



SURVEY ON THE AWARENESS OF MANGROVE BIODIVERSITY AND ITS CONSERVATION IN KRISHNA AND KAKINADA REGIONS OF

ANDHRA PRADESH

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ABSTRACT

Mangroves are a group of salt tolerant plants which are found in the brackish waters of the world. They are specially adapted to withstand a wide variety of climatic conditions like humidity, heavy rainfall, sudden drop in temperatures etc. They are also capable of withstanding change in the water levels due to high and low tides of the sea. These magnificent group of trees are found in the tropical and subtropical regions of the world. They occupy a significant amount of land cover in India, of which Andhra Pradesh has the second most land cover of Mangroves in India. The present study has been conducted in the Kakinada and Krishna regions of Andhra Pradesh. The focus of the study was on the knowledge that the local communities occupying the mangroves forests possessed on the different types of mangrove species, the fauna inhabiting the mangrove forests and their willingness in participating in the conservation of the mangrove ecosystem. A survey was conducted through questionnaire method in a group of villages falling under the jurisdiction of Kakinada and Krishna Regions. The results obtained were analyzed through random sampling method and the conclusion from the results is that the people in Kakinada region are more in touch with their surroundings, are keen on protecting their heritage and have the basic general knowledge about the mangrove forests and the flora and fauna found within them.

Key words: Mangroves, mangrove biodiversity, conservation, survey.

INTRODUCTION

Mangroves are a miscellaneous group of salt tolerant trees and shrubs that grow in tropical and subtropical inter tidal zones of the coastal environments. Mangroves are the only trees that are seen where freshwater mixes with the sea water. They are commonly referred as “tidal forest” or “marine coastal wetlands” or “mangrove forest”. are highly salt tolerant trees and are adapted to the harsh coastal environment. Mangroves have adapted specialized mechanisms to overcome the fluctuating salinity levels in the water. (Ghosh *et. al.*, 2015, Mangroves of Andhra Pradesh- Identification and Conservation Manual).

The mangroves are distributed over 123 countries in the tropical and sub-tropical regions. Asia has the most mangrove cover in the world. India contributes to 3% of the global mangrove forest cover (Mangrove Cover, India State of Forest Report, 2017).

In India, around 153 mangrove species have been identified of which 36 are identified as true mangroves and the rest are classified as mangrove associates. Some of the prominent mangrove species are *Rhizophora*, *Sonneratia*, *Avicennia*, *Bruguiera*, *Aegiceras*, *Excoecaria*, *Acanthus*, *Aegilotis*, and *Ceriops* etc. 77 micro algae were identified of which 40 were found to be true mangrove species, some of which are *Bacillariophyceae*, *Chlorophyceae*, *Myxophyceae* *Chrysophytes*, Chlorophyta and Pyrrophyta. Along with the floral biodiversity, the faunal biodiversity is also immense. It has been observed that 75 zooplanktons were identified in the mangrove forests which consisted of various larvae or fry of Acopepods, Decapods, Amphipods, Cladocera and fish larvae. Common benthic organisms found here are Polychaetes, Nemertins, Crustaceans, Actinarians, Gobiids and Molluscs. The Indian mangroves are also home to 24 species of fin-fish like *Mugil cephalus*, *Etropus suratensis*, *Sillago sihama* and *Lates calcalifer*. Other exclusive mammal species like the Bengal Tiger, Common Palm Civet and the Fishing cat are also endemic to the mangrove forests of India (Kaladharan P. *et. al.*, 2005, and Giridhar Malla *et. al.*, 2019).

The mangrove forests of Andhra Pradesh provide the livelihood for the fishing communities and other tribal members who live in them. These fisherfolk are dependent on the mangroves for their day-to-day activities, from wood for construction of houses to herbal medicines to cure their maladies and also the bountiful ichthyofaunal diversity which is found in these forests. The recent boost in the aquaculture industry is proving disastrous for the local communities as the heavy commercialization of fish rearing has made it difficult for them to sell their produce or acquire new instruments. These communities are below the poverty line and it is immensely difficult for them to get a loan of any sorts from the Government as there is always the fear of swindlers who might trap them in a huge debt with piling interest rates. (G. M. Narasimha Rao, 2018, M. Haritha *et. al.*, 2017 and Divya Deepthimahanthi *et. al.*, 2021).

