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Bhitarkanika: Biodiversity Hotspot of Unique Mangrove Ecosystem on Brahmani, Baitarani & Dhamra Delta, Orissa, India

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Abstract: Bhitarkanika is a combination of two words: Bhitar means "inside" and Kanika means "exceptionally beautiful".

Mangroves forests serve as ecotones between land and sea and elements from both are stratified horizontally and vertically, between forest canopy and subsurface soil. In India the mangroves are grown in two groups, the mangroves of the West coast and the mangroves of the East coast.

Bhitarkanika National Park is a 145 km^2 (56 sq mi) large national park in northeast Kendrapara district in Odisha in eastern India. It was designated on 16 September 1998 and obtained the status of a Ramsar site on 19 August 2002. The area is also been designated as second Ramsar site of the State after the Chilika Lake. It is surrounded by Bhitarkanika Wildlife Sanctuary, which spread over 672 km^2 (259 sq mi). Gahirmatha Beach and Marine Sanctuary are to the east, separating swamp region and mangroves from the Bay of Bengal. The national park and wildlife sanctuary is inundated by the rivers Brahmani, Baitarani, Dhamra, Pathsala. It hosts many mangrove species, and is the second largest mangrove ecosystem in India.

There are different species of Flora, Fauna, mammals, avifauna, aquafuna, marine mammals etc. The national park is home to Salt water crocodile *(Crocodylus porosus)*, Indian python, king cobra, black ibis, darters and other species of flora and fauna.

There are about 15 species of mammals, 120 species of fish, 271 species of birds, 25 species of reptiles.

Keywords:

River Delta, Mangrove, Saltwater Crocodile, Species Diversity, Eco-tourism

I. Introduction:

Mangrove forests, dominated by estuarine trees serve as ecotones between land and sea and elements from both are stratified horizontally and vertically, between the forest canopy and subsurface soil (Rao & Deshmukh, 1994)

Mangrove has been defined as "any woody, tropical halophyte that is an obligate inhabitant of ’mangal’ (wetland community) (Tomlinson ,1986).

The word mangrove has traditionally been used to describe the total community or the individual tree/ bushes, growing in the clayey, silty, inter-tidal coastal zones, deltaic and estuarine coasts and backwaters/ sheltered regions, in the tropical/subtropical belts of the world (Nayak & Bahuguna, 2001)

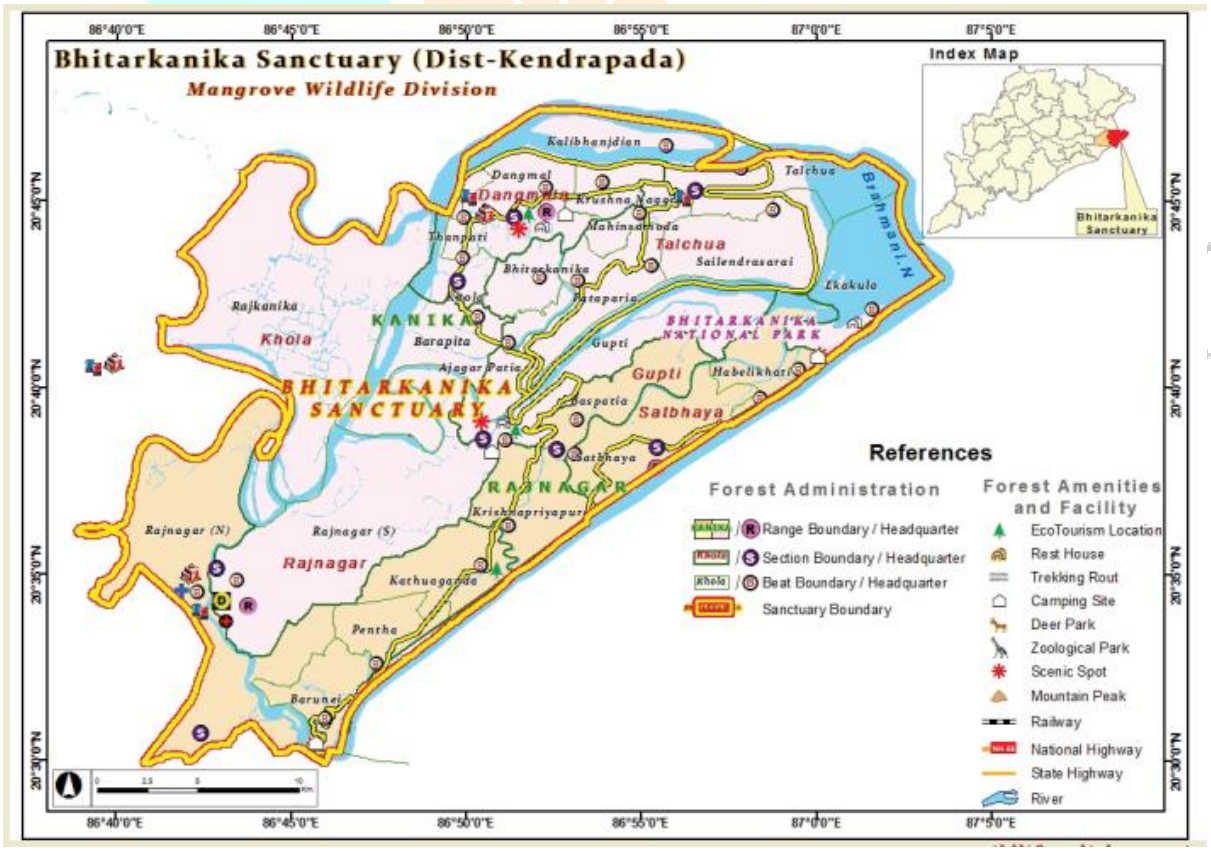
Mangroves can often survive non- saline habitats (Cintron & Schaeffer-Novelli, 1983; Walsh, 1974).

