

PECULIARITIES IN FOOD CHAIN OF SUNDARBAN TIGER RESERVE- RECENT CASE STUDIES

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INTRODUCTION

The saltwater crocodile, an opportunist apex predator, largest among all living reptiles, capable of taking nearly any animals that enters its territory either in water or in dry land. Large adult estuarine crocodile can kill and eat animals within his territory including monkeys, wild boar, birds, domestic livestock, humans, buffalo, gaurs, bats and even shark (Daniel, 1989; Das, 2002). The male crocodile can kill domestic cattle, horses, water buffalo and gaur, all of which may weigh over a ton. Juvenile crocodile may fall prey to tigers in certain part of their range, although encounters between these predators are rare and cats are likely to usually avoid areas with estuarine crocodile.

In Sundarban tiger on land and estuarine crocodile in water is the top most predator and both are found throughout entire STR but there was no previous record of encounter between these species for prey or others. Inter specific fight in the forest is very common and there are records that tiger killed the young rhino (Bist, 1994) and elephant.

Tigers are obligate carnivores and they prefer hunting large ungulates such as chital, sambar, gaur, barasingha, water buffalo, nilgai and

serow. Among the medium sized prey species they frequently kill wild boar, hog deer and monkeys. Small prey species such as porcupines, hares, peafowl etc. killed by tiger as their small prey.

The Royal Bengal Tigers have also been known to eat other predators like leopards, jackal, wolves, foxes, sloth bears, dholes etc. as their prey, although these predators are not typically as a part of tigers' diet (Bagchi *et al*, 2003; Andheria *et al*, 2007; Biswas *et al*, 2002; Prachi *et al*, 2006, Prater, 1993).

STUDY AREA

The Sundarban Tiger Reserve (STR) situated in the Southern most part of the state West Bengal, lies between the latitudes 21°31' and 22°31' North and longitude 88°10' and 89°51' East. It is bounded by fringe villages on the North, Bay of Bengal on the South, Bangladesh on the East separated by Raimangal, Kalindi and Harinbhanga river and on the west by Forests of South 24 Paraganas territorial division

It is one of the first nine tiger Reserves declared under project Tiger Scheme of Government of India in the year 1973. The total area of the Reserve is 2585 Sq km out of

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which 362.40 Sq km area belongs to Sajnekhali wildlife Sanctuary (SWLS), 1330.10 Sq km area under the Sundarban National Park and rest 892.43 Sq km area falls under buffer area (Reserve forest). Total area under critical Tiger habitat is 1699.62Sq km which mainly constitute the areas of Sundarban National Park and SWLS. STR consists of 15 Forest blocks, 71 compartments, and 4 territorial ranges. 15 land based camps and 10 water based (floating) camps.

Mangrove ecosystem of Sundarbans is very dynamics and it contain 31 mammalian species, 59 species of reptiles, more than 200 species of fishes, 53 snake species, 14 species of turtle and tortoises, 7 species of Amphibian and about 310 species of birds are found in entire Sundarban. Among invertebrates, 143 species of mollusks, 201 insect species, 240 species of crustaceans, 78 species of annelids, 68 protozoa species, 104 species of nematode identified in the Indian Sundarbans (Pandit, 2013).

A close network of rivers, channels and creeks intersects the whole STR which has resulted in formation of flat islands. In entire Indian Sundarban part there are 102 islands, out of which human inhabitation was found in 50 percent of the islands. The main river systems in and around the area are Matla, Bidya, Kapura, Jhilla, Raimangal, Harinbhanga, Gona, Gosaba, Gomdi and Kalindi.

Mangrove and mangrove associates constitute the dominant vegetation type of the area. As per Naskar and Mandal, (1998), there are 40 species of major mangrove, 32 species of minor mangrove, 30 species of back mangroves and associates and 3 species of mangrove habitat ferns found in the entire Indian Sundarban. These are grouped in to 39 families, 60 genera and 83 species. Some important mangrove families are Rhizophoraceae, Avicenniaceae, Meliaceae,

Sonneratiaceae, Sterculiaceae, Myrsiniaceae etc. According to champion and Seth's (1968) revised classification mangrove forests of STR belong to (i) Mangrove scrub (4B/TS1) ; (ii) Mangrove forest (4B/TS2) ; (iii) Saltwater mixed forest (4B/TS3) ; (iv) Brackish water mixed forest (4B/TS4) and (v) Palm Swamp type (4B/E1). Some important mangrove species are *Rhizophora species*, *Kandelia*, *candel*, *Avicennia alba*, *Excoecaria agallocha*, *Ceriops decandra*, *C.tagal*, *Bruguiera species*, *Xylocarpus species* *Sonneratia species*, *Phoenix palludosa*, *Nypa fruticans* etc.

