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**A STUDY ON ATTITUDE OF LOCAL COMMUNITY ON  
HUMAN-TIGER CONFLICT IN THE SUNDARBANS**

**Anwarul Islam**



**FORESTRY AND WOOD TECHNOLOGY DISCIPLINE**

**KHULNA UNIVERSITY**

**KHULNA, BANGLADESH**

**2015**

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HUMAN-TIGER CONFLICT IN THE SUNDARBANS**

**Course Title: Project Thesis**

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**FORESTRY AND WOOD TECHNOLOGY DISCIPLINE**

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## DECLARATION

*I, Anwarul Islam, declare that this research work is a result of my own works and it has not been submitted or accepted for a degree in any other University.*

Candidate.....

*Anwarul Islam*

Date.....

*10.02.15*

DEDICATION

*To my beloved parents*

## ACKNOWLEDGEMENT

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I am thankful to the members of the community (Mowali, Bawali, Shrimp collector, Fishermen, Crabs collector) in Sundarbans who cooperated with me during interviews, sharing their experiences and have enlightened this study with their perceptions.

This research would not have been complete without the support of my family. My parent's love, encouragement and good wishes always kept me focused in my study.

**Anwarul Islam**

## ABSTRACT

Human-tiger conflict (HTC) is a common scenario where tiger (*Panthera Tigris*, Linnaeus, 1758) and human coexistence (Goodrich 2010). The problem of human-tiger conflict (HTC) is long lasting in Sundarbans. Once it was permitted to kill the tiger and sometimes provided reward to the hunter for killing man-eater. The tiger was rapidly decreasing, so the government took steps to conserve it and formed The Bangladesh Wild Life (preservation) (amendment) Act, 1974 which prohibited killing them. This is the world's largest remaining population of wild tigers (440) and it shares its habitat with roughly 3.5 million people, which are living alongside the Sundarbans and mostly depend on its natural resources.

I found 561 (1990-2014 Oct)(Appendix-2) people killed by Tiger by an average 22.64 people/year killed, 186 (2008-2014 Oct) on about 26.57 people/year injured by tiger incidence and 67 Tiger died/killed by the local community, sometimes killed by poachers and the rate of incidence is higher in Sundarbans West Division basically in Satkhira range. I found (unofficially) 305 livestock killed from 2008 to 2014 (Oct) but only 107 cases reported by the Forest Department. This report indicates that only 35% of the casualties report by Forest Department, 65% of casualties is remained unknown. The loss of human life and livestock can have a devastating impact, both emotionally and economically, on the affected family.

I conducted interview 98 local people (Mowali, Bawali, Shrimp collector, Fishermen, Crabs collector) mainly who has experience (lost family member, neighbor or group member) in order to gather their views on tiger-human conflict. In my field survey I found 59.2% (Fig: 4.8) interviewees like tiger and 40.8% (Fig: 4.8) dislike tiger but when a stray tiger enter into villages and killed or injured family member or killed livestock 81.63% interviewees don't support stay tiger conservation, 39.90% (Fig: 4.10) interviewees feel happy (publicly 23.47% and tacitly 16.13%) because they consider the tiger as an enemy, 32.7% (Fig: 4.9) interviewees feel bad when tiger dead or killed, 16.33% (Fig: 4.9) interviewees taking normally 52.04% (Fig: 4.11) believed that most frequent cause of tiger deaths is poaching, 56.2% (Fig: 4.13) thought, stray tiger are mentally sick and killing of this tiger may be the best solution so they attack the tiger to kill, 33% (Fig: 4.12) interviewees' assumed illegal hunting of natural prey like deer is the main cause of tiger stray. I also found 95% of them wanted to change their occupation, if they have. Most of the interviewees (21.7%) (Fig: 4.15) tigers kill people mainly because of their fate, which indicates that people get killed mainly by man-eating tigers People living around the Sundarbans are so superstitious that most of the interviewees (44%) (Fig: 4.16) thought that human casualties by tigers can be reduced by taking only the spiritual protection measures, i.e., keeping a sacred bead, a sacred rope or a sacred handkerchief, or sacrificing domestic chicken or goat in the Sundarbans (by releasing them in the name of a spiritual man called 'Gazi'), or praying to Banbibi or Gazi-Kalu. Most of the interviewees (25.2%) (Fig: 4.17) thought that improved patrolling and implementation of laws by the Forest Department can reduce killing of tigers in the Sundarbans. About 95% of interviewees are not satisfied with FD management activities. 44.3% (Fig: 4.14) of my interviewees assumed that FD should take proper steps to stop illegal killing of natural tigers' prey.



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## ABBREVIATIONS

|      |  |
|------|--|
| DFO  | Divisional Forest Officer                      |
| ACF  | Assistant Conservator of Forest                |
| FD   | Forest Department                              |
| SPBC | Sundarbans Biodiversity Conservation Project   |
| BTAP | Bangladesh Tiger Action Plan                   |
| SRF  | Sundarbans Reserved Forest                     |
| IUCN | International Union for Conservation of Nature |
| IRMP | Integrated Resource Management Plan            |
| VTRT | Village Tiger Response Team                    |
| HTC  | Human Tiger Conflict                           |
| WT   | Wild Team                                      |

## GLOSSARY

|              |  |
|--------------|--|
| Bawali       | Wood cutter or collector from the Sundarbans.  |
| Mowali       | Honey collector.   |
| Compartments | Forest area delineated by natural boundary into several management units.  |
| Impact Zone  | The surrounding and adjacent 17 upazilas (lowest administrative civil unit) of SRF people of which are directly or indirectly depends on the resource of Sundarbans. |



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

The Sundarbans mangrove forest in the Gangetic delta is the largest continuous mangrove forest in the world (10,284 Sq.km) with 4,267 Sq.km (41.5%) in Indian territory and 6,017 Sq.km (58.5%) in Bangladesh. Possibly Sundarbans is one of the biggest remaining tiger populations in the world, human-tiger conflicts are more frequent than in any other tiger range of the world. Approximately 350-500 tiger population present in this land. It is a unique tiger land where the tiger is blamed as man-eaters. Only a limited number of tiger victim cases reach to the public. The discrepancy between the actual number of incidences and published could be related to the portion of victims have entered the forest illegally.

The tiger (*Panthera tigris tigris*, Linnaeus 1758) is the flagship species, we need to save the wilderness and biodiversity throughout its range. Royal Bengal Tiger is categorized as an Endangered species globally (Chundawat et al. 2011) and critically Endangered nationally (in Bangladesh) (IUCN-Bangladesh 2000). It is listed in the third schedule of the Bangladesh Wildlife Conservation Act of 1974, implying its full protection by interdicting killing and capturing (MoEF-Bangladesh 2004). The Bengal Tiger was randomly killed, especially man-eater or those staring into village before 1974 and sometime professional hunter was hired with giving reward Rs 50.00 per man-eater killing. A large number of tigers had been killed during Gewa collection for Khulna Newsprint Mills. But it is strictly prohibited to kill the tiger and give special emphasize to conserve it and its habitat.

The adjacent area of the Sundarbans is known as the Sundarbans impact zone. It is extended up to 20 km to the locality of Sundarbans. 17 upazila of 5 district falls under this area which has a population of about 3.5 million people. It was found that more than 68% of the households extracting the Sundarban resources were also involved in secondary occupations (also based on Sundarban resources) (SBCP, 2001). Fifteen percent of all household heads in the Impact Zone (113,534 households' total) declared earning their primary income from activities inside the forest (SBCP, 2001).

## 1.2 Problem statement

Although there are no human inhabitants inside the Sundarbans, eight Upazillas with a total population of around 1.7 million people lie directly adjacent to the forest boundary and approximately 3.5 million local people are directly involved in collecting forest products. People live on the fringes of the Sundarbans either partially or completely depend on the natural resources of the Sundarbans. These people have little choice but to go to the Sundarbans, either legally (with necessary permission from the Forest Department) or illegally. It is difficult to check the entry of a large number of people in this huge tract. When people and tigers roam in the same area, some conflicts take place. The level of tiger-human conflict in the Sundarbans, however, is the highest in the world because here many of the tigers are man-eaters. People are either deliberately or accidentally killed by tigers, whereas some tigers are killed by people either because those tigers started attacking humans and cattle or just to poach it for economic gain. Human-killing by tigers produces unnecessary human misery and economic stress, while tigers that enter villages are often killed in return (Gani 2002; Chowdhury et al. in press). Information on human and tiger-killing in the Sundarbans, however, is scattered across reports and papers not readily accessible by the FD. Most of the occurrences have occurred when victims enter into tiger territory or very close to the cubs.

A high density of humans and livestock gives rise to a high probability of encounters. In the Sundarbans, high human casualties were related to people collecting non-timber forest produce. A man-eating tiger is actually very rare believed that the ferocity of the tigers in the Sundarbans was related to the salinity of the surrounding water. Cattle in these areas serve as a supplement to natural prey. All the same, it contributes significantly to the human-tiger conflict.

Some people are vulnerable to tiger attack who live nearby the Sundarban are engaged in honey collections, cutting woods and gollpata, fishing, catching crabs and shrimps and collecting snails for their consumption and livelihood. Fishermen are the most as well as Bawalis are the second most vulnerable to tiger attack, Most of the human casualties by tiger occurred inside of the sanctuary and few occurred in the periphery. The monthly and diurnal patterns of occurrence of human casualties can be correlated with the activities of people and movement of tigers in and around the forest. Cattle lifting by tigers mostly occur outside the protected area boundaries because the agricultural fields offer continuity of habitat out of the forest areas and good conditions for resting, hiding and ambush cover for tigers.

Only a few studies have on human-tiger conflict in Sundarbans in some detail with the aim of producing factual information that could help in developing initiatives to lessen the number of attacks occurring each year. This study mostly deals with the human-tiger conflict, straying and man-eating propensity of Sundarbans tiger, but negligibly on its habitat specific use and status.

### **1.3 Objectives of the study**

1. To analysis the frequency of human-tiger conflict in Sundarbans during my observation period.
2. To analysis the seasonality of human-tiger conflict in Sundarbans.
3. To assess the perception of local community on tiger conservation.
4. To assess the perception of local community on stray tiger situation.
5. To assess the perception of local community on human-tiger conflict.

#### **Research questions for the objectives**

1. What is the frequency of human-tiger conflict in Sundarbans?
2. What is the seasonal variation of human-tiger conflict in Sundarbans over the year?
3. What is the perception of local community regarding tiger conservation?
4. What is the perception of local community regarding stray tiger?
5. What is the perception of local community on human-tiger conflict?

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## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 History of human-tiger conflict in Sundarbans

Sundarbans tigers have ill-famed as man-eaters. The earliest known written document is found in the letters of Portuguese Jesuit missionaries, among them Fernandez and Melchior Fronseca, who travelled to Banglail in 1598-99. For the first time they reported that tigers in the Gangetic delta are fond of human flesh (Hosten, 1925). The reason for this behavior can not so far be understood.

A study by Hendrichs (1975) used the timing and location of attacks to investigate the number of tigers involved in three outbreaks of human-killing. In the first case, a male and female tiger known as "the Chapra pair" were thought to be responsible for a spate of human-killing in the southeast of the Sundarbans. In the second instance, a male tiger, "the Marapassur man-eater", was identified as killing up to 32 people. In the third case, a male tiger, "the Arpangasia/Jafa man-eater", was reported as killing people either side of the Arpangasia River in the north-west of the Sundarbans (Hendrichs 1975).

A total of 7,833 human deaths from tiger attacks was recorded in the Sundarbans, between 1860 and 2006 and 1,259 tiger deaths were recorded from 1881-2006 in whole Sundarbans (Bangladesh & India); 233 tiger deaths in Bangladesh over 42 years, 1,020 tiger deaths over 33 years for the whole Sundarbans, where the country was not specified. These records were not included for further analysis, because the data were not year specific, and it was not clear how the information was collected. The remaining cases were recorded from 1881 to 2006 (Curtis 1933; Chaudhuri and Chakrabarti 1972; Hendrichs 1975; Chakrabarti 1980; Siddiqi and Choudhury 1987; Sanyal 1995, Indian Forest Department records 1985-2000; Bangladesh Forest Department records 1984-2006). Records were available for 84 of the 126 years, but some of the years had data for only the Indian or Bangladesh side. A total of 3,615 human deaths were recorded; 1,396 in Bangladesh, 1,231 in India, and 988 not specified to a particular country. Over the last 50 years in India, the recorded human deaths have decreased steadily, whereas the numbers for the Bangladesh side have remained more constant. For Bangladesh the mean was six tiger deaths /year in India was one tiger death/year. For the most recent decade 1991-2000 in Bangladesh, a mean of 3 tiger deaths /year was recorded (Indian Forest Department records 1985-2000; Bangladesh Forest Department records 1984-2006). Considering approximately 33% of incidents may go unrecorded (Jagrata Juba

Shangha 2003), gives a total estimate of 9,550 human deaths between 1881 and 2006, or an average of 76 human deaths/year.

## 2.2 Human-Tiger conflict

Mallick (2007) categorized the problem of human-tiger conflict in Sundarbans into two types:

1. Conflict outside the forest area: This is caused when the tiger strays out of the forests and enter the villages on the opposite side by crossing the channels. In the past, these fringe villages were established on the reclaimed forest land, where the interface is mostly demarcated by a small creek.
2. Conflict within the forest areas: This is caused due to the intrusion (with or without legal permits) of people in the tiger habitat. Mostly the honey collectors and fishermen fall prey to the tigers in the forest. The honey collectors penetrate deep inside the forest in search of beehives and, in the process, mostly get isolated from the other group members because of the thick and almost impenetrable forest. As a result, they become easy prey for the tigers. Sometimes these groups, accidentally and unknowingly get close to the tiger habitat and the disturbed tiger attack them. The honey collectors also burn the beehives by using the Golpata (*Nypa fruticans*) and Hental (*Phoenix paludosa*) leaves, which creates heavy smoke and causes irritation and disturbance for the tiger and they are attacked by the big cat.

## 2.3 Physical characteristics of incidence place

Most of the incidents occurred in deep forest, a very few cases occurred in the border of the tiger territory. The incidents mainly occur in the small creeks deep inside the forest and very close to the tiger habitat, where the tiger may hide behind the Hental bushes on the bank and extractors are attacked by the tiger. Crabs collection is higher in the western part of the Sundarbans, while fishing is more in the western part and honey collection is concentrated in the southwestern side. The low mud flats on both sides of the creeks are potentially best areas to find the crabs and a time consuming activity and these areas are also the most probable sites for tiger. Chakrabarti (1978) also identified the habitat formation 'pure Ceriops' for the highest records of human casualties, together with high records in pure and mixed Phoenix stands. The most notorious tigers are those which swim to the boat on the river or creek, mount on it, select their victims and jump into water with the dead body to return to the forests.

## 2.4 Straying of tiger

### 2.4.1 Period of tiger strays

The straying of the tiger is a common phenomenon (Mukherjee and Tanti, 2001), in which the tiger swims across the rivers to reach the fringe villages in darkness for many reasons. The tiger straying incidents happen throughout the year, but most of them occurred during 3 months (Dec–Feb) of the winter season (42 per cent) followed by 3 months (July–Sept) of the monsoon season (31 per cent).

The incidents of tiger straying mostly occurred during the winter (December- February). In most cases, the tigers had resorted to cattle lifting or poultry feeding and gone back to the forest on their own. These straying incidents may be termed as 'temporary straying', whereas in case of any repeated straying by the same tiger or tigress, it is captured by a trap cage and trans-located to a distant forest. In case of the permanent or semi-permanent straying, the tiger usually takes refuge in a cattle shed or inside any hut and has to be chemically immobilized and trans-located. Human killing occurred rarely in the civil areas and that too in self-defense. It may have some accidental cause. Therefore, the hypothesis that the tigers stray into the villages in search of the human prey is not acceptable.

### 2.4.2 Causes of tiger straying in the locality of SRF

Following are the main reasons for tiger straying in the locality of SRF:

**Scarcity of Prey Animals:** The abundance or scarcity of prey animals are not directly related to the human casualty figures to the tiger but related to tiger straying. Cattle in the reclaimed areas of Sundarbans serve as a supplement to the tiger's natural preys, which actually contribute significantly to the human-tiger conflict in the fringe villages.