Mangroves may show strong, weak or no spatial zonation (Tomlinson, 1986; Ellison et. al., 2000),

Bhitarkanika, a store house of nature's bounty, harbours a rich and unique bio-diversity. This unique ecosystem of Orissa is surrounded by rivers Baitarani, Brahmani, Dhamara, and is crisscrossed by several creeks-creeklets. The delta, river mouth, the sea, estuarine forest, mangroves, avifauna, reptiles, amphibians, varieties of fauna and flora are various aspects which contribute to the richness of its biological diversity.

II. Area Map:

The Bhitarkanika Wildlife Sanctuary is located between 200 35' - 200 38' N latitude and 860 50' - 870 longitude in the district of Kendrapara, Odisha. It covers an area of 672 sq. km. It has been designated as a Wildlife Sanctuary in 1975 as per the Wildlife (Protection) Act, 1972 the core of which has been notified as a National Park in 1998 covering an area of 145 sq. km. It has also been designated as one of the Ramsar sites (Wetland of International importance) in the country on 19.08.2002. In Odisha, it is the second Ramsar site. Geographically it forms the deltaic region of the rivers Baitarani and Brahmani. It is a micro-environmental region in Rajnagar Block of Kendrapara District. This region holds predominantly an important patch of mangrove forest along the East Coast of India extending over nearly 200 sq. km. It is surrounded by the tidal rivers on the North, South and West and by the Bay of Bengal on the East and is crisscrossed by network of a good number of tidal creeks. Hence, it enjoys an estuarine environment of the wet tropical zone. Physiographically the region constitutes the lower reach of the Brahmani - Baitarani delta, which is bounded by the Dhamara estuary on the North and Maipura and Baunsgarh creek on the south. This deltaic region is a unique bioclimatic zone in a typical geographic situation in the coastal region of Bay of Bengal.



source: www.wildlife.odisha.gov.in

III. Objectives:

The main target of writing this article is to inform everyone about the 2nd largest mangrove forest in India.

To discuss about the species (plants & animals) diversity.

To discuss about the safest home of salt water crocodile.

To highlight the importance of this unique mangrove ecosystem.

IV. Topography:

The landscape contains varied environments, including mangrove swamps, rivers, creeks, estuaries, marshes, inland flood plains, forested beaches, and mudflats.

The main feature of the Bhitarkanika is grown-up of mangrove forest on Brahmani & Baitarani river delta.

