

Diversity of Mangrove Ecosystem from Vaitarna Estuary (Palghar), Maharashtra, India

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ABSTRACT

Mangroves are one of the biologically diverse ecosystems in the world, rich in organic matter and nutrients and support very large biomass of flora and fauna. With continuing degradation and destruction of mangroves, there is a critical need to understand the biodiversity of the mangrove ecosystems. The present paper deals with the survey of mangrove species diversity along different sites, i.e. Dativare coast, Vaitarna Bridge and Wadhiv of Vaitarna estuary Maharashtra, India. During this study, 4 species of true mangroves representing 3 genera and 3 families, 5 species of mangrove associates belonging to 4 families, 1 Genus 1 species of mangrove halophytes were recorded from the mangrove ecosystems of Vaitarna estuary (Palghar), Maharashtra.

Key words: Mangrove diversity, Vaitarna, Estuary, Species, Maharashtra, India.

Introduction

Mangroves are one among the most productive ecosystems on the earth. They serve as custodians of their juvenile stock and form most valuable biomass (Odam, 1971). Covering about 47% of world's mangrove area, containing 85% of world's mangrove species and occurring in a variety of habitats, the mangrove ecosystem plays a vital role in coastal biodiversity. Certain mangrove species help prevent flooding and erosion of unconsolidated coastlines by breaking the force of waves (FAO 1994). Mangroves are suitable homes for epibenthic, infaunal and meiofaunal invertebrates and are able to support communities of phytoplanktons, zooplanktons and fishes due to the unique environment they create (Cañizares and Seronay, 2016). Mangroves are also nurseries and feeding sites for

some marine species (Rönneck, 1999; Long and Giri 2011) and nesting grounds for hundreds of bird species (Nagelkerken *et al.*, 2008; Garcia *et al.*, 2014). Mangrove ecosystem supports a rich species diversity of flora and fauna but it is facing heavy human pressure and natural stresses leading to the devastation of ecosystem and loss of biodiversity for which it is important to take the measures for conservation and management. Mangrove diversity have been studied well globally (Abantao *et al.*, 2015; Pototan *et al.*, 2017; Asuk *et al.*, 2018).

In India Sundarban mangrove forest, West Bengal shows the highest taxa diversity have been reported for the first time from India (Mandal *et al.*, 1995). Study on biodiversity of mangroves in estuarine ecosystems of Ratnagiri District, Maharashtra have been done by (Naikwade, 2014; Mulla and Chavan, 2017). Studies also shows that d the occur-

rence of a threatened species along the coast of Maharashtra (Gokhale *et al.*, 2015). Diversity of mangrove species were studied on Sunderban biosphere reserve (Brahma and Mukherjee, 2016). Diversity of mangrove species studied on Kerala coast (Sreelekshmi *et al.*, 2018).

Till now extensive research on ecological aspects of mangrove ecosystem has been carried out in India. However, data on mangrove diversity from Palghar district is not available. Hence, the present study on species diversity of mangrove ecosystem of Vaitarna estuary is undertaken.

Materials and Methods

Study area: Base map indicating the shore line with coastal wetland features was prepared using Google map with topography 19°30'49"9"N 72°51'55"E. Field work was carried out at the fringe of Vaitarna estuary from Month of December 2016 to January 2017 to study the mangrove diversity and fixed the three stations namely, Dativare coast, Vaitarna Bridge and Wadhiv. The mangrove species photographs were taken at site with Nikon digital camera. The mangrove specimen were collected and sealed in the clean polythene bag and brought to laboratory. They were identified using the mangrove identification manual and standard flora (Shah, 1978; Banerjee, 1089; Kathiresan, 2000; Rajendran, 2004).

Results and Discussion

During the survey of the mangrove species shows that there are very few species were observed at different stations namely, Dativare coast, Vaitarna Bridge and Wadhiv (Fig.1). Mangrove species observed during the survey were 4 species of true mangroves representing 3 genera and 3 families namely, *Avicennia marina*, *Avicennia officinalis*, *Avicennia alba*, *Acanthus ilicifolius* and *Rhizophora mucronata*, 5 species of mangrove associates belonging to 4 families, namely *Ziziphus ziziphus*, *Caesalpinia bonduc*, *Derris trifoliata*, *Lantana camara*, *Calotropis gigantean* and 1 Genus 1 species of Non-mangrove hydrophytes *Sesuvium portulacastrum* respectively (Table 1) (Fig. 2, 3 and 4).