The growing needs of the population also demands the scientific exploitation of the natural resources available in the mangrove forests for commercial purposes. Several studies are being conducted on the mangrove plants like *Avicennia marina*, *Rhizophora apiculata* and *Bruguiera cylindrica* to evaluate their pharmacopeial properties. Scientific studies on Mangrove forests along with the implementation of the

conservation strategies is needed to preserve these unique forests which contribute to the global carbon sequestration (Deepthimahanthi Divya *et. al.*, 2020).

The present survey is based on the idea about educating the local fisherfolk of Kakinada and Krishna regions about the importance of mangrove forests, the floral and faunal diversity and their willingness in helping the Government organizations as well as N.G.O.s in conserving the local forest areas.

STUDY AREA

The forest cover of Andhra Pradesh is around 63,770 sq. km, of which the mangroves occupy 582 sq. km. The Godavari river's mangrove forest is found in the East Godavari District of Andhra Pradesh between 16° 38' - 17°N and 82° 14' - 82° 23' E. The Coringa wildlife sanctuary is found in this area. In contrast, the Krishna mangrove forest cover is spread across Krishna and Guntur districts between 15° 42' - 15° 55' N and 80° 42' - 81° 01' E. The Krishna Wildlife Sanctuary is found here. The coastline of Andhra Pradesh is bound by the Bay of Bengal on the east (Mangroves of Andhra Pradesh- Identification and Conservation Manual).