V. Climate:

The region comes under the tropical monsoon climate with three pronounced seasons: winter (October to January), summer (February to May) and rainy (June to September). The maximum temperature is recorded in the month of April and May and the minimum temperature in winter during the month of January. The relative humidity ranges from 70% to 84% throughout the year. Wind speed from March to June is over 20 km. per hour, and the predominant wind direction is from south and south-west. Rainfall is around 1642.34 cm per annum and maximum rainfall is received between June and October. The most important weather phenomenon is the prevalence of tropical cyclones. The mean track of the cyclone passes over this region (Singh & Panda, 1999).

The weather in Bhitarkanika is typically wet and humid due to its proximity to the east coast of the Bay of Bengal. The temperature in the area ranges from 14 degrees Celsius in the winter to 40 degrees Celsius in the summer.

VI. Soil& Geology:

The sandy loam soil coast of Bhitarkanika is washed by Bay of Bengal and is subjected to tides twice a day.

Its proximity to Bay of Bengal makes the soil of the area enriched with salts, the vegetation and the species of the sanctuary is comprised of those which are mainly found in the tropical and subtropical inter tidal regions.

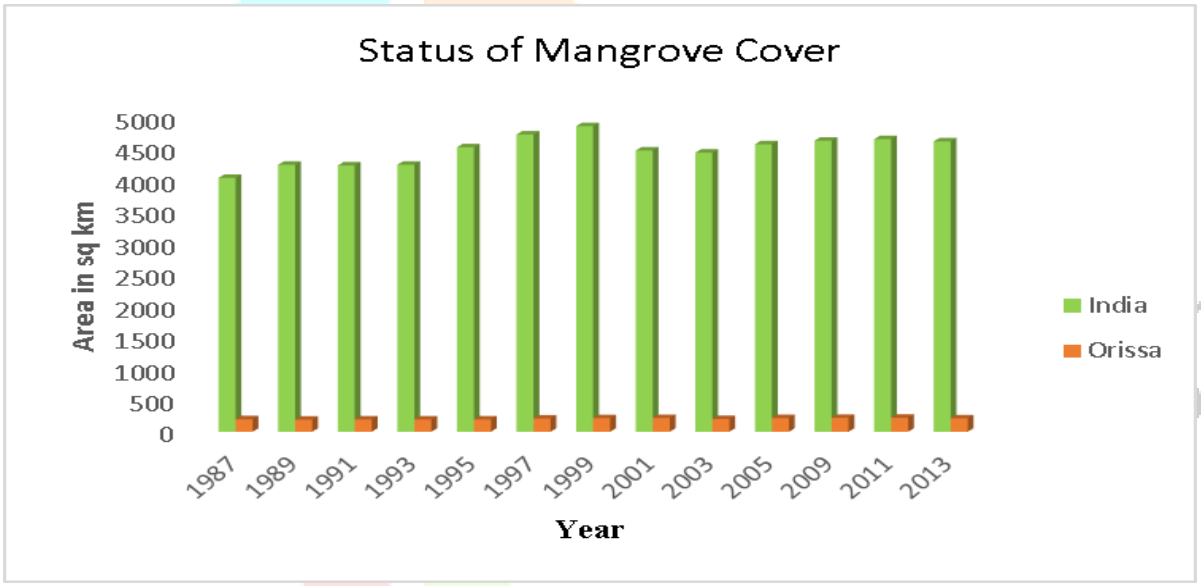
The soil sediments are divided into two categories, indicating recent or sub-recent forms named as 'newer alluvium' and Pleistocene forms named as 'older alluvium' (GSI, 1974). The recent sediments are represented by sand, silt, and clay with assorted boulders and pebbles. These are dark and loosely compacted with high moisture content. The Pleistocene deposits comprise of clay, sand, silt, and 'kankar', with locally cemented pebbles and gravels. These are reddish brown due to high degree of oxidation (Banerjee & Rao, 1990).

Roots of the mangroves forest control the soil erosion.

VII. Flora:

Bhitarkanika ecosystem is a hotspot of rich biological diversity with 71 species of mangroves. The existing mangrove forests in Odisha is available in the districts of Balasore, Bhadrak, Jagatsinghpur and Kendrapara, of which Kendrapara district occupies major part of mangrove forests.

Figure-1.



Data Source- State Forest Report, FSI-2015

This is all the dominant mangrove species in Bhitarkanika.

