

Thane Creek Flaming Sanctuary (TCFS)- Coastal Marine Biodiversity Centre (CMBC)- A Model of Mangrove Conservation and Flamingo Tourism

Kamat Vanita

Department of Zoology, Kirti M. Doongursee College, Dadar, Mumbai -28, INDIA

Abstract: Mangroves are salt tolerant evergreen forest ecosystem found mainly in tropical and sub tropical coastal and intertidal region. They have immense value due to their ecological and economical importance in terms of sustainability of coastal life. Mumbai and its sub urbs has total area of 64.3 km of Mangrove cover (ISFR Report 2019). There is increase in anthropogenic pressure on Mumbai Mangroves due to activities like reclamation for housing, sewage treatment, slums, garbage dumps thus leading to biggest threat to ecosystem and its associated flora and fauna. Govt of Maharashtra, under Department of Forest, created Mangrove cell in 2012 for conservation and management of Mangroves. Mangrove cell established Coastal marine biodiversity centre (CMCB) at Airoli, Maharashtra, INDIA in 2017. The aim of this centre was to use mix of visual, audible and tactile elements to sensitize visitors beauty of coastal and marine biodiversity through colourful exhibits of various marine species and facilitating visitors to witness thousands of Flamingos and other migratory birds at Thane Creek Flamingo sanctuary. Author in this review studied Coastal marine biodiversity centre (CMCB) and found how this centre is model for biodiversity conservation through sustainable development and tourism management.

Index Terms: Conservation, Flamingo, Mangrove, Tourism, TCFS, CMBC

I. INTRODUCTION

A. Mangroves :

Mangroves are salt tolerant evergreen forest found in tropical and sub tropical coastal and intertidal regions. They are valued as they have great ecological and economical importance in terms of sustainability of coastal life (ISFR 2019, n.d.). They protect coastal lands and the fishery food chain of estuarine and

coastal areas. Mangrove ecosystem plays very important role on lives of coastal and marine species and local community is dependent on them for livelihood.



1) Mangroves at the CMBC, Airoli



2) Mangrove Mud flats and waders

Mangrove ecosystem are one of the richest biodiversity areas inhabited by diverse group of flora and fauna. It includes various habitats like core forest, litter forest floor, mud flats, coral reefs, sea grass ecosystem, and water bodies like rivers, bays and creeks. To live in areas of lack of oxygen and high salinity, mangroves exhibit various adaptations like succulent leaves, sunken stomata, areal breathing roots called pneumatophores, viviparity etc (ISFR 2019, n.d.)

Mangrove ecosystem hosts different life forms like various invertebrates, fishes, reptiles, birds, mammals etc It provide nursery habitats for fish and crustaceans. They support complex communities where thousands of other species interact. It acts as natural coastal defence which helps in reducing the soil erosion, attenuating waves, reduces intensity of storms. Mangroves have complex root system which dissipates the sea wave energy. It protects the shore from the Tsunamis and soil erosion. It slows down the current of water and increase the sediment deposition creating 'Zone of Accretion' due to trapping of fine sediments including heavy metal contaminants. Thus they arrest coastal

erosion and sea water pollution. Mangrove soils are highly effective carbon sinks and thus help in carbon sequestration (ISFR 2019, n.d.). Mangroves are effective in carbon sinks. They store 1000 tons of carbon per hectare in their biomass and underlying soil. Thus if they are lost or destroyed the coastal ecosystem becomes the source of carbon dioxide and contribute to global warming (UNEP Report, n.d.).

Some important species of mangrove ecosystems in India include *Avicennia officinalis*, *Morinda citrifolia*, *Rhizophora mucronata*, *Sonneratia alba*, *Avicennia alba*, *Bruguiera cylindrica*, *Heritiera littoralis*, *Phoenix paludosa*, *Morinda citrifolia* & *Ceriops tagal* (ISFR 2019, n.d.).

B. Mangroves in Mumbai :



1) Mangrove Cover in Mumbai

2) Mangrove Trail at CMBC

Current Assessment of 2019 shows country has 4975km of mangrove cover which is 0.15 percent of country's area . There has been net increase of 54 kms in mangrove cover as compared to 2017 assessment . Whereas Maharashtra has total of 320km area under mangrove and there has been 16km rise in Mangrove cover .Mumbai city and its suburbs has total of 64.3 km area under mangrove with an increase in 0.30km in compared to the 2017 assessment (ISFR 2019, n.d.).

Mumbai mangrove forests are seen along various creeks, such as Gorai, Manori, Malad, Bassein (Vasai), Dharamaratar, Elephanta island, also along small patches of central and south Mumbai Coastline. But most widely spread mangrove forest is at Thane creek (Sanjay Monga, 2015) .