**Difficulty in Hunting:** The tiger depends on its stealth to stalk and ambush upon a prey. But the Sundarbans terrain provides an unfavorable condition for this purpose due to sticky, deep mud all around. Stepping a foot forward cannot be done without making a distinct sound, depriving the predator of its stealth. Hence, the hunting success rate in the Sundarbans is far low (only about 20 per cent) as compared to other areas.

**Proximity of human habitation to the tiger habitat (Mallick, 2013):** In some areas of Sunderbans human habitation and tiger habitat are divided by very narrow creeks. The cow sheds are situated almost at the fringe of the villages and on the banks of the narrow creeks. Generally catching of prey in the Sunderbans is quite difficult for the tigers due to the geomorphologic conditions. Sometimes the tigers stray inside the villages to search, easy prey like cattle.

**Embankment protection mangrove strips of the villages are confused by the tigers as their own habitat (Mallick, 2013):** In the fringes of some villages embankment protection mangrove strips have been developed. Tigers sometimes confuse those mangrove strips with their own habitat. Thus tiger straying may take place due to this reason.

**Littering female strays in the paddy field to protect her cubs (Mallick, 2013):** Female tigers have also been reported to stray into the paddy fields around the villages during littering season apparently to protect the newborn cubs from the aberrant behavior of the males.

**Confusion with paddy field with *Porteresia coarctata* (Mallick, 2013):** During the late monsoon or post-monsoon when paddy in the field around these villages ripe, the migratory tiger naturally gets confused as to whether there is a forest on the other side of the creek or not. To add to its confusion, the ripped paddy looks somewhat similar to *Porteresia coarctata*, commonly which is known as "shali ghas".

**Generally old tigers stray for easy prey (Mallick, 2013):** Partly it may be true that old tigers may stray into the villages for easy prey like cattle or stray dogs, but this is not the major cause of straying. The aged or injured tigers, which cannot capture any prey in the forest by chasing, stray out into the villages to capture easy prey. The tigers with paw injury cannot hunt any agile prey and have to depend on the easy kills like domestic animals and sometimes human being.

**Straying due to washing out of pheromone by tidal waves (Mallick, 2013):** Every day the Sunderbans witness high tide and low tide twice. Pheromone sprayed by tigers on the tree trunks to mark its territories are washed out by the tidal waves everyday and tigers get confused and stray inside the human habitation. This may be the one of many reasons.



**Shrinking habitat (Mallick, 2013):** Sea level and associated changes in the Sundarbans have been identified as the most important threats to the ecosystem (Hazra et al., 2002; Hazra, 2010). Lack of suitable habitat for the herbivores is decreasing the prey base for the tigers in Sundarbans. For increasing density of the tigers might have a neck-to-neck competition for the prey within a limited area. Under the circumstances, the tiger often strays out to the nearest reclaimed areas in search of suitable food. This might be a valid reason for the increasing trend of tiger straying.

**Fog Factor (Mallick, 2013):** Most of the straying occurs during the winters, particularly in the month of November- January. During winter, thick fog covers making it difficult to differentiate the land and waters. The tigers have Tapetum Lucidum in their eyes, which help them to have a better and clear vision at night than in the morning, but it seems that it does not help much in dense fog. Most probably the tigers cannot detect the right route (forest or village) and hence enter the villages by mistake.

**Suffering from cataract or broken canines may influence stray (Mallick, 2013):** Some of the strayed tigers suffered from cataract or had broken canines. But this is not wholly true because it is hardly found in less than 10 percent cases among the rescued animals. Besides, most of the strayed tigers were young and healthy, showing any visible signs of injury

**The Male Tiger Losing Domain to the Aggressive Male Tiger may stray (Mallick, 2013):** The possibility of territorial conflicts among the Sundarbans tigers is higher as twice every day there is high and ebb tides causing a change of the habitat by the tigers within the intertidal forest, when a male may intrude upon another's territory resulting in conflict. Occasionally, an old male tiger is driven out by the dominant male and the former takes shelter in the adjacent mangrove plantations near the village.

**Adventure (Mallick, 2013):** Many young tigers were also seen to stray out. It is argued that some of them may do so for the adventure. According to the villagers, it is very difficult to ascertain the age of the straying tigers as in most cases straying takes place during the night. Hence, it cannot be confirmed that the sub-adult males straying inside the villages losing domain before aggressive adult males.

## **2.5 Man-eaters**

The term "man-eater" is used here for all tigers that attack people within the forest, regardless of the circumstances and regardless of the victim's fate, be it getting injured, killed or eaten.

### **2.5.1 General characteristic of man-eaters**

There are various conceptions regarding the man-eaters (Chaudhuri, 2007). It is not true that every tiger in the Sundarbans is a man-eater. Man-eater should be treated as an ecological reaction to the gross over-exploitation of natural resources carried out by the humans for years together (Chakrabarti, 1992). Neumann- Denzau and Denzau (2010) gave another possible interpretation that, due to the disturbances caused by increased human activities, a local tiger could have turned into a man-eater.

Chakarbarti (1984) believed that the ferocity of the tigers in the Sundarbans was related to the salinity of the surrounding water. Chakrabarti (1992) believes that salinity of water is probably the most important factor responsible for a good percentage of tigers turning man-eaters. Continuous consumption of salt water might have affected the kidneys and liver of the animals and, hence, changed their physiology (Chakrabarti, 1986). Thus, they lose their temperament and become man-eaters. But that is only an unproved hypothesis. Even any kidney problem was not found in the rescued or dead Sunderbans tigers. In fact, the Sundarbans Tigers were wrongly branded as inherent and designed man-eaters (Chakrabarti, 1991, 1992).

Hendrichs (1975) had concluded that the primary reason for tigers in the Sundarbans killing high numbers of people was the increased brackishness of the rivers; this transformation had forced Sundarbans tigers to depend on the "sweetness" of human blood to obtain a certain dietary balance.

The tigers attack humans only when they are old and impaired, young tigers of the Sundarbans were seeking out humans by swimming over to villages or lifting people off boats to satisfy their hunger (Jalais, 2008).

### **2.5.2 Causes of turning man-eater**

Human behavior is responsible for this propensity in the tiger. People, who encroach upon the forest, take little precaution against the tigers. They go into the interior in small open *dinghies* (boats) and roam around together for months in search of the forest products, making an easy target for the tigers.

## **2.6 The Sundarbans**

### **2.6.1 General description**

The Sundarban tiger is a creation of the complex ecology and environment (Chaudhuri and Choudhury, 1994). The mangroves are adapted to the estuarine environment and the animals inhabiting the region demonstrate, in turn, the same adaptability to variable salinity, muddy substratum, and periodic tidal flush (Chandy and Euler, 2000). The Bengal Tiger has equally adjusted itself comfortably to this ecosystem (Mandal and Nandi, 1989). The habitat pattern in the Sundarbans is uniformly monotonous, not broken by such landscape features that are known to provide specific cover for the tiger in other areas. There is adequate forest cover for its hunting, hiding and procreation. However, it is generally observed that the *Heritiera* and *Phoenix* formations, which are not regularly inundated or inundated for a short period, form an ideal tiger habitat (Chaudhuri and Choudhury, 1994).

The tigers were observed to use these different habitats for definite purposes like shelter, breeding, hunting, etc. this habitat use pattern vis-à-vis the forest types are recorded separately. Due to frequent shifting or island-migration and occupation of new habitat by the tigers, the habitat occupation and range of movement varies considerably from individual to individual and from time to time, mainly depending on availability of the prey species- be it wild, domestic or human beings entering forests, some with legal permits and mostly illegally.

### **2.6.2 Climate**

Three seasons are identified- dry weather in the pre-monsoon from February to May; monsoon from June to September and post-monsoon from October to January with an average wind speed of 11.5 km, 11.1 km and 60-65 km per hour respectively. The climate is subtropical- temperature varying from 20°C (December-January) to 33°C (June-July), Average annual rainfall ranges from about 1,800 mm in Khulna near the north of the Sundarbans to 2,790 mm on the coast, with the majority of the rainfall (70-80%) occurring during the monsoon and humidity between 70 per cent and 80 per cent. The region is exposed to violent cyclonic storms from mid-May to mid- June due to north coastal winds followed by floods, which more or less damage the vegetation cover and have a negative impact on the wildlife.

### 2.6.3 Wildlife of Sundarbans

The Bengal tiger is the most important wildlife in Sundarbans. The others are about 289 terrestrial faunas species of 185 genera (Seidensticker and Hai, 1983) and 219 aquatic fauna species of 146 genera (Chantarasri, 1994) had been earlier reported as found living in the Sundarbans. The SRF and surrounding areas have a rich avifauna and 315 species, including 95 species of waterfowl, 38 species of Raptor, and 9 species of kingfisher representing 48% of the birds known to occur in Bangladesh have been recorded (IUCN, 1994; Hendrichs 1975; Seidensticker and Hai 1983; Sarker and Sarker 1986; Chaudhuri and Choudhury 1994; Hussain and Acharya 1994; Naskar and Mandal 1999). About 375 wildlife species of them 35 reptiles, over 300 birds, 32 mammals and 8 amphibians are found in Sundarbans (SBCP, 2004). Moreover, 200 -300 fish species are recorded in SRF (Chaudhuri and Choudhury 1994; Hussain and Acharya 1994; Sanyal 1999; Islam and Haque 2004) and a Giant honey bee (*Apis dorsata*) (Chakrabarti 1987a; Gopal and Chauhan 2006).

The major wildlife species are Bengal tiger (*Panthera tigris tigris*), Spotted deer (*Axis axis*), Wild boar (*Sus sacrofa*), Monkey (*Macaca mulatta*), Crocodile (*Crocodylus porosus*), Rock python (*Python molurus*), King cobra (*Ophiophagus hannah*), Common krait (*Bungarus caeruleus*), Olive ridley turtle (*Lepidochelys olivacea*), Green turtle (*Chelonia mydas*), Irrawaddy dolphin (*Orcaella brevirostris*), Melon-headed dolphin (*Neophocaena phocaenoides*), Minor lizard (*Varamus bengalensis*), Common otter (*Lutra lutra*) etc.

**Table: 2.1 Faunal biodiversity of Sundarbans comparison to whole Bangladesh**

| Fauna      | No. of species available in Bangladesh | No. of species available in SRF | % in SRF as compared to Bangladesh |
|------------|--|---------------------------------|------------------------------------|
| Mammals    | 116                                    | 32                              | 27.59                              |
| Aves       | 868                                    | 300+                            | 34.56+                             |
| Reptiles   | 143                                    | 35                              | 24.48                              |
| Amphibians | 22                                     | 8                               | 36.36                              |

**Source:** IUCN, 2000; Hendrichs, 1975; Seidensticker, 1983; Hussain & Acharya, 1994; FRMP, 1997; IRMP, 1998

The major birds are Brown-winged king fisher (*Halcyon amauroptera*), Rudy kingfisher (*Halcyon coromandra*), Blac-winged kite (*Elanus caeruleus*), Brahminy kite (*Haliastur indus*), Red jungle fowl (*Gallus gallus*), Little heron (*Butorides striatus*), Great egret

(*Casmerodious albus*), lesser adjutant (*Leptoptilos javanicus*), White bellied sea eagle (*Haliaeetus leucogaster*) etc.

#### 2.6.4 Extinct wildlife in SRF

Once SRF was enrich in various kind of wildlife. Due to unfavorable environmental condition some of the species are extinct. The extinct wild animals are noted in following table.

**Table: 2.2 Extinct wildlife in SRF**

| English name | Species name            | Scientific name             |
|--------------|-------------------------|-----------------------------|
| Wild buffalo | Wild buffalo            | <i>Bubalis bubalis</i>      |
| Deer         | Hog deer                | <i>Axis porcinus</i>        |
|              | Swamp deer              | <i>Cervus duvauceli</i>     |
|              | Samber                  | <i>Cervus unicolor</i>      |
| Rhino        | Indian one-horned rhino | <i>Rhinoceros unicornis</i> |
|              | Javan rhino             | <i>Rhinoceros sondaicus</i> |
| Crocodile    | Marsh crocodile         | <i>Crocodyles palustris</i> |

Source: Hussain and Acharya, 1994

#### 2.6.5 Prey base species in sundarbans

In Sundarbans the main prey base of Bengal tiger are spotted deer and wild boar. Beside Bengal tiger also eat Monkey, Otter, Crabs and Fish. Hendrichs (1997), Tamang (1993) and Integrated Resource Management Project (1996-1997) report on prey base population in Sundarbans are given below:

**Table 2.3 Status of major prey base species in SRF**

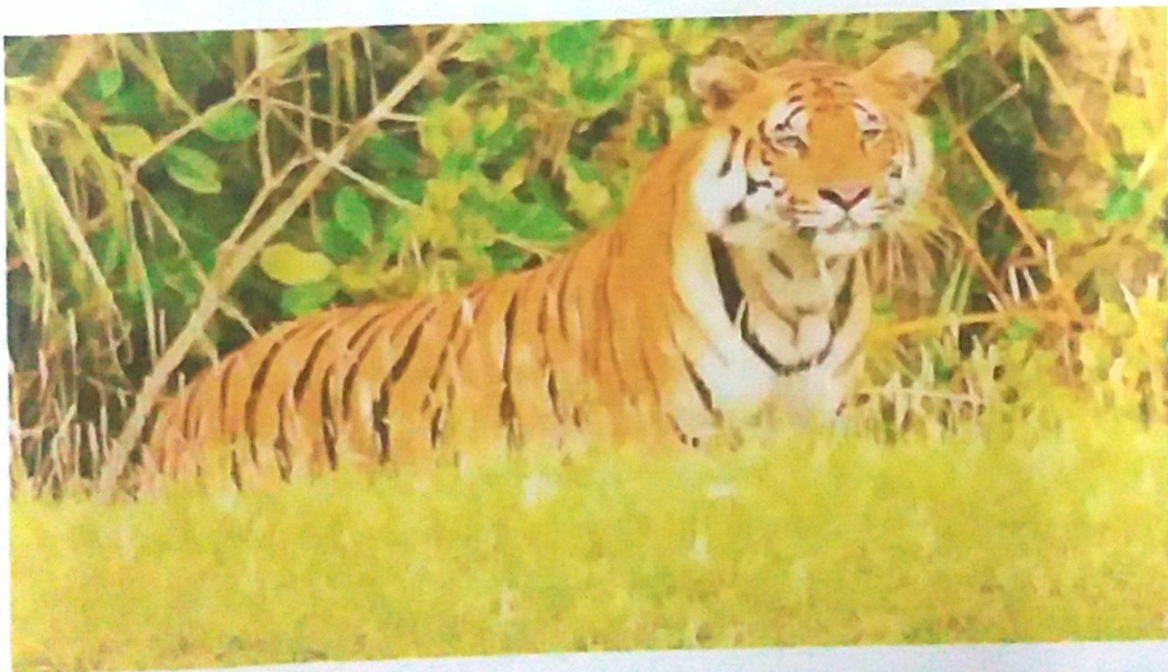
| Name of Species | No. of individuals |               |                   |                  |
|-----------------|--------------------|---------------|-------------------|------------------|
|                 | Hendrichs (1971)   | Tamang (1993) | IRMP (1996-97)    | FD-2014          |
| Spotted deer    | 80,000             | 90,537        | 1,00,000-1,50,000 | 1,00,000-1,50,00 |
| Barking deer    | ----               | 29,181        | ----              |                  |
| Wild boar       | 20,000             | 45,269        | 20,000-25,000     | 20,000-25,000    |
| Monkey          | 40,000             | 40,000        | 40,000-25,000     | 40,000-50,000    |
| Otter           | 20,000             | 20,000        | 20,000-25,000     |                  |

Source: FD, 2014; IRMP, 1998.

