the core areas. The returning river cruises have bright neon lights and play loud music at night, essentially disturbing the tiger and wildlife habitats located near the rivers.

4.2.4. ***Economic vs. Sustainability Challenges for the Government***

The respondents including forest officials, agree that economic-focused actions tend to exacerbate the already mismanaged situations. The Bangladesh government has constructed five cement factories, an LPG plant, and a thermal power plant in the ecologically critical areas of the Sunderban forest, next to the Poshur river. While the oil rigs and cargo ships are allowed to transit, oil and other pollutants from the cargo liners flowing into the river cause massive pollution to the critically endangered terrapin and other wildlife. They also damage the tranquil ambiance of the area, resulting in habitat disturbance and force the resident wildlife to relocate deeper in the forests. Tigers are especially vulnerable to habitat disturbances that impact their population sizes. Tiger litter size is small and female tigers are highly protective of their cubs. The presence of humans in the vicinity and habitat disturbances due to river traffic causes hormonally induced reductions in their annual breeding cycles. Intensification of tigers in smaller range areas also causes serious tiger (intra-species) conflicts, resulting in tiger deaths. As one NGO member struggling to change the government policy explained:

> The government uses lip-service depicting their commitment to conservation and sustainability, but when it comes to choosing between economics and conservation, economic options always win. Reiterating the damage to the fragile Sunderbans

ecosystem due to the activities of the industries located next to the forests, always falls on deaf ears.

Left with limited financial and other alternatives, the PA villagers consider the Sunderbans to be conducive for human living, despite the recurring HWC. The respondents recognize the destruction of the mangrove forests due to various anthropogenic activities and are willing to participate in the restoration activities. Acknowledging the illegal forest incursions and poaching to be detrimental to the ecosystem, thereby negatively impacting their lives, they were willing to assist the authorities by actively reporting such activities. Questioned about legal infringements of collecting forest products from the core areas, the residents acknowledge that the marginalized villagers without access to alternatives will continue to source forest products illegally.

Realizing the gravity of the HWC situation, the forest departments of the Indian and Bangladeshi Sunderbans have initiated actions to make the PA population free of forest dependence. While maintaining the traditional pecuniary activities of honey, wax, and thatching leaves (golpata) collection with vetted seasonal license, the forest departments have permanently suspended deadwood extractions from the forests. Based on extrinsic advice, the forest department has been introduced to the idea of apiculture outside the forest to avoid honey collection from within, a major HTC contributor. The forest department also provides alternate skill development training to the PA residents in conjunction with the NGOs. The PA residents agree that while the government is trying to create additional earning opportunities by providing long-term loans for small businesses, the qualifying standards for loan receipts are too high. However, efforts seeking capital to initiate business by the villagers get blocked by political bureaucracy. Also, nepotism and mandatory bribes act as deterrents for loan seekers. Special

loan programs for village developmental assistance, residents seldom get financial benefit assistance from the program.

The Indian Forest department touted their efforts of providing manual labor assignments to the local youth and opportunities for weaving nylon net tiger barriers to the women. They also offer small loans to initiate small-scale businesses, hoping to reduce forest dependence and HWC. Bangladesh forest department invite PA residents and pay them to joint forest patrols, manage deer and crocodile hatcheries while providing limited employment in the local government offices. The government does not enforce anti-encroachment laws for cultivation on buffer lands though they agree that the indifference contributes to HWCs.

4.2.5. ***Social Alliances Within the Village***

Most respondents reported positive attitudes toward creating alliances for survival. Honey collectors or Mowalis form alliances with villagers of neighboring villages skilled in specific aspects of forest harvesting like smoking beehives, honey collection, wax harvesting, lookout persons for averting tiger attacks, etc. Such groups include a Gunin (the Oracle or religious men to chant for warding off the tigers), that also officiate as a Kobiraj (medicine man for providing first aid after an attack), if available for the trip. Gunin having a positive reputation and accompany different forest-visiting groups at different times. Occasionally, some children follow their father and other relatives on forest trips to learn the work.

The respondents have very high esteem for the Gunin - the religious men who have traditionally learned their skills from their father or some well-known religious figures of the area. During the non-peak seasons, they work in alternate areas like shrimp farmworkers, agricultural labor, fishing, etc. During the start of the honey, wax, and golpata harvest season,

they act as conduits for invoking the blessings of Goddess Bonbibi to ensure safe passage into the forests. Depending on the majority and preference of the group, the Gunin can be a Hindu or a Muslim. Occasionally, the Gunin accompanies the forest product harvesters into the forests for chanting and keeping a watchful eye to ward off tiger attacks. The villagers have faith-based protection when it comes to their entering the core forest areas. As one honey collector stated:

> Our Gunin is very experienced. His father was a Gunin with magical powers. When a group of Mowalis had him accompany them, the tigers did not attack the group, even though they could hear the tiger in the nearby shrub. Our Gunin has learned a lot from his father and has the same aura to protect us one day.

The community, however, had mixed views of the Kobiraj – the traditional medicine man. Though not a trained doctor with minimal formal education, the Kobiraj accompanies the forest-bound group for contingencies during the trip. Working with senior herbal medicine men in the area to gain experience, they assist the forest-goers injured in tiger or wildlife attacks with a combination of herbs and basic medical practices. However, the well-reputed Kobiraj seldom travel with the group since the enterprise is deemed too risky. Though the villagers depend on the Kobiraj, they do not always trust them. One respondent critical of Kobiraj stated:

> The Kobiraj admonished my friend that he should have brought his tiger-victim nephew immediately after the attack to save him. We transported one of our neighbors to the Kobiraj immediately after another tiger attack. Even though the Kobiraj took our money and tried to heal the injured guy, he died an hour later. We need a regular Ingreji (Allopathic) doctor here and not these useless quacks.

The golpata collectors called Bowali work as manual and agricultural laborers in the off-season. In the limited time permitted for forest harvesting, the Bowali team up with the locals to collect the thatching leaves (golpata). Respondent Bowalis' reported similar dangers as the honey collectors during their forest visits or on the boats next to the forest while collecting golpata. The group is selected to include some Bowali with a talent to climb up the trees and harvest as many matured leaves as possible. The ability to stack the leaves in the boat in an orderly fashion within the shortest time is a developed talent. Since the Bowali cut and collect the leaves from the edge of the core forests, they traditionally are not accompanied by the Gunin and the Kobiraj. However, the threat of tiger attacks at the river edge coerces them to pray to Goddess Bonbibi before embarking on their journey into the forest.

The fishermen locally called Jele are another group that forms alliances. The fishermen used labor-intensive manual trawlers to maximize the fish catch. The fishermen enthusiastically await the peak fishing season when the saltwater fishes migrate upstream into the freshwater for spawning. The fishermen or Jele groups connect with multiple boats and aggregate in the prime spots for the best catch. They also coordinate with their group to get the best areas for the king prawn / shrimp-fry harvesting. Stressing the importance of local alliances for survival, a respondent (fisherman) explained:

> I am the only male member in my family. Though I am a good fisherman and bring home food every day, some additional help can improve the total catch for all of us. My brother-in-law and his friends have joined me, and we fish for king prawns. Though it is hard work from dawn to dusk, we also make a lot more money than we use to do before.

> My wife gets to see her brother every day that is good for her. Working as a group has positively helped us.

The PA villagers claim improved efficiency by creating societal alliances for improved political voice and clout in numbers against the forest officials to coerce them into enhancing HWC mitigating measures.

4.2.6. ***Symbiotic Partnerships with Neighboring Villages***

Respondents reiterated the benefits of partnerships with other neighboring village members for labor-intensive tasks like crop planting and harvesting, manual trawler fishing, joint forest patrolling, etc. The women form informal partnerships for weaving nylon nets, rearing and maintaining livestock, midwife assignments, and other manual projects. The lack of educational institutions and the financial challenges force the villagers to swap child-tutoring by comparatively qualified neighbors for assisting them in household chores. PA residents contend that similar reciprocal relationships provide livelihood avenues that can assist in moving away from forest dependence and mitigate HTC. It also provides them with a path of upward mobility by enhancing their options of educating their future generations. A participating PA resident clarified:

> I assist the NGO's wife in cooking and cleaning activities. Though they do not give me a comparable salary, I continue to work because they help my son with his studies. We are poor and uneducated people and cannot afford a private tutor for my son. I want my son to study and have a better future than us.

In most of the PA villages, there exists a panchayat, the local administration. The Sarpanch or Pradhan heads the panchayat and is a locally elected leader, often with deep affiliation to the regional mainstream political party. The Sarpanch, periodically convene meetings with the locals, irrespective of their party affiliations. They discuss pertinent issues dealing with the forests, HWC, their agricultural land, governmental policy impacts, and other issues that impact the lives and property of the community. The panchayat also invites the Panch or elected delegates of the neighboring villages to brainstorm overlapping areas of interest to the local communities. They discuss the importance of environmental /ecosystem education to foster community engagement in decision-making. In addition, the community impact panel analyzes issues dealing with conservation, sustainability, and human-tiger conflicts. Some village groups discuss income generation and livelihood strategies for the youth to dissuade emigration while enhancing eco-sustainability. Such interactions depicted a sense of ownership to cooperatively protect the reserve from outsiders while regulating the use of their local resources.

The panchayats of the Bangladesh PA villages create multiple lists of the local youths who are interested in joint forest patrols with the forest guards as a part of the community-based resource management. The lists are rotated for inclusivity and highlighting the importance of community participation in providing forest security. Though not explicitly mentioned by the forest guards, a mother explained her reasons for sending her son to the dangerous job of patrolling the core forest with the forest guards:

> My son has always been fascinated by the Royal Bengal Tiger. He was very excited when the local panchayat enquired about his interest in joining the forest guards on a routine patrol. He immediately consented. Since then, he accompanies the forest guards on their

> combined forest patrols. His dedication is easily discernable. I hope that the forest services will permanently hire him for the forest patrol duties. My son is minimally qualified but may have a good life if he gets a job in the forest department.

Alternate income generation tends to lead the PA community away from forest dependence and HWC. Forest boundary issues infringing on pastoral access are also contentiously debated, as indicated by one of the respondents. The cows seek better pastures in the core forested areas, considered out-of-bounds for the villagers. Since many PA residents have cattle and other livestock, grazing pastures in the buffer areas get severely depleted. The village community consistently coerces the panchayats to try and seek access to greener pastures. They also seek greater access to the erstwhile fishing areas near the core areas for improved fish harvesting. The forest department, despite panchayat requests, severely restricts such requested actions for protecting the forests and mitigating HWC.

4.3. Relationships with the Forest Employees

4.3.1. ***Resource Alienation***

The PA communities are a marginalized populace, heavily dependent on forest resources for their survival. Most of the respondents had complaints against the restraints imposed on their use of the forest resources. They felt the hostile attitudes towards forest entry continue due to the lack of a concerted community voice. While acknowledging the implications of the restrictions on forest access, the forest rangers indicated their compulsions of complying and enforcing the laws. Though they advise the villagers to approach their elected representatives for solutions, the villagers often see them as adversaries, the face associated with the enforcements. Discussions with residents revealed that some of their traditional rights were expropriated and denied by

groups that profess ecological conservation under the garb of forest protections. The environmental knowledge and concepts of the indigenous PA residents were lost and subsequently replaced by the colonial scientific knowledge obtained from the colonizers. Though localized decisions suggested by the PA community to the forest guards were important in attaining conservation, social justice, and sustainability, the governments are disinclined to restructure the top-down approach for community participatory management practices.

The community-participatory approach adopted by the Bangladesh government involving grassroots communities is a feeble attempt of restructuring the conservation strategies with resident villager cooperation. Pertinent suggestions were rendered ineffective due to the bleak implementation efforts. Based on the successes of the Arabari experiment of West Midnapore district of India and the other areas of Gujrat and Haryana, the government of India has initiated the Joint Forest Management (JFM) in 1990 (Sen et al.,2019). Observing cursorily, though villager participation in the forest management seems to be the intent for JFM, the forest officials were apprehensive of relinquishing even partial control. Eventually, the PA villagers end up with passive participation that limits their involvement in providing their observations of illegal forest activities and thoughts on better practices. The current forest management practices continue to be exclusionary, denying residents forest entry without permits. The strict restrictions on forest entry continue in the Sunderbans. Studies to extrapolate ways in which traditional practices can complement the formalized stewardship methods are yet to commence (Sen et al., 2019). The PA residents contended that marginalization pushes them to pilfer forest resources when they are not allowed complete forest access. They argue that some of the forest resources proscribed from gathering, like dead wood, are lost if left unused. However, they agree that destroying the forest under the guise of sustainable use is detrimental to their interests and are against it.

4.3.2. ***Access Restrictions***

Most respondents complained of the restrictions placed on entry into the forests. Political and social concerns prohibited discussions about the growing encroachments next to the core forests. The forest guards in some Sunderban PAs have created an additional buffer region to be only used for certain livelihood activities, e.g., livestock grazing. Such activities however, come with stringent restrictions. The PA residents being highly marginalized, need all the resources that they can have. Blaming their livelihood disruptions on the forest guards and the enforced policies, some PA residents vent their frustrations and make plans to look out for themselves only. Some act as conduits for the pirates and the poachers to make additional income. Others, though unhappy, end up as benign complainers.

Colonial practices of keeping humans and tigers away from each other necessitated the curtailing of anthropogenic activities that impact the forests and wildlife, particularly the tigers. The forest management of the Indian and Bangladesh Sunderbans have placed complete bans or severe restrictions on the core forest entries. While the Indian Sunderbans continue to maintain a no-entry policy except for special permits, Bangladesh Sunderbans allows for a community-based forest management philosophy wherein the community actively participates in activities like joint patrolling of the forests with the forest rangers. Resident participants stated that this activity was mutually beneficial in creating brotherly bonds and empathy with the forest guards. The forest guards benefit from the community suggestions of forest protection and wildlife conservation while receiving critical information regarding illegal forest activities. Villagers that live around the forests act as multiple eyes and ears for the guards to prevent illegal activities, thus assist law enforcement. Occasionally compensated for the assistance, the marginalized residents benefit economically. However, it falls considerably short when compared to the

benefits accrued from forest harvesting. Unhappy with the access restrictions and without adequate alternate benefits, a long-time elderly PA resident lamented:

> It is our forest - we have always used it to gather food, graze our livestock, and even hunted in it. We have never heard that the forest had run out of tigers or deer. The forest guards do not allow us to use the forest as before. They feel that we will destroy the forest, it is all because of monetary reasons. If you give them money, they will let you do anything.

The forest officials are confused between their duty and humanitarian thoughts - whether to enforce the laws or try and assist the marginalized community in which they live as co-residents. While acknowledging that there have been livelihood disruptions because of the legal enforcements, they attribute it to the greater welfare of ecology, the wildlife, and the local community. Though the guards continue to enforce laws in their official capacity, they also try to assist the local communities. They facilitate government assistance programs, expedite license processing for fishing and honey collection, provide temporary work of making nylon nets, forest labor, conducting joint patrols, etc. They also protect the tigers and villagers from each other.

4.3.3. ***Criminalizing Livelihood Activities***

The woodcutters (Kathure) are the latest Sunderban victims of the stricter government policy. One ex-woodcutter and now a laborer explained that the Sunderban forest regulation blanket ban on logging and collecting wood destroyed his livelihood and family. His wife has to go out and spend the entire morning searching deadwood and cow dung as fuel for cooking

purposes. Though he was issued a license for honey or thatching leaves (golpata) collection, the forest guards strictly prohibit tree-felling or even picking up the broken branches from the tree bases. As one woman pointed out:

> My mother and mother-in-law both used to collect dead wood lying around in the forests and use it as fuel. Since there are no cooking gas connections and the price of coal is so high, the collected wood used to be a lifesaver. Today, I must travel about 3 miles in the buffer region to pick up dead wood for cooking. Apart from the possibilities of being attacked by the wildlife or the tiger, daily walking about six to eight miles, makes me feel tired. Like the other women in the village, I just use dried cow-dung for cooking. The doctor told me that smoke inhalation from the cow dung smoke leads to lung cancer. Since we lack funds, we do not have alternatives but continue to use cow-dung, paper, and deadwood for cooking purposes. Picking up dead wood from the forest floor does not harm the forest or the wildlife. It makes our daily workings less stressful.

The fishermen also have their share of frustrations. A resident fisherman claimed that the forest department no longer provides boat licenses, a mandatory permit needed for procuring fishing licenses. He stated that the rental charges for the boat licenses are so high that he could barely afford it. New boat licenses are not issued anymore. This situation has forced him to rent it from one of the former village residents currently living in the city. He rents out the BLC license that was issued to his grandfather by the forest department. It can only transfer to blood relatives. When added to the fishing licenses, the daily expense becomes so high that he can barely break even. He blames the forest officials for taking away his livelihood and continuing to reduce his earnings by creating more restrictive policies:

> The boat license owner demands a large amount of money for renting out the license for a day. The forest officials have issued licenses to people who do not fish anymore but rent it out at an exorbitant price. The forest department charges us for issuing the fishing permits. When we go to the rivers for fishing, the fishes swim away to the areas near the core forests. The government restricts us from fishing there. The biggest and the best fishes are thus, lost. We can barely feed our families after paying the license rent and fees. I feel that the government is cheating us. Since we do not have power, nobody listens to us.

On community-relationship questions, the forest guards blamed the community members as self-serving with a propensity of infringing the legal regulations whenever possible and use the poverty or the relationship card to avoid prosecution and fines. They also blame the administration for failing to provide the basic requirements for law enforcement. One Bangladeshi supervisor of the forest guards griped:

> The tea and biscuits that I am offering you are from my own money. We cannot afford to fill the patrol vehicles with petrol due to the shortage of allocated funds. We use personal motorcycles with higher mileage to stretch the allocated funds, occasionally paying for the petrol ourselves. We cannot afford to pay the informants for reporting illegal activities. To compensate for the critical information provided, I offer tea and snacks to the informants. The shortage of funds forces us to curtail the requisite number of forest patrols that are required. We neither have the quality nor the number of weapons needed

> to stop the poachers. To protect the forests and tigers, we put our lives on the line. Even after all the hard work, we do not get paid adequately.

There is a deep distrust of the forest guards within the community. The forest guards assured the villagers of a mutually beneficial relationship with them if they jointly participated in forest management. However, a holistic overview of the cooperation efforts indicated that the strategies were not uniformly implemented and lacked inclusivity. The financial disparities and the social standing of the residents results in withholding resident participation. The forest guards categorically deny the findings. They claim that the enforcement efforts alienate the locals who then, refrain from cooperating and providing critical information on illegal entrants, pirates, or poaching activities in the forest. The size of the forest is a handicap to law enforcement. The cooperation of the local villagers must be encouraged for proper coordination, enforcement, and forest management.

Conversely, the villagers of the Bangladesh Sunderbans claim that the forest rangers are a part of the problem. They collude with the river pirates and condone or turn a blind eye to their activities. One PA respondent explained that the forest rangers have never rescued a kidnapped fisherman; on the other hand, the pirates get the personal information of the fishermen from the forest rangers, making the kidnapping targeted and easier. The villagers also claim that the pirates are not scared of the forest rangers since the latter receives bribes from the pirates. The only effective enforcers against the pirates are the Bangladesh Navy, which adopts a non-compromising attitude towards the pirates. Residents claim that the Navy patrol schedules are leaked to the pirates by the forest guards. Pirates avoid venturing out during the patrol hours lest they are accosted and killed in the resulting encounters. The river pirates cause damage to the

forests and the tiger populations that the residents try to protect. In their covert efforts to protect the pirates, the forest guards have lost their credibility; hence, the villagers are apprehensive of providing critical information for forest protection. One participant accused the forest guards of revealing his identity to the loggers. Fearing retribution, he promised not to provide information to the forest guards again:

> The forest guard had sought information regarding illegal mangrove tree felling in the village, claiming to be my friend. I knew about the villager who used to cut and sell Sundari trees, so I gave him the name and the time of his entry into the forest for logging. The forest guard revealed my name, resulting in a verbal fight with the co-villager for snitching. When I approached the same forest guard for the honey collection license, he stated that they had given away all the permits allocated for the year. He said that the only way around was to pay him Rs. 900 to try and get a license from his superior. Later, I found out that it was a ruse to solicit a bribe. I felt cheated and will never help him again.

The participation of the PA villagers in joint-patrolling operations in the Bangladesh Sunderbans seemed to create amicable bonds and goodwill concerns amongst both parties. Such safety concerns indicate that community inclusions ensure better PA management. Community cooperation also provides critical information on tiger poaching, crocodile harvesting, and other illegal forest activities. The PA residents felt that the forest guards perform their functions at great peril and occasionally lay down their lives to save the forest and its wildlife, particularly the tigers. Community participation in the decision-making process effectively raises compliance

levels of the forest laws amongst the participants while strengthening bonds to benefit conservation.