Devastating floods of year 2008 once again showed how mangroves are essential for survival of Mumbai. Mumbai being financial capital of country, many low skilled adults migrate from across country to Mumbai. Due to exorbitant real estate prices, these migrants settle in slums or in chawls. According to MCGM report of 2016 , 40 % of Mumbai's population lived in slums located on green spaces like mangroves , hills and forests in suburbs.

Mumbai's Mangroves were destroyed for the roads, buildings and other public infrastructure. Many slums came in existence. Remote sensing technology used to detect changes in mangrove habitat around Mumbai and suburbs region has shown degradation of Mangrove vegetation due increased population pressure, construction and developmental activities , conversion to agriculture land and fish farm besides effect of industrial

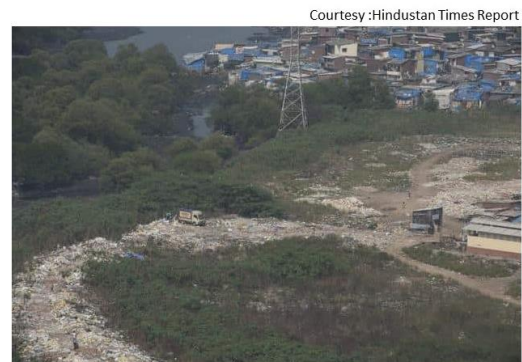
effluents (V.Vijay, 2005) . But due to conservation activities of forest dept , the mangrove cover grew in Mumbai (ISFR 2019, n.d.).

C. Mangrove Cell :

Government of Maharashtra created 'Mangrove cell' on 5th January 2012 for protection, conservation and management of mangroves. The Cell is headed by Chief Conservator of Forests. Mangrove cell has taken many efforts to create social awareness and to train the staff for effective conservation of mangroves. Mangrove cell's biggest achievement is they have increased the mangrove cover in Maharashtra state (Sanjay Monga, 2015).

Mangrove cell is involved in enhancement of mangrove cover. It does satellite monitoring to closely monitor status of mangroves, patrolling mangrove forest, capacity building of staff for effective conservation and protection measures. Its involved in raising mangrove saplings in nurseries across different coastal districts and plantations of mangroves in coastal areas. Mangrove cell is involved along with citizen of Mumbai for removal of garbage. Since initiative started in 2015 ; within 3 years 11.3 km area was cleaned and 8000 tonnes of plastics were removed (Mangrove Cell Activities , Govt of Mah, n.d.).

Mr. N. Vasudevan , Senior Officer of Indian forest service , marine biologist , now chief conservator forest heads the Mangrove cell at the forest Department. He took the responsibility of shouldering and implementation of this conservation from the beginning i.e. 2012. According to him the project is working fairly well and it has many agendas for conserving biodiversity (GIZ Report, n.d.)



Slums encroaching Mangrove areas in Mumbai

Mangrove protection force was created which further helped in removal of encroachment of Govt lands. Mumbai Mangrove Conservation has hired security personnel from Maharashtra State Security Corporation under by Department of Police of Maharashtra and has successfully removed 6000 illegal structures. This force is involved in patrolling , demolition drives and also marine mammals rescue. They have power to take action under Environment Protection Act 1986 (Hindustan Times Report Jan 2018, n.d.)



1) Mangrove Nursery

2) Encroachment Removal

Mangrove cell created Mangrove co management committees comprising local people who were encouraged to take up livelihood activities like crab farming, oyster farming, mussel farming, ornamental fishery, cage culture of brackish water fishes ecosystem. As local communities are benefitting, thus they will get committed for mangrove conservation movement. Mangrove cell hired trained graduates which are deployed now in coastal villages. These trained graduates conduct various courses of aquaculture related courses to local communities along in these villages. Mangrove cell conducts various programmes like Mangrove marathon, Mangrove clean up drives etc. These programmes help to do mangrove conservation along with social awareness about mangroves but also help people to get a platform for contributing to environmental cause (Mangrove Cell Activities, Govt of Mah, n.d.).

Many activities commissioned by the Mangrove cell have helped in improved understanding of mangroves, coastal birds, turtles, dolphins, finless porpoises, whales, corals and associated flora and fauna (Sanjay Monga, 2015).

D. GIZ-CMPA :

Based on 'International Climate initiative' agreement between Government of Maharashtra and federal republic of Germany the project for improvement of biodiversity called 'Sustainable Management of Coastal and Marine Protected Areas (SM-CMPA)' was launched in Maharashtra with help of German agency called GIZ (Thane Creek Flamingo Sanctuary, Mah Govt, n.d.). The project is funded by German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). Using funds provided under the International Climate Initiative (IKI), the BMUB has commissioned the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to jointly implement the project with Ministry of Environment Forest and Climate Change (MoEFCC). This project aims at conservation and management of potential marine protected areas in India by developing capacity of individuals and building community support for conservation through education and outreach (GIZ Report, n.d.). In Maharashtra the Mangrove cell is implementing the project in three sites i.e. Thane Creek, Velas- Dabhol Coastal area and Ansure Creek (Sanjay Monga, 2015). Indo German Biodiversity programme is working on goals of sustainable use of biodiversity to support local livelihood for future generation.