Mangrove diversity along the Vaitarna estuary was studied. Only five species of mangroves were observed during the period of study. These were namely *Avicennia marina*, *Avicennia alba*, *Avicennia*

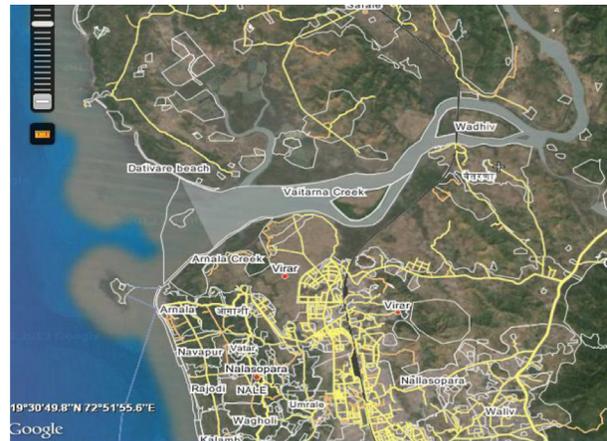


Fig. 1. Google Map of the three sites of the study namely Dativare beach, Vaitarna creek and Wadhiv.

officinalis, *Acanthus ilicifolius* and *Rhizophora mucronata*. Three species were belonging to family aviceniaceae where as 1 species from acanthaceae and 1 species from rhizophoraceae. *Avicennia marina* was the most abundant at Dativare. *Avicennia officinalis* was observed in abundance at Wadhiv. *Acanthus ilicifolius* and *Rhizophora mucronata* were observed moderately at Vaitarna Bridge and Wadhiv. In India a total of 82 mangrove species distributed in 52 genera and 36 families, has been recorded by different workers. Sundarban mangrove forest, West Bengal, shows the highest taxa diversity: 69 species, 49 genera, 35 families, including two species, viz. *Scyphiphora hydrophyllacea* and *Atalantia corea* reported for the first time from Indian (Mandal *et al.*, 1995). Mangrove ecosystem of Indian Ocean region with about 55 mangrove species belonging to 22 genera 23 and 18 families from the Indian Ocean region. Species such as *Avicennia marina*, *Rhizophora mucronata*, *Acrostichum aureum*, were found to be cosmopolitan in distribution (Kathiresan and Rajendran, 2005). Study on 4 species of true mangroves representing 3 orders and tree families, 10 species of mangrove associates belonging to 5 orders and 5 families and 1 species of non-mangrove halophytes from Uran region of Alibag district (Pawar, 2011). Biodiversity of mangrove was reported at Thane creek, Maharashtra. About 11 species of mangroves including *Rhizophora apiculata*, *Sonneratia Sps.*, *Rhizophora mucronata* etc. were found (Athalye, 2013). In 2014 studied biodiversity of mangroves in estuarine ecosystems of Ratnagiri District, Maharashtra, shows biodiversity of mangroves with

Table 1. Taxonomic Arrangement of Mangroves Observed at Vaitarna Estuary

Sr. No.	Kingdom	Division	Order	Family	Genus	Species	Abundance		
							Dativare	Bridge	Pargaon
1	Plantae	Tracheophyta	Lamiales	Avicenniaceae	Avicennia	marina	+++	+	-
2	Plantae	Tracheophyta	Lamiales	Avicenniaceae	Avicennia	officinalis	+	++	+++
3	Plantae	Tracheophyta	Lamiales	Avicenniaceae	Avicennia	alba	+	-	-
4	Plantae	Tracheophyta	Scrophulariales	Acanthaceae	Acanthus	ilicifolius	-	++	++
5	Plantae	Malpighiales	Rhizophorales	Rhizophoraceae	Rhizophora	mucronata	+	++	-
Mangrove Associates									
1	Plantae	Rosanae	Rhamnales	Rhamnaceae	<i>Zizihpus</i>	<i>zizihpus</i>	++	++	+
2	Plantae	—	Fabales	Fabaceae	<i>Caesalpinia</i>	<i>bonduc</i>			
3	Plantae	—	Fabales	Fabaceae	<i>Derris</i>	<i>trofoliata</i>	+	+++	++
4	Plantae	—	Lamiales	Verbenaceae	<i>Lantana</i>	<i>camara</i>	++	+	+
5	Plantae	—	Gentianales	Asclepiadaceae	<i>Calotropis</i>	<i>gigantea</i>	++		++
Non-mangrove haplophytes									
	Plantae	—	Caryophyllales	Aizoaceae	<i>Sesuvium</i>	<i>portulacastrum</i>	+++	++	-

Keys:
 +++ Dense population
 ++ Moderate population.
 + Sparse Population



Fig. 2. Mangrove species diversity location photo at Dativare Jetty site.



Fig. 4. Mangrove species Photo location at Wadhiv site.



Fig. 3. Mangrove Population Photo at Vaitarna Bridge.

20 species with 15 genera. *Sonneratia*, *Avicennia* were the more common genus with three species each (Naikwade, 2014) and in 2017 (Mulla and Chavan, 2017) recorded 7 families and 11 species of mangroves diversity along the Ratnagiri coast. Observation shows the occurrence of *Dolichandrone spathacea* a threatened species along the coast of Maharashtra. On the coast of Maharashtra and Goa few trees of

the *Dolichandrone spathacea* are recorded. These are growing along the borders; in the crop fields in enshroud mangrove land as well as directly on mangrove mud. It is well associated with *Rhizophora mucronata*, *Avicennia officinalis*, *Sonerettia alba*, *Sonerettia caseolaris*, *Heritierra litoralis*, *Exoecaria agallocha* as well as *Aegiceros corniculatum*, as per the location i.e. typical mangrove habitat or encroached mangrove land (Gokhale *et al.*, 2015). Total 30 species were collected during the field visits. Among them 16 species are major mangroves and 14 are mangrove associates. They belong to 23 families (Brahma and Mukherjee, 2016). The species composition and structure of Kerala mangroves revealed that 18 mangrove species are evenly distributed throughout the coastal districts, occurring in heterogeneous mixtures with the dominance of *Acanthus ilicifolius* and importance of *Avicennia officinalis* (Sreelekshmi *et al.*, 2018).