4.3.4. ***Personal Relationships with the Forest Guards***

The forest guards highlight their status as the next-door neighbor. As community members, the forest guards are involved in social activities that include marriage within the community, raising their families, shopping in the local markets, etc. They identify their responsibilities of maintaining a dual role - as a law enforcer for the forest department and a social member of the local community. While the PA communities generally do not hold grudges against the forest guards, a substantial number of the residents blame the guards for partisanship, bribery, and coercion, etc., under the pretext of law. They charge the officials with demanding bribes for ordinary services that are a part of their job duty like paying out the compensation for livestock killed by the tiger, informant payment for stopping an illegal logger, etc. The villagers blamed the forest guards and the officials for demanding bribes to issue licenses and then demand a part of the collected honey at below-market, pre-determined rates from the Mowali (honey collector), as required by the forest department. The forest guards contend that they must enforce the laws for which the villagers blame them.

4.3.5. ***Reluctance to Remedy Past Oversights***

The PA community residents of the Indian Sunderbans have historically sought for and continue to seek equity in fishing, honey collection, and other license distributions to enter the core forests and make a living. The PA residents continue to complain while most of the fishermen respondents spoke about it in greater detail. These licenses allow for a windfall when used with discretion and during the business season. The optimal use of a single honey collecting

license can occasionally provide revenues that can equal or exceed the yearly earnings of an agricultural laborer. The fishing permit is issued to the fishermen holding boat license certificate (BLC), required to fish in the waters with the best fish stocks. Fishing licenses include a small fee called the dry fuelwood collection (DFC) fee. The fishermen must approach the forest beat office with a valid BLC for getting the DFC permission to enter the forest for 2-3 weeks. The BLC licenses were last issued in 1973 when 5070 BLC licenses were issued (Vyas, 2012). The government justifies its decision of withholding new BLCs to maintain fish sustainability and avoid overharvesting.

The previously issued BLC licenses continue to be maintained by the older fishermen, many having moved away from the Sunderbans to the nearby cities or have passed away. The BLC ownership is inherited by the next of kin, an adult family member. The holders, most of them have since become rich, live far away from the forests, refuse to relinquish their licenses to the forest offices. Instead, they chose to rent it out to the PA fishermen at exorbitant prices. While this practice is considered illegal, the forest officials turn a blind eye to the infractions. To break even the rental charges and earn a profit, the fishermen choose to cut corners and fish in the restricted areas. Also, they ignore the restrictions of harvesting certain fish species and fishes below a certain size or when the fish is about to lay the eggs. Such activities harm the sustainability of the ecosystem and risk the endangered fish from completely disappearing due to overharvesting. Fishing next to the core forest rivers in the morning and late evening hours exacerbate tiger attacks since those are the times when the tigers are most active. The fishermen are also attacked by river crocodiles, active during the early evening hours. Thus, the high rental prices of the fishing licenses exacerbate HWC.

The BLC needed for honey collection continues to be currently issued. However, the honey collector must sell most of the honey collected to the forest department at pre-fixed, below-market prices. As a result, the PA villager with the honey collecting license substantially under-report the amount of collected honey to sell it later in the open markets for fetching premium prices. The marginalized villagers that cannot afford to buy or rent the BLC, enter the forests area illegally, and exposes themselves to HTC. A fisherman who periodically enters the core area illegally for fishing admitted:

> I am a poor fisherman and cannot break even the large amounts of rent as desired by the BLC holders, even if I continue to fish day and night. I enter the core areas illegally and fish in the rivers next to the core areas where I get a good catch. Occasionally, the forest guards catch me in the act. I give them some bribe or pay a fine and getaway. Though I know that I risk being attacked by a tiger or a crocodile, I will have to assume the risk to make a living. As a poor man, I have to survive and feed my family.

While the government has promised to change the BLC regulations, political interference and red tape management are more successful in delaying the changes. Humans entering the core areas often face life threats attributed to tiger attacks, poisonous snakebites, crocodile attacks, piracy, natural calamities, or illness after they enter the core areas. Though the license does not mandate governmental protection against wildlife, legal forest entrants can claim compensation if they can verify that the animal attacks were responsible for their injury or death. The unauthorized entrants into the forests are never compensated for wildlife conflicts to deter future unauthorized entries. To avoid being additionally penalized for the confessed unauthorized forest entry, the tiger victim's family does not notify the forest officials regarding the death.

Another major issue in the Sunderbans is the fishing for shrimp-fry and prawn seeds/larvae/hatchling collections. Special fine nets collect these highly remunerative youngsters that grow to the high-priced king prawns. PA fisherman uses drag nets to catch the seedlings and transfer them to the shrimp farms to be raised to adulthood and then sold in the market. The dragnets are harmful to other fish, mollusks, crustaceans, and freshwater fauna and flora that get drawn out during the fishing process and ends as collateral damage. While the forest department and government have permitted shrimp hatcheries in the PA villages near the forests to avoid harvesting from local rivers, the results are non-conforming and detrimental. The massive price difference between the shrimp fry or prawn hatchlings compared to other seafood results in preferential harvesting for the former. Shrimp fry harvesters are often women and children fishing in waist-deep waters. They fall prey to crocodile, shark, and snake attacks, losing their life or limbs in the conflict. Mechanized trawlers involved in the shrimp fry harvesting cover the ocean skyline from dawn to dusk and devastate the marine flora and fauna. Even with available alternatives of creating shrimp farms away from the eco-sensitive Sunderbans, administrative actions are deferred and delayed because of the export revenues created by shrimp and prawn exports. Though crocodile-related human fatalities challenge and occasionally overtake tiger-related human fatalities, it is deemed inconsequential and overlooked. Crocodiles are non-charismatic predators with a limited number of large adults that can partake in human attacks. However, the inactions of the local administration to relocate shrimp farms away from the PA areas and remedy the historical error seems implausible.

A critical issue for the Sunderbans is the relentless influx of migrants encroaching around the forests. Massive human settlements in the highly fragile ecosystem are unsustainable. While the HTCs keep increasing, the already scarce drinking water resources are drying up. Freshwater

mangrove vegetations get decimated by saltwater like the interdependent flora and fauna. Brine seawater backs up in the rivers to change the natural morphological designs of the local ecosystem that erodes the protection from recurrent floods, cyclones, and hurricanes. Remedial actions need to be activated to counter the long-term impacts of human migrations on the sensitive ecosystem, that is currently overlooked.

4.3.6. ***Unethical and Disproportionate Regulatory Behavior***

The PA community holds grievances against the government officials and forest guards regarding the behavioral disparities within the local communities. The residents accuse the forest guards of stratifying them based on the areas of residence and their economic conditions. While the roads and facilities are maintained inside the village and away from the core forests, village officials reiterate the paucity of funds and lack of resources to deny the benefits from percolating to the core area residents. The villagers attribute this type of behavior to the self-endowing attitude of the fund disbursing officials residing in the area, receiving the disproportionate funds. The respondents indicated that while the financially well-off residents and panchayat leaders expect the marginalized villagers to provide ‘shramdaan’ or free labor during natural calamities, they are disinterested and fail to contribute when the residents living next to the core areas are affected by weather or animal predations.

Marginalized residents that live next to the forests complain of disparate behavior observed when forest officials impose heavy fines or penalties for minor offenses. The residents of relatively well-off neighborhoods get a slap on the wrists based on their residency status as neighbors or friends of the forest officials. The shrimp farm and the agricultural landowners, many living in the nearby metropolitan cities (e.g., Kolkata in the Indian Sunderban and Khulna

in Bangladesh Sunderbans) have personal relationships with the forest officials. Their financial prowess allows them to contrive connections to obtain lucrative licenses, government assistance, and premium permits. Ordinary villagers get denied the bare benefits, even those allocated for their improvement.

The Bangladeshi Sunderban PA residents blame the forest guards for conspiracy with the river pirates. The pirates move closer to the core areas to avoid detection. Pirates camp inside the core forests with their kidnapped victims for the night, making them vulnerable to tiger attacks. To protect themselves, the pirates do not hesitate to kill the tigers. They keep the teeth and skin and bury or burn the remaining carcass. They kill and eat ungulates during the entire period of holding the kidnapped victims. Indiscriminate tiger killing by the pirates is a contributing factor in the reduction of tigers in Bangladesh Sunderbans. To alleviate this evil, the Bangladesh government has directed its navy to neutralize the pirates upon discovery. The forest guards allegedly accept bribes for overlooking encroachers in the areas adjacent to the core forest areas. Being separated by dry rivulets, the livestock crosses over to graze in the core forests, thus, presenting itself to the tiger as easy prey. Tiger habits change over time; the lure of an easy meal makes the human habitation areas a hotspot for HTC. The proximity to the core forests allows the tiger to walk out of the forest and kill livestock periodically. Villagers that accidentally stumble into the path of a fleeing tiger pose an immediate threat that results in death or trauma.

Developments of neoliberal conservation ideas highlight political agendas of ecological elitism where the tiger is an emblem of pride for the elite and prioritized for conservation. However, tiger conflicts that result in the loss of human lives must stop. Regional development projects devised by local elites in conjunction with the PA stakeholders that are effective must be enhanced. Identifying forest offenses and mitigating reports of tiger attacks are the cornerstone

markers of success for the elite groups. The villagers and the NGOs complain that the local police do not register accident reports without prior consultations with the forest guards. The low accident numbers enhance the efficiency of the forest officials while proving the effectiveness of the elitist advice (Sen et al., 2019). These elitists work closely with the forest rangers to penalize the victim families that report tiger attacks and casualties.

4.4. Local Area Challenges

4.4.1. *Perceived Risk Due to Core Areas Proximity*

The PA villagers living next to the core PA areas feel isolated since the forest officials do not care about them because of their marginalized status. The villagers are in a state of constant fear of tiger attacks. Even though the residents bear the brunt of the tiger and other wildlife conflicts and resultant sufferings, they continue to stay in the location due to their impoverished status. These villagers also complain that their counterparts living further away from the forests are seldom affected by the tigers/wildlife depredations and thus, have minimal concerns about their ongoing conflicts. Nonetheless, such residents expect that the ones living next to the forests contribute equally to overcome the impacts of floods or hurricanes when it hits their end of the village, as a sign of social collegiality. As one villager living next to the core area complained:

> My neighbor lost a cow and her calf to a tiger on a stormy night. We heard the tiger growls that scared the neighbors. The owner of the cow was a daily wage laborer without a steady income. The cow milk provided additional income. The neighbor did not receive any compensation for the loss of the cow and the calf. None of the area residents or the forest services provided any assistance. However, when the storm continued for four days leaving the village waterlogged, the local panchayat (council) decided that all physically

able residents must provide a free day of manual labor to open the village road. While the road on our side of the village is in a perennial state of disrepair, we had to provide free work for opening the road on the affluent areas. Not surprising, the Sarpanch lives there too.

The feelings of isolation have also created neighborly bonds to alleviate the existential threats. As one resident indicated – neighbors almost always respond to calls for help or frightened screams when straying tigers come to the villages to grab livestock. When a lone person comes across a fleeing tiger, the tiger attacks in self-defense. However, when the neighbors come out in unison, armed with sticks, sound-creating utensils, and their dogs, they are able to scare away the tigers. Their strength in numbers occasionally scares the tiger to run away into the forests, climb up a tree or face the crowd with its back into the river. The forest officials tranquilize the tigers or scare them back to the forest. Such actions impact the tiger psychologically and deter them from straying into the village.

4.4.2. ***Resource Constraints***

The PA communities indicated that they are frustrated with the status-quo and desperately wanted to get out of the 'poverty-rut'. They feel that their entrepreneurial abilities are thwarted since they do not have the startup funds. The rural banks have been provided with public funds, meant for PA residents' loans to start new businesses. However, the red tape involved in obtaining the funds, the high amount of funds required to start an enterprise (not covered by the loan) and the interest charges accruing after the introductory period, all add to make such funds, highly inaccessible. Added to this, they almost always have to bribe the bank officials disbursing the loan. High interest private loans can ordinarily complement the public

loans but require a guarantor or security, unavailable for the marginalized villager. Thus, the villagers cannot access the benefits that are meant for them and continues to simmer in the same situation.

The forest officials complement themselves in providing some kind of financial assistance by way of providing contracts for weaving nylon nets (in the Indian Sunderbans) and the assistance provided for joint patrolling in the Bangladesh Sunderbans; however, the remunerations provided is meagre and inadequate. The lack of adequate schools, effectively close the prospects of higher education for the resident children. While the male members of the PA communities have a sliver of hope, the women are automatically positioned to be housewives or home-aides with the best options of raising chickens and livestock, intermittent fishing, and weaving nylon nets. They also work as domestic help for comparatively well-off residents in the neighborhood. The complete absence of any entrepreneurial opportunities in the PA or its vicinity, adds to the feelings of youth demotivation. In addition, the lack of proper transportation to the nearest cities, forces the residents to be closeted in the villages. The only resemblance of individual businesses are the shrimp farms that are owned by the non-resident investors and managed by the locals as daily laborers. Their operations max out the potential of additional shrimp farms which also need an unsurmountable startup capital.

The local youths look to the challenge of securing forest jobs but the lack of formal education, coerces them to the limited manual labor positions. Many frustrated youths take the leap of faith and move to the cities for manual labor jobs. The unlucky youth, blame their fate and continue to tread on the path of their predecessors, i.e., living off the forest and the rivers. Their frustrations reduce their moral compass leading them to pilfer and poach forest resources, thus, contributing to ecological imbalance.

4.5. Relationships with the Sunderban NGOs

4.5.1. *Interactions with the PA Community*

The PA resident – NGO interactions mostly yield beneficial results and are generally praised. However, some residents continue to feel that the NGOs work to personally benefit by siphoning off monies due to the community from the government. The PA residents acknowledge that the NGOs make them aware of the existing benefits and facilities, assist in clearing government red tape issues, and provide need-based assistance. They also acknowledge that without the NGOs, nobody would have made their voices heard outside their community. The NGO contributions also assist the community in transporting critically sick and injured patients to the hospitals in the neighboring cities and for almost all other kinds of emergencies. The community members receiving the NGO assistance view the NGOs as God-sent. Others harbor mixed feelings, claiming the NGOs work on hidden agendas for the government and themselves and are not transparent in their community dealings.

4.5.2. *Benefits Distribution*

The PA villages of Sunderbans in India and Bangladesh have a handful of NGOs that have the distinction of working to improve the lives of the PA villagers and encouraging them to be more self-reliant. While many NGOs struggle because of a lack of consistent funding, others are flush with cash. Overall, the government of both countries feels that the NGOs have immense contributions to the development of the region. Some PA villagers accuse the NGOs of inconsistencies in their behavior and dealings. The villagers accuse the NGOs of favoritism to serve only the rich and famous for improving their brand visibility. They only deliver services contingent on the media reporting their successes. Some villagers claim that the NGOs develop

contacts with potential donors with their final goals of receiving the donations. They argue that since the funds were to alleviate their problems, the entire funds must be disbursed to them directly. Villagers recollect emergencies like hurricanes (hurricane Aila), droughts, and other situations where the government and other private donors had entrusted the NGOs with aid distribution. Despite adequate aid dispensation, villagers question the distribution methods. Villagers with close contacts and connections with NGO friends seemed to receive more essential supplies in an expedited manner when compared to the other villagers. A village woman recalling the incidence stated:

> My friend living next door works as a home-help for the area NGOs relative. After hurricane Aila, the entire area was underwater. We barely had food for a day or two. When the government and the relief agencies started providing food for the villagers, my neighbor got it two days earlier. As a good friend, she shared the food with us. Her relief bag consisted of lentils and vegetables that we did get. My neighbor informed me that the NGO chief visited the relative's house after the flooding. Fortunately, my neighbor was there, waiting for some food handout since she had no food for her children. On learning that she was the house-help with no food, the chief promised to send some food the next day. Without the contact privileges, she could not have the food for the next three days.

The villagers blamed the NGOs for working on their priorities, which often conflicted with the community welfare. Though the NGOs collect funds for aiding the PA communities, they help themselves first. Their actions can be antagonistic to the interests of the villagers. As one of the PA residents recollected:

> When the bird-flu virus spread, the NGOs went door to door to advise us to destroy our chicken. They promised to compensate us for the destroyed chickens, reasoning that it was a safety issue for my family and the community. They gave us a meager amount, far less than the market value of the chicken. I found out later that while the government had provided the full compensation for the total number of chickens, the NGO only gave us 2/3rd of the costs and retained 1/3rd for their administrative purposes. On arguing that the administrative charges were excessive, the NGO promised to reimburse it back. However, I have not received any monies from her after that. Without the NGO, I would have been compensated for the complete fifteen chickens by the government.

Other villagers point out that the NGOs take their cut before they disburse any funds to the community. They negate the NGO claims of fund scarcity by claiming that the NGOs spend a lot of money when politicians visit the area to seek votes. The NGOs solicit self-promotion publications from visiting media rather than dealing with the community issues.

However, most villagers acknowledge that it was always one or the other NGOs that assisted them during HWC incidences. The NGOs act as conduits between the forest department and the community members by ironing out the red tape issues and ease the compensation process for the community members. Occasionally, the NGOs provide financial assistance to villagers affected by crop predation. They also assist the kin of the injured or deceased HTC victims by paying off their medical bills. The NGOs were very efficient in securing aid during hurricane Aila, managing food and relief distribution as their prerogative that deterred PA residents from criticizing them.

4.6. Cultural Relationships

4.6.1. *Cultural Demographics in the Sunderbans*

The Sunderban PA communities consist of a disproportionate mix of various religious followers with direct and indirect impacts on the Sunderban ecosystem. While the Bangladesh PA communities have a majority of followers of Islam (Bangladesh is a Muslim majority nation), the largest minority community are the followers of Hinduism. The remainder practice multiple religions that include Buddhism, Jainism, tribal culture, and a host of other minority religions. Similarly, the Indian Sunderbans in the secular country has a mix of the majority practitioners of Hinduism followed by the religious minority of Islam. The region also has a mix of other religions that includes Buddhism, Christianity, and tribal followership. With the rich mythological and historical background, the Sunderban culture abounds with religious festivals, myths, beliefs, music, dance, traditional arts, and architecture. However, they have a unique and exclusive practice where Hindus, Muslims, and other religious followers pray together to Goddess Bonbibi for averting tiger threats.

As a folklore Goddess, Bonbibi is an archangel from Medina, summoned by the gods to assist the marginalized populace from the tyranny of Dakshin Rai, the Bengal tiger with a penchant for human flesh. An ascetic with the powers to transmute, Dakshin Rai desired to stop exploitations of the forest by humans. Goddess Bonbibi defeated Dakshin Rai and forced him to refrain from attacking the followers of the goddess. Forest harvesters pay their obeisance to Goddess Bonbibi before entering the forest, based on the religious belief of being spared from tiger attacks. However, they understand that the goddess will not protect those who chose to harvest for profits or seek to destroy the forest.

4.6.2. ***Faith Resolves Issues***

The overlap of the religious beliefs and association with the gods intend for providing respite from tiger attacks. The major goddess of the PA communities is Goddess Bonbibi, the folklore tiger goddess protecting the ordinary forest-going villager from tiger attacks. She is revered alike by all the religious communities in the PA. The PA fishermen, honey collectors, and all forest visitors of various religious beliefs agree that humans must not enter the forest without paying their obeisance to the tiger goddess for their safety. Villagers consider nature as god's cherished creation. Efforts to destroy nature automatically incurs the wrath of the gods. From a conservationist perspective, such ideas motivate the village community to be more tolerant of the wildlife, despite the occasional crop and livestock predation. In some PAs of India, the tiger is a past family member (brother); however, there are no such notions in the Sunderbans. There are religious nuances that the residents follow to avoid divine wrath. It teaches them to be kind to the wildlife and the tiger and desist from killing them when they stray out. The PA community residents acknowledge that the tiger is a wild animal and that they, the humans, have encroached on its land. They believe that the tiger has the right to hunt for its food and the right to live. However, the loss of livestock or physical harm to the marginalized villager overrides the wildlife-tolerant relationship, resulting in vengeful acts that result in the killing of the animal.

Faith also assists the PA resident in participating in activities that benefit the community at large. They agree that the religious group interactions with the forest guards and the NGOs are intimate but within their religious groups. PA community residents of the same faith tend to be closer, assisting each other during their times of need. Despite the marginalization and financial disparity between different resident groups, religion tends to bring many groups together. They

celebrate the religious ceremonies within their religious groups though followers of other religious beliefs also pitch in. Being prone to injury or death by tiger attacks and lacking possible solutions, they seek refuge and solace in their religion and destiny. The major coalescing factor is the vulnerability that arises from predatory carnivore attacks and crop depredation by wildlife. All the groups have one thing in common – their faith in the divine. One villager commented:

> Moving to the Sunderbans was a huge decision. Without any means of livelihood, we are forced to live next to the core forests prone to tiger and other wildlife attacks. We believe in the Almighty to protect us.