Management problems in STR are (i) killing of prey species (ii) illegal collection of honey (iii) collection of crab and tiger prawn seeds (iv) illegal fishing (v) human-tiger conflicts (vi) difficult terrain (vii) unstable nature of land (viii) frequent natural calamities (ix) high level resource dependency by fringe people on mangrove forests and (x) porous boundary

THE SUNDARBAN TIGER

The tiger of Sundarban is the world renowned Royal Bengal Tiger (*Panthera tigris tigris*). Its claws are adapted to strike and hold prey canines are designed for biting and killing; short strong jaws are controlled by powerful muscles, soft pads for steadily approach make the tiger capable of sudden speed and burst of power (Fig-1).

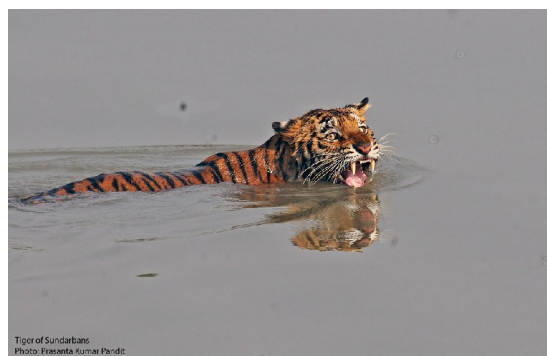


Fig-1: Tiger of Sundarban Tiger Reserve



Fig-2: Tiger of Sundarban. Pix PK Pandit



Fig-3: Hind portion of the tigrees eaten by crocodile. Pix PK Pandit



Fig-4: Elliptical deep piercing wound on the body. Pix PK Pandit



Fig-5: Tail portion of water monitor lizard within the oesophagus. Pix PK Pandit

It is combined with highly developed sense of hearing and vision. However its power of smell has been found to be not as powerful as the hearing ability. Its unique striped colour of deep yellow orange and black are variable. Sundarban tiger in different from any other tiger in the country and world because of its adaptability to the unique mangrove habitat. Their behaviors are highly individual

specific and can't be generated or replicable (Mukherjee, 2004).

FOOD HABIT OF SUNDARBAN TIGER

Predatory behaviors of tiger may differ by prey size or species and by habitat and some behaviors may change with experience. The plasticity in their prey capture and killing behavior affords tiger access to a wide range

Table-1: Food Habit of Sundarban Tiger

Prey Base	Occurrence	Mean Mass	Biomass (%)	Individual (%)
Spotted Deer	72.27	50 kg	58.17	26.24
Wild Boar	42.57	45 kg	32.61	16.28
Rhesus Monkey	9.9	8 kg	4.82	13.57
Monitor Lizard	5.94	8 kg	2.89	8.14
Fish	3.96	2.5 kg	0.85	7.69
Bird	1.98	2.5 kg	0.42	3.84
Crab	0.99	0.2 kg	0.21	23.75

of prey types and sizes (Seidensticker and McDougal, 1993). However, tigers also readily prey on carnivores including each other on occasion (Schaller, 1998).Tigers in Sundarban eat fish, crab, even raid the bee-hive for honey in addition to the normal food chain components like chital, Rhesus monkey, wild boar etc. In a recent field study by analyzing real samples founding Sundarban Tiger Reserve, the following proportion of food components found in 205 nos. of tiger scat (Annon, 2010)

morning of 18th July, 2009 by a team of VeterinaryDoctors headed by Dr. Swapan Ghosh, Veterinary Surgeon and assistant Director, Alipur Zoological garden, Kolkata.

Findings of Post mortem was as follows–

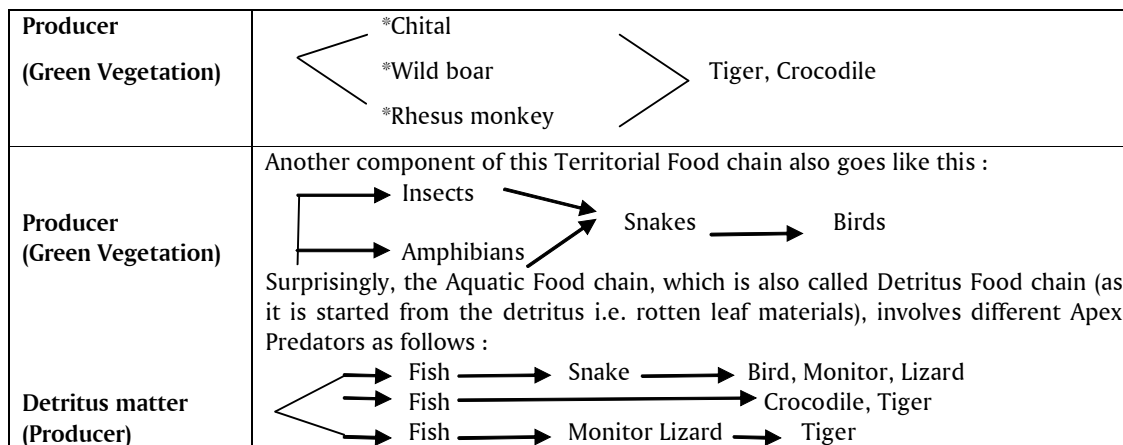
- Carcass was of a male tiger, having more than 10 years of age.
- No external injury found on the body and nobody part was found missing.
- One king cobra and one monocellate cobra (*Naja naja*) were found in the stomach in semidigested condition.