Conclusion

Different species of mangroves and mangrove associates vary in abundance in the different stations. The distribution of the mangrove species in the study area depends upon the physical and chemical characteristics of the area, and the substratum where the mangrove species thrives. The main causes for the degradation of Indian mangroves are land reclamation, pollution and over exploitation of the resources. There is urgent need for conservation of mangrove resources and to enhance biological diversity.

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References

- Abantao, S.C., Apacible, T.C., Cortez, S.P., Pereda, L.T. and Orlex, Y. 2015. Mangrove Species Diversity and On-site Impact Assessment of Mangal Coastal Areas. *Expert Opinion on Environmental Biology*. (04.) 3-1-5. doi.org/10.4172/2325-9655.1000122
- Asuk, S.A., Offiong, E.E. and Ifebueme, N.M. 2018. Species composition and diversity of mangrove swamp forest in southern Nigeria. *Int J Avian & Wildlife Biol*. 3(2) : 159-164. DOI: 10.15406/ijawb.2018. 03.00078
- Athalye, R.P. 2013. Biodiversity of Thane Creek, *National Conference on Biodiversity: Status and Challenges in Conservation*. 'FAVEO' 2013 ISBN : 978-81-923628: 1-6.
- Banerjee, L.K., Sastry, A.R.K. and Nayar, M.P. 1989. Mangroves in India – Identification Manual. Botanical Survey of India, 1989. Calcutta
- Brahma, G. and Mukherjee, S. K. 2016. Studies on mangrove diversity of India with special reference to Lothain island wildlife sanctuary. *Plant Science Today*. 3(1) : 25-29. <http://dx.doi.org/10.14719/pst.2016.3.1.186>.
- Gokhale, M.V., Patil, K. H., Toro, S. V. and Chavan, N. S. 2015. *Dolichandrone Spathacea* (LF) K. Schum: A Threatened Biological Entity on the Coast of Maharashtra. *World Journal of Pharmaceutical Research*. 4(9) : 2245-2249.
- Kathiresan, K. 2000. Flora and Fauna in mangrove ecosystem: A manual for identification. All India coordinated project on coastal and marine diversity, training and capacity building and Coastal diversity (East–West). *Ministry of Environment and Forest, CAS in Marine Biology*. Parangipettai.
- Kathiresan, K. and Rajendran, N. 2005. Mangrove ecosystem of the Indian Ocean Region, *Indian Journal of Marine Sciences*. 34(1) : 104-113.
- Mandal, R.N., Ghosh, D.C., Sarkar, A.K. and Naskar, K.R. 1995. New distributional record of Scyphiphora hydrophyllacea from the intertidal mangrove forests of the Indian Sundarbans. *Journal of National Botanical Society*. 49 : 71-74.
- Mulla, T.M. and Chavan, N.S. 2017. Mangrove diversity along the coast of Ratnagiri, Maharashtra. *Current Botany*. 8 : 123-126.
- Naikwade, P.V., Bansode, R.B. Sagar, T. Sankpal, S.T. and Bharati, B. B. 2014. Biodiversity of mangroves in estuarine ecosystems of Ratnagiri District. *Journal of Aquatic Biology and Fisheries*. 2 : 472-475.
- Odum, E.P. 1971. *Fundamental of Ecology*. 3rd Edition, W.B. Saunders, Philadelphia.
- Shah, G.L. *Flora of Gujarat State*. Sardar Patel University, Vallabh Vidyanagar, 1978, India
- Pawar, P.R. 2011. Floral diversity of mangrove ecosystem from coastal environment of Uran (Raigad), Navi Mumbai, Maharashtra. *Electronic J. Environ. Sci*. 4 : 113-117.
- Pototan, B.L., Capin, N.C., Tinoy, Myla Ross and Novero, Annabelle, 2017. Diversity of mangrove species in three municipalities of Davao del Norte, Philippines. *AAFL Bioflux*. 10. 1569-1580.
- Rajendran, N., Baskara, S. S., Ajmalkhan, S. and Balasubramanian, T. 2004. Ecology and biodiversity of Eastern Ghats - Estuaries of India. *EPTRI-ENVIS News Letter*. 10 : 1-11.
- Sreelekshmi, S., Chakkalakkal, M.P., R. Varghese, P. Joseph, Chalil, V.A. and Shivshankaran, B.N. 2018. Diversity, stand structure, and zonation pattern of mangroves in southwest coast of India. *Journal of Asia-Pacific Biodiversity*. 11 : 572-583.