Table:1

SL NO	Local Name	Botanical Name
1	Bani	Avicennia officinalis
2	Dhala bani	A. alba
3	Singal Bani	A. marina
4	Sundari	Heritiera fomes
5	Dhala Sundari	H. littoralis
6	Keruan	Sonneratia apetala

7	Orua	S. caseolaris
8	Guan	Excoecaria agallocha
9	Rai	Rhizophora mucronata
10	Sisumar	X. granatum
11	Khalsi	Aegiceras majus
12	Garani	Ceriops roxburghiana
13	Bania	Hibiscus tiliaceous
14	Harkancha	Acanthus illicifolius
15	Habali	Thespesia populnea
16	Rasinia	Brugueira gymnorrhiza
17	Nalia grass	Myriostachya wightiana
18	Dhani dhana	Oryza coarctata
19	Bana lembu	Merope angulata

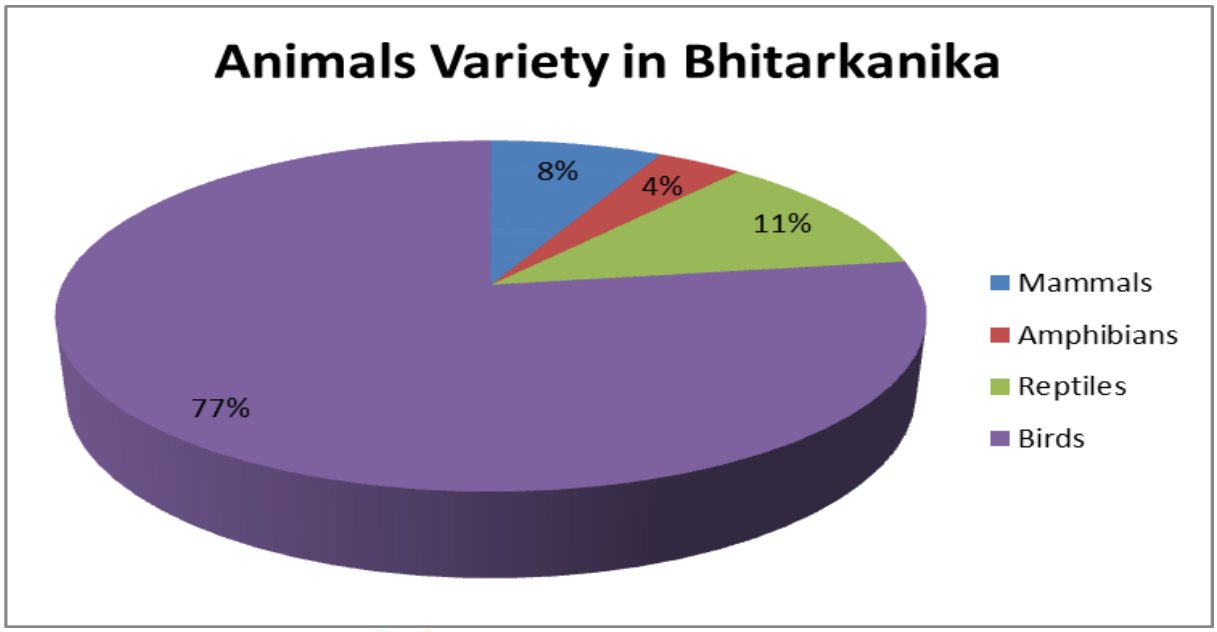
The aquatic fern Kharakhari (Acrostichum aureum) is scattered throughout the sanctuary. Besides these a deciduous plant Karanja (Pongamia pinnata) is also seen in association with the mangrove species. Some mangrove taxa like Cerbera manghas, Acanthus volubilis, Xylocarpus granatum, Heritiera kanikensis and Bruguiera gymnorrhiza are restricted to Bhitarkanika and are not found in other mangrove forests of Odisha. Sonneratia apetala is the dominant element found in abundance and in luxuriant state along the river banks of Bhitarkanika and its creeks.

VIII. Fauna:

The animals that are associated with the mangroves span a wide range of invertebrate and vertebrates. In Bhitarkanika the fauna is distributed throughout the National Park, often in distinct zones which relate to the frequency of tidal flooding, salinity, soil type and type of surrounding plant community. Some species exploit the mangroves permanently such as crabs, snails, shrimps, some insects, reptiles and birds; others move into the area from the sea with each tide and from the land into the sea when the tide is out.