Living close to the core forest incurs inherent wildlife conflict challenges to place the highly marginalized group in danger. It is not surprising that they hold different attitudes towards the forests and wildlife compared to the residents living far away from the forest. Residents living on the far end of the village, away from the forest, do not fathom the constant phobia of the tiger. Nevertheless, they occasionally complain of crop depredation by the wildlife. To protect their crops, they feel that the tigers be left alone to control the herbivores. They recommend a non-interference attitude towards wildlife as the best option for both humans and tigers. They blame the encroachments next to the forests for luring the tigers to stray out for livestock. The long-time residents harbor negative attitudes against recent PA migrants, with more pronounced attitudes towards those that had moved across the national border. When asked if the respondent is a long-time resident or a recent migrant, she responded with a scornful sneer:

> Oh no, I'm not a Bangal (the colloquial name for a person from Bangladesh), my grandfather moved here, and we were born and raised here. We cultivate a small piece of

> land, grow rice and vegetables that the deer and pig occasionally destroy. My brother was killed by a tiger when he went into the forest with his friends to make some quick money by harvesting honey. Tigers kill humans that venture into the core forest. However, if you leave the tiger alone, it will never hurt you. There has not been a single incident when a straying tiger has killed any human outside the forest.

Though many residents that have experienced HTC hold vengeful attitudes towards the tigers, some feel that the tiger is a wild animal that must kill to feed and survive. Agreeing that venturing into the forest was not a good idea in the first place, they feel that Goddess Bonbibi must have been displeased for some reason. Questioning themselves regarding their unintended indulgences, the victim's family blames themselves for antagonizing Goddess Bonbibi to be left at the mercy of the tiger. Though HTC fatalities are tragic, religion provides a base to make peace with the tragedy.

4.6.3. ***Religious Diversity for Community Integration***

Though the professional relationship between the PA villagers is superficially collegial, it does not migrate over to religious closeness in the community. While the PA residents assemble to alleviate the existential tiger threats by jointly praying to Goddess Bonbibi irrespective of their beliefs, the religious disparities are unambiguously exposed. There are no inter-religious marriages, and diverse food habits with behavioral nuances remain preserved within the religious groups. Villagers in the PA community are sensitive to the faith, culture, and beliefs of the other co-resident diverse religious groups. They participate in the celebrations of other faith communities, thus, allowing a sense of cohesiveness. On being questioned about the religious

differences, all groups indicated that religious beliefs are personal and must be respected. An elderly community member from an Indian Sunderban Muslim community stated:

> Though we are Muslims, we were once Hindus. Yet, the Hindu community would be hesitant to eat our food since we eat beef that they consider religious sacrilege. We are skeptical about eating their food since they do not eat halal meat. However, we never impose our religious beliefs on others. Whenever we share food, it is always vegetarian dishes.

When asked about inter-religious marriages within their community, a respondent was visibly shocked at the question. She blurted out:

> There are no marriages between Muslims and Hindu families though we are good friends. Muslims do not consider marriage to a non-Muslim as jayez (legal). We cannot get our kin married to a Hindu because they perform the ceremony before a fire. Our Maulavi (Imam) has specifically asked us to refrain from that.

The Hindu respondent was even more rigid. He mused:

> Though the followers of Islam and Hinduism in the Sunderbans originated at the same place historically, their religious beliefs have drastically changed over time. They kill cows, prohibited in our religion. Of course, I have to follow the Hindu religious beliefs. I will be ex-communicated and looked down upon if I let my son or daughter marry a Muslim or if I eat beef, forbidden in my religion. Even the thought of getting my child to marry a Muslim would push me, my future generations, and my forefathers to eternal hell.

The diverse philosophies were apparent when the tribal members, some of whom had adopted Christianity, were asked similar questions. When asked whether they follow the Christian traditions rigorously, a young tribal housewife explained:

> Though we call ourselves Christian, I still must follow the tribal dharma (beliefs). I have grown up practicing my dharma. When my tribe has practiced it for centuries, how can it be bad for us? We continue to conduct all our ceremonies and rituals based on our tribal culture. Some of us have incorporated the Christmas celebrations, but our tribal festivals are still predominant.

The ethnic tribes believe in the plurality of religions. While they consider themselves a part of the mainstream religion, they feel that their intrinsic tribal practices are their identity and must be respected. The Hindus and Muslims have diagonally opposite religious faiths, beliefs, and practices. Muslims and Hindus view wildlife differently through their faith-based lens and have disparate attitudes. However, both the religious followers pray to the same Goddess Bonbibi and follow the same prayer rituals to appease Goddess Bonbibi before embarking on a journey into the forest core areas.

Many orthodox followers of the individual communities, unwilling to accept praying to a goddess of a different faith, describe Goddess Bonbibi differently, alienated her with their specific religious beliefs. While the Hindu population believes that Goddess Bonbibi is an incarnation of the mighty godmother Durga, the Muslim followers of Goddess Bonbibi consider her an archangel of Allah. Historically though, the folklores of the origins of Bonbibi do not attest to the individual religions. Though the practice of diverse religions has overlapped in

world PA communities, such extreme core value accommodations for ameliorating existential threats from tigers are rare.

4.7. Historical Relationships

The Sunderban mangrove forests have a diverse historical background that impacts the conservation and management issues, crucial for understanding the current ecological challenges. Historical records trace the Sunderban population from the early Mauryan empire (321 – 226 B.C.) till the Gupta dynasty (320 - 415 A.D.) (Chowdhury et al., 1994; Farooque, 1997). The older generation respondents, quoting their grandfathers, lament the bygone era of the dense forest areas, the awe and risks of more tigers, and no shortage of ungulates. They acknowledge the lack of anthropogenic pressures that had allowed for peaceful mutual co-existence. Discussions of widely available food from the rivers and forests, less migration of humans to the vicinity of forests, and the idea of sacredness protected the forests and their wildlife. Older residents discussed flashbacks highlighting the forest conservation practices. A senior resident recollected a discussion that he had with his father as a child after he had chopped off a tree, deemed as sacred. With a smile, he recounted:

> During one of our celebrations in autumn, we collect deadwood and light a pyre at sundown. Since our competitors had picked up all the dry wood in the area, I sneaked into the forest to retrieve some wood. Unable to collect sufficient wood, I had to cut an almost dry tree. Identifying the tree as the same one that he had climbed to evade a tiger, my dad reminisced an experience during a honey collection trip to the forest. While extracting a honeycomb from the tree, his friends ran away after spotted a tiger. My dad stayed on the tree while the tiger stood at the bottom of the tree, waiting for him to come

down. Reminding me that the tree saved him from the tiger, my dad told me that trees are sacred and should not be cut. I was so embarrassed for cutting the tree that saved my dad.

Religious beliefs and practices have historically associated different wildlife, including tigers, with multiple gods and goddesses. Killing wildlife for reasons other than consumption was seldom condoned due to the fear of vexing the gods. Animals were treated with empathy and were provided vast latitudes with the argument that these were wild animals on their turf and not intelligent humans. The increased levels of tolerance for the wildlife had resulted in avoiding harm to the animals. Rampant poaching and forest exploitation by outsiders were protested and restricted because of the opposition from the resident populations, who felt it to be a part of their responsibility since it was an extension of their home. Controlled extraction of forest products and farming were practiced and enforced by the village elders to avoid destroying the forests by overexploitation. The maintenance of forest cover was always ensured and constantly maintained. Saplings are planted at regular time intervals to retain the tree numbers and protect the sacred groves. The tribal residents have a designated seasonal ritual of planting trees for forest sustenance. Historically, forests were considered sacred, and destructive activities were prohibited. Village communities support the tiger and wildlife impacted human victims of their village, based on humanitarian concerns; it also created less antagonism towards the predator.

Research indicates that the actual HWC started when the Santhal tribe from the hills of Chota Nagpur in the central regions of India were brought as labor by the colonial rulers for forest clearing and conversion to agricultural land. With their lived background experiences in rural and mostly forested areas, the tribal populations seldom over-extracted the forests, though they cleared selected areas for agriculture. Hunting was actively practiced as a machismo sport

by the colonial rulers and their guests but not for the locals. Memorabilia pictures show the colonists posing with tigers killed during sport hunting. Hunting of the tigers was banned by the colonists only after a steep fall in the tiger population threatened complete eradication of the tigers (Rangarajan, 2001). Bushmeat harvested illegally by the locals was distributed among village residents. Residents still remember the imposition of a complete ban on hunting and harvesting forest products after the zoning of the forest. This action created antagonism amongst the PA villagers, heavily dependent on the forest products and impacting their traditional livelihood practices. The PA elderly residents remember the rampant killing of the tigers by the wealthy, poaching tigers for their skin and teeth by outsiders, and the exacerbations of encroachments by the massive inflow of refugees into the Sunderbans.

Post-independence, the PAs generated little or no incentives for employment. The residents were denied developmental benefits and amenities due to the imposed exclusionary practices. The policy adopted from the colonial era continues in the Sunderbans of India. With the newer migrating residents and the exclusionary policies that detached the PA communities from the forests and their wildlife, the villagers ceased to consider their sacred duty to protect wildlife and the tigers. PA village elders were nostalgic of the days when life was easy, laid back, and enjoyable. They complain of the current population explosion near the forests, the loss of humanity and empathy, the lack of adequate and stringent enforcement that had allowed the tiger killings to continue, thus, bringing the entire tiger population to the brink of extinction.

Discussions with the PA residents highlighted the deep mistrust of the PA villagers by the forest guards and the government officials. This attitude has led to the further alienation of the locals from the forests. The forest guards confirmed that the minimal poaching occurring in the Indian Sunderbans today exists with the connivance of the disgruntled but seasoned villagers that

know their way around the intricate forests. The complete aversion to protecting the forests and their wildlife, especially the tigers, highlights the breakdown of the relationship between the PA community and the forest management. Though Bangladesh Sunderban is open to community participation, the decision-making aspects are strictly limited to the forest guards and the officials. Studies indicate that mitigating human-tiger conflicts cannot be effectuated without active PA community participation.

4.8. Role of the Tiger in the Relationship

Though PA villagers face wildlife conflict challenges from crocodiles, snakes, sharks, tigers, pigs, and other ungulates that cause direct harm to the community and its livelihood, the greatest perceived threat as mentioned by the villagers is the tiger. While the PA residents acknowledge the maximum financial loss of crop depredation are from ungulates and pigs, they tend to be more forgiving when compared to the tigers. They reason the behavioral anomaly to the recoverable nature of the crop losses that cannot be attained with the tigers' human predation. The general fear of the tiger creates an apprehension of harm, often leading to the killing of straying tigers by the villagers. Nevertheless, the PA residents iterate that the tigers are one of the most important animals of the Sunderbans and removing them would cause havoc to the entire ecosystem. Since the tigers are the cohorts of the gods, killing them would displease the gods and invoke divine fury. Folklores indicate that Goddess Bonbibi, the relentless protector of the villagers from the tigers, had a deal with Dakshin Rai, the tiger god, to not kill the tigers as a consideration for not killing humans that enter the forest. Killing the straying tiger will thus, anger Goddess Bonbibi and must be avoided.

4.9. Social Influences of the Tiger

4.9.1. *Tiger Impacts - Ambience of Pervasive Fear*

It is a norm that large carnivores like the tiger are highly valued globally but are treated poorly with low economic standing in their habitation areas. To amend this thinking and reduce HTC, the revenue earned from the tiger and its presence should outweigh the challenges and costs associated with its co-existence with humans. Tigers are the dreaded human predators of the Sunderban. The tiger image and its size are predominant in the minds of the PA residents. The respondents indicated that while the crocodiles can be scared away and snakes avoided, a tiger will always attack if it comes face to face with the humans. The chances of a fatal encounter are more feasible than merely being injured by the tiger. Tigers pose an existential threat. HTCs can result in grievous injuries or death. While crop and food depredation are common in the Sunderbans, the residents argue that money lost can be re-earned but lost human lives cannot be returned.

4.9.2. *Tiger Widows – The Obscured Walking Dead*

Focused on the details of tiger predations and the efforts to mitigate it, lies obscured a group of collateral tiger victims - the tiger widows. They continue to live in the shadows, stigmatized, abused, exploited, discriminated against, unable to even complete the bereavement process and express their grief. It exacerbates the mental health issues and the suicide rates among the tiger widows. The semiliterate, patriarchal Sunderban community inextricably links the identity of the wife to her husband. The unnatural and premature death of the husband due to tiger conflict is often associated with a social stigma, capable of ostracizing the widow and making her an outcast in the family and society. Forest harvesters and the fishermen are the most

vulnerable population of the PA society, exposed to wildlife predations. Paying obeisance to Goddess Bonbibi before the onset of forest entry predicts protections from tiger attacks; nevertheless, when such attacks occur, it is construed to be a sign of divine displeasure, pointing to the flaws in the religious beliefs or the inability to conform to the rituals. Since it is the wife that conducts the prayer rituals to appease Goddess Bonbibi for protecting her husband, tiger conflicts and the resultant injuries/ death are attributed to her imperfections in performing the rituals, thereby angering Goddess Bonbibi. Tiger attacks are thus divine punishments for the blasphemies.

Widows are inherently in a difficult social situation in the Sunderbans; the stigma attached to tiger deaths exacerbates the pernicious position. The demise of the husband is the most tragic occurrence in the life of a wife. The family and social support assist the widow in coping with the extreme emotional feelings associated with mortality. The refusal to allow the grief-mourning-bereavement process starts with the negative societal connotation of denying the cremation rites of the tiger victim and only allowing the burial (culturally inappropriate), usually inside the forest (Chowdhury et al., 2016). The funeral rituals with traditional religious values are necessary for the soul to rest in peace and a peaceful crossover to the life beyond (Cohen, 2013). Denial of the cathartic grief and mourning process augments the guilt, shame, and traumatic fear that negatively impacts the psyche and wellbeing of the widow and the children. While most of the tiger-widows do not get a chance to see the deceased, those that have viewed the body recall it as the most horrific emotional experience of their lives. The severely mauled body covered in blood with missing body parts was occasionally troublesome to recognize and gruesome. It created long-lasting detrimental psychopathic impacts of flashbacks and PTSD-like complications. Others are denied closure with the non-recovery of the victims' bodies.

Add to the feelings of anguish and despair, widows of the victims suppress the manifestations of grief to cover the unauthorized forest entry of the deceased. Tiger widows recount those overt expressions of grief can alert the forest guards to charge the families with penalties for the forest entry transgressions. Many widows continue to dress like married women, even in the face of enduring the divine wrath and sins, since religious practices condemn them to wear only white sarees with no make-up. Tiger widows are not permitted to attend social and family functions like weddings, child-birth celebrations, religious gatherings, etc. Dubbed as 'shami-khego' or one that eats her husband, the community prohibits the tiger-widows from starting a business for livelihood purposes and even shopping at certain stores. Daughters of tiger widows have a hard time getting married because of social stigma. Widows are forbidden from appearing outside during mornings, lest they are seen by other villagers and attract bad omen to those venturing out. Compared to an ordinary widow, tiger-widows are associated with the religio-spiritual stigma of being cursed by Goddess Bonbibi. They are outcasts in their society, labeled, blamed, and consequently discriminated against by the family members, in-laws, and the community (Chowdhury et al., 2016).

Frustrated, widow-participants have indicated that most of them have either tried or contemplated suicide after the death of their husband. The ostracization was historically so intense and pervasive that some tiger widows left their homes and moved to a village that housed many similar tiger widows. This place is called Bidhoba Palli (in Bengali) that translates to the widow-village. However, current findings indicate that the infamous village is not due to the tiger-widows moving there, but the proximity to the forest and the intensity of tiger depredations that have inherently created the number of tiger widows in Bidhoba Palli. Over half of the Sunderban tiger-widows living there suffer from mental illness. Surprisingly, in the rare

instances of a male villager becoming tiger-widowers, he remains unaffected since the community continues to treat him normally, even allowing him to remarry (Chowdhury et al., 2016).

The death of the only breadwinner leaves the family mired in poverty. Devoid of alternatives, the widow leads a menial life as manual labor to raise the children. They are also the prime targets for sexual abuse. As a conservative society, the issue of tiger-widow sexual abuse is very private and confidential. Since it is the able-bodied that travel into the forests and become tiger victims, most tiger widows are young females. Instances of sexual harassment of the widow include abuses by her in-laws, advances by the brothers-in-law, male family members, and other male members of the community (Chowdhury et al., 2016). Sexual abuse and molestations in the community are pervasive though concealed. Young tiger-widows reported as lost were later discovered to be trafficked (Dist. HDR report, South 24 Parganas, 2009). Victims of insults and sexual abuse suffer silently to avoid social humiliation. Children born posthumously are often labeled illegitimate and widows derided as promiscuous. The children are also humiliated by their peers (Chowdhury et al., 2016). Reports of physical and verbal abuse by landlords and money lenders are frequent and include forcible evictions, snatching away livestock and other belongings. Some widows report assaults by their sons and daughters-in-law. One widow reminisced:

> If my husband were alive today, no one would have dared to touch me. With his angry personality, he would have killed them. Now that he is no more, even my son and daughter-in-law beat me. I have no one to protect me.

Though some do get remarried, most widows seldom remarry due to the stigma of being a tiger widow. Lack of education and work skills force the widows to live a life of abject poverty and open vistas for different forms of sexual and physical exploitation, physical, mental abuse, and discrimination. During the interview discussion, one widow confided:

> My husband died in a tiger attack when I was very young. A well-off married fisherman of the village wanted to keep me as his mistress, with the promise to take care of me. Though one of my acquaintances, a tiger-widow, eloped with a married person, I did not agree to the proposition since it was humiliating and socially forbidden.

Social organizations and NGOs have created support groups for tiger widows to prevent exploitation and ensure that they become self-sufficient.

4.9.3 ***The Tiger as a Blessing***

Tiger researchers have concluded that the Sunderban tigers are the most feisty and aggressive animal, with a penchant for targeting humans as prey. However, the historical evidence of being a ruthless human killer has earned it the respect and fear of the Sunderban residents. The tiger is the only hurdle for humans, advancing into the Sunderban forests for extracting land and natural resources. PA communities that have historically and currently resided in the Sunderbans understand the importance of tigers and other wildlife to maintain the forests. A PA resident questioned about the efficacy of protecting a tiger from being killed, mused:

> The day that humans exterminate all the Sunderban tigers will be the last day for the existence of the forest. The forest will be cleared for agricultural purposes and taken over

> by the encroachers, the wildlife killed and consumed as bush meat, and there will be no fish or crabs left in the rivers and no honey or wax to collect. As long as the tigers live, the forests and the villagers will survive.

Their tendencies of protecting the tiger and wildlife, in general, can be observed in the actions of the historic PA villagers to embed religious affiliation with the animals. Killing the animal would invite the wrath of the associated gods. It is this apprehension that ultimately saves tigers and other wildlife from being hunted indiscriminately. The tiger and the lion, being adopted as the cohorts (vahana) for Goddess Durga, the holy matriarch considered to be invincible and unassailable, and one of the most powerful of gods in the Hindu religion, provide a little leeway for protecting them by a section of the PA villagers. While some contend this to be a mere coincidence, it is arguable that the traditional conservation efforts have intently associated most of the gods and goddesses with wildlife to protect them.

Though most of the village residents are illiterate, they have a deep religious faith in the gods and avoid killing the associated wildlife. Wildlife associations with various gods and goddesses of India include the patriarch God Shiva with bull and snake, Lord Ganesh with the mouse, Goddess Lakshmi with the owl and peacock, Goddess Saraswati and the swan, and Lord Kartik with the peacock as their cohorts (vahana). The other human incarnate, Lord Krishna, has the cow while Lord Rama has the monkey god Hanuman as his follower. It is thus reasonable to assume that the intent of associating a wild animal with the gods was to protect the animal and prevent its killing, based on the fear that it will displease the gods. Most of the PA residents state that the tiger is an unextractable part of their social identity. As one resident impacted by the tiger attack said:

> The presence of the Sundarban tigers ensures that the forest is too dangerous to enter casually. As PA residents, we rely on the forests for survival. Though the tiger attacks us when we enter the forest, people will destroy the forests if there are no tigers.

In the Sunderban forests, as the top predator, the tiger is revered. While other wildlife is considered necessary, it always assumes a subordinate position to the tiger. As a keystone species, removing the tiger from the Sunderbans would cause the populations of the lower order carnivores and the herbivores to explode, thus, causing havoc on the entire ecosystem. The tiger protects the forest by restricting human and livestock entries to extract forest products and encroach. Removing the tiger, a higher-order predator from the Sunderban forests, will destroy the ecological balance and allow the uncontrolled herbivore proliferation to overgraze and destroy the fragile mangrove vegetation. It will also result in the lower-order carnivores decimating certain species. Tigers stop the crocodiles from migrating inland that can cause mayhem to the ecosystem. The tigers assist in maintaining the sustainable production of honey, wax, fish, and other agricultural produce by controlling the agriculture and crop predators. Though the tiger is a danger to humans, it is a blessing in disguise to maintain the PA ecological balance. The PA villagers agree that the tiger never strays out of the core forest to target humans. A respondent villager who was attacked and almost killed by a tiger related the story:

> It was about 2:00 AM when I came out of my hut to relieve myself. I could hear the restlessness of the cows and the bleating of the goats. Though I did not initially see the tiger, I could smell its fetid odor. I heard a rustle and suddenly saw the tiger about 100 feet away. It was moving towards the cowshed as if it was stalking prey. In a panic, I screamed to scare it away, but it turned and attacked me. My scream must have

threatened the tiger. Tigers do not attack humans outside the forests unless cornered but will attack you inside the core forests.