E. Thane creek :

Thane creek is unique. It is Asia's largest creek spread over 1690 hectares equivalent to 16.9 square kms (Thane Creek Flamingo Sanctuary, Mah Govt, n.d.). Large patches of mangroves border this creek. It supports rich marine life including thousands of flamingos and many wading birds. Among these birds, splendid coloured flamingos are the topmost attraction. Flamingos are tall, pink, wading birds with thick downturned bills, slender legs, long graceful necks, large wings and short tails.

So as Airoli Thane creek has rich mangrove habitat and diverse avian life, this area was considered to be the best spot for Mangrove conservation and Flamingo tourism. Mumbai also lacks open spaces. Thus this spot has high potential of becoming a recreation spot for tourists and a biodiversity study spot for researchers, students and amateurs.

F. Thane Creek Flamingo Sanctuary (TCFS) :

Thane Creek Flamingo Sanctuary is a marine protected area within metropolitan limits of Mumbai. The sanctuary was notified in the Govt Gazette on 6th August 2015. TCFS is a continuous mangrove ecosystem that exists between Mumbai, Thane, Navi Mumbai. Total area of sanctuary is 1690 hectares where in 896 hectares of mangrove forest and 794 hectares of water body is there. During winter, Thane creek is home for thousands of migratory birds, flamingos.

(Courtesy: www.facebook.com/coastalmarinebiodiversityairoli/photos)



Flamingos

Thane creek has more than 200 species of resident and migratory birds including rare osprey, Greater spotted eagle, black tailed Godwit, Pied Avocets (TCFS Brochure, n.d.)

G. Coastal and Marine Biodiversity Centre (CMBC) :



Coastal and marine biodiversity center, Airoli

GIZ Project helped to establish Coastal and Marine Biodiversity Center (CMBC) in Airoli, Thane on 30th April

2017. This center with the state of art interpretation facilities was developed at Thane creek site to support conservation , education and sensitise visitors about coastal and marine biodiversity of Maharashtra especially Thane Creek(*Indian Express Report*, 2017) . It has helped students and tourist to understand need for conservation of wetlands. 7000 square feet center has been divided into 2 parts. First section has coastal exhibits of mangroves and aquatic life found on coast while second section shows exhibits models of whales, turtles and other marine animals. The display is made with latest technology to give information and pictures that can be enlarged , tilted around on computer screen. The main concept is to use mix of audio visual information of coastal and marine biodiversity to create the awareness among the visitors about the role played by biodiversity in coastal areas and also to explain the various threats present in to biodiversity. Sounds of various birds like lesser and grater flamingos, kingfisher, marine animals like Indian Ocean humpback dolphin, blue whale etc can be played . Another display explains how visitors can contribute for conservation and prevent use of plastic, reduce pollution in sea, river etc. Interactive computer screens and cinema rooms are also there . Other features of nature information center includes many marine species photographs on display , recordings to hear how birds attract their mates using calls and small video documentary on thane creek is shown.(*CMBC, Govt of Mah, n.d.*).



Boat ride for flamingo watch

Currently there is 24 seater and 8 seater boats are available and use of life jackets is compulsory. Boating timings are subjected to tide . Boat has Guides which have been trained by BNHS . There is availability of ‘Birds of Thane Creek ’book available at the souvenir shop . Boat fees is rs 300 in weekdays and rs 400 on weekends. Additional facilities like mangrove trail using board walk are available.

II. CONCLUSION :

With undertaking of conservation work by visionary Government officials and thorough utilization of available Project funds along with the contribution of various stake holders like different environmental Non Government Organisations, environmentalists , nature lovers , conservationist , researchers and local community various threatened ecosystems like Mangroves can be sustainably maintained and developed. Thane Creek Flamingo sanctuary Coastal marine biodiversity center (CMCB) , Airoli , Maharashtra, INDIA can be considered as model of biodiversity conservation through sustainable development , conservation education and tourism management.

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1) Students and amateurs in the exhibition hall receiving information from experts



2) Interactive screen for learning biodiversity

H. Flamingo Safari :



1) Flamingos (Far View)



2) Flamingos (Closer View)

There is mangrove flat of 1690 hectars between Vashi and Airoli areas .Boat ride tour of one hour around 10 kms of mangrove beginning from Airoli to Vashi and back takes tourists to the areas close of flamingos via boating .

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