MATERIALS AND METHODS

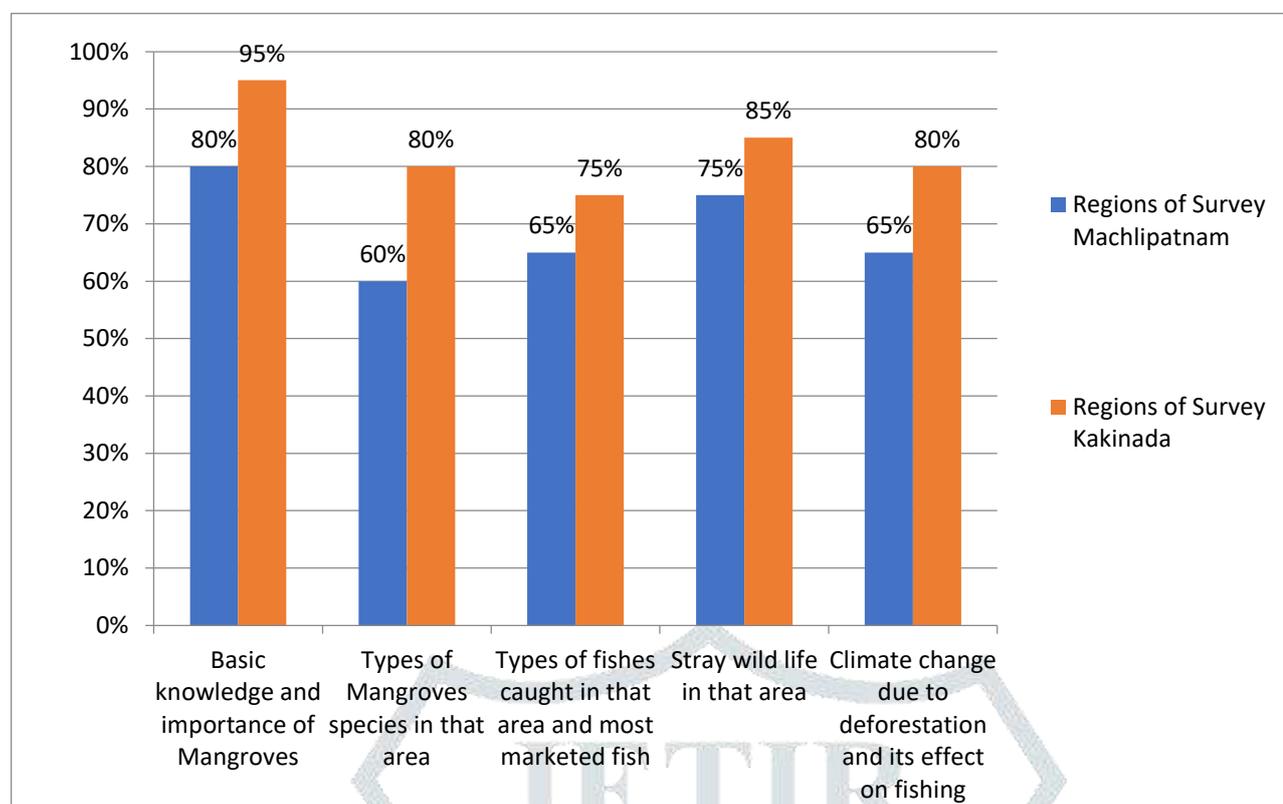
The survey was conducted mainly in the fish markets as well as by going to individual households and general public areas of Kakinada and Krishna regions. The survey was conducted from October to December 2020. The data was collected from Bhairavapalem, Chollangi, Coringa, and Gadimoga villages from East Godavari District and from Krishna region, the data was collected from Machilipatnam, Gilakaladindi, Hamsaladeevi, Polatitippa and Palleshummalapalem villages. The questionnaires were segregated into three categories viz., questionnaire for general public, questionnaire for local residents of the area and questionnaire for literate people. Through these questionnaires the team was able to gather ample knowledge about the socio-economic conditions of the local residents, their lifestyle, their knowledge about the mangroves, the mangrove produce, the types of fish that they catch in general, the types of animals which dwell within the local mangrove forest, the type of mangroves which are found in these forests and their willingness to contribute in the protection of the local wildlife. The survey was conducted for 100 individuals from each region and the results obtained were analyzed through Random Sampling Method (Nisha R. Mugade and Jagdish B. Sapkale, 2017, Govardhan S. *et al.*, 2017, and Sarang K.T, 2020). The aspects taken into the consideration while conducting the survey were: 1) Basic knowledge and importance of Mangroves, 2) Types of Mangrove species in that area, 3) Types of fish caught in that area and the most marketed fish, 4) Stray wildlife in that area and, 5) Climate change due to deforestation and its effect on fishing.

RESULTS AND DISCUSSION:

The residents of all the villages from Kakinada and Krishna regions mostly had sufficient knowledge about the mangrove forests. The fisherfolk were mostly knowledgeable about the local ichthyofauna, about the local flora and fauna and their significance as well as about the impact of deforestation of mangrove forests

in their area. All five aspects are grouped together to understand the stance of the local residents of the villages from Krishna and Kakinada Regions on the importance of mangroves and their conservation.