Many community members feel that the tiger is doing what they expect from a wild animal. They think that humans have the understandings to protect themselves rather than killing a majestic beast that indirectly helps them. However, many PA residents feel otherwise. They question the benefits of the tiger to the community, indicating that they lose livestock, get injured, or worse, killed by the tiger in their efforts to earn a livelihood.

4.9.4. ***The Tiger as a Curse***

PA villagers tend to be more forgiving towards the herbivore depredators when compared to the tigers due to the perception of an existential threat. They argue that the lost agricultural produce has a value and can be regrown but lost human lives cannot be quantified. Mortified at the thought of tiger attacks, PA villagers always pay obeisance to the tiger goddess, Bonbibi before entering the forests. While some PA villagers argue for tiger conservation and sustenance, others complain that the ardent tiger protection policies have destroyed their simple ways of life. Arguing against the residents that advocate forgiving the tiger for the human predations, some tiger-victim families accuse them of not experiencing the pain and trauma of losing a loved one to the tiger. They cannot comprehend the idea of ever forgetting that the tiger had killed their loved one. The human predation in the Sunderbans by the Royal Bengal Tiger had earned it the dubious distinction of a natural man-eater.

The earliest Portuguese Jesuit merchants, traveling through the Bengal regions of India around 1598 – 1599, had vividly documented manuscripts that indicate the tigers of Gangetic-Bengal are inherently fond of human flesh. They threaten all the humans in the area (Mallick,

2014). Their accounts insinuate that the tigers are vermin to be exterminated. A tiger widow challenged the instrumental value of the tiger, complained:

> Tigers harm us and disrupt our lives. I remember that we used to go to the forests in the mid-morning, collect berries, deadwood, and some wild but edible vegetables. Add some fish, and we have a sumptuous lunch. Today deer, boars, and monkeys come out of the forests to eat and destroy the vegetables grown in our backyards. That is the food that we cultivate. Since we have to again buy the same vegetable from the market, we constantly lose money and do not get reimbursed. The animals destroy our crops periodically, so it seems that the tiger does not predate on them. Instead, the tigers take away our livestock and even killed my husband. The forest guards and the government officials zealously protect the tiger, claiming that it preserves the environment and our future. I have never seen or felt that way but have seen the destructive actions of the tiger and the wildlife.

Economic marginalization of the Sunderban community predicates tiger values on its abilities to control the wildlife, particularly the crop predators (instrumental value). Since hunting the crop predating herbivores is also prohibited, villagers are dependent on the tigers' abilities to keep the former populations in check. Occasionally, some villagers are willing to sacrifice their livestock or acknowledge their exposures to the heightened tiger risks in exchange for a reduction in crop predation, thus increasing the instrumental value for the tiger. The populace with no crops to protect do not assign any instrumental value to the tiger; additionally, they question the intrinsic value of the tiger since it only depredates their livestock.

Some local folks quote the historical folklores that have depicted the tiger as the incarnation of evil. Goddess Bonbibi and her brother Shah Jongli had to come from Medina to

save the humans from the evil tiger. They were the chosen ones to defeat the demon tiger king Dakshin Rai and subjugate him to allow human survival. The tiger is a predator of humans and livestock – it also kills almost everything alive and moving. Some Sunderban villagers believe that the tiger comes out of the forests into the villages to kill humans. Tigers are presumed to possess superhuman skills, often associated with the devil. One villager who claimed to have hunted multiple tigers in his youth spoke about its prowess, comparing it to the strength and powers of the evil. He pointed out to the yellow eyes that glare in the dark, the dead transfixing stare, the pinpointed iris, the blood-curling growl and roar, the emanating fetid odor of death and the ability to appear out of nowhere, as all the traits of the devil. The southeast Asian countries crave tiger body parts that emanate from the belief that superhuman powers can be obtained by eating the specific tiger body parts associated with the prowess. A survivor of a tiger attack recounted his surreal experiences to depict the hunting prowess of the tiger:

> The tiger appeared out of nowhere before attacking. I could not see it hiding in the shrubs till the time it just sprang out.

A villager who had lost his friend to a tiger attack described the incident in great details, highlighting the plausible evil powers:

> My Gunin had asked me to avoid staring at the tiger. Once you look into the eyes of a tiger, there is something magnetic about it. It transfixes you to the spot and disables you. You cannot run away when the tiger is standing in front of you. It is the stare of Yamaraj - the messenger of death.

A honey collector describing the tiger attack on his friend wincingly stated:

> We were busy packing up the honeycombs after harvesting them. Suddenly I could smell a fetid odor – the smell of rotting flesh. I tried but could not see or hear anything. Even the birds had stopped chirping. Suddenly I heard a roar. My heart froze. With a rustle and growl, the tiger was already on my friend, holding the neck in his mouth. One of my friends screamed to wake me up from the stupor. All of us rushed towards the tiger at the same time. It was as if we were staring into the eyes of pure evil.

The colonial government had justified their sport of tiger killings, claiming it as a mitigation of evil. However, the Sunderban populations have never unanimously agreed the tiger to be evil, which has historically allowed the tigers to co-exist with the human population.

4.9.5 ***Perceptions of Tiger Phobia***

Tigers command fear and respect amongst the humans and wildlife in the Sunderbans. The tiger is revered and is considered necessary for forest survival. Nevertheless, the PA community has historically harbored an intrinsic yet, justified fear of the tiger. Areas with higher incidents of Human Tiger Conflict (HTC) in the proximity of the core areas are associated with higher tiger risks and hence, experience a greater fear of the tiger. Research has indicated that the community perception of risk did not depend solely on dominant land use or the frequency of observed kills near the PA villages. The Sunderban core forest experiences the highest tiger attacks on humans. The PA residents associate the core forest or other dense areas with higher tiger risks. While it is necessary to fear and respect the tiger, harboring tiger-phobia is detrimental to the tigers and the forest ecosystem.

Threat behaviors that emanate from tiger phobias can be changed if the factors causing them are recognized, understood in detail, and effectively targeted for actions by conservationists and environmentalists. Since tiger phobia results in the killing of straying tigers, PA residents must participate in the discussions to understand the threat behaviors to try and rationalize the fears. Like other PAs of the world, the park management can incentivize the livestock owners to adjust the livestock protection strategies and implement adequate adaptive response like building a stronger livestock pen to prevent access by the tiger.

The marginalized residents living next to the core areas with limited funds have either one or two livestock and are disinclined to invest further in any adaptive livestock depredation mitigation strategy. Creating a tiger-proof livestock corral is feasible when the resident owns multiple livestock or when different livestock shares the corral. Residents living further away from the core forests are not confronted with such issues since the occurrences of HTC are remote as they go deeper into the village.

Bio-conservation research has confirmed that reducing the tiger range due to anthropogenic forest reclamation reduces the ungulate numbers by reduced breeding due to natural hormonal controls triggered by the perceived dangers of predatory attacks. The increasing tiger population in the ever-shrinking PA areas coerces the tiger to stray outside the forest for food or merely being pushed out by a territorial tiger. While crop depredation can be limited and occasionally reimbursed by governmental and NGO contributions, the human-tiger conflict with livestock and human depredations takes it to a different level. The livestock losses due to the HTC is always a huge loss for the PA residents. Human conflicts with the tiger almost always result in injury or death to the humans or the tiger. Evaluating the costs of human life is always complicated due to the emotional elements. PA residents claim that though other

herbivores and some carnivores cause huge losses by way of depredation, losses due to the tiger are more visible and impactful for every incident. Thus, the residents are always fearful of the tiger attacks though such attacks do not occur widely.

Retributive tiger killings do not necessarily kill the specific individual causing the harm. Killing a single tiger has widespread impacts on the nearly extinct species, holistically. PA villagers understand that herbivores are necessary for wildlife sustenance. Hunting wildlife for retribution or bushmeat is illegal in the Sunderban. They also realize that herbivores sustain the tiger, and its shortages can force the tiger to stray into the villages more often. A villager whose son was attacked and killed by the tiger stated angrily:

> We are poor folks living next to the forest. Tigers periodically stray out and kill our livestock. We cannot continue to afford the loss. When my son was killed by a tiger while collecting honey, the forest office refused to compensate us for his death. I was angry at their decision, but they told me to calm down. I am tired of the tigers. Though the forest guards are not aware, I and some villagers have killed a tiger that had strayed and was trying to kill my cow. I do not care if the forest guards tell me not to do it because they never assist me by providing compensation for my livestock.

Most of the PA residents are religious and strongly opine that killing the tiger will displease the gods. Though the killing of the tiger angers Goddess Bonbibi the need for retribution and to mitigate the risk of a possible future attack takes precedence. The thoughts of the PA residents change immediately in the aftermath of livestock depredation or a human attack that results in injury or death. It suddenly feels that the phobia of the tiger takes precedence, and most of the

residents suddenly band together and kill the straying tiger, even if it is not the culprit individual. One of the respondents who had admitted to the killing of a tiger angrily stated:

> The tiger had killed a cow and injured my neighbor. It has returned to kill a villager because it has now enjoyed the taste of human blood. Even if it is not the same tiger, there is a strong possibility that this tiger will at least kill another livestock. Preemptively killing it removes the long-term risk.

This research has concluded that although tigers have historically co-existed with humans in other parts of India and the world, the Sunderban tigers are inherently not used to the human presence in the core areas because of their geographical inaccessibility. Such anthropogenic stressors cause the tiger to be more aggressive when faced with humans. The aggressiveness of the tiger is often erroneously construed as the specific intent of the tiger to attack humans. Tigers target humans as prey only when the latter enters the core forests, which are the hunting ranges of the highly territorial tiger. Outside the core forests, straying tigers are not in their natural environment. The hungry tigers, enticed by the seemingly slow-moving livestock, grabs the animal, and pull it back into the safety of the forests. However, chance encounters with the villagers cause the tiger to feel threatened in the unfamiliar territory. The tigers attack to defend themselves. Coming face-to-face with an aggressive tiger stirs the existential fear in the humans and results in the killing of the straying tiger.

To mitigate tiger threats, the villagers seek the divine intervention of the tiger Goddess Bonbibi. Their faith is blind and so deeply entrenched that the marginalized villagers spend a lot of money to ensure that Goddess Bonbibi is happy. The villagers talk endlessly about the efficiency of her bountiful blessings as narrated in the folklores.

One of the respondents seemingly bemused, recounted an anecdote:

> A honey collector and his colleagues were trying to take out a beehive full of honey when they heard a rustle. Suddenly they were facing the tiger. The tiger looked at them for a minute, growled, and walked away. The non-aggressive attitude of the tiger was because the honey collector had paid obeisance to Goddess Bonbibi before entering the forest. The Goddess had sealed the mouth of the tiger, so it retreated like a pet cat and could not do any harm.

In the instance where a tiger attack kills or injures a villager who had prayed to the Goddess Bonbibi before entering the forest, the tiger attack symbolizes the ire of Goddess Bonbibi due to the inadequacies in performing the prayer rituals. However, as a general observation, the prayer rituals are never overlooked before entering the forest. As a Boulay - a traditional expert with supernatural powers to stop the tiger from entering their enchanted territory, stated:

> Forest is our second mother, who provides us food, fish, and firewood. The forest is sacred and respectable and always cares for us, it is by the grace of Goddess Bonbibi that 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.

Even though the tiger attacks on humans have subsided due to the various preventative steps, news of a PA villager harmed by a tiger tends to draw media attention in the neighboring areas. Although the incident may be sparse, its broadcast adds to the negative opinions and the fear of the tiger, often harbored by the PA community for a long time.

4.9.6. *Different Views of the Tiger*

The constant visits of the forest officials, NGOs, and social scientists to lure the villagers towards conservation and sustainability have resulted in the villagers repeating similar language used by the officials. The villagers mimic the official narratives indicating that the mangrove forests are necessary for the fish, crabs, and other marine products. The forests provide nectar and pollen to the honeybees to make honeycombs which is a huge revenue source for the residents. Villagers understand that the extermination of the tigers will lead to the destruction of the forest and place their livelihoods in jeopardy. However, some young villagers believe that clearing the forest is essential for ushering in modern technology. They blame the policymakers for the PA village development oversights with the excuse that it will not be conducive for nearby wildlife habitation. Villagers feel that the forest needs to be removed for the area to develop like the neighboring cities. The suggestion that they could move to the cities, if they chose to, for the associated benefits, immediately elicited the response that they can never afford to live in the city due to the sky-high prices. They feel that speaking their minds to the forest officials is seldom done due to the fear of retribution.

4.10. Cultural Influences of the Tiger

4.10.1. *Tiger as an Emblem of Pride*

The Sunderban forests of India and Bangladesh have always manifested themselves as the symbol of the ecological elite. The forest is an emblem of pride for the Bengali population that needs protection at all costs. The tiger image is synonymous with strength, raw courage, and graciousness to justify its name as the Royal Bengal tiger of Bengal. The Bengalis are proud people, and the cavalier image of the tiger is something in which they want to be affiliated.

Stories of the superior strength of the tigers over lions and other wild animals abound and are well-documented when the kings had organized fights between tigers and lions. Like the Bengali community, multiple world communities associate themselves with the tiger image to depict power and pride.

It is no wonder that the tiger holds a place of eminence, featured in most socio-cultural activities occurring in the Sunderbans. The tiger identity is sought after by the theaters, festivals, schools, and businesses, all vying for the tiger brand that symbolizes formidable strength, agility, grace, and a fearless daunting image that aligns with the tiger. West Bengal as a state and Bangladesh as a country have an intensely deep and proud affiliation with the tiger due to the Sunderban forests and its tigers within the state territory. Names of famous personalities, the national animal of India and Bangladesh, the logo for the West Bengal ministry of transportation, Bangladesh cricket board, tourist souvenirs all incorporate the tiger image and name, indicating the pride in the associations. As far away as the USA, the Bengal tiger is used to name a professional American football franchise based in Cincinnati – the Cincinnati Bengals that highlights the pride in adopting the Royal Bengal Tiger name. The team still retains the tiger stripes and color as their team colors, the mascot as the Bengal tiger, and their fight song as the Bengals Growl. Multiple sports teams and organizations in the US continue to use the Bengal tiger name to identify their abilities with the tigers.

Tigers are also predominant in religious and cultural roles. The tiger is the central figure and identity of the Sunderbans. Certain areas of the Sunderbans celebrate Tiger Day when all kinds of cultural activities revolve around the tiger. Though the tiger benefits are featured, the religious functions celebrating Goddess Bonbibi continue to portray the tiger as evil, and divine assistance is sought from Goddess Bonbibi to protect the PA community from the tiger atrocities.

4.10.2. ***Relationships of Respect and Forgiveness***

The historical Sunderban populace considers tigers to have multiple relationships with the PA community for protecting the forests and the tigers. Tigers are deemed to protect the forests by keeping the herbivore populations in check and by scaring away human harvesters that would have destroyed the forests by overharvesting. However, the mere categorizations of tigers as forest-protectors were insufficient to stop the human killings of tigers. Tigers are associated with the gods; killing them is a taboo that invites divine fury. Tigers are portrayed as compassionate animals, equating them with motherly love and a protector of the family to evoke empathetic responses among the residents.

Some communities consider tigers to be family members like brothers and condone their predation by justifying their actions as survival mechanisms of a wild animal. Tigers that were observed depredating livestock and occasionally injuring humans were let go by the tolerant community. Historical tiger ranges were large with sufficient ungulates and less anthropogenic pressures, so the HTCs were less intense. Tiger straying in the Sunderbans is well-documented in the past yet, the instances of HTC were minimal. The marginal PA residents did not have any livestock since they could not afford it. Since food incentives outside the forests were absent, the temptations for tiger straying were minimized. The presence of adequate ungulates also contributed to the reduced straying when compared to modern times. It could also be true that the HTC was not actively recorded or broadcasted by the media thus, did not create the present-day hype.

Like most wildlife, tigers are scared of high noise volumes. Traditional methods to ward off tigers use drums and cymbals to produce high-volume sounds. However, such high-intensity sound can also disturb tiger habitats within the forests. Folklores abound regarding the human-

tiger relationship of mutual understanding and respect. The history of Sunderban indicates that if tigers get to eat ungulates, they do not kill humans. Transgressing the limits into the human arena would mean death. Folklores suggest that both humans and tigers had respected their boundaries. The mutual fear between tigers and humans was essential to peaceful co-existence.

4.11. Historical Influences of the Tiger

4.11.1. *Religious History of the Tiger*

Sunderban history points to the religious relationships that existed between the community residents and tigers to mitigate HTC. The village ancestors had reckoned the need for tigers to balance the herbivores and sustain the forests. However, justifying human predations necessitated stronger reasonings to offset human reprisals, like conferring religious protections to the tiger. Tiger killings were fraught with risks, given the highly aggressive and intelligent nature of the beast. The ancestors knew that normalizing the practice of tiger killings will incorporate an additional layer of risk by increasing human fatalities. Forest visitors, however, had different challenges. Sunderban tigers have always viewed humans as prey within the core forests since it is their hunting zone. Most of the HTC occurs in the core forests, and humans barely stand a chance in the conflict. Faith in the superior powers like Goddess Bonbibi is thus, essential for the survival of the humans and tigers.

Humans have always devised ways to make life comfortable for themselves. Since early days, the forest traveler used to pray to Goddess Bonbibi before embarking on their journey. Historical documents indicate that Hindu travelers claimed psychic interconnectedness with the forest established over centuries of human habitation in the area. Sunderban fisherman and forest harvesters reveal that while growing up, they had seen their elders pray to Goddess Bonbibi

before embarking on their forest or fishing journey. Followers of Islam and Cheunpagdee (a hill tribe) have similar cultural beliefs and psychic dependence on Goddess Bonbibi to avoid and protect them from tiger attacks. The folklores indicate that her arrival from Medina makes her a Muslim. Hindus feel that she is the reincarnation of goddess Durga, the destroyer of all evil, to keep the evil Dakshin Ray, the tiger king, in check. The words Durga in Bonodurga and the word Bibi in Bonbibi indicate the religious connotations of the Sunderban community. The Hindu and Muslim PA communities consider Goddess Bonbibi as the unifying forest goddess. Villagers trust her abilities to unconditionally safeguard devotees that pay obeisance to her before entering the forests. Offering joint prayers to Ma Byaghro (synonym for Goddess Bonbibi) and Raja Dakshin Rai before the forest entry indicates the inclinations of the villagers to avoid conflicts at all costs.

The PA community is a religious group with some forest-goers disinclined to utter the word bagh (tiger), lest it offends Dakshin Rai. They refer to the tiger as Boro-Mian or big uncle in Muslim, Boro-Babu or big mister in the Bengali language, and Boro-Thakur or the big lord in other languages and religions. The Hindu and Muslim PA residents have changed the basic religious tenets due to their existential threats. While the Hindus have accepted a Muslim goddess for prayers, the Muslim residents have started to pray to Bonbibi, an idol that Islam strictly prohibits worshipping. Both communities seek the divine blessings of Goddess Bonbibi before embarking on forest trips. Though the changes seem to be minuscule in a small area of India and Bangladesh, the actions strikingly deviate from the practices motivated by the existential tiger threats.

The fear of angering Goddess Bonbibi is so pervasive that forest visitors refuse to wear the masks on the rear of their head (depicting a human face to trick the tiger and deter attacks

from behind). The face mask is provided free of cost by the forest department, yet it lacks demand. Wearing the mask to confuse the tiger and mitigating attacks also indicates the lack of faith in the protective abilities of the Goddess Bonbibi. The history of Bonbibi has changed with time. While the actual forest visitors still do not question their faith in the goddess, the politically affiliated newer generation seems to have introduced the quotient of religious efficacy back into the human-wildlife equation.

4.11.2. ***Changes in Tiger Perspective***

The perceptions of the tiger have considerably changed over time. No longer is the tiger revered as a vehicle of gods or treated as a family member; villagers treat the tiger as a mere commodity with skin, body parts, and bones, all with the potential to be traded for immediate short-term gains. A tiger carcass that used to be buried before with inherent faith and reverence is desecrated today for its skin and body parts, viewed as a mere depredatory carnivore. The outlook regarding the tiger has changed drastically - statements that a dead tiger is worth more than a live tiger, hails true today.