The Sanctuary houses over 28 species of mammals, 14 species of amphibians, 42 species of reptilians and more than 285 species of birds.

Figure-2.



Data Source - https://orissadiary.com

Among the mammals there are Fishing cats (*Felis viverrina*), the Jungle cat (*Felis chaus*), Hyaena (*Hyaena hyaena*), Wild boar (*Sus scrofa*), Rhesus macaque (*Macaca mulatta*), Indian porcupine (*Hystrix indica*), Otter (*Lutra persipicillata*) and Rat (*Rattus rattus*). The Herbivores are represented by Chital or Spotted deer (*Axis axis*) and Sambar (*Cervus unicolor*).

Avifauna

271 species of birds are recorded in this area which includes about 100 species of local and long distance migratory water birds. Some notable avifauna of the National Park is Heron, Darter, Egret, Stork, endangered White bellied sea Eagle, Plover, Koel, kingfisher, Hornbill, Bulbul, etc.

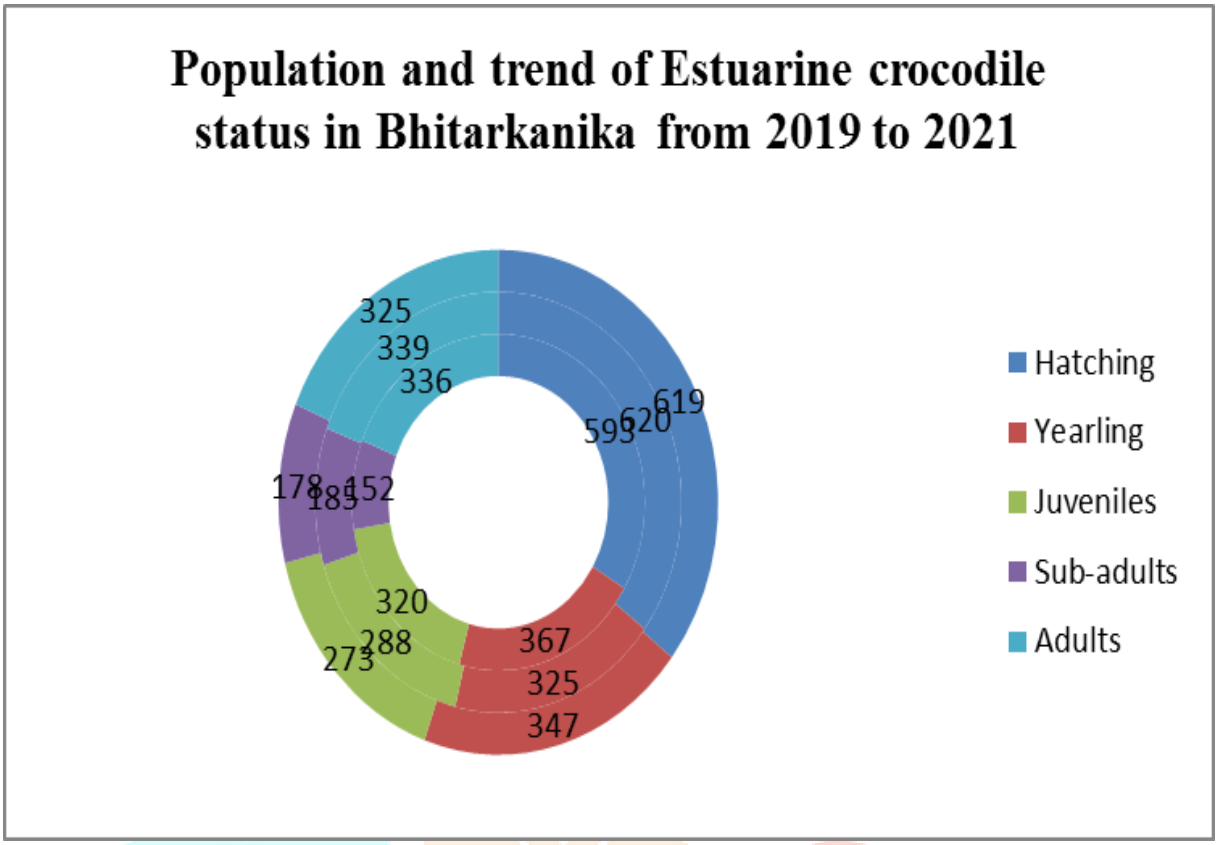
Aqua-fauna

Bhitarkanika estuarine forest is an ideal habitat for many reptiles both aquatic and terrestrial, fishes. Notable among them are given bellow.