## 2.7 Bengal Tiger

### 2.7.1 General description of Bengal Tiger

The tiger is the largest obligate carnivore in all over the mammalian assemblages in which it occurs in Asia and most iconic animals. Historically, tigers could be found over most of Asia and Central Asia. The world's population of wild tigers has plummeted by 95 percent in just over a century, from an estimated 100,000 in 1900 to approximately 4147 today. Their habitats have shrunk by 93% and the remaining tiger range countries today are Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Russia, Thailand and Vietnam. The World Conservation Union (IUCN) has listed the tiger as Endangered to Critically Endangered. Tigers have already disappeared from Central Asia. Tigers are divided into six living subspecies: the Royal Bengal (*Panthera tigris*), Indochinese (*Panthera tigris corbetti*), Malayan (*Panthera tigris jacksoni*), Sumatran (*Panthera tigris sumatrae*) Siberian or Amur (*Panthera tigris Altaica*), and South China tiger (*Panthera tigris amoyensis*). The three extinct subspecies are the Bali tiger (*Panthera tigris balica*), the Javan tiger (*Panthera tigris sondaica*) and the Caspian tiger (*Panthera tigris virgata*). The remaining tiger habitat is spread across 13 countries and faces many challenges as a result of human population growth and development pressures.



**Fig: 2.1 A Bengal Tiger searching prey ( Source: FD, 2014).**

### 2.7.2 Scientific classification of Bengal Tiger

To get knowledge about the kingdom and identification of all the species in the world are arranged in a specific manner has given scientific name following a scientific manner that is known as scientific name. The scientific classification of Bengal Tiger (Linnaeus, 1758) is as follow (IUCN, 2003):

|             |                                 |
|-------------|---------------------------------|
| Kingdom     | : Animalia                      |
| Phylum      | : Cordata                       |
| Class       | : Mammalia                      |
| Order       | : Carnivora                     |
| Family      | : Felidae                       |
| Sub-family  | : Pantherinae                   |
| Genus       | : <i>Panthera</i>               |
| Species     | : <i>Panthera tigris</i>        |
| Sub-species | : <i>Panthera tigris tigris</i> |

### 2.7.3 Physical description of Bengal Tiger

The coat exhibits yellowish-orange color and are mostly dominated by the brown or black stripes that run across its belly together with a white tail. The length of the Bengal tiger measures around 270 – 310 cm (110 – 120 inches), in which the females are 240 – 265 cm (94 – 104 inches) long. These animals have 85 – 110 cm (33 – 43 inches) long tail. The shoulder height is about 90 – 110 cm (35 – 43 inches); head and body measuring around 189 – 204 cm (74 – 80 inches) by length as well as 100 – 107 cm (39 – 42 inches) long tail. Bengal male tigers weigh about 180-280 kg (397-617 lb) on an average, while the average weight of the females is 115-185 kg (254-408 lb). Males have greatest length of the skull measuring 332 – 376 mm (13.1 – 14.8 inches).

### 2.7.4 Bengal Tiger Home range

Bengal tigers are the solitary hunters and they aren't normally found to forage in groups. There is limited territorial area within which they restrict their movements. There must be an ample quantity of food available together with the tranquility of place is a must for Bengal tigers to live in. In winter, these animals cover 110 sq. km (42 sq. miles) while in summer Bengal tiger encompasses 200 sq. km (77 sq. miles). The habitat range is about 16 – 31 sq. km (6.2 – 12 sq. miles). Males tend to occupy greater home ranges so as to ensure various females inside their territories on the other hand females have much smaller ranges and are

restricted to smaller ranges and restricted to smaller territories and for raising and protecting cubs (Maudud, 1998).

In 1975 Hendrichs observed a pair of stray tigers living within a territory of 15 sq. km to 30 sq. km Tamang (1993) reported that one man-eater moved in 9 compartments between November 1992 and July 1993 in the Chandpai ranges that is a much larger area (Maudud, 1998).

### **2.7.5 Bengal Tigers diet**

Since they are carnivorous, they largely eat chital, deer, gaur, sambar, and other ungulates. Bengal tigers get through 6-10 kg (13-22 lb) of meat in one time. Past studies based on baits and wild prey indicates a tiger needs 2555kg (7 kg X 365 days) of meat per year that is roughly about 73 spotted deer or wild boar (Tamang, 1993). With a population of 419 tiger in SRF the total amount of meat will be required 1070545 kg, which is 30587 number of spotted deer or Wild boar per year.

### **2.7.6 Reproduction and life cycle**

Females normally give birth to their cubs in the months of December and April. However, the mating season has also been observed at mainly rainy season (March, May and October) when the forest is likely to be less disturbed (Maudud, 1998). Tiger is polygamous. One of the best mating season ranges from November to the end of February. Males take 4 – 5 years to be fully mature; however, females become mature at 3 – 4 years. The period in which the tigress is receptive lasts for 3 – 6 days. The gestation period lasts for 100 – 108 days (Crandall, 1964) and 98-112 days (Perry, 1964). Females litter 1 – 5 cubs (mean=2.98) that are sheltered in the caves. The inter birth interval may as short as 20 months (mean=21.6 months, range 20-24).

A relatively short inter birth interval enhances the reproductive output of tigresses, especially if litters are large and survival of young is high. In 3 cases when inter litters were lost shortly after birth, the interval between litters was 7-8 months (Sunquist, 1999). A tiger is fertile upto 15 years. Tigress can produce 6 litters and can give birth up to 15 cubs in her life (2.5 cubs in a litter). It will of course depend on the condition of the habitat.



The weight of the cubs is around 780 – 1,600 grams (1.7 – 3.5 lb). The young are covered by a thick fur after 120 to 150 days. After 14 – 21 days, the milk teeth begin to emerge in the juveniles. These cubs won't be enjoying large-sized food for at least 55 – 60 days. However, while hunting they do accompany their mother. After 150 – 180 days, these cubs will now start hunting. The young tigers are known to establish their own territory after 2 – 3 years separating from their parents.

**Table: 2.4** The brief information of Bengal Tiger is given in the following charts.

| Local Name | English Name | Scientific Name               | National Status       | Global Status |
|------------|--------------|-------------------------------|-----------------------|---------------|
| Bagh       | Bengal Tiger | <i>Panthera tigris tigris</i> | Critically Endangered | Endangered    |

| Life Span  | Body Length                           | Tail Length | Height    | Weight                                | Daily Food      |
|--|---------------------------------------|-------------|-----------|---------------------------------------|-----------------|
| Captive 25-26 yrs.<br>Nature 15-20 yrs.<br>Tigress>tiger | Male 270-310 cm,<br>Female 240-265 cm | 60-110 cm   | 95-110 cm | Male 180-280 kg,<br>Female 115-185 kg | 6-10 kg<br>Meat |

| Sexual Maturity              | Gestation Period | Litter Interval | No. of Cubs/Litter         | Status in SRF | Food   |
|------------------------------|------------------|-----------------|----------------------------|---------------|--|
| Male 4 yrs.<br>Female 3 yrs. | 100-110 Days     | 2.5 yrs.        | 2-4 common<br>1-6 reported | 440           | Deer, Wild boar, Monkey, Otter, Jungle cat, Fishing cat, Lizard, Jungle fowl, Frog, Crabs, Fishes etc. |

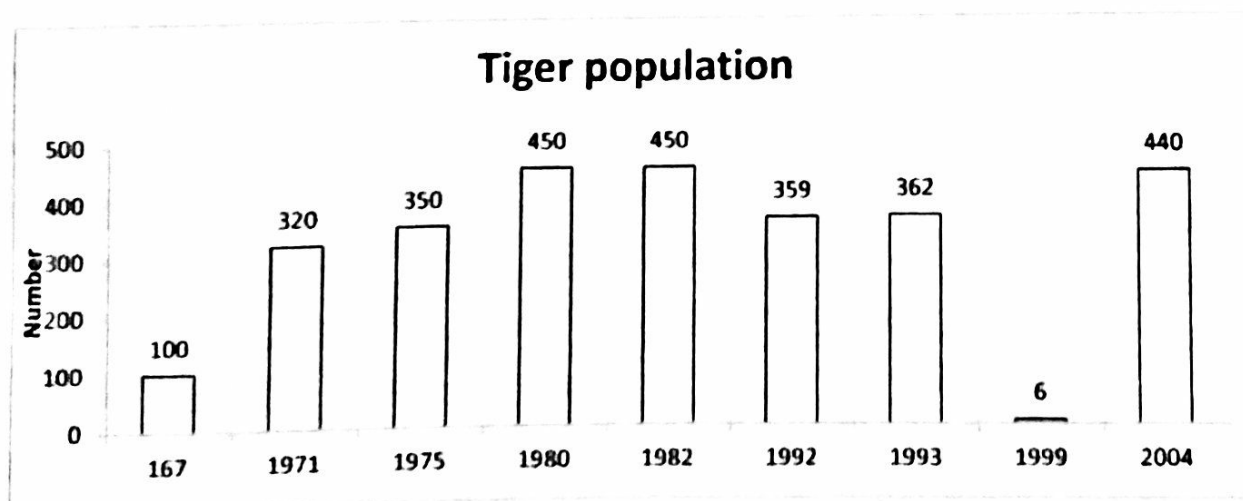
| Habitats   | Distribution in Bangladesh | Distribution in the World                            |
|--|----------------------------|--|
| Mountain forests, Evergreen forests, Grassy swamps, Open jungle and Mangroves. | Sundarbans Mangrove forest | Bangladesh, India, Myanmar, Nepal, Bhutan and China. |

Source: IUCN, 2003.

**Table: 2.5** The current status of tigers can be seen at a glance from the reports of different surveys

| Agency   | Year | No. of tiger estimated | Survey technique  |
|--|------|------------------------|---|
| Guy Mount Fort, WWF                                | 1967 | 50-100                 | Field study   |
| Forest Department                                  | 1971 | 320                    | Based on interviews   |
| Hubert Hendriks                                    | 1975 | 350                    | Based on pug mark and study in some areas ( Compartment 3, 4, 5, 6, 29, 30, 31, 46, 47, 48, 49 and 50B) |
| Gittings   | 1980 | 430-450                | Study carried out in 100 km <sup>2</sup> areas in south wildlife sanctuary                              |
| Forest Department                                  | 1982 | 450                    | Based on the information of east, south and west wildlife sanctuaries                                   |
| Forest Department                                  | 1992 | 359                    | Based on interviews   |
| Tamang   | 1993 | 362                    | Based on pugmark and studies in 350 km <sup>2</sup> areas   |
| IUCN   | 1999 | 6                      | From direct sighting in east sanctuary  |
| Forest Department with the assistant of UNDP       | 2004 | 419+21 cubs =440       | Pugmark collection and analysis from whole of SRF   |
| Forest Department with the assistant of World Bank | 2014 |                        | Camera trapping   |

Source: SBCP & FD, 2004.

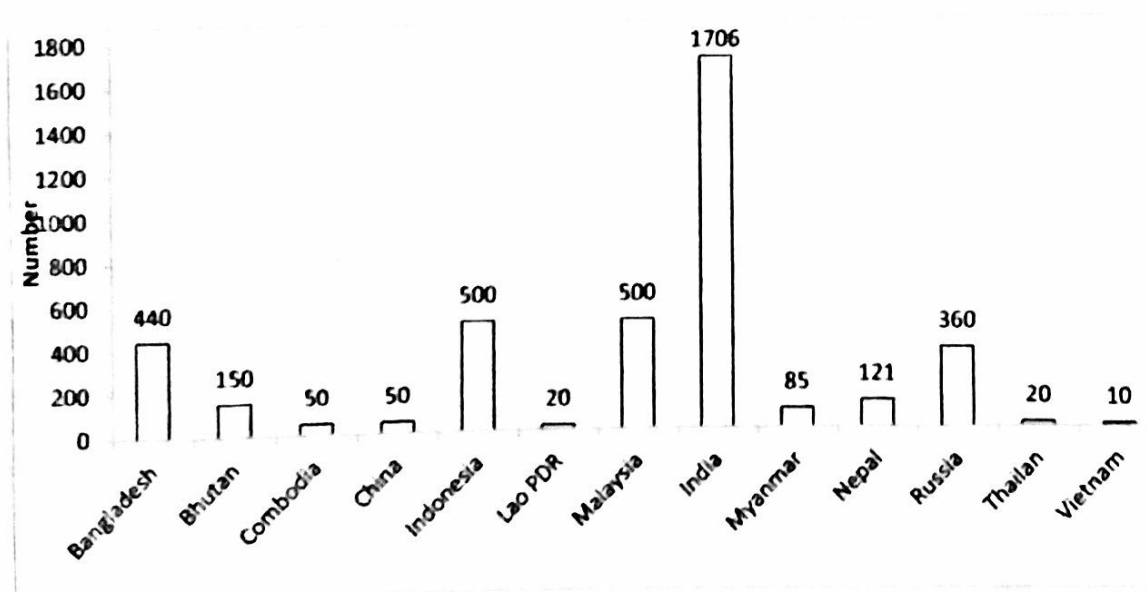


**Fig: 2.2** Status of Tiger population on different survey reports

**Table: 2.6 The status of the tiger *Panthera tigris* (Linnaeus 1758)**

| Country    | No. of tiger individuals                | Area of Tiger Landscape (Sq.km) |
|------------|---|---------------------------------|
| Bangladesh | 440 (2010 Estimate)                     | 6,000                           |
| Bhutan     | 115-150 (based on 1998) (2010 Estimate) | 28,000                          |
| Cambodia   | 50 (2010 Estimate)                      | 75,000                          |
| China      | 40-50 (2010 Estimate)                   | 29,000                          |
| India      | 1706 (2011 Estimate)                    | 2,00,000                        |
| Indonesia  | 500 (2014 Estimate)                     | 88,000                          |
| Lao PDR    | 20 (2014 Estimate)                      | 63,000                          |
| Malaysia   | 500 (2011 Estimate)                     | 55,000                          |
| Myanmar    | 85 (2010 Estimate)                      | 2.50,000                        |
| Nepal      | 121 (2010 Estimate)                     | 11,500                          |
| Russia     | 360 (2010 Estimate)                     | 2,42,000                        |
| Thailand   | 200 (2010 Estimate)                     | 1,16,000                        |
| Vietnam    | 10 (2011 Estimate)                      | 37,000                          |
| Total      | 4147                                    | 12,00,500                       |

**Source: Second Global Tiger Stocktaking Conference and Sundarbans Tiger Conservation Landscape, 2014**



**Fig: 2.3 Status of Tiger population on different countries**

## 2.8 Demographic and socioeconomic profile of local community of Sundarbans Impact Zone

The adjacent area of the Sundarbans is known as Sundarbans impact zone (SIZ). It is extended up to 20 km to the locality of Sundarbans. 17 upazila of 5 district falls under this area. The districts are Satkhira, Khulna, Bagerhat, Pirojpur, Barguna and the upazilas are Kaliganj, Ashasuni, Shamnagar of Satkhira districts ; Dakope, Paikgacha, Batiaghata, Kaira of Khulna district; Rampal, Morelganj, Shrankhola, Mongla of Bagerhat district; Mathbarbari, Necharabad, Bhandaria of Pirojpur district; Bamna, Barguna Sadar and Patharghata of Barguna district which has a population of about 3.5 million people. Most of the (68%) households extracting the Sundarban resources were also involved in secondary occupations (also based on Sundarban resources) (SBCP). Fifteen percent of all household heads in the Impact Zone (113,534 households' total) declared earning their primary income from activities inside the forest (SBCP).

**Table: 2.1 Population and households in the Sundarbans Impact Zone (SIZ) depending primarily on Sundarbans resource extraction.**

|   | <b>Total SIZ 5 Zilas, 17 Upazilas</b> | <b>Satkhira Zila 3 Upazilas</b> | <b>Khulna Zila 4 Upazilas</b> | <b>Bagerhat Zila 4 Upazilas</b> | <b>Pirojpur Zila 3 Upazilas</b> | <b>Barguna Zila 3 Upazilas</b> |
|---|---------------------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------------------|--------------------------------|
| Population in the SIZ                                   | 3,449,741                             | 819,409                         | 738,709                       | 791,167                         | 631,015                         | 469,441                        |
| Households in the SIZ                                   | 712,977                               | 163,333                         | 150,080                       | 166,320                         | 132,801                         | 100,443                        |
| No. of households depending primarily on SRF of the SIZ | 113,534                               | 32,921                          | 35,787                        | 23,574                          | 5,876                           | 15,376                         |
| %   | 100.0 %                               | 29.0 %                          | 31.5 %                        | 20.8 %                          | 5.2 %                           | 13.5 %                         |

Source: Tiger paper, 2010.