Shahbuddin (2019) indicates that though the tiger is the emblem of pride in Bengal, the idea has always been to use this status for mitigating HTC and reducing the community distress due to human fatalities. However, the anguish of certain families of the victims did not have the intended impact of treating the tiger as a symbol of pride. The death is an attack by a wild animal that does not provide any benefits to the community. This fall in social status meant that tigers were dispensable, and villagers must kill them to ensure safety. This attitude change is responsible for the near extermination of tigers.

Factors Influencing Social, Cultural, and Historical Relationships

4.12. Social Factors

4.12.1. *Impacts of Migration and Colonial Practices*

The Sunderban PA population has historically co-existed with the tigers, living next to the forests with minimal impacts on the individual populations. There are differences between the fringe communities of global PAs and those of the Sunderbans. The populace of Sunderban fringe villages were manual laborers brought by the colonists from other tribal Indian belts for clearing up the forests. They cleared the forest and used the fertile land for growing crops. The majority of the Sunderban population was thus, intrinsically transient. Later, these working laborers decided to settle down in the periphery of the forests. Residents indicate the current migration occurs from Bangladesh or other parts of India, often from the tribal belts, essentially for economic purposes. Surprisingly, migration from India to the Bangladesh Sunderbans rarely occurs, possibly due to the livelihood potentials and economy of the country. The heavy migration has led to massive encroachments in the PAs, right next to the core forested areas.

Historical documents indicate that the advent of the colonial era changed the entire landscape. The colonial rulers discovered the sport of hunting big game and extravagantly indulged in it. They hunted large carnivorous and herbivorous species that are protected traditionally by supernatural myths and legends. Older residents indicate that they have observed huge buffalo-heads and tiger skin displays in the British wilderness lodges during their childhood. This display created the ambiance of the forests and the prowess of the hunters. Today the wild buffalo is extinct in the Sunderbans.

The notions of sacredness disappeared amongst the local populace since the wrath of the supernatural did not affect the wildlife hunting colonial rulers. The colonial rulers regarded hunting to be their right and even invited friends from different countries to participate. When they realized that they had decimated the large carnivores and other wildlife populations, it was already too late. Their policy of allowing and condoning sport hunting encouraged the locals to hunt, though they were never allowed the exclusive privilege of hunting. Frustrated, they resorted to the poaching of the wild animals. It was also their only way to get even with their colonizers that disparaged their land and the wildlife and coerced them to change their ancestral livelihood patterns.

Blaming the wildlife depredation on the local indigenous populations, the colonists introduced strict exclusionary policies for the local villagers while continuing their sport-hunting covertly. They touted the idea that the indigenous population was ignorant of the sustainability practices and must follow western scientific methods thus, encouraging exclusionary practices. Access to the forests for traditional harvesting was banned, further to the eco-imperialistic exclusionary practices of the colonial era. Though sport hunting was allowed for the colonizers, subsistence hunting and forest foraging for the locals were forbidden. As soon as sustenance hunting was banned, unauthorized hunting activities for bushmeat collection surfaced. Lack of access to the forest meant that the villagers could not collect forest products. Since most of the wildlife habitats were in undeveloped, colonized countries, the exclusionist policies were incorporated there in the beginning. The emulation of the colonial practices in the Sunderban forest continues today. The communities that had traditionally enjoyed forest rights harbor feelings of disempowerment and disenfranchisement today.

4.12.2. ***Government Policy Changes to Include Communities***

Tiger conservations mandate anthropogenic behavior modifications that affect the carnivore populations like poaching, ungulate depletion, range reduction, etc. The conservationists and environmental interventionists identify, comprehend, and efficiently target such behaviors. To alter the PA community behavior and motivate them to consider the forest as their own, the Bangladesh Sunderban practices Community-Based Natural Resource Management (CBNRM), inviting the local villagers to participate in certain selected activities with the forest guards. The villagers with the forest guards form action committees that consist of volunteers who patrol the forests with the guards on selected days of the week and discuss existing issues to formalize pragmatic solutions. Assuming responsibility for the forest protection, the youth volunteers also act as eyes and ears for the forest guards. Evidence of poaching and illegal activities get reported to the forest guards that indict and prosecute the involved perpetrators. The information provided is often critical and leads to enhanced enforcement. A Bangladesh Sunderban forest supervisor highlighting the importance, explained:

> We had heard reports of illegal logging by a select group of operators. Since the loggers are aware of our patrolling schedules, we hardly see any illegal activities during our routine patrols. We occasionally confiscate timber in the process of being transported from the forests. A volunteer from an action committee called me one day to report an ongoing illegal tree felling. We rushed to the spot and discovered that not only was the group illegally logging, but they had also accosted a tiger the night before that they shot and killed. We impounded the tiger skin, bones, and body parts that they had selectively harvested, carefully packaged, and stored in their vehicles. Such seizures would not have

been possible without the constant alertness and observations by the volunteers that live next to the forests.

However, several villagers allege that some guards are working together secretly with the poachers/ harvesters in selected cases due to their participation in commercial bribery. Those villagers, not a part of the voluntary action groups, complaint that nepotism and favoritism play a role in the action group selections. They also claim that the forest guards demand bribes for regular functions like compensation claims, issuing permits, etc.

4.12.3. ***Altered Priorities: Economic Returns vs. Conservation***

While the country of Bangladesh works towards closing the food chain gaps, it continues to build polluting industries in the heart of the highly fragile ecosystem of the Sunderbans (Abdullah, 2014). Due to the lack of enforcement, poaching continues in Bangladesh. It is also the same reason that the rivers next to the core areas remain pirate infested. The river pirates kidnap the fishermen and hold them inside the forests, awaiting ransom delivery. Survival inside the core forests depends on using bush meat and killing the tigers for threat mitigation. The tiger carcass is buried or burnt after harvesting specific body parts.

Pirates are also known to have links to international groups interested in purchasing tiger body parts. The respondents indicated that they had never witnessed a river pirate killed by the forest guards in their area. They state this to highlight the bribery, conspiracy, and collusion of the forest guards with the river pirates. During their routine patrols, the Bangladesh Navy confront the river pirates. With their superior firepower and training, the Navy kills the pirates to free the ransom hostages. The residents reiterate their faith in the Bangladesh Navy for eliminating the river pirates and understand the inabilities of the Navy to provide constant

patrols. They also assert that the piracy issue will continue since the motivation of earning extra income by way of bribes from the pirates is too good to be relinquished by the forest guards. As a responded griped:

> The forest guards claim that they are always constrained for funds since they receive a meager salary. Then why did they join the services with such a low pay scale? They can still quit their job. The guards believe that the bribes will compensate for the salary deficits. Once they are on the payroll of the pirates, they can never quit since the pirate groups will kill them. However, continuing support to the pirates will ensure improved financial conditions while leading a happy life.

India has stringent enforcement with a zero-tolerance policy. While poaching occurs, it is few and far between. India continues to use exclusionary policies for PA residents. Enforcement of the exclusionary policy and the attitude of the forest guards has alienated the PA community. The exclusionary policies have squandered the traditional conflict mitigation knowledge and historical forest management techniques. However, there is a governmental desire to protect the tiger population, even though only 40% of the Sunderban forests are within India (Jhala et al., 2018; Vyas, 2012). Recent data quoted by the Indian government indicates a steep rise in the tiger population of the Indian Sunderban. However, such data are not conclusive as they lack proper scientific estimation techniques (Jhala et al. 2018).

4.12.4. ***Tiger Adaptations to Human Behavior***

The colonizers had brought the historical PA residents to the Sunderban as laborers from different parts of the country to clear the forests. The tribal laborers were marginalized and

seized the opportunity to reside in the PA areas with the residual benefits even though it entailed relocating next to a forest with dangerous predatory wildlife. The impoverished labor, totally dependent on the forest for survival, could not afford livestock. The lack of a quick livestock meal in the PA villages eliminated the motivations of the tiger to stray. Reduced straying reduces livestock depredation in the PA villages. The colonizers had to go deep inside the dense forests to hunt tigers and fell prey to the tiger in the process. While humans have evolved with time, tigers have also followed suit. Tigers are intelligent and resilient predators that have evolved with the changing world. Following the grazing cattle out of the forests, tigers have learned that a quick livestock meal was available only if they could stray out into human habitation. As an opportunistic hunter relying on the element of surprise rather than speed, tigers stalk humans and interpret their slow running and swimming as a weakness.

Fishing on the country boats next to the core forest exposes the fishermen to tiger attacks. With the ability to modulate opportunistic survival behavior (further to the psychological 'Theory on Mind' attributes), tigers have realized the human reactions when attacked. Tigers ambush humans from the rear to avoid resistance and resultant injuries. The neck is the most vulnerable part of the body and the tigers' favorite area of attack. A strong bite on the neck by the tiger is the best way to paralyze the prey and mitigate the chances of getting injured. Though initially apprehensive, tigers ignore the confusion created by humans wearing face masks on the back of the head or using metal headgears to protect the neck from tiger bites. They have also learned that humans in the core forests are rarely armed and thus are fair game. Outside the core forest, humans are in large numbers with weapons, thus must not be confronted.

PA residents have closely observed tiger behaviors over the years to understand the astounding intelligence of the animal and its adaptability to new situations. Tigers have

effectively emerged as the most efficient human killing machine in the Sunderban forests. Efforts to revert the time-based behavioral changes in the tiger have been futile. The tiger is an intelligent and adaptable animal and tends to improvise its actions based on its experiences. Ideally, tigers are uncomfortable hunting humans because of the suspense and fear of the unknown and the potential of retaliation. Yet, as opportunist predators willing to take risks, tigers will also not let an easy human kill pass them.

The number of HTC in modern times has exploded (Vyas, 2012). Relationships of respect and forgiveness, historically practiced by the community, were replaced by retribution and vindictiveness. The advent of the transient and migrating populations into the Sunderbans without exposure to the depredatory side of the tigers lacked the religious and social coercions traditionally intended to protect the tiger. Persistent efforts that seek commercial benefits inside the forests, even at the expense of the endangered tigers, are gaining prevalence. Forest boundaries meant to avoid human-tiger interactions have slowly grown into fuzzy partitions that permeate into their respective domains and explode into active confrontation sites that exponentially exacerbate HTC. Respondents opine that given the behavioral changes of humans and tigers the strict enforcement of the anti-encroachment laws can mitigate future HTCs.

4.13. Cultural Factors

4.13.1. *Erosion of Self-Esteem Over Time*

The historical residents of the Sunderban PAs lacked adequate education and thus, could not seek improved job opportunities. They remained cut off from the rest of the world due to the restricted access to convenient transportation. The reclaimed forests provided food to the limited community residents. Continued migrations, encroachments, and other anthropogenic activities

challenged food availability by exerting pressure on the sensitive ecosystem. The once-proud populace, faced with the current enhanced communications and perceptions through social media, are suddenly aware of their shortcomings. Identified by the city dwellers as junglee or forest dwellers, and with media access that highlights their disparities, the youth populace has developed an inferiority complex. In the quest to become modern and remove the associated social stigma, the residents, particularly the youth, have started to emulate the city people. Their legendary pride of being tough to survive alongside the tigers continues to fade. The community has reconciled with the changing times. As a disillusioned mom recounted:

> Since my husband died in a tiger attack, I wanted my children to leave the Sunderban area and get educated. While studying in Kolkata, my son got bullied because of his Sunderban background. His classmates used to call him a junglee (forest resident) and sarcastically look around, searching for the hypothetical tiger. He was very depressed; I finally decided to bring him back home. I barely survive and cannot afford to relocate to Kolkata. Maybe, destiny wants him to remain uneducated and in the Sunderbans.

The changes in social media have also affected the outlook of the PA residents. The PA residents had shifted their focus from the plans to improve their community and livelihood to changing their social status and relocate out of the Sunderban area. However, this change of mentality was prevalent in the comparatively well-off strata of the PA society. The feelings of being trapped and helpless have overtaken the community mentality, contributing to the loss of morale and self-respect. These thoughts were noticeable in the youth who had migrated to the nearby cities for basic manual labor jobs but were unsuccessful and thus, had to return to the village. The complete lack of opportunities while being ignored by the state and the central governments

forced the youth to do menial work and moonlight as fishermen and honey collectors for incrementing their income. The feelings of attachment to the forests and the wildlife disappeared on discovering that they did not have any say in the forest management.

Forest-produce pilfering, assisting outside intruders in poaching activities, harboring disdain for the wildlife and the tigers that they blame for their misfortunes, and using all means to increase their illegal earnings, has become ordinary practice. The desire to improve their quality and enjoyment of life has led some residents into a life of crime. The elders, however, continue to persuade the youth to adopt legal practices and support the forest administration in anticipation of a better future.

4.14. Historical Factors

4.14.1. *Loss of Traditions and Beliefs*

The Sunderban PA community has seen a consistent demographic relocation by immigrations and emigrations. The immigrating population to the PA is domestic and international, both marginalized. Some historic residents have little savings to support their temerity of moving out of the Sunderbans in the quest for a better life. However, their numbers are very few. The immigrating population without the environmentally friendly and god-fearing background seeks out ways to make a living. They have scant regard for the environment, forest, wildlife, culture, and beliefs. The youth, both residents and migratory, are also detached from nature. As a disadvantaged, despondent Sunderban youth pointed out:

> There is no relationship whatsoever between the forest, its employees, and my family. We are not allowed to enter the forest for foraging and do not get any benefits – many of which are rightfully ours. The forest guards come to us when they need our assistance.

> Though they are not bothered about the welfare of the forests or the PA residents, they must display it for retaining their jobs. They seldom care about us, and neither do we; it is the reality.

Exclusionary policies create distrust among PA residents and forest guards. Researchers agree that to maintain a healthy forest, the cooperation of the PA communities is critical. Frustrated with the PA community attitude, one forest guard quipped:

> The villagers are not bothered about the forests. They are always looking for something that will benefit them personally and is not necessarily good for the community. Providing them with any forest harvesting benefits means that they will over-exploit the resource without any consideration. Their state of marginalization indicates that they have nothing to lose. Since they have no connections to the forests now, keeping them away seems to be the best option.

Meanwhile, the NGOs try to be the mediator for both groups. They try to assist the community in their day-to-day lives and act as an intermediary in smoothing out the red-tape policies impacting the residents. They cooperate with the forest officials in situations of need to assist them when seeking community assistance is not possible. The NGO groups are also an effective resource for relevant information and data.

CHAPTER V

DISCUSSION AND CONCLUSIONS

This research integrates and adds a holistic understanding to the sketchy literature of HWC in the Indian and Bangladeshi Sunderbans. The study findings contribute to the current knowledge of the social, cultural, and historical relationships between the community, the ecosystem, and wildlife, particularly from the perspectives of the various stakeholders. Also included are recommendations and future research opportunities.

5.1. Human Predators of Sunderban

5.1.1. *Royal Bengal Tiger – Mythologized, Vilified Wild Animal.*

Living around the Sunderban PAs has always been fraught with danger, as indicated in the study findings. A surreal fear of death is palpable in the PA residents living near the core areas after a livestock kill or a tiger attack on a villager is reported. The fear is so vivid that locals do not utter the word 'bagh' (Bengali for tiger) after dark, lest it tempts the tiger. Phrases like 'jeikhane bagher bhoy, sheyikhane shondhey hoye' (translates to - the anticipated fear of the tiger, beckons the darkness) point to the pervasive fear triggered amongst the residents around the forests at dusk when the tiger starts hunting. Tiger encounters in the Sunderban forest are always interpreted as a run-in with death. With the high levels of germane phobia, it is imperative to understand tiger behavior for circumventing unwanted human interactions. Tigers have excellent night vision, prefer to hunt in the dark to startle and catch their prey unaware. Bengal tigers also synchronize hunting behavior with the grazing times of ungulates to improve

their success. Tragically, the PA harvesters enter the forests at dawn and depart at dusk to maximize working hours, thus, increasing tiger encounters and attack vulnerabilities.

As easy prey, Sunderban tigers have distinguished and hunted humans through multiple generations. The behavior passed on from mothers to cubs is used to circumvent the challenges of prey depletion, territorial disputes with truculent tigers, physical deformities due to old age and injuries, etc. Fishing in the creeks adjacent to the forests, the fishermen are attacked, presumably due to the fishy smell emanating from the boats. Attempts to mitigate tiger attacks, e.g., facemasks on the rear of the head, fiberglass helmets to stop tiger biting the neck, and use of electrified dummies to modulate and repulse tiger behavior, have all been halted due to poor results and villagers' indifference.

The only way to reduce HTC is to keep humans and tigers apart from each other. The extreme aggressiveness of the Sunderban tigers offsets its small stature. These tigers will almost always attack humans, possibly due to the perceived threat. The ferocity of the tiger towards humans was historically attributed to its brine drinking water and addiction to human flesh from scavenging on partially cremated human corpses in the Ganges river, the reasonings dispelled after failing validation. With a hunting success rate of about 5%, tigers are versatile eaters supplementing ungulates with other alternatives, including mollusks, fish, crabs, small mammals, and occasional livestock gleaned from PA villages. The Forest Department has established farms in the Sunderbans that constantly replenish the deer and pig populations. This compensates the ungulate crunch created by the unauthorized hunting of the bushmeat foragers that eventually leads to tiger straying.

Local poachers illegally enter the forest and use rope snares to trap deer and pigs, often snagging tigers. Lacking firearms, some trappers use metal snares or poison ungulate carcasses,

placing them on known tiger paths. Opportunistic trappers kill the tigers to harvest souvenirs like skin, teeth, nails, bones, and other body parts for making quick money. Carcass poisoning is also a predominant method and trademark of professional poaching gangs. (Saif, 2016). Treading into the core areas is a gamble, at times exacting the life of the entrant. Bangladesh river pirates hiding in the forest dugouts with their kidnapped victims kill tigers to mitigate possible attacks while scaring kidnapped victims of their prowess. After selling the body parts to international wildlife dealers, they bury or burn the carcasses.

As the top predator with no coequal adversaries, tigers confidently hunt in the forests, their domain. Unaccustomed to humans inside the forest, tigers silently stalk and quietly take out the last straggling person of the group. Though most attack victims outrightly die, efforts to scare the tiger away or retrieve the body often get the group members injured or killed. Seriously injured victims usually succumb to their injuries during the arduous travel to the hospital in old, antiquated riverboats and unreliable vehicles. Forest goers that have experienced tiger attacks tend to forewarn future forest harvesters by marking the creek entrance close to the vicinity of the attack sites with a piece of white or red cloth tied to wooden poles. While such markers often get washed away by the weather, lack of alternate entry points force harvesters to enter through nearby creek entrances, well within the range of the man-eating tiger involved in the earlier attack. In the animal kingdom, dominant predators determine the power hierarchy, respected by the lower order animals for ensuring individual safety.

Aligning humans as predominant hunters in the Sunderban can potentially avoid tiger attacks and reduce HTC. As inherent solo hunters with the potential of sustaining injuries, tigers are apprehensive of humans and dogs in groups. Firecrackers, loud sounds, and bright lights act as deterrents to tiger straying and attacks around the core areas.

Tigers are killed by the villagers when they stray out of the forests. Volunteer groups like Forest Protection Committee (FPC) in India and Village Tiger Response Team (VTR) in Bangladesh assist the forest guards and mitigate tiger killings. They provide immediate information to the forest guards and assist in tranquilizing and relocating stray tigers. Though dogs are individually vulnerable, trained dogs in groups can alert the PA residents and stall the approaching tigers. Stray tigers cause massive physical and psychological harm to the PA residents by killing all livestock in the holding area, though they cannot consume it all. Chased by angry villagers, fleeing tigers attack residents and cause immense damage to life and property. Tigers are often bludgeoned to death by the villagers with bamboo sticks and farm tools if not evacuated promptly by the rescue teams. Rescue teams create an exit passage for the tiger to run back into the forest or sedate and relocate it. Instinctively, tigers return to consume their kill.

Outraged livestock owners poison the carcass with pesticides (Furadan) to kill the tiger. While tiger-proof pens halt livestock predation and reduce tiger straying motivations, water-resistant nylon net fences and improvised floaters placed around the forest fringes are efficacious in impeding tiger straying. The Indian Sunderbans villagers use such nets though the village residents in the Bangladesh Sunderban do not. Using satellite radio collar can identify the handful of tigers that constantly stray out of the forests for relocation to avoid HTC. It also prevents the killing of innocent straying tigers while providing data on Sunderban tiger interactions and behavior. Placing collars on all the Sunderbans tigers is challenging due to the terrain challenges, collar size, and battery life; microchipping tigers can be a viable alternative. Planting microchips in tigers allow drones to circumvent the hostile ground conditions to calculate distribution, range, behavior, and lifestyle patterns. Microchipping can also assist in

geo-fencing by putting PA communities on guard against approaching tigers while mobilizing tiger response teams to tranquilize and safely transport the tiger to the forest.