1. Salt Water Estuarine Crocodiles:

Bhitarkanika harbours one of the largest populations of endangered Estuarine Crocodile in India and is globally unique since it includes 10 percent of the adults which exceed 6m length. Nearly 1500 Estuarine crocodiles inhabit the rivers and creeks. World's longest estuarine crocodile has been lighted in this area.

Figure-3.



Data Source - https://www.downtoearth.org.in

2. Snakes:

Two kinds of snakes are found in this area. Some of them are deadly poisonous and some of them are non-poisonous in nature.

Table: 2

SL NO	Local Name	Scientific Name	Snake Types
1	Kingcobra	Ophiophagus hannah	Deadly poisonous
2	Banded krait	Bungarus fasciatus	
3	Common krait	B.caeruleus	
4	Indian Rock python	Python molurus	Non-poisonous
5	Rat snake	Ptyas mucosus	
6	Water snake	Natrix piscator	

3. Lizards:

So many species of lizard are found in this area. One of them is India's largest lizard.

Table: 3

SL NO	Local Name	Scientific Name
1	Water monitor lizard	Varanus salvator
2	Land monitor	Varanus flavescens
3	Chameleon	Chameleo zeylanicus
4	Garden lizard	Calotes versicolour
5	House geeko	Hemindactylus sp.
6	Skink	Mabuya sp.

4. Fishes & prawns:

Some of the commercial fishes recorded in this area are Ilisha (Hilsa Illisha), Khainga (Mullet sp.), Bhekti (Lates calcarifer), Kantia (Mystus gulio), and Kokili (Anchovella sp.), Prawns such as Penaeus indicus, Tiger prawn, Penaeus monodon, Metapenaeus affinis and crabs mainly the Mud crab, Scylla serrata and Fiddler crab (Uca sp.), etc.

IX. Environmental problems & Threats:

1. Climate change

Bhitarkanika area is under tropical monsoon type climatic condition. Due to Global warming phenomena day to day the temperature has been gradually increases & the rate of precipitation also been increases. Sometime this huge amount of precipitation is a cause of over flood on this area.

2. Salinity

Due to the increase of temperature the rate of ocean & river water evaporation, evapotranspiration from forest area has been increases. So the rate of salinity is proportionally increases with rate of evaporation. Excessive salinity reduced the quantity & damages the quality of river fresh water.

3. Cyclone

Every year this area is suffering by so many climatic disturbances like, cyclonic storm, flood etc. The number of occurrence of natural disaster like cyclone has been increases. Although the mangrove forest always act as a natural barrier to reduce the velocity of wind of cyclonic storm. But most of time it is damages.

X. Anthropogenic problems & Threats:

1. Land conversion

Most of the time, the mangrove forest land is converted to the agricultural land or residential land by cutting of huge number of mangrove trees. So, this is a bad habit of migratory people. This activity creates a harmful impact on environment.

2. Aquaculture & Fishing

Unauthorised intensive prawn farming has put pressure on the naturally grown mangrove forest. Discharge of untreated effluent creates pollution of the nearby rivers and creeks affecting the aquatic fauna and the mangroves. Fishing in the rivers and creeks by the people of the surroundings villages pose adverse factors on the migratory routes of fishes, movement of crocodiles and other aquatic wildlife.

3. Grazing

Large number of cattle grazes in this area which put pressure on mangrove vegetation.

XI. Conclusion:

The Bhitarkanika region is a very diverse in term of biodiversity & 2nd largest mangrove forest in India. There is a closed connection among rivers, seas and mangrove forests. The human being also associated with it very deeply. It is a natural barrier of cyclone & control the rate of soil erosion by flood. So, we should protect this unique mangrove ecosystem.

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