## CHAPTER THREE

### MATERIALS & METHODOLOGY

#### 3.1 Selection and Location of the Study area

The Satkhira Range of the Bangladesh Sundarbans and its vicinity is taken under consideration for conduct interview. Most of the incidence (about 80%) occurs on this site. The Sundarbans is south of the Tropic of Cancer, and located between N' 21°30' - 22°40', and E' 88°05'- 89°55' in the Ganges-Brahmaputra delta. The Sundarbans mangrove forest in the Gangetic delta is the largest continuous mangrove area in the world (10,284 Sq.km) with 4,267 Sq.km (41.5%) in Indian territory and 6,017 Sq.km (58.5%) in Bangladesh, possibly one of the biggest remaining tiger populations in the world, human-tiger conflicts are more frequent than in any other tiger area of the world. The total landmass of the forest is 4,143 Sq.km (68.85%) covered with mangrove vegetation, bare ground, scrub and the grassland. The remaining 1,874 Sq. km (31.15%) is water bodies in the form of numerous rivers, canals and creeks of widths varying from a few meters to several kilometers. The highest tiger population present in this land. It is a unique tiger land where the tiger is blamed as man-eaters, human-tiger conflicts are more frequent than in any other tiger range of the world. About 440 tiger, 40000-50000 monkey, 100000-15000 deer, 20000-2500 wild boar, 150-200 crocodile and 20000-25000 dolphin are remaining in the Sundarbans (FD,2014).

#### 3.2 Research Approach

This research was based on both literature review and interview with structured questionnaires of target group and it was analyzed 7 years (2008-2014), which was collected through interview of the victims (who personally attacked/injured), victims family member (who lose his family member or cattle), local community who directly in collecting forest product (honey, golpata, fish, shrimp, crabs, fuel wood etc), traditional leaders, political leaders, GO and NGO's officer from Sundarbans East & West Forest Division , Wild Team, Sonadanga, Khulna and Sundarbans wildlife management & nature conservation Circle Office, Khulna. Bangladesh.

### **3.3 Preparation of questionnaires**

Questionnaires were made basing on the theory of human-wildlife conflict for interviewing the victims (physically injured), victim's family member, traditional leaders (Imam, Purohit, Teachers, Mondal etc), political leaders (chairmen, members of local government), government officer (Forest officer, Administrative officer, Police, BGB etc) and non-government officer (NGO's officer, Journalist, Researcher etc) and local community who directly involved with forest resources collection and those are vulnerable to tiger attack. My main target group was victims family members, physically injured, who lose their group member by tiger attack and who experienced before on tiger incidence. A pretest questionnaires survey had been done before completing questionnaires.

### **3.4 Sampling technique and sample size**

A survey questionnaire form (Appendix-3) was prepared to get primary data from focus/target group (victims, victim's family member, Sundarbans resource extractors, traditional leaders, political leaders, GO & NGO officers etc.). Purposive sampling was used in this survey. In case of village survey I needed help of local NGOs who conserve the list of victims and Sundarbans resource extractors (Mowali, Bawali, Fishermen, Shrimp collector, and Crab collector). I conducted 98 interview with survey questionnaire from target group. Frequently I visited the forest along with the interview to identify the location of the incident. Selected villages located on the edge of the forest were surveyed to determine the areas frequented by tigers. Information on compensation paid for the losses was also recorded. Furthermore, focus group discussions were organized with local community leaders, forest officers and local government representatives to exchange opinions about the purpose of tiger conservation and conflict reduction perspectives. For analysis of this thesis it was targeted to collect 1990 to 2014 data but in some cases the data was not available up to target limit so less data has been plotted here and some cases more has been collected, as it was available.

### **3.5 Data analysis**

The collected raw data was sorted based on their importance and usability to make the analyses easier. Data were coded and digitalized to ensure easy analyses. SPSS (Statistical package for social analysis) software version 16.00 (IBM, USA) and Microsoft Office Excel were used to analyze.

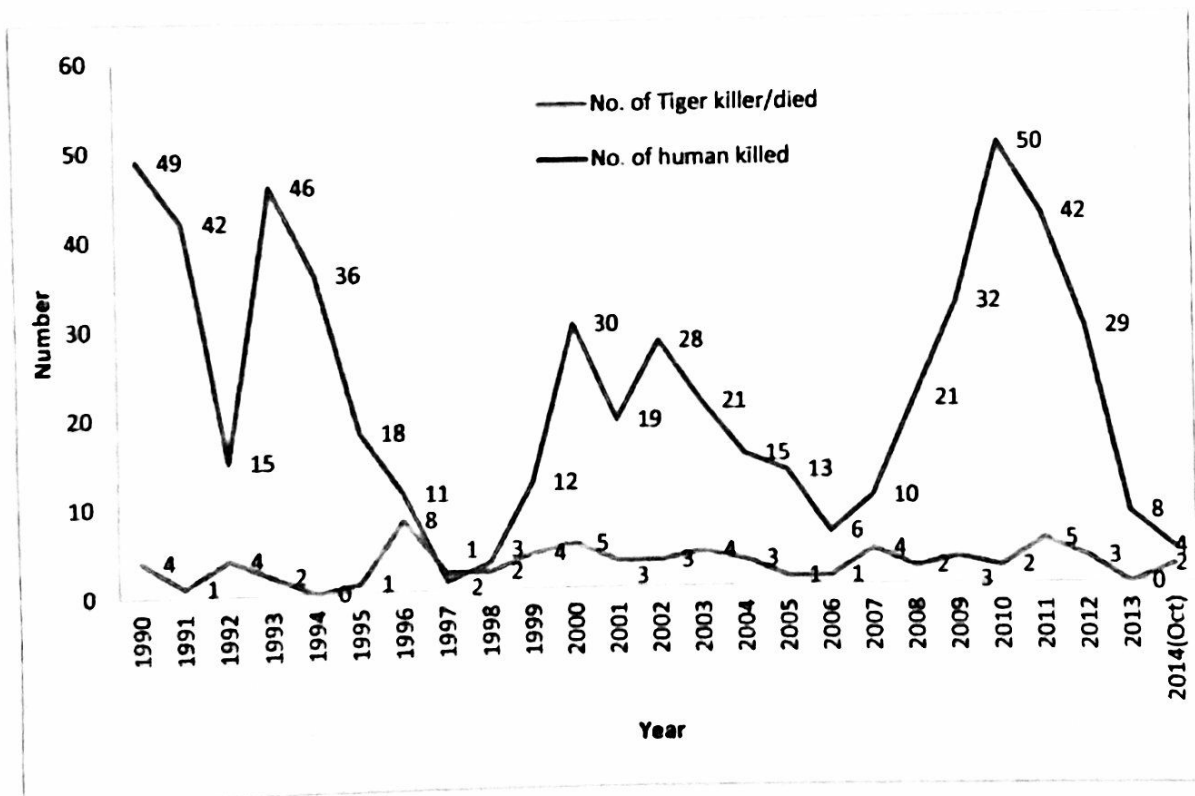
## CHAPTER FOUR

### RESULT & DISCUSSION

#### 4.1 Tiger incidence in Sundarbans Reserved Forest (SRF)

##### 4.1.1 Human death by tiger & tiger death (natural) or killed by poachers or local people.

Hendrichs (1975) found 392 cases for the period of 15 years (1956/57-1970/71), about 70% of tiger casualties reached in the files of the Forest Department and he estimated 10% illegal entries yearly in Satkhira Range. Siddiqi and Choudhury (1987) analyzed Forest Department data on 554 human casualties for a period of 28 years from 1956-1983. JJS (2003) analyzed data of 181 tiger attacks. Their information was based on Forest Department data, newspaper clipping and interviews with staff of local hospitals and other people for the period of January 1999 to March 2002.



**Fig: 4.1a Human killed by tiger & Tiger killed/died in SRF during 1990-2014(Oct)**

A.C.D. Barlow, I. Ahmad & J.L.D. Smith (2013) found 1396 human deaths were recorded over 63 (1935-2006) years, or an average of 22 human deaths/year and 110 tigers killed by

humans in the SRF over 23 (1984-2006) years with a mean five victims/tiger, and most tigers that killed humans were concentrated in the west. An estimated 50% of tigers only killed one person, and tigers that killed more than one person accounted for 81% of total human fatalities.

Helalsiddiqui (1998) supposed a number of 100-150 people killed by tigers each year. JJS (2003) found 71 tiger attacks found in the year 1999 and were surprised to find only 12 cases reported by the Forest Department. These three years indicated that only 10% of the casualties report by the Forest Department, 90% of the victims were illegal entries. Tiger paer (2010) shows that only 20% of the tiger victims become known to the public, while 80% have remained unreported. It was suspected that the discrepancy could be related to the portion of victims having entered the forest illegally.

Illegal extractors enter without legal permission, either unseen entries or entries achieved by bribing the forest staff. The resource extractors may not always know the difference between legal and illegal entries when paying fees. For many years the system has been obviously very corrupt from top to bottom.

I have found 561 (1990-2014 Oct) people killed by Tiger by an average 22.44 people killed /year, 69 Tiger died/killed by the local community on an average 2.76 tiger/year. sometimes killed by poachers and the rate of incidence is higher in Sundarbans East Division basically in Satkhira range. In last 7 years found 186 (2008-2014 Oct) people killed by Tiger on an average 26.57 people killed /year, 17 Tiger died/killed by local community on an average 2.42 tiger/year that indicates the killing of human raising by tiger.

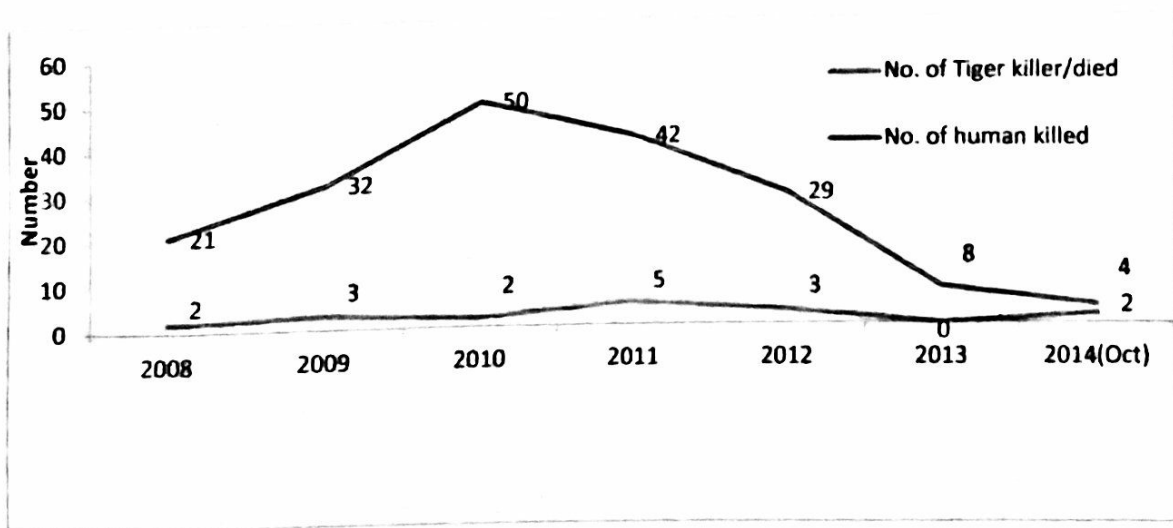


Fig: 4.1b Human killed by tiger & Tiger killed/died in SRF during 2008-2014(Oct)



#### 4.1.2 Human injured by tiger

In the last 7 years found 186 (2008-2014 Oct) people killed by Tiger incidence on an average 26.57 people killed/year, 49 people injured by Tiger incidence on an average 7 people injured/year that indicates the incidence raised in recent year.

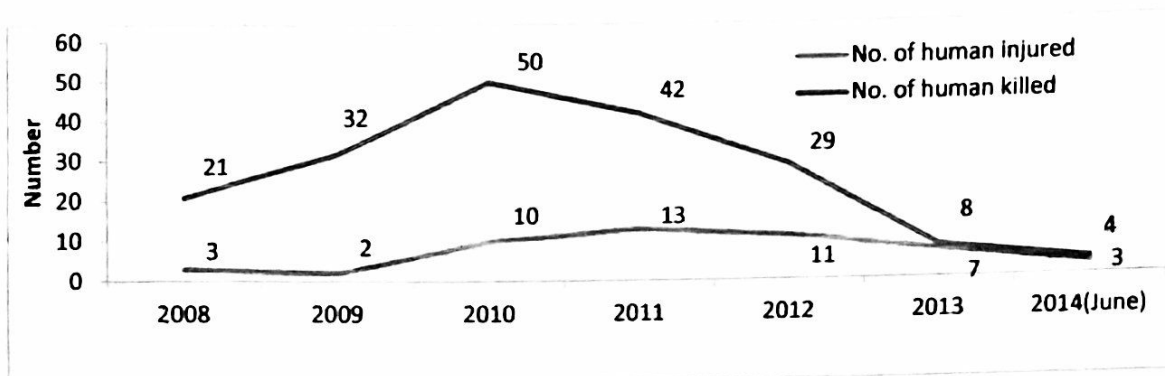


Fig: 4.2 Human injured by Tiger attack

So far, the total number of tiger victims in the Sundarbans has remained hidden (mainly injured), since too much causality of illegal extractors has gone unreported. Most of the forest intruders are illegal; they cannot even visit a government hospital when injured because of 'police case'. They usually take treatments from the local 'quacks'. Blamed for their illegal entries their fate was passed over in silence, suppressing the justification of the forest staff for letting such a high degree of illegal entries happen. Most unfortunate part of the story is that when someone is dead or injured, for fear of legal harassment, they have to keep it secret.

#### 4.1.3 Livestock killed by stray tiger

The number of stray tigers in Sundarbans incidence has remained hidden; especially killing of livestock by stray tiger is higher than reported by FD. Wild Team found 305 livestock killed from 2008 to 2014 (Oct) but only 107 cases reported by the Forest Department.

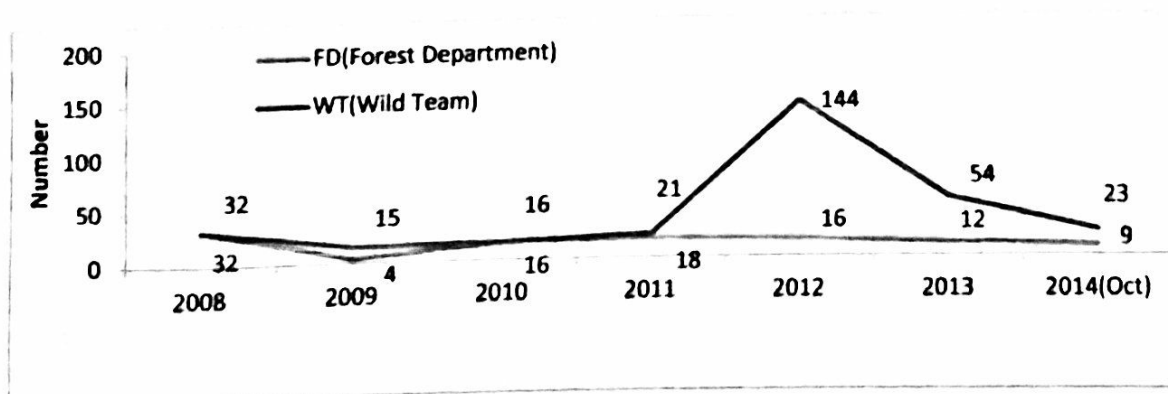
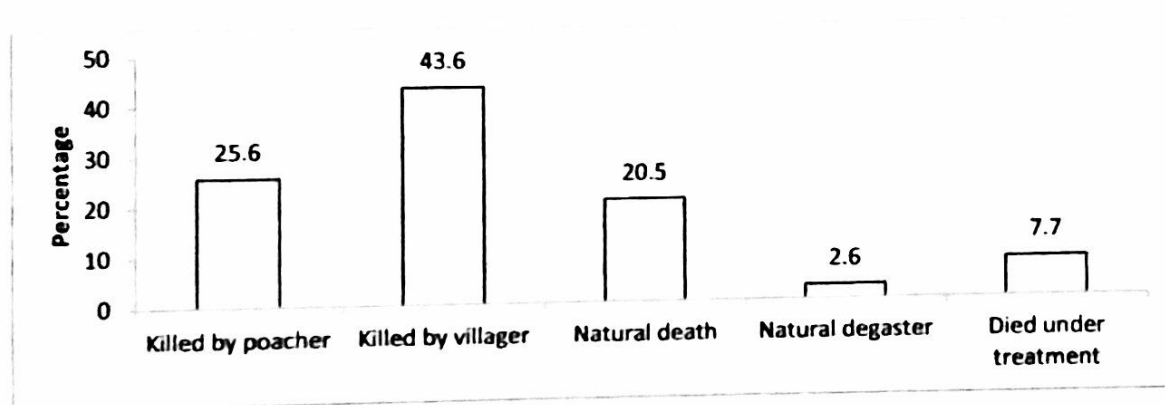


Fig: 4.3 Livestock killed by stray tiger (Source: FD & WT, 2014)

It indicates that only 35% of the casualties are reported by Forest Department, 65% of casualties are remained unknown. The number of livestock killing has so far difference between FD and WT (wild team), because WT collect information from VTRT (village tiger response team) and FD shows the data only reported by the victims. Local people are not aware about the reporting, their livestock killing of stray because they could not get compensation money for this and the compensation process of FD is, very complex, so that people may avoid it, though they have lost their livestock.