The stealth with the cryptic coloration, camouflaged coat, elusive presence, ever-pugilistic attitude, and its surreal association with death contribute to an aura of the hypnotic mystique of the tiger that further permeates the deeply ingrained fear of death by the tiger. Most of the tiger killings of humans occur in the forests. Often tiger victims are the only income providers to make it devastating for the family. Some villagers believe that the tiger stare mesmerizes and transfixes its human victims to the spot, furthering the belief that tigers are evil and doubt their abilities to mitigate HTC. Multiple efforts, albeit half-hearted, fail to stop human killings that validate the invincibility of the tiger. They feel that only Bonbibi can save them from tiger attacks.

5.1.2. ***Other Ostentatious Predators***

Obscured from the HWC limelight lies hidden an apex river predator that audaciously kills and injures more women and children in the Sunderbans than the tiger, the river crocodile. Any discussion on the HWC in the Sunderbans is incomplete without the mention of crocodiles that kill and maims hundreds of PA villagers each year. Their ubiquitous presence in the creeks around the forests, rivers, and water bodies next to the villages exponentially increases the chances of HWC. Preferring the monsoon season for reduced water salinity, crocodiles partake in the maximum human conflicts during September and October months, near the water edges. These incidents occur especially with women and children who use drag nets for fishing crab, mollusks, and prawn seeds in waist-deep water. While mid-sized crocodiles are apprehensive,

large crocodiles brazenly attack humans and drag them into the deeper water to drown. Till 2007, crocodile fatalities remained unrecorded and uncompensated (Vyas, 2012).

Though crocodile hunting is banned, it is extensively poached to near extinction for the skins. Sunderban crocodile farms periodically release young crocodiles to replenish the critical wild numbers. As apex river predators, crocodiles indicate the health of the river ecosystem. They feed on the predatory fishes that impede the growth of other fishes to maintain healthy seafood populations. While crocodiles seek bigger prey, sharks bite off human arms and legs in similar waters. Snakes and sharks have ceased to be consequential predators after hurricane Aila due to their modest numbers. Avoiding manual river fishing can mitigate human-crocodile conflicts. Enforcing shark fin and crocodile skin transactions can reduce poaching. Human-crocodile conflict issues must be adequately dealt with to coexist peacefully with humans. Though life in the Sunderbans revolves around the ominous foreshadowing of tragedies due to the tigers, other human predators like the crocodiles, sharks, snakes, etc., contribute their individual shares of misfortunes.

5.2. Goddess Bonbibi - Paradox of Cohesiveness and Religious Bigoted Divergence

Multiple renditions exist about Goddess Bonbibi. While some claim her origins as Medina, others consider her a local goddess. Construed through the lens of the religion, the Hindus regard Goddess Bonbibi as the incarnation of the Hindu goddess Durga while Muslims believe her to be the archangel of Allah. However, her prowess in saving villagers from the tigers is universally recognized. While most forest harvesters secularize and jointly seek her divine protection from tigers before forest entry, religious constraints on idol worship in Islam and non-Hindu God worship in Hinduism get brazenly defied. Yet, deep schisms exist amongst the PA

villagers based on their faith, confined within their religious dogmas. However, many religious beliefs get routinely vitiated by ingenious contrivances for economic gains.

Tiger killing is taboo among the Bangladesh indigenous communities. Even in marginalized communities, tiger meat consumption is rare and only occurs when villagers kill the tiger in self-defense. Bushmeat includes pork, is consumed openly by Hindus and surreptitiously by some Muslims, though expressly prohibited in Islam. Villagers kill tigers and then perform rituals to get rid of the tiger killing sin. Before the prohibited actions, religious followers chant prayers (Bismillah) to make the action halal (pure) and override the proscriptions. Killing tigers is a sacrilege that angers Goddess Bonbibi because she protects both humans and tigers. Though Goddess Bonbibi protects the forest harvesters, she will not defend the pernicious forest exploiters, aiming to profit rather than simply survive. PA residents not affiliated with forest harvesting ascribe tigers as depredating vermin with minimal tangible benefits, not worth protecting. While PAs are needed for the tigers to survive, human entries into the forests must be prohibited to avoid conflicts with the tigers. These research findings indicated that while the Indian PA forest officials have privately acquiesced to the idea of a complete forest entry ban, they concede their inability to completely stop harvesting forest products like honey and wax at this time, absent alternate sustenance options.

5.3. The PA Residents

5.3.1. ***Livelihood Perspectives***

The livelihood strategies of the locals involve one or a combination of the activities of forest resource extractions that involves shrimp farming and non-farm activities, such as trade, business, selling labor, etc. The lower-income households rely heavily on subsistence-based

livelihood strategies related to forest resources, crops, and livestock, involving high risk and low remuneration with some paid labor work in shrimp farm and non-farm activities. The middle and high-income households are less dependent on forest resources and focused on non-forest activities like shrimp farms and other business activities. Shrimp-farm aquaculture is the single socio-economic factor and indicator of household income that allows residents access to funds with reasonable commercial covenants. Shrimp farmers convert land used for rice farming and install illegal sluice gates in the riverbanks to allow saline water inflows required for rearing shrimps. Natural calamities like cyclones inequitably breach the weakened river embankments, damaging shrimp farms and causing huge losses. Lacking land and financial resources for initiating shrimp farms, the middle-income PA groups act as conduits for resourcing prawn seeds, agricultural products, and forest resources.

With the lack of secure access to the mangrove resources, almost all the low-income PA residents reported using illegal forest resource harvesting as a coping strategy. Dependence on moneylenders, criminally prosecuted by the forest department and attacked by pirates and wildlife, creates more vulnerabilities in the lives of the PA residents. Denied loans, vulnerable PA villager approach local loan sharks that precondition the lending contracts to buy the entire agriculture/forest produce at below-market prices to sell it in the open markets with accretive profits. The boat and nets of the defaulter are confiscating as surety if the owed principal and interest remain unpaid by the stipulated time. Unscrupulous lenders coerce the borrowers to assist in nefarious activities like unlicensed harvesting, directing pirate kidnappings for ransom, and facilitating poaching.

Enticed by the financial windfalls of honey and fish, respondents admit to illegal forest entries, entailing huge penalties, bribes, or even worse, ending up as tiger victims. Antagonized

by the lack of enforcement assistance and wary of their unlawful forest entries revealed, PA villagers refrain from providing critical information to protect the forest and tigers. Some opportunistic villagers assist poachers, illegal forest intruders, loggers, etc., and abuse their knowledge and forest understandings to further their economic and vested interests. Villagers kill straying tigers for safety, retribution, and to enhance self-esteem. Other groups kill inside the forest professionally or opportunistically. Tigers are killed inside the forest by poachers, shikari (hunters), and trappers for harvesting tiger body parts, used locally as a talisman or for medicinal purposes. Tiger killing also accentuates the social esteem of the PA residents, now considered to be brave hunters, along with enjoying the rush of killing a powerful human predator. Poachers and pirates (in the Bangladesh Sunderbans), custom-poach tigers for specific organs, paid for by commercial body parts dealers from China and other Asian countries (Saif dissertation, 2016). Pirates assign their tiger killings as community services, meant to protect the villagers while covertly scaring the kidnapped victims of their invincible hunting skills. Pirates donate money to build mosques that elicit community respect (Saif dissertation, 2016). They kidnap fisherman and villagers with taxidermy (embalming) skills to assist them in processing the killed tiger parts. Respondents point to the audacious acts of the pirates by providing ransom receipts to avoid repayment or repeat kidnapping during the current fishing season, indicative of their working in connivance with the forest guards.

Pirate ransom complaints are seldom resolved but identifying the pirates is always retributive; it indicates the collusions of the forest guards with the pirates. Forest guards allegedly provide confidential enforcement information to the pirates. PA women also complain of physical and sexual exploitation by the forest guards, police, and politicians. Forced to cede their forest rights for conservation purposes, residents allege that forest officials treat the HTC as

a socially mediated tradeoff that favors tigers to the PA villagers. Based on an estimation called the 'value of statistical life' calculating the tradeoff between risk to life and money, a joint university study estimated that tiger victims get compensated about 100 times lower than the estimated costs (Madhusudan, 2003; Gulati et al, 2021). While tiger conservation is critical for maintaining the ecosystem, a trustful relationship among the PA residents, forest guards, and other area stakeholders is needed for the program to succeed.

5.3.2. ***Resident Movement Drifts***

Multiple forest harvesting alternatives to mitigate HTC enumerated by the forest department proved illusory. Farming and daily-wage labor remain the only pragmatic options. The continued decline of tiger and wildlife populations forced the administration to ban human activities like wood cutting, deadwood collection, and reducing harvesting permits for honey, wax, and golpata, all resulting in exacerbating clandestine resource pilferages. The absence of livelihood resources resulted in emigrations, changing joint to nuclear families, challenging established religious, traditional beliefs, practices, and diluting community values of sharing and friendship. New migrants create mass encroachments that lead to the villagization of the areas next to the forests, enhancing HTC. Barebone huts with unguarded livestock pens, separated from the forest by small or dry rivulets, entice tigers for a quick and easy meal. Livestock cross over the small streams into the forest edges to graze during the daytime that tigers follow backward to the villages at night, leading to HTC. Surviving exclusively on clandestine forest foraging is not a feasible mode of livelihood, so PA residents supplement it with fishing as a plausible alternative.

The lack of new boating license permits (BLC), the royalty and registration fees for dry firewood, charged by the forest offices, tempt the fishermen to harvest the fish-rich rivers of the critical wildlife area and sanctuaries next to the forests in the no fishing and no honey collection zones. Since steep fines are levied as a penalty if spotted fishing in the area, the fishermen choose to illegally fish after dusk to reap the bountiful harvest. In turn, they fall prey to hunting tigers that pick the fishermen off their boats. Actual fatality numbers are seldom reported during illegal forest incursions since such deaths remain uncompensated by the forest services. Instead, it creates a whiplash and penalizes the family of the tiger victim for the unauthorized entry, further eviscerating the family finances already devastated by the loss of probably their only breadwinner. Resettlement efforts outside of the PA areas are frustrated by the vulnerable villagers opting for livelihood options over tiger predation risks. Justifying their actions, PA residents suggest that only esoteric groups like themselves, living next to the forests can empathize with the situation. Fear of attacks compels the residents to question the efficacy of tiger protection. Arguing HTC as indomitable, residents indicate the dilemma posed by alternatives of either struggling in the cities or risking their lives to the marauding tigers.

5.3.3. ***Forest Proximity Matters - Human-Human Conflicts***

The human-human conflicts are an important factor depending on how the PA residents perceive themselves in the Sunderban environment. Based on the proximity to the forests, PA residents hold antithetical viewpoints amongst themselves on issues including HWC, tigers, and eco-conservation. Residents living further away from the forest seldom rely on forest foraging and thus, do not enter the forest. Such village areas are comparatively well-off and use aquaculture as the leading component of the livelihood strategy mix. While avoiding forest-

entry, drastically reduces the risks of HTC, it also lessens villager empathy for tiger victims and HWC issues. Most PA residents living next to the forests are impoverished, their livelihoods dependent on extracting forest resources or cultivating on reclaimed forest lands. The residents lack the wisdom of conservation practices. They merely echo the scientific recommendations, plausibly to appease forest officials and be eliminated from the arena of suspicion in the aftermaths of stray tiger killings.

In theory, while most PA residents believe in the recommended standards as professed by the eco-conservationists and forestry departments, only a handful are sincerely interested in sustainability and conservation. Ironically, most villagers around the forests are opportunists, merely interested in maximizing forest extractions for personal benefits, conceivably due to their abject marginalization. This research noted an incidence where almost immediately after meeting with forest officials to discuss conservation practices, villagers mobilized to attack a tiger that had strayed. It was the timely intervention of the forest officials that saved the tiger else it would be bludgeoned to death by the villagers. Retributive behavior and anticipatory fear of future attacks lead to the killing of straying tigers. Yet, a furtive wild tiger in the open always inspires awe, invariably attracting enthusiastic onlookers, even when sedated and subdued. During the efforts to tranquilize and relocate the straying tiger, passive bystanders are occasionally attacked by the cornered tiger when it tries to flee.

PA residents reiterate that forests are necessary for the survival of the PA villagers and that the tigers are crucial for protecting the forests. Tiger conservation should thus be a priority. However, the significant challenge to tiger conservation is the lack of a sincere desire amongst the villagers to protect the wild tigers. Villagers are resigned to their fate regarding the HTC, cognitive of the lack of viable alternatives and safety nets. Efforts to mitigate HTC entwined

with the challenges of fund shortages, a highly marginalized and disenfranchised populace solely dependent on forest foraging, and a constant deluge of migration from within and across the national borders, create immense pressures on managing the PA population. Adding the critically endangered fast declining tiger species, its habitats, range reduction, prey depletion, and lack of relevant information with the unpredictability of success all contribute to a wicked problem that signifies no foreseeable inclusive solutions. The adopted strategies focus on deterrent activities that deal with curbing the tiger straying and minimizing the human lives lost to HTC, both short-term and expensive, but provides an analysis of its efficacy. The long-term strategies of reducing HTC by educating the public and rationalizing tiger attacks are less cumbersome but fail to provide relative efficiency in accomplishing this goal.

5.4. The Forest Guards

5.4.1. *Vague Strategies*

Creating and maintaining a steady feasible development plan remains a persistent problem in the PAs. The forest guards acknowledge that human-tiger conflict is the most persistent challenge that they face every day. Asserting that humans and tigers are incompatible, the Indian forest guards conclude that the tigers and humans must not come across each other, contradicting the ideas of peaceful coexistence. Though the Bangladesh guards also believe that humans and tigers must be kept separate, they feel that given proper management strategies, humans and tigers can coexist as they have for centuries. Forest guards note that protecting the forest harvesters from predating tigers inside the forests is practically impossible. They indicate that such a move will intensify HTC while impacting wild tiger populations negatively. It will also risk the life of the guards. In 2001, the Forest Protection Groups (FPG) started working in

tandem with the forest services. Between 2001- 2012, though 324 tiger strays were reported, no tigers have been harmed and over 55 stray tigers were captured and returned to the wild. Claiming success in protecting straying tigers and villagers with the support of the village/ forest protection groups, stray tiger killings have dipped visibly (Vyas, 2012).

Pointing to the practical challenges of effectively monitoring and protecting the illegal forest entrants, the guards argued that they should protect themselves from tiger or wildlife predation. Referring to their insistence of invoking the antiquated red-tape practice of requiring unrealistic proof for claiming human and livestock predation, the guards stated that regulations require corroborative proof for compensatory payments to the tiger victims. They affirm that the villagers entering the forests with valid entry permits are compensated for injuries or death by HTC. The unauthorized forest entrants do not report human death or injuries for fear of punitive reprisals. Officials reiterated their inability to provide compensation since the regulations do not permit such payments. Absent permits to harvest, families cannot claim tiger injuries or fatalities inside the forests or prove animal encounters outside the core forest, so the claims are deemed farcical and summarily denied. Guards justify penalizing the deceased illegal entrants' families with steep fines to deter similar futuristic activities for mitigating HTC. Stating that the forest harvesters are included in a social insurance program to ensure some compensation for tiger victims illegally entering the forests, the guards acknowledge the need to revisit antiquated laws in the present situational contexts.

Some officials recommend maintaining the records of habitual forest entry offenders and scale-up penalties exorbitantly for deterring repeat offenses. Admitting the use of obsolete technology, they endorsed immediate upgrades to enhance monitoring and enforcement. The guards concede that much needs to be done to enhance the living conditions of the PA residents

and ensure their safety. However, they also stress the importance of cooperation and information from the villagers living around the forests to reduce illegal activities inside the forest and mitigate HTC. Though the guards are aware of the importance of conserving the keystone species - the tiger, they agree that definitive strategies dealing with human and tiger killings are glaringly missing. The guards contend that the anti-poaching coordination and support from the transit and target countries are critical. They emphasize the need for countries like China to curb wet markets and animal body part trading for stamping out tiger and wildlife depredation. Enhancing incarceration periods and imposing stiff monetary penalties to reduce the incentives for wildlife trade were recommended. While acknowledging that changes in BLC are past due, guards indicated their willingness to assist the fishermen when requested, giving them occasional breaks for minor infringements. The guards claim that obtaining a fishing license is not as arduous as indicated by the residents. Denying the accusations of demanding bribery for issuing almost all forest permits, the guards blame it on a few bad apples in the department. Bemoaning the vilification for all forest-related flaws, guards conceded the current HWC mitigation strategies as vague and obscure, thus ineffective. They stressed the need for transparent and concrete measures to deter illegal actions for protecting the residents and the tigers.

5.4.2. ***Government Indifference***

Sunderban forest guards mired by the allegations of resident mistreatments, lacking empathy, and charges of corruption, paint a different picture of forest management when compared to the PA residents. Pointing to the consistent reduction in government fund allocation, the guards underline fund scarcity as a major hindrance to their work efficiency and often pitch in their meager salary for official work. Lack of proper forecasting, evaluation,

planning, and management was abundantly visible in the village activities. The abysmal conditions of healthcare, schools, roads, broken solar panels lighting, overflowing dams, and sliding embankments into the river all point to the careless management of the agency administration.

With mortality rates for children to be the highest in the state, mental health care lacking, skin diseases due to arsenic poising in groundwater, injured tiger victims, along with pervasive malnutrition in children and continuing common and chronic illness, attest to the abysmal healthcare system (Kanjilal et al., 2010; Choudhury et al., 2000). Lacking incentives for job accomplishments, forest guards indicate their frustrations and disappointments due to the PA residents disparaging them though they try and help them with their lives. Pointing to their cooperation with the Forest Protection Group (FPG) task force, guards indicate their willingness to protect the villagers and the straying tigers, concurrently. They rush to resolve incidents and ensure that straying tigers are returned ck to the forest without harming any villagers. A designated helpline number notifies the straying incidence and enables the FPG to arrive on short notice. Forest guard empathy, relationships, and reassurances during HTC are crucial in enhancing tiger tolerance. Sadly, only a handful of villagers sincerely believe that a guard-villager relationship even exists.

The consistent budget constraints stagnate the reconstruction process to relegate the Sunderban infrastructure to a dismal shape - abandoned and crumbling. The Bangladesh forest guards complain of the budget crunch and unsustainable wages and ascribe it to the staff shortages and truncated forest enforcements. PA villagers accuse the guards of colluding with the river pirates, money lenders, politicians, etc., and soliciting bribes for almost all kinds of discretionary activities. The guards assert that they coordinate with the local law enforcement

and the navy to overcome their enforcement shortcomings. They allege that occasionally the informants are paid out of their measly salary. To overcome the funding constraint, the forest guards conduct forest patrols with their private motorbikes. They blame the meager wages as a justification for the solicitation of bribes by some guards. Bangladesh forest guards indicate that the government officials are aware of the dismal low wages and hence, condone bribery and resident exploitations. Bribery allegations are equally pervasive in the Indian Sunderbans. With the forest guards on the frontline protecting the forest resources and the PA population, governments must provide adequate support and resources to manage the ecological balance and mitigate HWC.

5.5. The Non-Governmental Organizations

*5.5.1. **Alliances and Relationships***

Non-Governmental Organizations (NGOs) are Voluntary Organizations (VO) that work independently and unrestricted from governmental control to perform their altruistic tasks while soliciting charitable, tax-exemption status, and financial support from the government, private donors, and international NGOs (Punalekar, 2004). The NGOs engage in a wide array of activities in the PA regions ranging from aiding the poor and helpless to seeking lucrative business ventures that enhance their assets despite being counterintuitive to the primary agenda of serving the disadvantaged (Chowdhury, 1990; Islam, 2000; Zaman, 2003). Conversely, local Sunderban NGOs lack diverse plans and resourceful global contacts and remain constrained for funds. Devoid of a strong business sector, grassroots development experiences, and affiliations, NGO collaborations are crucial to the Bangladesh government for economic, social, and

infrastructure improvements (Mujeri, 1999). Conversely, the Indian government is less vulnerable, yet NGOs provide vital strategic resources for development.

While multiple NGOs are involved in improving various grassroots sectors in India and Bangladesh (World Bank, 1996a), only a handful of NGOs collaborate in the Sunderban PA areas to mitigate HWC. NGOs like the International Union for Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund for Nature (WWF), etc., work in tandem with the governments for nature conservation and sustainable use of natural resources. NGOs working in the Sunderban areas are familiar with the diverse existing issues and provide holistic comprehensions of the local needs and priorities to alleviate human suffrage (Siddiqi & Oever, 1998; Caplan, 2001). NGOs assist the governments in facilitating rural micro-credit, managing environment, and natural resources, disaster risk reduction, drinking water access, healthcare, education, infant rights, development, and women empowerment (Dutta, 1999; Zaman, 2003).