FOOD CHAIN IN SUNDARBAN TIGER RESERVE

Normally there are two different food chain are inoperation in Sundarban Tiger Reserve: (1) The Territorial Food chain & (2) The Aquatic Food chain. The Territorial Food chain mainly comprises of the Tiger as “Apex predator” having following components:-

RECENT CASE STUDY IN STR -2

On 9.8.2011 at about 8.45am another carcass of a female tiger was recovered by the staff of Sundarban Tiger Reserve at Pirkhali – 5 compartment near Dobanki camp of Sajnekhali Wildlife Sanctuary Range(Fig-ii & iii). The post mortem was done on the same



RECENT CASE STUDY IN STR - 1

On 17th July 2009, a tiger carcass was recovered by the staff of Sundarban Tiger Reserve at Netidhopani – 1 compartment under National Park West Range. Post Mortem was done in presence of Principal Chief Conservator of Forests (Head of Forest Force), WB; Director, Sundarban Biosphere Reserve, Field Director Sundarban Tiger Reserve at the

day in the late afternoon by a special Medical Board, headed by Dr.Swapan Ghosh, Veterinary Surgeon (VS) and Assistant Director, Alipur Zoological garden, Kolkata.

On post-mortem it revealed that sex of tiger is female although vital reproductive system was eaten by crocodile but only 4 slightly large teats were found. Approximate age of tigress was 5-6 years. External appearance

revealed that rigor mortis stage of dead tigress was already over so expected time of death is 24-28 hours before post-mortem. It had been observed that all 4 canines were intact, nothing abnormal discharge from nasal opening and ear orifice was detected. Body length from nose tip to lumber vertebra was 108cm and height was 84cm. Tail and hind portion had been eaten by the crocodile so full body length could not be measured. On outside of the body several wound was noticed. One opening of the body 22 numbers scattered elliptical deep piercing wound throughout the body was found. On right upper abdomen (9 nos.), left upper abdomen (2 nos.), right dorsal foreleg (7 nos.), dorsal thoracic region (3 nos.), dorsal posterior neck region (1 no) such wound was observed. Jaws of the Crocodile were so powerful that it could penetrate through the rib of dead tigress. It had been found that the portion beyond the 2nd lumber vertebra was totally torn off. Only a flap of skin which hangs the dislocated femur up to paw of the left hind leg was found. Lungs and both the kidneys were found to be intact and large tearing vent was observed in the diaphragm. All visceral organs like heart, trachea, esophagus, were in normal condition; pleural cavity was completely destroyed through the big diaphragmatic vent. Blood tinged fluid was observed in the pleural cavity. The morphology of liver was normal with only a few patchy whitish mark was observed. Gall bladder and ducts were not identified. Lymph grand was not identified due to due to massive loss of texture of visceral organ. Pericardial sac was full of blood tinged fluid. Heart muscle was shrinks but not discomposed, numerous haemorrhages evidence was noticed in the pericardium of both auricles. All the three chamber of heart was empty except the left ventricle which was full with clotted blood.

In the esophagus a skin of tail portion of water monitor lizard was observed. Small and large intestine was not found during post-mortem as it was eaten by the crocodile. Reproductive organ and ordinary bladder was also not found. From second vertebra to posterior all the skeleton absent except the left hind leg which was detached from the tabular cavity through portion of skin. From observation of post-mortem report all three Veterinary Officers concluded that death of tigress was done due to crocodile attack (Pandit, 2012).

RECENT CASE STUDY IN STR –3

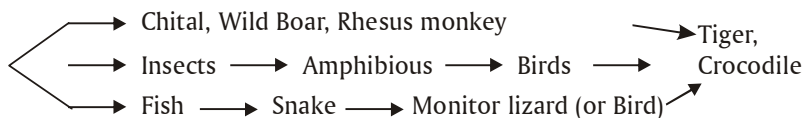
A carcass of a female crocodile was recovered by the staff of Sundarban Tiger Reserve on 20.10.2011 at about 6.35 pm from Pirkhali – 2 compartment of Sajnekhali Wildlife Sanctuary Range. The post mortem was done by Dr Utpalendu Mondal, Veterinary Officer, Sundarban Tiger Reserve on 21.10.2011 at 10.30 am.

Findings of the Post mortem report were as follows:

- Remnant of a long body tail part of monocellate cobra (*Naja naja*) found from the stomach of the crocodile.
- Stomach also contains scales and bones of fishes.

DISCUSSION

It is quite evident from the above case studies that based on the specific habitat and overlapping niche in different food chain, the predators may take up head-on collision in form of preying upon each other. Thus the particular niche of any “Apex Predator” is not properly defined in Sundarban, rather a partial overlapping between Terrestrial and Aquatic Food chain discloses an established aberration in the interest of survival of the fittest as shown below:



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