The loss of human and livestock life may lead to negative attitudes towards tiger of local communities, to retribution killing by local community, thus make it difficult to implement conservation actions, especially stray tiger. Adjacent people are mainly poor, a livestock might be the only asset for a family, when they lose it, then they exhibit a negative attitude on conservation of stray tiger.

#### 4.1.4 Actual causes of tiger loss



**Fig: 4.4 Causes of tiger loss**

In 2000 to 2014(Oct) 39 tiger deaths recorded by Forest Department, 10 (25.6%) tiger killed by poachers. Tigers are usually killed for their fur and for their body parts. These are widely used as traditional medicine despite the fact that any part of the tiger's body has no medicinal value. Tigers' hides are being used for decoration. 17 (43.6%) tiger killed by villagers, tigers are often killed by the neighboring people as revenge or to 'prevent' future conflicts. 8 aged tiger died, 3 Tiger died under treatment and only 1 Tiger died during Sidor.

## 4.2 Seasonality of conflict

### 4.2.1 Monthly trends of human killing by tiger

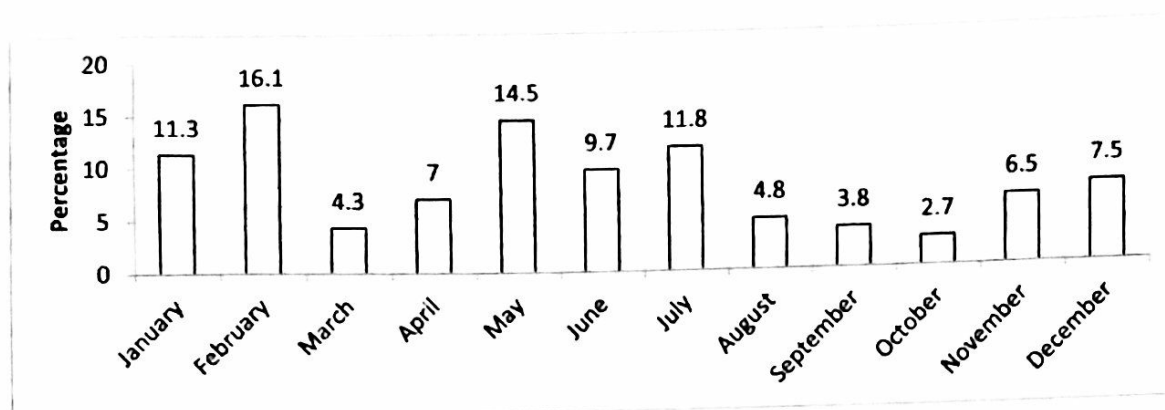


Fig: 4.5 Monthly trends of human killing by tiger

In the last 7 years found 186 (2008-2014 Oct) people killed by Tiger incidence on an average 26.57 people killed/year, from the figure 4.5 we can easily find out a relationship of the incidence and season. The rate of incidence is categorized in two ranges those are November to February (winter) and April to July (monsoon). In these periods large number of people enter into the deep forest to collect the producers, people and tigers roam in the same area, some conflicts take place. November to February is the mating period of Tiger and is the best time for collecting nypa leaves (golpata) in this period Bawali (nypa collector) and tiger roamed in the same site, is the main cause for higher tiger incidence, May and June are the best time for honey collection as well as the tiger littering, June and July for crabs and fish collection. and so in these periods incidence frequency is high because human interference is high.

### 4.2.2 Monthly trends to tiger death

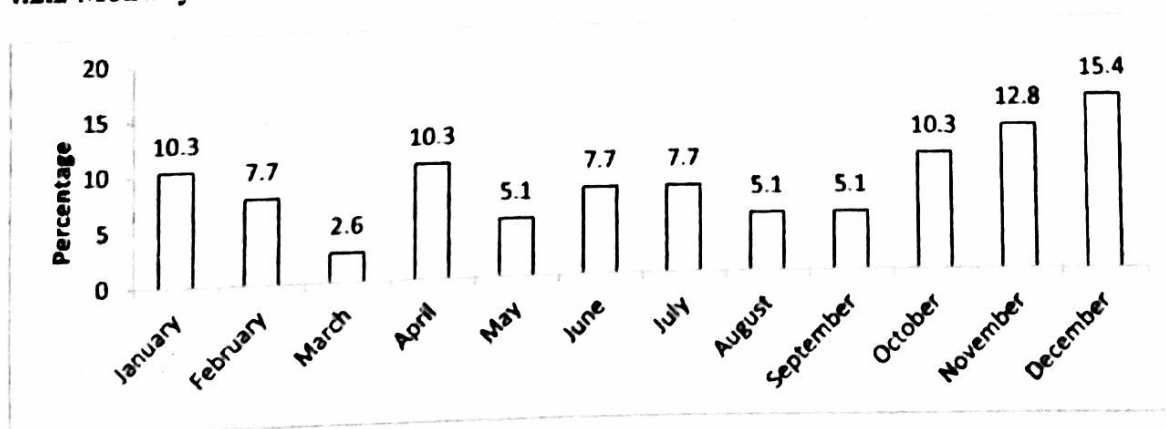
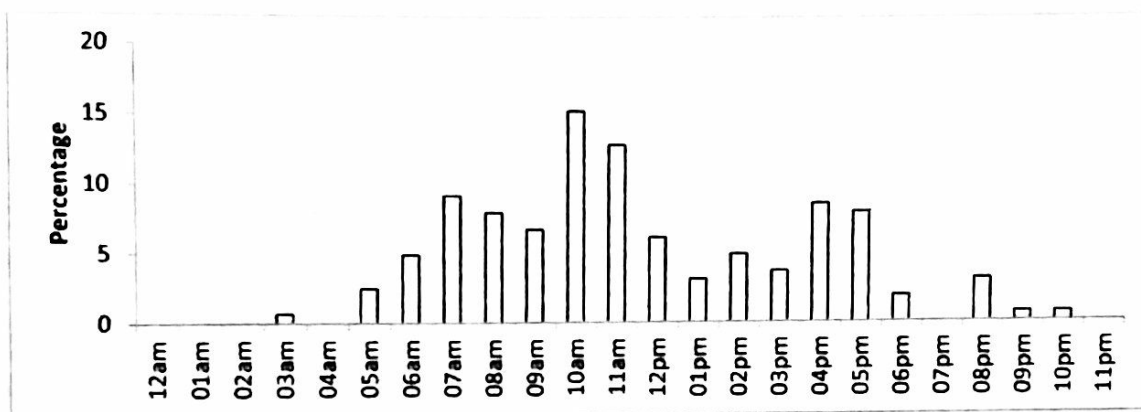


Fig: 4.6 Monthly trends to tiger death

Most of the stray tiger incidence occurred after midnight or midnight. The frequency of tiger death is higher in October to February (mainly winter), in this period stray tiger enter into village for searching food or it think localities also forest area due to paddy field which creating confusion in the mind of tiger leading to its straying. Tiger straying in Sunderbans happens between the wintry months of November and January. The river and forest are confused together due to dense fog. It's impossible for one to separate the land from the river. In paddy season tiger get good coverage in villages, thus incidences of straying are to raise. Floating males are often pushed by dominating tiger, younger one sometimes pushed by older one in mating season (November to February).

#### 4.2.3 Time of incidence of day



**Fig: 4.7 Time of incidence of a day**

The largest concentration (59.13%) of conflicts took place between 5-11 am and least (2%) at 9 pm to 4 am as well as who live nearby the Sundarban are engaged in honey collections, cutting woods and gollpata, fishing, catching crabs and shrimps and collecting snails for their consumption and livelihood. Fishermen are the most as well as Bawalis are the second most vulnerable to tiger attack, most of the victims attacked during fishing and catching crabs. The incidents mainly occur in the small creeks deep inside the forest and very close to the tiger habitat, where the tiger may hide behind the Hental bushes on the bank and they are attacked by the tiger. Crabs collection is higher in the eastern part of the study area, while fishing is more in the western part and honey collection is concentrated in the southeastern side. The low mud flats on both sides of the creeks are potential best areas to find the crabs and a time consuming activity and these areas are also the most probable sites for tiger.

### **4.3 Profile of respondent**

Respondents were interviewed based on their profession. I interviewed 98 local people (Mowali, Bawali, Shrimp collector, Fishermen, Crabs collector) mainly who personally experienced (lost family member, neighbor or group member) before in order to gather their views on tiger-human conflict from different villages adjacent to the Sundarbans Reserved Forest (SRF). A semi-structured questionnaire was used to collect necessary information from the respondents.

#### **4.3.1 Perception of local community on their own occupation**

Around of the Sundarbans 17 upazila of 5 districts which has a population of about 3.5 million people. It was found that more than 68% of the households extracting the Sundarban resources were also involved in secondary occupations (also based on Sundarban resources) (SBCP,2002). Fifteen percent of all household heads in the Impact Zone (113,534 households' total) declared earning their primary income from activities inside the forest (SBCP, 2002). SBCP, 2002 and Haider, 2004 found shrimp collector- 71699, honey collector- 2352, wood collector- 24318, nypa leaf collector- 12557, fishermen- 34473 who are the most vulnerable to tiger attack. All of them fisherman, honey collector, nypa leaf collector have great possibility to tiger attack. In my field survey I have found 93.5% interviewees want to change their occupation, if they have another choice.

#### **4.3.2 People perception in Tiger population and its conservation**

##### **4.3.2.1 Perception of local community in tiger conservation**

The loss of human life is tragic for the victim and their family on a personal level and sometimes devastating to the family economically and emotionally; the tiger victim may well be the main breadwinner for a family. Likewise the loss of livestock is an economic blow to sometimes already impoverished families. 59.2 % (Fig:4.8) interviewees, like a tiger and 40.8% (Fig: 4.8) dislike tiger, but when a stray tiger enters into villages and killed or injured family member or killed livestock 81.63% interviewees don't support stay tiger conservation and 13.27% agree to conserve stray tiger.

#### 4.3.2.2 Perception of local community on tiger

In my observation, I found 40.8 % (Fig: 4.8) of my interviewees strongly dislike tiger because of human and livestock killing by a tiger and consider the tiger as an enemy, 35.7% (Fig: 4.8) think conservation of tiger is needed to protect Sundarbans, they believe when a tiger disappear from Sundarbans then the forest will destroy within a few days and 15.4% (Fig: 4.8) people respect tiger due to religious prospective.

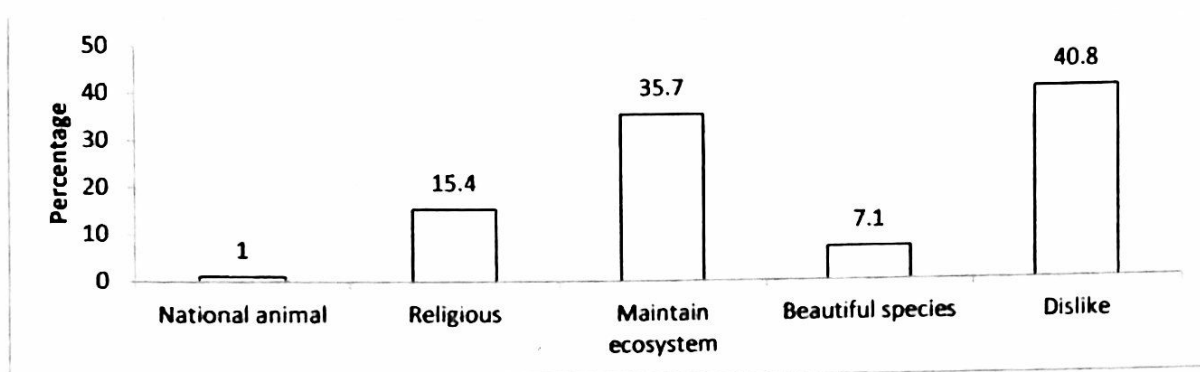


Fig: 4.8 Respondent perception tiger

#### 4.3.2.3 Feelings of local community on tiger death

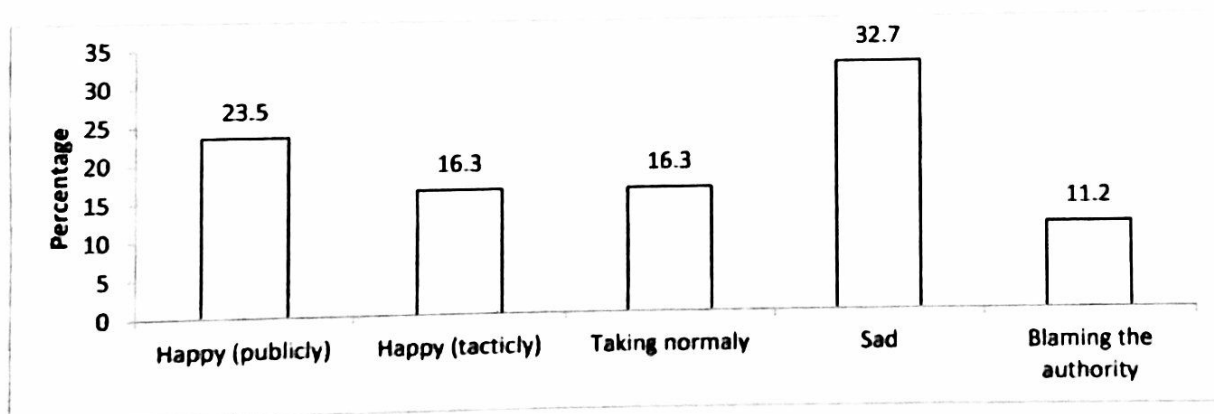


Fig: 4.9 Feeling of local people on tiger death

In my observation I found 32.65% (Fig: 4.9) interviewees feel bad when tiger dead or killed because they consider as natural gourd and believed without tiger, could be impossible to protect the forest , 23.47% interviewees feel happy (publicly), 16.33% (Fig: 4.9) interviewees feel happy (tacitly), because they consider the tigers as an enemy, 16.33% (Fig: 4.9) interviewees taking normally and the others (11.22%) (Fig: 4.9) blame the authority for tiger death or killed.

#### 4.3.2.4 Respondents perception of Tiger death



Figure 4.10 Respondents perception of Tiger death

Among the 98 respondents 26.5% (Fig: 4.10) believed that most frequent cause of tiger deaths is poaching, 15.3% (Fig: 4.10) think tiger death occurs due to disease, 19.4% (Fig: 4.10) thought tiger death occurs due to old age or natural death, 18.4% (Fig: 4.10) people assumed that tiger died because of starving, 10.2% (Fig: 4.10) respondents believe tiger death occurs by retaliation when tiger straying in forest adjacent villages and 10.2% (Fig: 4.10) respondents thought tiger death occurs by natural calamities like Sidor, Tsunami, Ayla.