In their attempts to remedy the PA eco-problems, the forest department utilizes its in-house resources while the NGOs collaborate with the local communities. Results indicate NGO-community collaborations tend to be more successful than the collaboration of the forest departments with other institutions. NGO successes are attributed to the ability to detect PA issues and providing solutions with the cooperation of the local PA communities, while the forest department initiatives had yielded mixed outcomes (Bhatt et al., 2011; Selvam et al., 2012; Dutta, 2018). NGO partnership successes are evidenced from the sapling planting, honey-bee rearing, easing of transportation issues, etc. over the forest department collaboration accomplishments. The Forest Department had acknowledged that despite being the forest of primary succession, they have failed to equate their progress with the NGOs, attained by engaging the locals. The NGO practices are the emblems of successful community participation

in mangrove restoration (Dutta, 2018). The government officials and forest guards were effusive in appreciating the NGOs for bringing community benefits to the area.

Though most NGO interventions were successful, many have miserably failed to fulfill the promises made to the community. To alleviate the challenges of high-interest loans and collateral requirements for small business startups in the PA, the NGOs started to facilitate the loan distribution. Paradoxically, the NGO loan offers were far more expensive than the local banks, albeit the collateral requirements were no longer needed. Some NGO projects claiming to benefit the locals have exclusively profited the third parties with a history of funding the NGOs. Government-NGO partnership initiatives to eradicate poverty and inequality among Bangladesh PA residents have dismally failed, remaining unchanged between 1983-84 and 1991-92 (Haque, 2004). Ironically, the poverty eradication program bore negative results on the poverty numbers and rural development (Rahman, 2000). NGO collaboration for increasing land ownership for PA residents doubled landless resident numbers in Bangladesh between 1984-96 (Islam, 1999). Despite the NGO collaborations, Bangladesh remains one of the poorest countries in the world, its Human Poverty Index (HPI) worse than the average South Asian HPI (Rahman, 2000).

5.5.2. ***Absolving Obligations***

The governments of India and Bangladesh seek NGO partnerships to improve the social conditions of the underprivileged PA residents (World Bank, 2002). In association with NGOs like World Food Program, Bangladesh Rural Advancement Committee, and others, they provide aid to destitute tiger widows, address food insecurity, and render sustainment support, education, and training to the PA community (Aminuzzaman, 2000). The collaborative successes of the past have motivated the Bangladesh government to expand NGO partnerships in the areas that need

the most assistance. NGOs are better informed to tackle local issues, understand local needs and priorities, address rural poverty, and use consultative management for resolving concerns that the governments are ill-equipped to perform alone (Siddiqi & Oever, 1998; Caplan, 2001). Additionally, the partnership with NGOs reduces the risks and obligations of the government, minimizes public sector debt, creates better public policies along with a congenial image of the government (McCormick, 1993).

5.5.3. ***Optimize Capacity Building***

To ensure good governance and maintain a sustainable ecosystem, the government has created partnerships with the NGOs to ensure efficiency and obtained financing from foreign donors (Brinkerhoff, 2003). NGO Partnerships have gained popularity since collaborations are essential to enhance the organizational capacity, cost-effectiveness, resource mobilization, managerial innovation, consensus-building, people participation, and public accountability that uses multiple perspectives and strategies for realizing the goals effectively (Asian Development Bank Institute (ADBI), 2001). The Sunderban NGOs receive funding from numerous donors with diverse interests though seldom earmarked exclusively for highly selective projects. Area NGOs target local critical issues to enhance their chances of success and be optimally effective as the voice of the voiceless. Fund shortages limit the ability of the local NGOs to seek experts for facilitating specific issues intrinsic to the Sunderban PAs.

Oblivious to the NGO efforts and priorities, some locals blame them for the pertinent unresolved challenges. They allege that the NGOs increase their capacity with the promise of improved resolution but withhold information, initiatives, latest expertise, and practices that develop understandings to benefit the PA populace. Many residents and stakeholders opine that

the NGOs cater exclusively to their vested interests and community assistance is incidental to their organizational goals (Haque, 2004).

5.5.4. ***Improved Coordination and Support***

There is a need to mitigate poverty, empower the locals and serve the marginalized rural communities. Though the government often delegates its responsibility to the regional offices, it is indisputable that the better-organized NGOs can perform more efficiently to obtain consistent and improved fundings. The government partners with NGOs, and foreign donors to enhance collaboration, effectuate common goals, and share developmental agendas (Lister, 1999; Brinkerhoff, 2003). Such partnerships also absolve the government of monopolistic state bureaucracies and advocate for the NGOs as the preferred alternatives for the tasks (UNESCAP, 1999). However, on the social, economic, and political powers of the partners involved, it is always the more powerful partner whose identity and interest become dominant in most cases. Since poverty is a leading factor in exacerbating HWC government - NGO partnerships emphasize providing generous assistance to facilitate proper development and management of the PA areas.

The NGO discussions reflected an impartial insider perspective of the PA situation. Except for the superficial changes of routine patrols and mangrove seed collections, the NGOs pointed out that the forest department had not undertaken any actions for improving or changing the status quo within the forests and the PAs, including initiatives to mitigate HWC. The NGOs participate with the PA residents to plant endangered saplings, extract mangrove seeds, maintain water salinity for plant growth, protect the endangered flora and fauna by erecting protective fences, and assist in eco-management projects. In doing so, NGOs foster personal relationships

that are critical to their survival and functioning. NGOs ensure that the residents receive their legitimate claims based on compassionate, historical, and moral grounds that essentially benefit the ecology and the natural resources. The NGOs rely on the PA residents to curb illegal logging and boosting mangrove replantation. Some PA respondents and forest officials felt that the NGOs are the community lifeline; their involvement and contributions have immensely benefited the community. Local NGOs lament the lack of synergistic efforts between the stakeholders and global NGOs that can lead to better outcomes towards mitigating HWC and improving the lives of the PA residents.

5.5.5. ***Functional Maladies***

The inhospitable coastal mangrove forest terrains of the Sundarban boasts of being the only natural tiger habitat in the world with its unique set of problems that are unlike the other world PAs; it inhibits the integration of research ideas. In the Sunderban PAs, the lack of interactions with partners and stakeholders fails to create levels of trust and exchange of accurate and pertinent information. PA communities are thus not privy to the resources, knowledge, and particulars of the information gathered and actions undertaken by the forest administrations. When the park managers and major NGO - heads depart, residents refuse to accept ownership of the derived solutions. Adaptive management strategies developed by the consensus of managers, researchers, and practitioners, await PA resident acceptance and participation.

The major NGOs with the world knowledge and understandings of the Sunderban PAs base their operations in the metropolitan cities of Kolkata and Dhaka to lose direct contact with the local PA residents. The smaller local NGOs inhibited by the constraints of funds and expertise fail to resolve the myriad of the existing PA problems. The major NGOs rarely discuss

their conflict management understandings and feasible strategies with local NGOs, afraid of losing their dominance. Lack of interaction and information exchange regarding the other PAs precludes the local NGOs from the shared expertise and knowledge needed to understand the Sunderban HTCs and to articulate the site-specific challenges to the other world PA managers.

Some prominent Bangladesh NGOs face criticisms for undertaking commercial ventures for financial gains instead of working on developmental agendas that assist the PA communities (Chowdhury, 1990; Islam, 2000; Zaman, 2003). NGOs employ their partnerships to obtain massive grants and loans from the government and international donors, allocated for multiple projects, and provide micro-financing to the poor PA villagers at meager interest rates for initiating businesses. Local organizations and the NGO Affairs Bureau (NGOAB) offer soft loans to the partner NGOs for disbursing to the impoverished families under the micro-credit program (Dutta, 1999). However, the large NGOs charge steep interest rates beyond the borrowing capacity of the villagers (Hossain, 1995; Kurien, 1995). Though the Government-NGO partnership profits from the grants and low-interest capital, it is detrimental to the overall development of the PA region. Most of the NGOs specialize in specific programs, but only a few develop a complete developmental agenda. Competing for the same government and foreign fundings, multiple NGOs duplicate similar activities that cause loss of efforts and funds (Ebdon, 1995). The NGO-foreign partnerships often lead to the domination of donor preferred projects at the expense of the actual community needs, obscuring the development agendas (Zaman, 2003; Aminuzzaman, 2000). Rather than striving to improve the socio-economic conditions of the PA residents, the NGOs invest in profitable ventures to enhance their revenue flow, often construed as the marker of success, and use it with their government connections to shield themselves from regulatory actions.

While NGO autonomy is necessary for the conscious learning and efficient dissemination of knowledge, they must also be required to maintain accountability and remain answerable for their actions to the government regulators. In the absence of donor fundings and technical know-how, it is unlikely that government partnerships with the NGOs to assist the community will survive. However, such relationships must not be allowed to bypass state regulations or be detrimental to the interest of the communities that they are supposed to serve. The participation of NGOs with the government is generally good for community development, empowerment, and participation. It also enhances the efficiency, effectiveness, and responsiveness of the government (Brinkerhoff, 2002a). However, the questionable actions by some NGOs allow the beneficiaries to doubt their credibility and tarnish the trust and image that undermines the impressive contributions of other NGOs. The NGO activities should be subject to periodic reviews by nonpartisan bodies to ensure accountability.

5.6. Study Limitation: Theoretical

While the current study is comprehensive in the study area, wildlife conflicts are site-specific, dependent on multiple factors. This study identified relatively lesser-explored areas and offered suggestive evidence with the potential to mitigate HWC for future studies.

5.6.1. *Conservation Intent*

PA residents living further away from the forest prioritize their livelihood over conservation reflections while intermittently exhibiting resentments when wildlife destroy their crops. Residents that depend on the forests for their livelihood strive to conserve tigers that presumably protect the forests. However, most residents largely remain unenthusiastic about conservation and are skeptical about the efficacy of tiger protection. Though the forest guards care about managing the forest, they mostly remain uninformed about the intricacies of day-to-day tiger conservation. NGOs are focused on the predetermined welfare spheres of the residents and ensure the governmental benefits reach the intended community. They are also concerned about conserving the ecology but remain perennially accused of partisan corporate patronage seeking to exploit the ecosystem. Nonetheless, this study confirmed that communities living next to the forests show greater effectiveness in conservation projects when invited to participate in joint forest operations. The efficacy of including PA community participation for improved conservation efforts and mitigating HWC, absent in the Indian Sunderbans, needs further investigation.

5.6.2. ***Population Shifts***

The Sunderban PA areas witness ongoing migration, both across the international borders and through domestic migrations. New migrants taking advantage of the porous borders and promises of free forest products encroach next to the forests and entice tigers with livestock meals. Newly constructed huts of new migrants are separated from the forest by small creeks. Moving the encroaching residents away from the forest edges fosters the rational idea of mitigating tiger straying and livestock predation. However, it conflicts with the choice of stay near the forests and the non-availability of land for encroachment. The migrants feel that the settlement locations next to the forest are ideal for surreptitiously entering the core forests for harvesting forest products. Citing the scarcity of survival resources, the migrants are amenable to tiger conflicts, attributing their survival to fate.

While such encroachments exacerbate HTC, they also create social complications by disturbing religious balances and enhancing livelihood challenges within the resident community. Older area residents are often conflicted about encroachments and tiger conflicts, feel that migrants tempt the tigers to attack. However, they remain unconcerned due to their psychological animosity towards new migrants and their inability to coerce them out of the area. Forest guards try to relocate the encroacher but face resistance from relatives, friends, and politicians. Encroachers receive tacit support from the local politicians that stymie eviction actions to boost their vote banks, even for illegal immigrants from across the border. Politicians join the relatives of the migrants to act as enablers and accomplices by stopping evictions and relocation of the migrants elsewhere. Villagers tend to accuse the guards of accepting bribes and condoning the encroachment. The relocation, even if feasible, exposes the next set of residents to

the frontline of tiger incursions. It is imperative to examine if shifting residents to a certain distance away from the frontline impacts HTC.

5.6.3. ***Stakeholder Relationships***

Though the PA residents must make choices to reduce vulnerabilities, the governmental programs and socio-cultural factors have barely assisted in alleviating the situation. The total dependence on mangrove resources increases resident vulnerabilities to seasonality, permit/ license costs, possibilities of death/injury due to HTC, and ransom payments to the kidnappers in the Bangladesh Sunderbans. Curtailing forest access coerces the marginalized harvesters to enter the forest without permits for collecting forest resources. Ensuant legal actions and associated costs imposed due to enforcements increase the vulnerabilities. Expectedly, the PA residents do not generally trust the forest guards, as this study determined. However, they trust and work with the NGOs to suggest possible mediation between the residents and the forest guards for ironing out issues and suggest operational improvements. NGOs focus on balancing the PA resident welfare with ecological conservation and ensure that the governmental benefits reach the intended community. They provide conceptual ideas and techniques for efficient forest management but avoid direct involvement in protecting wildlife. Since their actions do not always concur with the activities of the villagers, they are categorized to be partisan.

Consistent with similar findings, this study supports the setting up of an international task force comprising wildlife practitioners, research professionals, stakeholders, and NGOs for the collaborative exchange of ideas, resources, acquired knowledge, and adaptive management strategies from their respective PAs. It will also enhance HWC recognition,

capacity enhancement, cooperation, and financial allocations to address existing gaps and review subsequent performance lacunas stemming from the changes.

5.6.4. ***Shifting Attitudes Towards the Tiger***

This study concluded that the PA resident attitudes towards the tiger vacillate by socio-demographic differences. Tiger tolerance is dependent on multiple factors like gender, age, education, and those who work with the forest offices. The PA population that includes women, educated, aged residents, and forest employees, generally empathize with the tiger to condone its actions by reasoning that it is a wild animal that hunts to feed itself and its cubs. Such feelings, however, are not ubiquitous with an existing undercurrent of resentment amongst the residents, identifying the tiger as depredating vermin, with no direct benefits accrued due to its presence. Relatives of the tiger victims remained retributive, mourning the irreplaceable loss of a family member. The indignant majority of young and middle-aged male populace, incensed due to the historical human conflicts, do not hesitate to kill straying tigers merely to attenuate future attacks. The study also found that most villagers involved in the tiger killing do not contemplate the prospects of harvesting body parts. Such ideas occur after the excitement of the killing has subsided.

5.6.5. ***Goddess Bonbibi Relationships***

The study uncovered the reverence to Goddess Bonbibi is not as secular as was presumed earlier, and deep-seated schisms exist amongst the Hindus, Muslims, and other religious followers. The continued migration of people with divergent religious beliefs to the PA villages tends to alter the current equilibrium of secularism and create long-term conservation and conflict ramifications that need further examination.

5.7. Recommendations for Natural Resource Practitioners

5.7.1. *Coexistence with the Tigers and Wildlife*

The proximal forest residents have cited tiger predation to be the prime cause of concern in the area. It is also the foremost reason for their anger towards the tiger. The study findings indicate that the tiger-tolerance levels are not consistent among the residents with women and aged residents inclined to individualize tigers as mothers of cubs and wild animals that need to hunt for survival. Forest employees and those who have received compensation for livestock predation tend to indicate forgiveness for their enhanced tiger tolerance. Injured villagers who have escaped death are occasionally sympathetic to the predatory acts of the tiger. Though the policy exists for compensatory payments to wildlife conflict victims, the impasse over unrealistic proof requirements is disturbing.

This study revealed that expediting the compensation payments for livestock predation reduces antagonistic attitudes towards the wildlife and mitigates HWC. Families experiencing fatal tiger casualties, however, remain retributive irrespective of receiving compensation. Surprisingly, crocodiles that remain a leading human predator are not viewed with similar animus, plausibly because of their fear of humans and apprehensiveness to attack due to their size constraints. Other predatory wildlife with minimal human impacts encounters less hatred.

5.7.2. *Acclimatization to Human Presence*

As apex predators, the intelligent tigers do not envisage wildlife attacks except by their species. The humans fighting back, attacking, and killing tigers create skepticism and apprehensiveness that make tigers jittery when facing humans. The current findings determined that many tiger attacks are preemptive defensive attempts, common in the animal kingdom, to

forestall and deter human aggressions and mitigate risks. Tigers construe the core forests as their domain. Exposing tigers to human presence in the core forests can reduce the spurt of defensive attacks on humans. It can also instill fear of humans in the tigers and create supremacy images to mitigate tiger attacks on forest harvesters. The antithetical behavior of tigers to be scared of humans can be reinforced for psychologically mitigating HTC. Simultaneously, human impulses for illegally entering the forest need to be analyzed, customized for avoiding HTC, and curbed to minimize human-tiger interactions, as desired by the forest officials. Studies to evaluate the impacts of increased penalties and minimum mandatory sentences for repeat offenders involved in unauthorized forest entries, tiger killings, and the sale of wildlife or wildlife products for formulating long-term HTC mitigating policies be conducted. Improvised electronic enforcements also need to be introduced to reduce costs while enhancing surveillance.

5.7.3. ***Suggestions for Mitigating Tiger Conflicts***

While tiger proclivities are intricately studied, their adaptative hunting tendencies continue to evolve. Though humans are not the staple tiger food yet, Bengal tigers target humans as prey. Biological propensities of why and what triggers the tigers to attack humans must be examined by animal behavior specialists and strategies devised to mitigate it. As a primal instinct, tigers avoid well-lit areas to retain the element of surprise. This behavioral tendency of the tigers led the PA villages to install solar lights in the village areas next to the forests. Lacking repairs, the lights rust away. The paved roads constructed next to the rivers provide a clear view that exposes the straying tigers. Like the lights, the lack of road maintenance has led to pothole formation, making it unusable. In the shadow of darkness, straying tigers cross into villages to prey on livestock that exacerbates HTC. Microchipping tigers can provide advanced

tiger entry warnings to the village communities. It also provides data for tiger management and identifies tigers that repeatedly stray out for possible relocation. Dogs specially trained by the forest department provide tiger warnings and deter tiger straying. Given the abject marginalization, cost-effective tiger deterrents are necessary for mitigating HTC in the Sunderbans. Affordable tiger-proof pens manufactured from local resources for protecting livestock from predators also need to be further explored for mitigating HTC and tiger straying.

Nylon net fencing is deemed efficacious in preventing tiger straying in the Indian Sunderbans. Appropriate net-fencing materials that resist net-rotting from prolonged brine exposure or avoid being chewed off by the tiger must be selected. Bangladesh Sunderbans must be encouraged to use net fences for abating tiger straying. Skilled local villagers can maintain the infrastructure, thus, benefitting the community. Placing microchips in the tiger must be further explored to mitigate HTC.

5.7.4. ***Minimizing Forest Entry***

This study concurs with the earlier findings that honey, bee-wax harvesting, and fishing in the creeks next to the forests cause the predation of humans by the tiger. Apiculture initiated outside the forest on immobilized river barges will eschew reasons for forest entry while circumventing honey-quality complaints by allowing bees to travel deep inside the forest for the coveted mangrove flower-nectar, endorsed for premium honey. Fish and shrimp farming should be encouraged for the fisherman to have a sustainable livelihood. Fishing in the no-fishing zones of the critical wildlife areas must be strictly prohibited, and habitual offenders heavily penalized for future deterrence. The study determined that boat license certificates (BLC) and dry fuelwood collection (DFC) permit processes are redundant and must be revised and deactivated. Fishing

licenses be issued only to the local professional fishermen and not to non-residents. Since dry wood collection (DFC) is no longer permitted, the forest department should provide subsidized fuelwood or mobile LPG cylinders while issuing fishing permits. They must mandate the use of closed-canopy boats and trained dogs in cages to warn the fishermen and deter incoming tigers. Providing training, insurance, medical kits, drinking water during the fishing trips can minimize HTC and win the trust and goodwill of the fisherman.

5.75 *Study Limitations and Recommendations for Future Research*

5.8. Research Paradigm

Based on qualitative methods, this research seeks to understand the cultural, psychological, and socio-economic drivers of HWC. This study bears several limitations outlined below. The cultural and socio-economic drivers in the sizeable Sunderban areas are dynamic, given the changing population demographics, country traits, weather impacts, religious attributes, and lifestyle habits. Based on the current findings, a new set of questions in future studies can add to obtaining new understandings about the Sunderban. Since qualitative research is not commonly generalizable, it is not a limitation for this study.

5.8.1. *Data Collection Settings*

The interview settings in a public or private location can also significantly impact the results. Interviews for this research were held at open public places rather than in the privacy settings of the respondents. While individual interviews in community locations opened the possibilities of community participation with divergent ideas, the local power politics may have inhibited the respondents from answering truthfully due to the onlookers. Interviews in private

settings allow the participants to respond candidly without antagonizing others with contradictory views. Future interviews conducted in nonpublic settings can better capture the context, perspectives, thick descriptions, and detailed experiences of respondents.

5.8.2. ***Study Samples***

Purposive sampling strategies used for participant selection in this study strictly include tiger attack victims or their immediate family members, forest employees, and NGOs from villages with the highest incidents of tiger attacks. Though this combination enhanced the sample quality by relying exclusively on tiger victims and their families from the high-impact locations, it has overlooked the perspectives of other Sunderban villagers experiencing HTC. Also, study participants strictly included tiger attack victims or their immediate family members that excluded the perspectives and opinions of villagers who lacked tiger encounters but were knowledgeable of the HTC that occurred in their villages. Also, the understandings of other Sunderban villagers not experiencing HWC was excluded, which reduced the breadth of the study. Study limitations can also be ascribed to PA respondents self-reporting their forest-related behaviors. Though self-reporting substantially reveals actual behaviors, it can also alter reality in the eagerness to appease and be politically correct, thereby introducing bias. Since the study asked questions related to HTC that occurred due to unauthorized forest entry, illegal harvesting, poaching, assisting kidnappers, bribery, etc., villagers hesitate to respond, apprehensive of self-incrimination.