#### 4.3.2.5 Respondents thinking about tiger population decreasing

In my observation on my field survey most of the interviewees (75%) said, they didn't see any tiger or cubs in the forest in this year (2014) and they think the tiger population decreasing day by day. 52.6% (Fig: 4.11) of respondents believe that poaching is the main cause of decreasing tiger population and 20.8% (Fig: 4.11) believe lack of food, 20.2% (Fig: 4.11) believe disease is the cause of shrinking of tiger population.

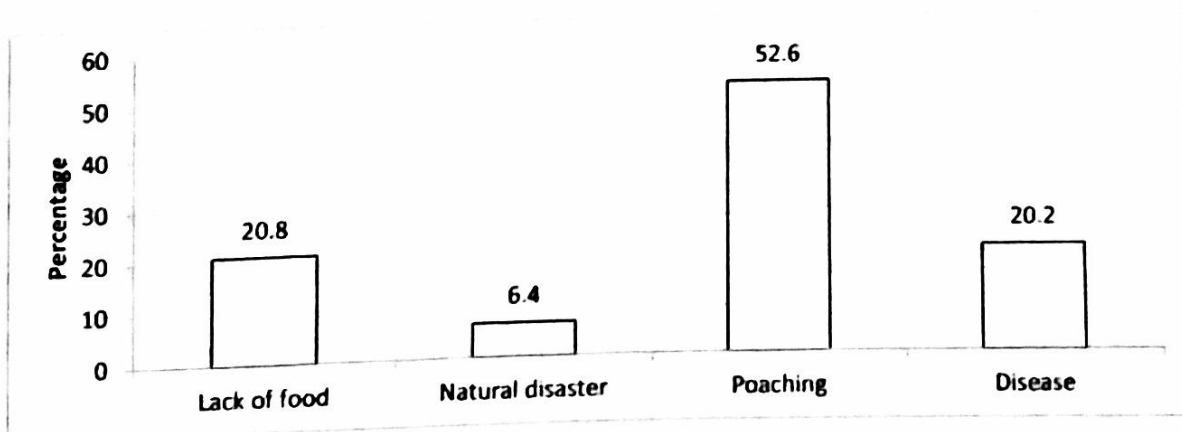


Fig: 4.11 Respondents thinking about the tiger decreasing

#### 4.3.2.4 Respondents perception of Tiger death

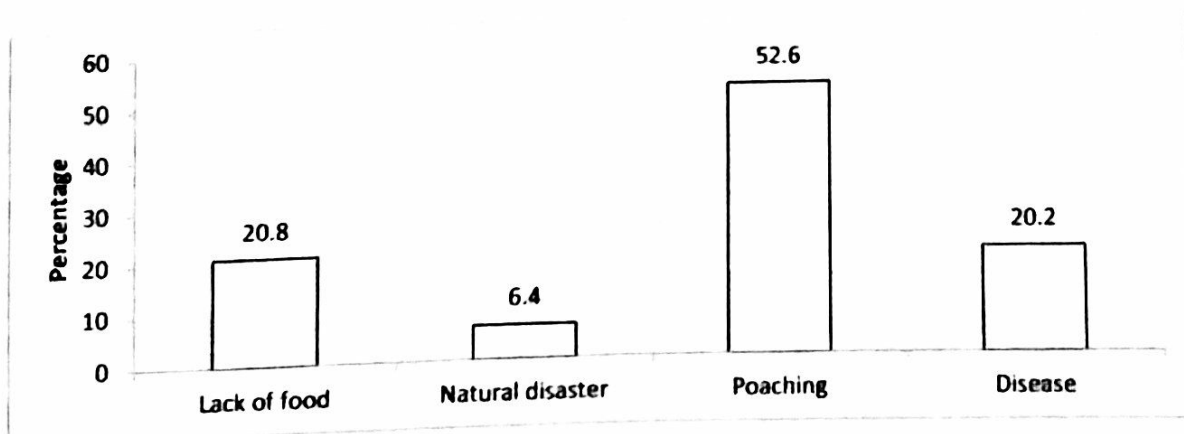


**Figure 4.10 Respondents perception of Tiger death**

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**Fig: 4.11 Respondents thinking about the tiger decreasing**



## 4.4 Respondents' perception on stray tiger

### 4.4.1 People's perception on why stray tiger enter into the village

Normally tiger enters into adjacent villages in the midnight or after midnight. Sometimes it kills some livestock and then disappears. 33% (Fig:4.12) interviewees' assumed illegal hunting of natural prey like deer is the main cause of tiger stray, 11000 deer are poached per year from Sundarbans, 25.4% (Fig:4.12) interviewees assumed that tiger strayed adjacent village because tiger thought localities also forest area due to its vegetation pattern, 24.6% assumed tiger entre village becoming anger due to mental disorder.

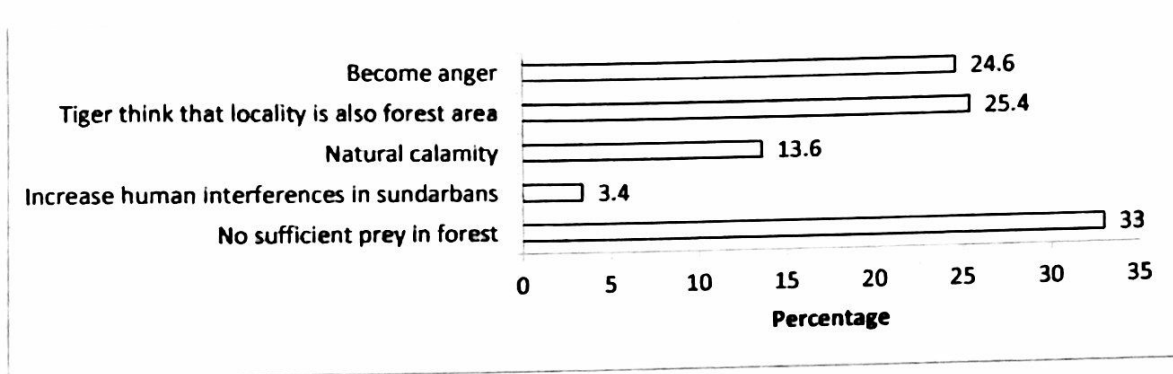


Fig: 4.12 perception of respondent on stray tiger

### 4.4.2 The activities of local communities on stray tiger situation

About 81% interviewees feel insecure when they go to sleep for their family members as well as livestock. When stray tiger enter into villages, and then keep alert and gather all the villagers who at first noticed it by shouting or making.

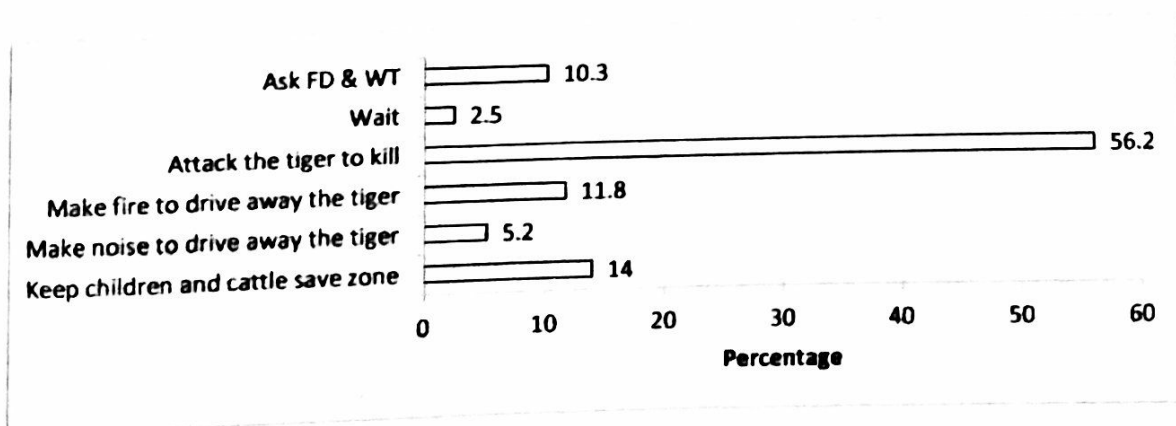


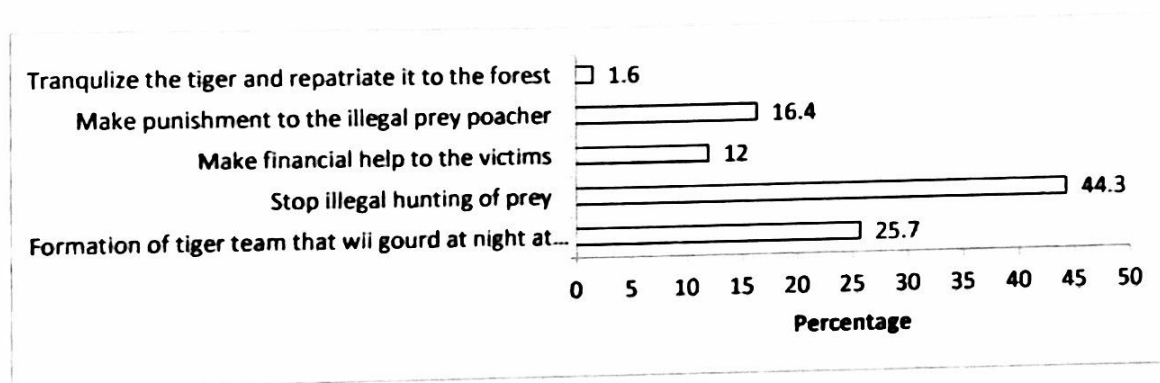
Fig: 4.13 Activities of the local community on stray tiger situation

Most of the interviewees (56.2%) (Fig: 4.13) thought, stray tiger is mentally sick and killing of this tiger may be the best solution so they attack the tiger to kill, 14% (Fig: 4.13)

interviewees thought gather people and keep children and cattle in saving zone to control the situation. 10.3% (Fig: 4.13) of my interviewees asked FD and VTRT. 11.8% (Fig: 4.13) believed fire and 5.2% (Fig: 4.13) believed noise can drive tiger. They also said “sometimes tiger is entering villages and eat or kill livestock then disappear without human damage. A scarcity of herbivorous prey caused either by poaching or environmental factors might increase the tiger’s interest in human prey.

#### 4.4.3 Should be the activities of FD to control the stray tiger situation

Most of the incidence occurred inside the Sundarbans. It is quite impossible to provide protection to the extractors inside the SRF. They need to take precaution to avoid this situation.



**Fig: 4.14 Should be the role of FD to reduce conflict in the strays tiger situation**

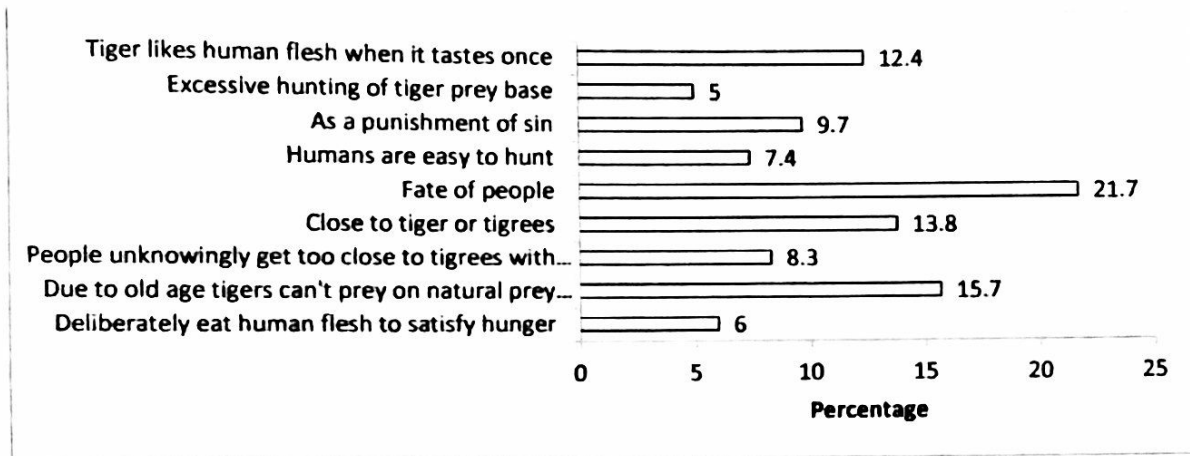
About 95% of interviewees are not satisfied with FD management activities. 44.3% (Fig: 4.14) of my interviewers assumed that FD should take proper steps to stop the illegal killing of natural tigers’ prey. 25.7% (Fig: 4.14) of the interviewers thought, if FD provides security to the vulnerable villages by forming guard that will guard at night at village to avoid the incidence. 12% (Fig: 4.14) of them believed that, if FD makes financial help to the victims who lose his family member or physically injured and provide compensation for the family who lose cattle animals, then people will discourage to kill the stray tiger. 16.4% (Fig: 4.14) of interviewees believed that if we improve the tiger habitat, providing protection to the natural prey from poachers, don’t create disturbance within tigers’ territory in breeding period as well as whole year, then it’ll get food from nature and not attack the people or stray to nearest villages to searching prey.

## 4.5 Respondents' perception on Human-Tiger conflict

### 4.5.1 Perception of local community on human-tiger conflict

The loss of human and livestock life may lead to negative attitudes towards tiger of local communities, to retribution killing by local community thus make it difficult to implement conservation actions. Women whose husbands are killed by tiger are known as "tiger widows" and are stigmatized rather than supported by Bangladeshi society.

#### 4.5.1.1 Respondents perception on human getting killed by a tiger



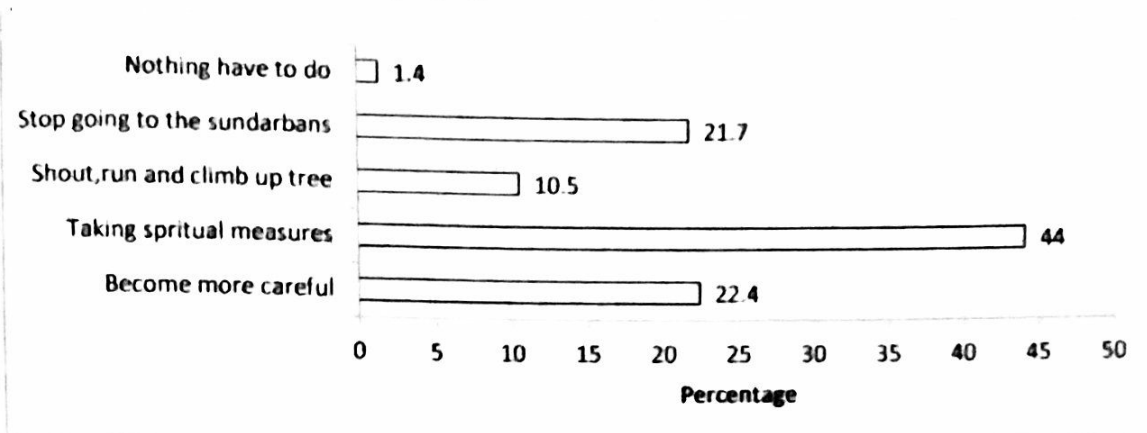
**Fig: 4.15 Respondents perception on people getting killed by a tiger**

According to my field survey I found 21.7% (Fig: 4.15) interviewees strongly believed that people getting killed by tiger due their fate, 15.7% (Fig: 4.15) assumed that due to old age tigers can't prey on natural prey species that why tiger attack on people, 13.8 (Fig: 4.15) % of them assumed that people getting killed when they getting close to the tiger or tigress, 12.4% (Fig: 4.15) believed tiger likes human flesh when it tastes once before, 9.7% (Fig: 4.15) thought people get killed due to their sin, 8.3% (Fig: 4.15) of them assumed people unknowingly get too close to tigress with cubs, 7.4% (Fig: 4.15) assumed humans are easy to hunt, , 6% (Fig: 4.15) assumed tigers kill people mainly because the tiger deliberately eat human flesh to satisfy hunger, which indicates that people get killed mainly by man-eating tigers.

#### 4.5.1.2 Respondents perception on the causalities by tiger can be reduced

People living around the Sundarbans are so superstitious that most of the interviewees 44% (Fig: 4.16) thought that human casualties by tigers can be reduced by taking only the spiritual

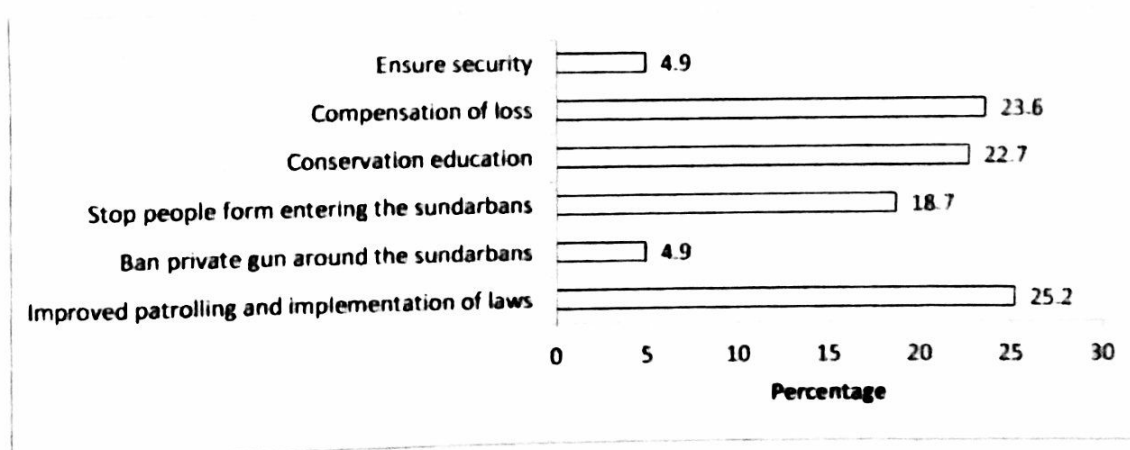
protection measures, i.e., keeping a sacred bead, a sacred rope or a sacred handkerchief, or sacrificing domestic chickens or goat in the Sundarbans (by releasing them in the name of a spiritual man called 'Gazi'), or praying to Banbibi or Gazi-Kalu.



**Fig: 4.16 Respondents perception on the causalities by tiger can be reduced**

22.4% (Fig: 4.16) of them assumed that become more careful could reduce human death 10.5% (Fig: 4.16) shouting could save from tiger attack and 21.7% (Fig: 4.16) of the interviewees thought stop going to Sundarbans could be the best solution but they have no other option to lead their livelihood.

#### 4.5.1.3 Respondents perception on the killing of tiger by people can be reduced



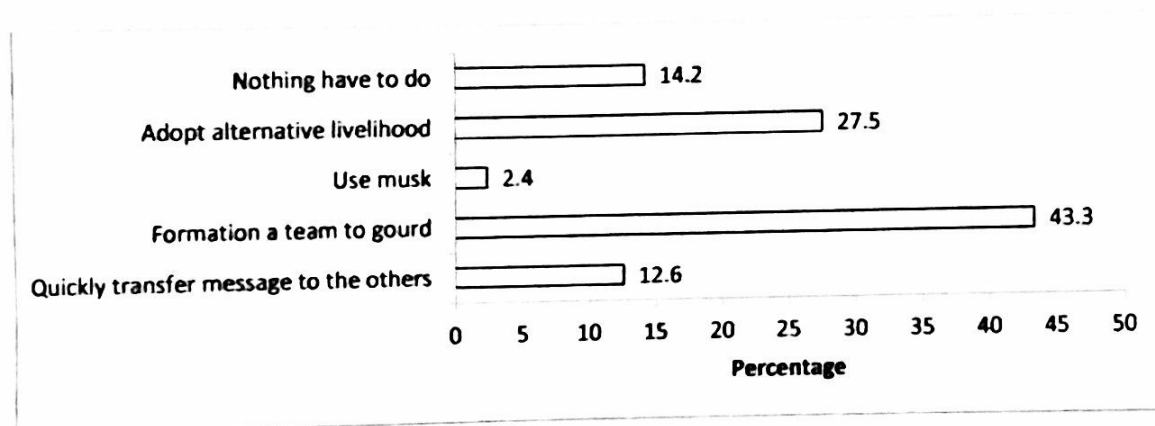
**Fig: 4.17 Respondents perception on the killing of tiger by people can be reduced**

I found 25.2% (Fig: 4.17) the interviewees thought that improved patrolling and implementation of laws so that poachers and illegal resource collectors can't make disturb in tiger habitat as well as tiger territory and 23.6% (Fig: 4.17) interviewees thought providing compensation losses to the victims' family who lose their family member or injured or lose

their livestock by tiger attack, which can change their attitude on the tiger. 22.7% (Fig: 4.17) believed conservation education by the Forest Department can reduce the killing of tigers in the Sundarbans.

#### 4.5.1.4 Role of the extractor to avoid incidence inside Sundarbans

I conducted interviews with those people mostly who had experienced this situation before. Most of them (43.3%) (Fig: 4.18) thought that, form a team to gourd might be the best solution so that one of a team member can notice the tiger first and then make alert to others. 27.5% (Fig: 4.18) of my interviewees believed that adopt with alternative livelihood, but they have the least chance of this because they mostly earn their livelihood hand to mouth. 14.2% (Fig: 4.18) interviewees experienced that nothing had to do to reduce the human killing, they also experienced that tiger hide itself in the bushes before attack, then it fixes target one and attack on target from the backside. They only observed the situation, because they didn't get a single moment to do something.



**Fig: 4.18 Role of extractor to avoid human-tiger conflict inside forest**

## 4.6 Discussion

In this study I have found 186 (2008-2014 Oct) people killed by Tiger by an average 26.57 people killed /year that is higher than before, 17 Tiger died/killed by the local community on an average 2.42 tiger/year that indicates the killing of human raising by tiger. The largest concentration (59.23%) of conflicts took place between 5-11 am and least (2%) at 9 pm to 4 am. In winter mainly November to February the intensity of incidence in inside and straying in villages both was higher than the rest of the year. Respondents (52.6%) assumed tiger population decreasing due to poaching, but statistics mentioned higher number (43.6%) of a tiger killed by villagers. People believed tiger enter into the village due to deficiency of natural prey or lost of memory, but actually that may have many reasons. They also believed if forest habitat would improve, that may reduce the tiger incidence in inside as well as outside. Most of the people (56.2%) wanted to kill the stray tiger because they considered as an enemy. The forest department could make a team to gourd at night at the vulnerable tiger entrance point that might save cattle loss as well as human lives. Large number of people believed people getting killed by tiger due to their fate (21.7%), also believed most of the human killing occurred by old tigers that they enabled to hunt natural forest. Some of them believed that tiger like human flesh or eat human flesh to satisfy hunger. People around the Sundarbans are so superstitious that most of the interviewees 44% thought that human casualties by tigers can be reduced by taking only the spiritual protection measures, i.e., keeping a sacred bead, a sacred rope or a sacred handkerchief, or sacrificing domestic chickens or goat in the Sundarbans (by releasing them in the name of a spiritual man called 'Gazi'), or praying to Banbibi or Gazi-Kalu. Using musk (usually practiced in India) would be the best solution to reduce incidence because the tiger would be confused to detect the front of the human body; basically tiger attacks human from the backside. The loss of human and livestock life may lead to negative attitudes towards tiger of local communities, to retribution killing by local community thus make it difficult to implement conservation actions. Women whose husbands are killed by tiger are known as "tiger widows" and are stigmatized rather than supported by Bangladeshi society. Local community thought improved patrolling could minimize the tiger killing and provide compensation to the victims who lost his family member or cattle that may improve their attitude on tiger conservation.

## CHAPTER FIVE

### RECOMMENDATION & CONCLUSION

#### 5.1 Recommendations

To overcome the problem of human-tiger conflict in SRF proper action should be immediately taken. Here some recommendations are given as short term and long term remedy of human-tiger conflict in SRF. If these are properly implemented, there is a great chance of getting success in reducing human –tiger conflict in SRF.

##### 5.1.1 Short term recommendations

The short term recommendations are as follows

###### 5.1.1.1 Advertise tiger hotline number

Wildlife crime retardation hotline no- 01755660033, email- [wccubd@gmail.com](mailto:wccubd@gmail.com).

###### 5.1.1.2 Stop prey poaching

Depletion of prey has already been documented (Jagrata Juba Shangha 2003). The prey may be poached from any part of the Sundarbans due to the widespread distribution of forest users and the current limited protection capacity of the FD (Greenwood et al. 2009). Along with tiger poaching, poaching and consumption of deer – the tiger’s primary prey – is also a significant threat in Bangladesh. A research, conducted by Wild Team, a national NGO in the biodiversity conservation area, shows that 11,000 (Prothomalo, 28 Oct.2014) deer are likely poached in a year that is eventually reduced the capacity of the Sundarbans to support tigers. Research also shows that this is driven by domestic demand for consumption of deer meat as a luxury food or Raj Mangsho. Deer poachers consist of both organized poachers, often the same criminals who are involved in tiger poaching and opportunistic poaching, and the forest resource users. According to the collected newspaper reports covering deer poaching in Bangladesh Sundarbans between 2003 -2008, 74% of the poachers (14 out of 19 cases) were based in Shyamnagar upazila. In a discussion on nature conservation in 2009, about 80% of approximately 100 students in a school in Burigoalini (Shyamnagar upazila) said that they had eaten deer meat in their lifetime and 50% family eaten deer meat every year. A scarcity of herbivorous prey caused either by poaching or environmental factors might increase the tiger’s interest in human prey. Reversing this threat would require improved forest protection and reducing demand for prey products.

### **5.1.1.3 Make imprisonment to the pirates & prey poacher**

Poaching is obviously another precarious issue. In their interviews, JJS (2003) came across 160 deer hunters (amateurs, semi-professionals and professionals – all illegal) and found that Shyamnagar upazila had more hunters (40), than any other of the 9 upazilas in the Impact Zone. They go hunting deep in the westernmost parts of the Bangladesh Sundarbans where most of the tiger attacks occur. Pirates are an organized armed group of men who control territories in the Sundarbans and who further limit many villagers' income by demanding payment from forest resource users to enter the forest; demanding ransoms for the villagers they have kidnapped; and even murdering villagers. Poachers and pirates are correlated with each other. Sometimes resource users inform the poacher about deer location to gain their own gain. FD should make imprisonment to the pirates & prey poacher as immediately to tigers' prey.

### **5.1.1.4 Using musk by resource extractors**

Experienced people say that tiger generally attack on human from the backside. Musk can be used to confuse the tiger about the front and back of a man. In Indian part of Sundarbans the resource extractors have used musk recently and they got benefit by using that. A considerable number of people in the Sundarbans of Bangladesh part are losing their valuable life in each year. In such respect Forest Department can supply musk to the resource user to lesion the human-tiger conflict situation.

### **5.1.1.5 Seek co-operation of local administration**

Local people living in the impact zone of Sundarbans have their own legal and illegal firearms that are often used for wildlife poaching in the forest. To control the use of illegal arms in the forest, law enforcement of local administration should be more effective.

### **5.1.1.6 Ensure health care facility**

A problem like 'Health care' influence the perceived severity of attacks on people and stray tiger incidents respectively. For example, "When a man is attacked by a tiger, he cannot get proper [medical] treatment here. He has to be taken by trawler to the hospital elsewhere. The person might die on the way to hospital." Lack of medical care in villages therefore increases the (perceived) probability of a person dying following a tiger attack, increasing the risk associated with these incidents. FD should set up at least 4 special hospitals or clinic in four ranges of SRF to ensure health care facility especially for tiger attacked or injured people.



#### **5.1.1.7 House construction and fencing critical area**

People's houses do not provide protection for them and their livestock from stray tigers. This increases the (perceived) probability of a person being attacked in a village and heightens the potential severity of stray tiger incidents. The cattle-sheds should be well-protected by Goran stick fences and bamboo, so that, it cannot be broken easily. At first FD should identify the most vulnerable tiger entrance point and make a nylon wire fence (probable solution) at the forest to prevent intrusion of tiger in the village. Sanction loan for house construction with lower interest to the people who are the most vulnerable to tiger attack.

#### **5.1.1.8 Produce appropriate HTC and domestic animals killing report combine with FD and NGO's**

JJS (2003) found 71 tiger attacks found in the year 1999 but only 12 cases reported by the Forest Department. Tiger paer (2010) shows that only 20% of the tiger victims become known to the public, while 80% have remained unreported. Lack of a systematic procedure for data collection, compilation, analysis and development of management prescriptions remain a stumbling block for better informed tiger conservation efforts. Need actual incidence data (tiger death, human death, livestock death, frequency of stray), that help to formulate future policy and management.

#### **5.1.1.9 Improve coordination between territorial and wildlife FD activities.**

All government organizations like Local administrative division, Civil defense division, and Detective agencies are independent organization. They implement their own rules and regulations and this influence the illegal activities in side forest. Terrorists and criminals can shelter inside the forest. So FD should ensure coordination between territorial and Wildlife Management and Tourism Division.

#### **5.1.1.10 Improve trans-boundary cooperation between India and Bangladesh**

Tigers have no national borders; a cross border task force can be set up between Bangladesh and Indian Sundarbans to combat poaching and illegal trades in tigers. In addition, it is an urgent need to set up a National Environmental Security Task Force/Bureau (NEST) in the country for developing government capacity. The existing World Bank funded project includes funds for the development of a wildlife crime unit which can be upgraded to a

NEST. INTERPOL is also offering training for NEST staff via their Project Predator. Both the government and NGOs working in relevant fields should conduct awareness campaigns to tackle the social motivators behind poaching and the consumption of tiger and its' prey. Enhance trans-boundary cooperation in combating the illegal trade in increased wildlife, maintaining ecological integrity in the tiger landscapes, and promoting tiger tourism. Joint regular trans-boundary efforts enhance trans-boundary cooperation (meetings, information sharing).

#### **5.1.1.11 Give responsibility to the wildlife division to manage stray tiger situation**

When a stray tiger enters into the forest adjacent village, then Wildlife and Nature Conservation Division need to get permission from higher authority to take a decision, that's why need a long time (4-8hrs) to tranquilize a stray tiger. Sometimes forest officer firstly experienced this situation that's why he who how to manage. Introduce compensation and reward system and creation of appropriate working/living conditions and incentives for field staff.

#### **5.1.1.12 Introduce insurance program for the resource extractors**

The loss of human life is tragic for the victim and their family on a personal level and sometimes devastating to the family economically and emotionally; the tiger victim may well be the main breadwinner for a family. Likewise the loss of livestock is an economic blow to sometimes already impoverished families. Women whose husbands are killed by tiger are known as "tiger widows" and are stigmatized rather than supported by Bangladeshi society (Daily Naya Diganta, 2014). So the Government and other Insurance companies should introduce an insurance program for the forest resource extractors.

#### **5.1.1.13 Infrastructure development of Wild life & Tourism Division:**

SRF need some petrol post in some critical region with organized personnel. Wildlife and Tourism Division need some satellite phones, tranquilizer guns, water ambulance and faster boat to response HTC and stray tiger situation.

#### **5.1.1.14 Strengthen existing VTRT to reduce retaliate death of human and tiger in stray situation**

Bangladesh is acutely short of human resource at all levels. This is especially true in the protected areas. To cope with this, the Department of Forests and Wild Team (Founded by World Bank) has recruited villagers as a voluntary tiger response team (VTRT) to help reinforce the protection of forests, wildlife (mainly tiger and its prey) and to help FD staff in HTC and stray tiger situation. These voluntary tiger response teams (VTRT) need basic training in surveying and monitoring wildlife. There is also a need for additional training to locally trained foresters in order to update their skills in survey methodologies adapted to local conditions. These trainings will be in the form of specialized courses, study tours and attendance at various regional and international conferences and workshops on tiger and wildlife conservation.

#### **5.1.1.15 Simplify the compensation program for the victims**

Ministry of Environment and Forests has declared compensation policy for wildlife victims in 2012. On the basis of this policy Tiger victim's family (killed) will get Tk. 1,00,000/- (US\$ 1250.0) and the injured person will get Tk. 50,000/- (US\$ 625.0). Since today 53 families have got Tk. 48,00,000/- (US\$ 60,000.0). As a result stray Tiger killing incidence in the Sundarbans surrounding villages has been reduced substantially. It's a long process of getting compensation money and takes a long period (1-2yrs). But still, it's a complicated process of getting compensation to the victim's family member from Forest Department. He, who didn't get compensation money, lost his cattle by stray tiger. FD should provide compensation money the family, who lost their cattle in stay tiger incidence.