The study sample should also include NGOs conversant in diverse focus areas from different parts of Sunderbans. The NGOs will provide a comprehensive and impartial outlook of the problems faced by the PA residents and seek ways to address them. As mediators, the NGOs

can impartially resolve the grievances of the forest guards with the community and the government. The forest guards that had participated in the study felt trapped between the PA residents and the government, dissatisfied with the government resources made available to perform their duties and suffering the resentments of the unhappy residents. While it is highly likely that forest guards will have similar perspectives, the government officials from other Sunderban PAs could provide alternative viewpoints. As a voice of the local PA populace, the NGOs can mediate with the forest guards to resolve the local issues while discussing with the government as an interlocutor for the forest guards to resolve thorny issues like salary and adequate funds allocation for smooth forest operations.

Future research should further expand the geographic representation by involving other PA communities, different forest officials, and NGOs not limited by HWC to provide a comparative, in-depth understanding of the problem. The sample size expansions will broaden the already complex study. Efforts to avoid dilution and oversimplification of data be ensured.

5.8.3. ***Trustworthiness***

Trustworthiness, indicated by Lincoln and Guba (1985), is credibility, transferability, dependability, and confirmability. The credibility of data is linking the research findings with reality to demonstrate its accuracy. The transcribed interview results were forwarded to the respective respondents for their review and confirmations of their response intent and information accuracy (member checking), correct errors, and provide additional information (accurate interpretations) before concluding the topic. Yet, the absence of a deep social, time-tested relationship within the respondent world can allow researcher bias errors to creep in the

form of hunches or felt sense. The uniqueness of this research restricts audit trail verification by experienced auditors.

Transferability indicates the volume of research findings that apply to other contexts and populations (Lincoln & Guba, 1985). Though some research findings are transferable to similar studies, the tiger behavior and socio-morphological conditions of the Sunderban forests are so unique that they inhibit the complete transferability of finding. Even otherwise, qualitative research findings are seldom generalizable and thus, cannot be construed as a study limitation. Lincoln and Guba (1985) noted the transferability judgments are the responsibility of potential appliers. Given the research singularity and the study constraints of time and costs, validations are restricted to peer researchers only, rendering it arduous to predict similar interpretations and conclusions while repeating the research.

5.9 Concluding Remarks

This research examined the interactions of the Royal Bengal Tigers with the local villagers in the peripheral area villages of the contiguous mangrove forests of India and Bangladesh - the Sunderban forests. This study has tried to understand and explore the villager perspectives, beliefs, knowledge, perceptions, and interpretations by analyzing the societal, cultural, and historical relationships with the ecosystem and how it has historically impacted and will continue to influence the human-tiger relationship over time. While providing a detailed reflective analysis into the resident-ecosystem relationship, the results of this research can act as a valuable resource in seeking mitigating solutions for the human-tiger conflicts in the Sunderban forests. It can also assist in improving the livelihood solutions for the residents and their quality of life in the highly marginalized and underdeveloped PA villages. Though not generalizable, some conclusions may apply to similar socio-ecological PAs of the world.

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APPENDIX A

HISTORIC SOCIAL TABOOS URGING CONSERVATION

Table 6

Historic Social Taboos with Hunting Guidelines

Resource Users (Country)	Locality in the country	Segment of population observing taboo	Food (species) avoided in daily consumption	Source quoted
AFRICA	Central African Republic (Pygmies)	Married Couples, Pregnant Females Children	Mushrooms(sp.Cortinariaceae), Mushroom (sp. Termtimes, Amanitaceae)Bongo(antelope), White-bellied duiker (small species of antelope), Tree hyrax (small squirrel like tree (dwelling mammal), genet (small arboreal cat), panther.	1
	Zaire (Mbuti)	All clan members especially women	All totemic animals e.g. leopards, chimpanzees, squirrels, buffaloes, owl-faced monkeys, Bate's antelopes, porcupines, snakes, monitors, Guinea fowls, hornbills, great blue turacos brown crested alethes. Bate's antelopes	2
	Zaire (Ntomba)	Women and Children	Three species of small fish, all reptiles, 24 species of animals, aquatic mammals and carnivores.	3
	Nigeria (Edo state)	Pregnant females	Large fish, rare aquatic animals	4
SOUTH AMERICA	Brazil (Ka'apor)	Menstruating or pubescent girls, newborns- mom 6 mo. father 15d	All meat except turtle	5
	Brazil (Buzios Island)	Menstruating and women	Bullet mackerel, little tunny, ray, shark, Mackerel, shark,	6

		after childbirth, Ill persons	bluefish, blue runner, cutlass fish, guachanche.	
	Brazil (Northern Kayapo)	Pregnant girls, child's mom of ≤ 2 yrs.; Father (till 14 days)	Tapir, peccary monkey, anteater, coati, deer, capuchin monkey, anteater, coati.	8
SOUTH AMERICA Continued	Brazil, Venezuela (Yanomamo)	Pregnant females Menstruating women	Tapir, deer, peccary, anteater, monkey All meat	8
	Brazil (Shavante)	Spouse of pregnant females Father of newborn (14 days) Adolescent females at first menses	Armadillo, All meat Coati, anteater, monkey	8
	Brazil-Colombia (Desana)	Pregnant females, Father of a newborn (14 days) Boys prior to puberty	All meat Howler, night and churroco monkeys, tapir, deer, peccary	8
	Brazil (Tenetehara)	Pregnant females, spouses Adolescent initiates (10 days) Parents of newborns (14 days)	Anteater All meat All meat	8
	Brazil (Tapirape)	Females, adolescents, Adolescent fathers of children ≤ 2yrs	Tapir, deer Anteater, howler monkey	8
	Brazil (Eastern Timbira)	Spouses of pregnant females, parents of newborns-14d, Menstruating women	Armadillo All meat	8

	Bolivia (Siriono)	Pregnant females Parents of newborns (3d) children	Coati, anteater, howler & night monkey Paca, coati, anteater, howler monkey night & howler monkey	8
	British Guiana (Waiwai)	Spouses of pregnant females, adolescent females at first menses (2 mo.), mom of child ≤ 3yrs, adolescent females for 2 yr. after first menses	All meat All meat Tapir, peccary	8
	Ecuador (Jivaro)	Parents of newborns Adolescent females at first menses Males and females after sowing crops (2 mo.)	Peccary Monkey, Howler monkey	8
SOUTH AMERICA Continued	Brazil (Tocantins River)	Ill persons	Local fish species	7
	Colombia (Tukano)	Man with expectant wife, pregnancy, at childbirth, menstruation, mourning periods, gatherers of medicinal herbs, prepares poisons, narcotics etc.	Tapir, peccary, monkey All meat, wild fruits, nuts, honey, edible insects	9
ASIA	India (Tamil Nadu)	Pregnant and puerperal women	Ray, shark	10

S.E. ASIA	Malaysia	Fishermen-women after the birth of a child	Ray, bonito, mackerel	11
PACIFIC ISLANDERS	Papua New Guinea(Maopa people)	Men	Spider-claw crab	12
	Central Pacific (Tuvalu)	Pregnant women of Samoan descent	Rays Octopus	13
	c (Kiribati)	Young boys, Periods of warfare, Old men Pregnant and menstruating females	Cowries, damselfish, lagoon bivalves, Turtles, various wrasses, jelly- fish, or any fish liver, Clams, coral cod, Sole, flounder, turtle, clams, wrasses, crayfish, garfish, cetacean flesh	13
	Solomon Islands (Marovo Lagoon)	Clan members	Giant clams, sharks, crocodiles	14

Sources cited: (1) Motte-Florac, 1993; (2) Ichikawa, 1993; (3) Pagezy, 1993; (4) Osemeobo, 1994; (5) Balee, 1984, 1985; (6) Begossi, 1992; (7) Begossi & de Souza Braga, 1992; (8) McDonald, 1977; (9) Reichel-Dolmatoff 1976; (10) Ferro-Luzzi 1980a, b; (11) Wilson 1980; (12) Kwapena 1984; (13) Zann 1989; (14) Hviding 1989. (**Courtesy**: Colding et al., 2001).

APPENDIX B

PARTICIPANT QUESTIONNAIRE

Background Information

1. Tell me about yourself, your age, education, occupation, family members, parents, and children? Were you born in this area, or did you migrate from other parts of the country or from a neighboring country? If migrated, why?
2. Do you reside close to the core forest? Do you have cows, goats, chicken, pigs, or other livestock?
3. Do you have a fishing license? How do you feel about BLC and fishing licenses?

Relationships between Sunderban villagers and ecosystem

4. What is the importance of the forest, its wildlife to you, your family and to the community?
5. Have you ever harvested products from the forest? If no, why not?
6. Did you or any relative have negative interactions with the wildlife resulting in injuries, loss of life or property? If so, what happened?
7. Historically, how has your family and/or community dealt with such issues?

Human-tiger in these relationships

8. What were your ancestors' views on co-existing with the tiger?
9. How has that changed over time and why?

10. Have you ever seen a straying tiger? How did the situation end? Do you feel okay that some PA residents choose to kill the straying tiger?
11. Do you feel that the tiger behavior has also changed with the passage of time?
12. Do you feel that the tiger is a part of your life and livelihood?
13. How do you think that the tiger problem can be resolved?
14. How do forest guards and officials assist in mitigation of negative interactions?
15. Have you ever been invited or have participated in joint forest operations with the forest services?
16. Living in the PA areas, do you know of someone who is involved in poaching or trades in animal body parts? If so, how do you feel about it?

Factors influencing human-tiger relationships

17. Do you travel into the forest for your livelihood?
18. How do you feel about the tiger – do you have a religious connection? What is your religion mandate about killing / not killing the tiger/wildlife?
19. Tell me more about Goddess Bonbibi. Do you feel that she always protects you inside the forest? If so, how do you justify her devotees getting killed in theforest?
20. Have you/ your community members, ever entered the core areas without permission? If so, why? What will it take for you to stop doing that?
21. Living next to the forests with the dangerous wildlife, how do you feel about the future of your family and the children?
22. Does the tiger presence in the PA affect your and your community's daily life?

Relationships with the forest guards and officials

23. Do you know any forest guard or officials? If so how and how good is your relationship?
24. Do you feel that the guards are helpful? Justify. What do you think that the guards must change and what should they retain?
25. As a normal village resident, have you ever reported illegal forest activities? Why or why not? What would it take for you to be vigilant in protecting the forest?

Relationships with the NGOs

26. How do you feel about the NGOs? Do they help the PA community? If so how?
27. Are the NGOs more interested in their agenda or have they ever helped you?

Forest guard and government official interviews

28. Describe an ordinary PA villagers' attitude towards the forests. How do you feel about their historical forest relationships? What do you think that will benefit the villagers coming from a forest guard/official perspective?
29. What do you think about the state governments attitude towards managing the forests, PA residents and the forest guards/officials?

NGO Interviews

30. How will you categorize the NGO relationships with the PA residents? How can you improve it?
31. Why do you think that your discussions with the forest guards, officials, and state government will improve the conditions of the PA residents? Do you have the

means? If not, how can you improve?

32. Does investing in external profitable ventures by the NGOs create a conflict of interest with those of the PA communities?

33. How do you counter the PA resident accusations of the NGOs working only for themselves?

APPENDIX C

DEMOGRAPHIC MAPS OF PROTECTED AREAS

Figure 7

Detailed Map of the Villages Near the Core Areas of Indian Sunderbans *(Stock photo)*

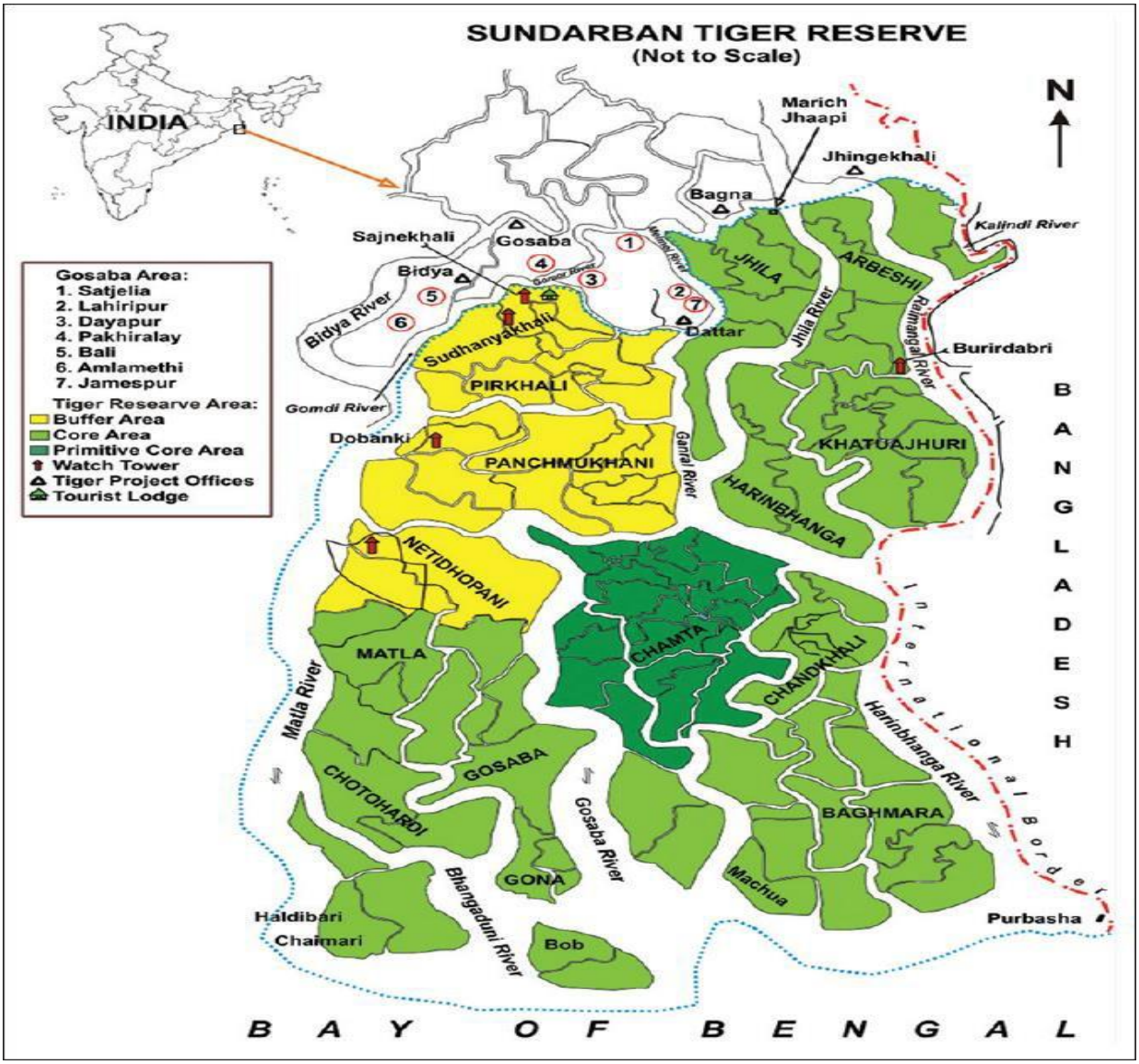

Figure 8

Detailed Map of the Four Ranges (zones) of Bangladesh Sunderbans *(Stock photo)*

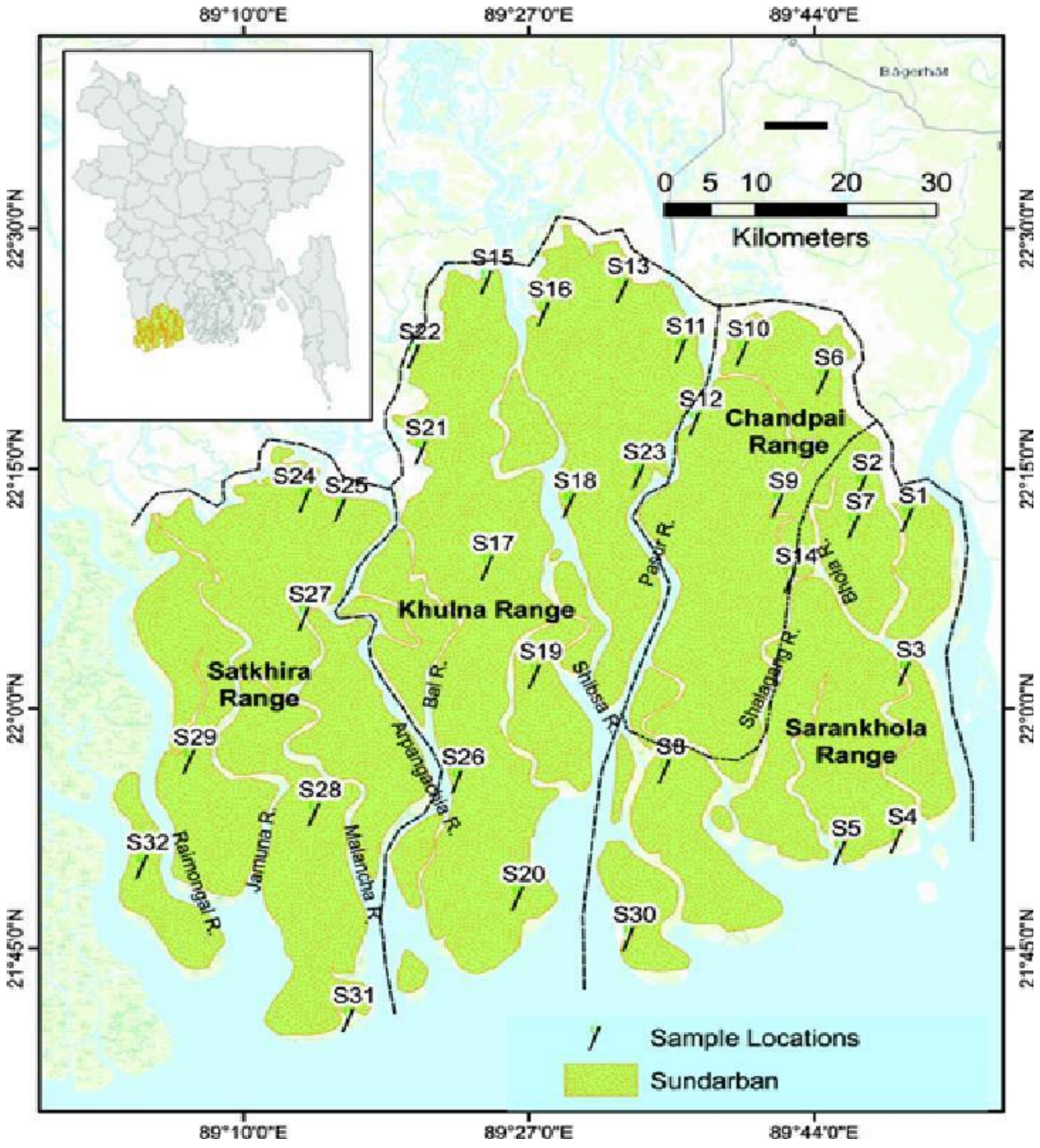

Figure 9

Tiger Reserves in India *(Stock Picture)*

APPENDIX D

POPULATION DEMOGRAPHICS IN THE SUNDERBANS

Table 7

Population Demographics in the Sunderbans

(Gosaba block study community)

Employment demographics	**Total**	**Male**	**Female**
Main Workers (perm. employees)	50,994	43,720	7,274
Cultivators	14,425	12,962	1,463
Agricultural Laborer	23,194	20,408	2,786
Household workers	1,178	774	404
Other workers	12,197	9,576	2,621
Marginal workers	60,002	32,096	27,906
Non-working	135,602	50,094	85,508

Table 8

Poverty Level Changes in Bangladesh Study Area (2005-2010)

District	Subdivision	2005		2010	
		% extremely poor (lower poverty line)	% poor (upper poverty line)	% Extremely poor (lower poverty line)	% Poor (upper poverty line)
Bagerhat	Sadar	42.7	31.6	18.6	35.9
	Sarankhola	62.8	48.7	28.2	48.0
	Mongla	56.4	41.5	22.7	41.9
	Morrelganj	64.0	50.3	27.0	46.5
Khulna	Koyra	50.0	34.8	29.1	49.1
	Dacope	73.3	60.4	24.9	44.5
	Paikgaccha	49.6	34.4	23.3	42.4
Satkhira	Shyamnagar	75.7	65.2	33.8	50.2

Source: Adapted from World Bank Poverty maps of Bangladesh, 2005 and 2010.