#### **5.1.1.16 Introduce a reward to the informer**

News of poaching tiger, killing of deer, pirates, illegal entries of extractors in Sundarbans get FD from the informer (local people). Informers feel insecurity when they provide information about the poacher. FD should provide security to the people who they inform FD about the poachers, pirates and illegal resource user. The government should introduce reward to that person who they inform FD about the poachers.

## **5.1.2 Long term recommendations**

### **5.1.2.1 Motivation and public awareness campaign**

People living in and around SRF forests are not aware of the importance of the tiger and its contribution to the maintenance of an environmental balance. An awareness program (Week of Protecting Tiger, Month of Protecting Wildlife, National debate on Tiger and its prey poaching) on tiger conservation should be undertaken on a massive scale. Lectures, exhibitions and film shows are all part of these exercises to introduce the protection measures taken for the tiger by the government. Public Awareness programs for local opinion makers, teachers, students, NGO, SRF users who are staying on the impact zone / periphery of the SRF are necessary.

### **5.1.2.2 Capacity building to the Forest Department staff**

A basic introduction to wildlife management is given to forest staff and officers from Forest Guard to Assistant Conservator of Forest during their training in Forest Schools in Rajshahi, Sylhet and the Bangladesh Forest Academy, Chittagong. But there is a need of further and advanced training in wildlife management among the forest officers. Training of FD personnel on mangrove ecosystem, biodiversity conservation, conservation biology, ecotourism, wildlife treatment, camera trapping, tranquilizing etc. is necessary.

### **5.1.2.3 Recruit Vets by FD for long term THC management**

The need to study the diseases and treatment of the tiger is a long-felt requirement. Sometimes wild animals, including tigers, get injured due to poaching, trapping and natural calamities and treatment become difficult due to lack of skilled personnel. So it is necessary to train FD staff in basic veterinary skills.

### **5.1.2.4 Purchase equipments e.g. rubber bullet and immobilizing drugs by FD to manage stray tiger situation**

Bangladesh Forest Department (BFD) has only two tranquilizer guns to manage stray tiger but no expert, who can operate it. It is difficult to manage a stray tiger with inadequate equipments (tranquilizer gun, rubber bullet, immobilizing drug etc.). It becomes more

difficult when the team (FD) takes more time to take decisions and arrive to the incidence place. So FD should purchase at least 4 tranquilizer gun, adequate rubber bullet, immobilizing drug, at least 4 speedy water vehicles and recruit specially trained officer who has experience.

#### **5.1.2.5 Build up anti trafficking unit to control commercial poaching and wildlife trade**

Many parts of the tiger have alleged medicinal value, while some parts are made into highly priced souvenirs. These parts and products have a lucrative market in the region, as well as in the United States and Europe. In addition, Bangladesh has a porous border with both India and Myanmar, making the transportation of wildlife parts and products across borders relatively easy. The problem is compounded by the lack of manpower to effectively carry out anti-poaching patrolling.

The Forest Department needs to be equipped with the proper tools and training to be more vigilant in their patrolling activities in order to control poaching of tigers and its prey. A wildlife crime reporting and intelligence service need to be functional and effective to respond to wildlife crime. The wildlife act has been updated recently, with increased penalties for tiger and deer poaching, consumption and trade – these welcome changes should be implemented rigorously

#### **5.1.2.6 Wildlife rescue center, rehabilitation and build breeding centers, investigate wild populations and study**

In order to effectively preserve the habitat of tigers, their prey animal and their population, Forest Department have been set up a wildlife rescue center for injured tiger or its prey animal and need a breeding center for tiger, deer, wild boar etc. to maintain ecological balance and need more research on tiger and its prey population.

#### **5.1.2.7 Training & rehabilitation of the forest dependent people.**

SBCP (2001) shows that 34,49,741 people live in Sundarbans Impact Zone and founded that more than 68% of the households extracting the Sundarban resources were also involved in secondary occupations (also based on Sundarban resources) (SBCP, 2001). 15.9% of all households in the Impact Zone (113,534 households' total) declared earning their primary income from activities inside the forest (SBCP). They mainly depend on the resource of SRF like golpata, honey, fish, shrimp, crab, Goran. An alternative income generating sources

should be developed to reduce biotic interference on forest and improve economic conditions. Some local and international NGO's trying to motivate the forest dependent community to another occupation. They train to people like poultry farming, agriculture, cattle farming, hatching, shrimp cultivation, apiculture etc. and provide loan to run a small poultry business, farming, cattle farming, hatching, shrimp cultivation, agriculture and purchase vehicle. Government should encourage their program and provide loan at lower interest.

## 5.2 Conclusion:

The Bengal Tiger (*Panthera tigris tigris*) is the flagship species as well as the greatest indicator of the health of the Sundarbans, the largest continuous single tract of mangrove ecosystem in the world. The effect of human population growth accompanied by reduction and degradation of habitat has resulted in a fast decrease in tiger population. Higher human pressure, illegal activities, natural disaster, reducing fresh water flow, etc. hampered on tiger, its habitat and prey base species in SRF. The demand of tiger skin, bone, teeth and other parts of the body fall them into a threat. According to Bangladesh wildlife act, it is prohibited to kill all kinds of wild animals, but every year a considerable number of tiger and deer are hunted by illegal poacher. From this study it is found that 2-3 tigers kill/death in each year, but according to local people tiger casualties will be 10-15 in each year. Sundarbans is abundant with various valuable resources. People generally go to the Sundarbans to extract minor forest products and they fall under tiger attack. It is found from list of FD 22 people are killed by tiger each year, but according to local people it will be around 50-75 per year. The human-tiger conflict is still now in alarming position, FD should adopt and implement an effective working plan to reduce above problem. The tiger is carnivorous animal and it is a topmost component of the food chain, if tiger loss from SRF the food chain will be broken down, the whole eco-system will be collapsed and the forest as well as other wildlife will be disappearing in the long from the forest. Sundarbans is only mangrove tiger land in the world, therefore the protection of the tiger is very much important to protect the entire ecosystem.

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## Appendix

Appendix-1: Several photographs were collected from field survey from different sources.

|   |  |
|---|--|
|    |    |
| <p>Fig : Human killed by tiger</p>  | <p>Fig : Human killed by tiger</p>   |
|   |   |
| <p>Fig : Physically injured by tiger</p>  | <p>Fig : Stray tiger top of the roof</p>   |
|  |  |
| <p>Fig : Retaliate death of tiger</p>   | <p>Fig : Injured tiger by trap</p>   |
|  |  |
| <p>Fig : Tiger body parts</p>   | <p>Fig : Medicine</p>  |

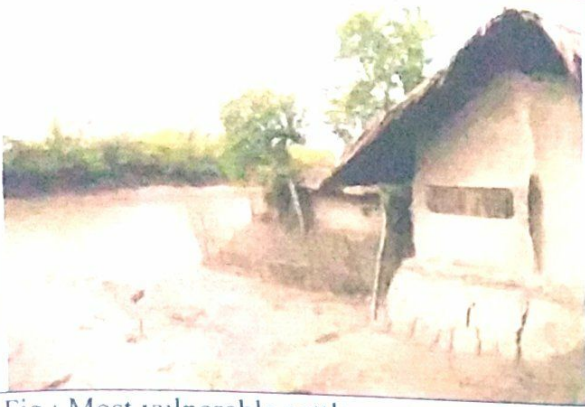


Fig : Most vulnerable settlement



Fig : Poaching deer



Fig : Resource extractor inside Sundarbans



Fig : Honey collecting process

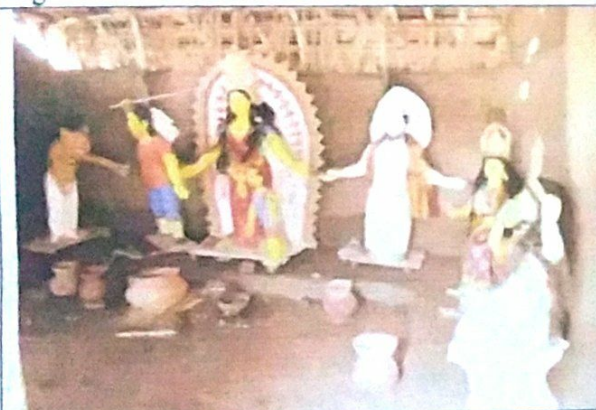


Fig: Bonbibi, Gazikalu temple



Fig : Using musk as a protective measure

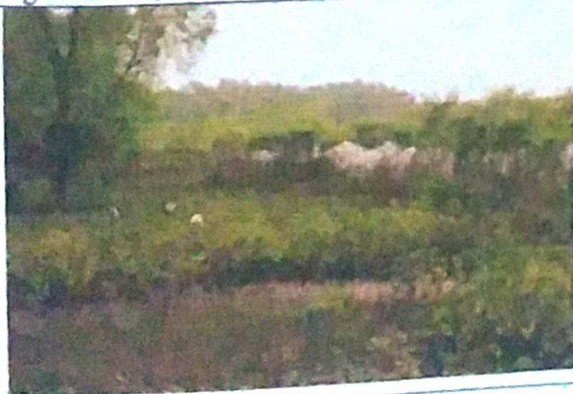


Fig : Cattle grazing inside Forest



Fig : Most tiger entrance point

## Appendix-2:

## Human killed/injured by tiger &amp; Tiger killed/died in SRF during 1975-2014

| Year       | No. of human killed | No. of injured | No. of tiger killed/died |
|------------|---------------------|----------------|--------------------------|
| 1990       | 49                  | 5              | 4                        |
| 1991       | 42                  | 0              | 1                        |
| 1992       | 15                  | 1              | 4                        |
| 1993       | 46                  | 2              | 2                        |
| 1994       | 36                  | 2              | 0                        |
| 1995       | 18                  | 0              | 1                        |
| 1996       | 11                  | 0              | 8                        |
| 1997       | 1                   | 0              | 2                        |
| 1998       | 3                   | 0              | 2                        |
| 1999       | 12                  | 0              | 4                        |
| 2000       | 30                  | 1              | 5                        |
| 2001       | 19                  | 0              | 3                        |
| 2002       | 28                  | 0              | 3                        |
| 2003       | 21                  | 2              | 4                        |
| 2004       | 15                  | 0              | 3                        |
| 2005       | 13                  | 0              | 1                        |
| 2006       | 6                   | 5              | 1                        |
| 2007       | 10                  | 0              | 4                        |
| 2008       | 21                  | 3              | 2                        |
| 2009       | 32                  | 1              | 3                        |
| 2010       | 30                  | 17             | 2                        |
| 2011       | 42                  | 15             | 5                        |
| 2012       | 29                  | 11             | 3                        |
| 2013       | 8                   | 7              | 0                        |
| 2014 (Oct) | 4                   | 4              | 2                        |
| Total      | 561                 | 75             | 69                       |

Appendix-3: Questionnaire for survey in the respective area

**QUESTIONNAIRE FOR SURVEY**

Topic: A study on attitudes of local community on human-tiger conflict in Sundarbans.  
Forestry and Wood Technology Discipline, Khulna University, Khulna.

**BASIC INFORMATION**

Name of the respondent.....

Age class     Young                       Middle                       Old

Sex             Male                                       Female

Address: Range.....                                      Thana.....  
                  Union.....                                      Village.....

**Respondents belong to  
Stakeholder type**

- Gollpata collector (Bowali)
- Honey collector (Mowali)
- Shrimp collector
- Fishermen (Jella)
- Common people
- .....

**Tourist**

- Domestic (common, student, researcher)
- International (common, student, researcher)

**Leader**

- a. Traditional leader (imam, purohit, modal, teacher)
- b. Political leader
  - Chairmen of union porishod
  - Member of union porishod
  - Chairmen of upozila porishod
  - Parliament member
  - Opposition party member

**GO or NGO officer**

- Forest officer
- Administrative officer (UNO, DC)
- NGOs officer
- .....



**PART -1 ATTITUDE AND TOLERANCE TO HUMAN-TIGER CONFLICT**

1, Do you like tiger?

- Yes (conserve)  No (eradicate)

2, If yes, why do you like them? (If no, skip to question 3)

- Beautiful species
- Endangered species
- Maintain ecosystem
- Religious
- Revenue from tourism
- .....

3, Why don't you like tiger?

- Kills livestock
- Attacks human
- .....

4, What do you feel on the death of tiger?

- Happy(publicly)
- Happy(tacitly)
- Taking normally
- Sad
- Blaming the authority

5, Generally what are the reasons for tiger death? Please rank:

- Diseases
- Old age
- Starving
- Natural calamities: flood, cyclone etc.
- Killed by poachers
- .....

6, What do you think, why tiger is decreasing day by day? Please rank:

- Not decreasing still raising
- Lack of food
- Natural disasters
- Poaching
- Not breeding
- Increase disturbances of tourist
- Disease
- Lack of fresh water

**11, Why do tigers come out of the forest? Please rank:**

- No sufficient prey in forest
- Lack of habitat
- Illegal hunting of deer/pig
- Increasing human interferences in sundarbans
- Lack of fresh water inside the forest
- Natural calamity/ cyclone
- Tiger think that locality is also forest area
- Don't know
- Mental disorder/sick

**12, Are you satisfied with problem-tiger management?**

- Yes  No

**13, What should be the role of forest department to reduce human tiger conflict according to your perception? Please rank**

- Formation of tiger team that will gourd at night at village
- Tranquilize the tiger and repatriate it to the forest
- Habitat should be improved
- Protect illegal hunting of tiger and deer
- Make fence of the fringe of the forest near the village
- Make financial help to the victims

**14, Local government / local administration / forest department should provide compensation to the victims family who lose their cattle or properties, agree with me ?**

- Agree  Disagree  Neutral

**15, I support tiger conservation even if a family member is killed.**

- Agree  Neutral  Disagree

**16, I support tiger conservation even if a family member is attacked and injured**

- Agree  Neutral  Disagree

**17, I support tiger conservation even if my livestock are killed.**

- Agree  Neutral  Disagree

**18, When you go to sleep, do you feel insecurity of your life/lives of your family members or other properties? (Only forest community)**

- Yes  No

19, Where does the human-tiger conflict (tiger attack human) occur more frequently?

- Inside the forest
- Buffer zone
- Border of the forest and BZ
- Outside of the BZ

20, When do tiger attack inside of the forest?

- During night (.....)
- Evening (.....)
- Mid-day (.....)
- Morning (.....)

21, When do tiger come out of forest?

- During night (.....)
- Morning (.....)
- Mid-day (.....)
- Evening (.....)

22, Tiger behavior after entrance into village

- Enter into the room and attack on human
- Attack on domestic animal
- Both

23, When a straying tiger enter into your village what do you do? Please rank :

- Keep children and cattle save zone
- Make noise to drive away the tiger
- Gather people
- Make fire to drive away the tiger
- Attack the tiger to kill
- Wait
- Inform forest department

24, Role of extractor (local people) to reduce human tiger conflict

- Quickly transfer message about tiger attack to the nearest forest station
- Formation a team to gourd
- Bawali, mowali, fishermen can use musk
- Keep pet dog with team
- Inform the forest department about poachers
- Adopt alternative livelihood
- .....

25, Do you have got/seen to another one get the compensation which provide by FD to the victims family who lose their family member?

- Yes
- No
- Know but don't get.

**26, Do you have got/seen to another one get the compensation which provide by FD to the victims family who lose their cattle or properties?**

- Yes
- No
- Know but don't get.

**27, Do you have got/seen to another one get the compensation or help by NGOs who lose their family member or cattle or properties?**

- Yes
- No
- Know but don't get.

**28, Do you know pet dog might be a good solution to be safe from tiger attack inside forest as well forest?**

- Yes
- No
- Know but don't use.

**29, If you have another choice to lead your life (occupation), will you change? (Forest community)**

- Yes
- No

**30, Do you have any future plan to rehabilitize victims or victims family? (GO, NGO, PL, TL)**

- Yes
- No

**31, Do you have any future plan to motivate the forest dependent people to another occupation? If have, what is this? (GO, NGO, PL, TL)**

- Yes
- No

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