1. The first aspect of survey is to know the basic knowledge and importance of mangroves in Kakinada and Krishna regions. It was observed that 80% of the people of Krishna region were aware of it whereas in Kakinada region it was observed that 95% of the surveyed people were aware of the basic importance of mangroves. This aspect helps us gain an insight into the type of information about which they might not be aware of regarding the mangrove forests. Efforts could be put in by the government organizations or N.G.O.s which could further educate these people about the mangroves. Further education on the importance and identification of mangrove biodiversity is necessary to promote the conservation drive in local residents of these tidal forests (P. Raghavan *et. al.*, 2020).
2. The second aspect of the survey deals with the knowledge on different types of mangroves species found in these areas. It was observed that 65% of the people can identify the mangrove species in Krishna region while 80% of the people from Kakinada region are aware about the mangrove flora in their local forest. The rich floral diversity in the area gives an opportunity for the residents of these forests in exploiting the natural resources for their own purposes.
3. The third aspect of the survey is based on the knowledge about the fishes caught in a given area and the most marketed fish in that area. It is observed that 65% of people in Krishna region are aware of it whereas in Kakinada region 75% of people have knowledge about it. The aquaculture industry contributes to a lot of income in India (Bijayalakshmi *et. al.*, 2014). Knowledge about the types of fishes caught, their identification and knowledge on the techniques used for their rearing are the need of the hour. The fisherfolk of Kakinada region were able to identify most of the fish caught and could educate the team members about the different techniques and instruments that they used while fishing.
4. The fourth aspect deals with the sightings of the stray wildlife in the mangrove forests and the surrounding areas as well as near the outskirts of these villages. In Krishna region it was found that 75% of the people are aware of the stray wildlife seen in their areas while in Kakinada it was seen that 85% of the people were aware of the wildlife sightings and the identification of the wild animals. Folklores and the general idea about the wildlife seen in an area are the key factors which help the local residents in identifying different fauna found in that given area. Conservation of wild animal species endemic to the mangrove forests is necessary, as a healthy ecological balance would mean that the mangrove forests are thriving properly.
5. The fifth aspect is about the Climate change due to deforestation and its effect on fishing. In Krishna region, 65% of people are aware of the drastic effects of climate change while in Kakinada region 85% of people have knowledge about it. Construction of houses near forests results in remarkable levels of deforestation which would result in drastic climatic changes. Growing population would demand a decrease in forest cover. It has been observed that the past century has contributed to 40% loss in the mangrove forest cover in the country. The readiness of the local tribal as well as fisherfolk communities to restore the mangrove forests and conserve them plays a huge role in regaining the lost forest cover (Sahu S. C. *et. al.*, 2015)



CONCLUSION

The purpose of this survey was to get an approximate estimate about the stance of the local people with regards to mangroves and their biodiversity. It could be noted from the survey that the residents of Kakinada region have more basic knowledge about mangroves in comparison to those residing in Krishna region, this could be due to various reasons, but one of the leading factors in this immense gap in knowledge could be the socio-economic pressures of the local communities and also the lack of proper dissemination of knowledge on environment and biodiversity in these regions. Owing to the lack of proper resources, the tribal and fisherfolk communities of the Kakinada and Krishna mangrove forests have no other option than to rely on the mangroves for their bread and butter. It could be concluded from this survey that, to gain maximum support from the local people, it is imminent for the Government organizations and N.G.O.s to educate the elderly folks and school going children about the need for conservation, the need to identify and recognize their local biodiversity and to sustainably manipulate the nature's bounty to suit their needs.

REFERNCES:

1. Bijyalakshmi Devi Nongimaithem and Ajit Kumar Ngangbam, Socioeconomic Conditions and Cultural Profile of the Fishers in India- a Review, IOSR Journal of Agriculture and Veterinary Science, vol 7, issue 9, ver 1, pp.- 42-48, 2014.
2. Divya Deepthimahanthi, D. Sirisha, K. Govinda Rao, R. Vijaya Nandini and Tasneem Jahan, Mangroves of Andhra Pradesh; Their Ethnobotanical Significance and Conservation Strategies: A Review, International Journal of Multidisciplinary Educational Research, vol 10, issue: 2(5), pg. 105-118, 2021.

3. Deepthimahanthi Divya, G. Beulah, K. Govinda Rao, N. S. Sampath Kumar and G. Simhachalam, Phytochemical Screening of *Avicennia marina* Extracts and its Evaluation for Antioxidant and Antimicrobial Activities, Indian Journal of Ecology vol 47, special issue 11, pp 231-235, 2020.
4. Ghosh S, Bakshi M, Bhattacharyya S, Nath B, and Chaudhuri P, A Review of Threats and Vulnerabilities to Mangrove Habitats: With Special Emphasis on East Coast of India, Earth Science and Climatic Change, 6:4, pg. 1-9, 2015.
5. Kaladharan P., A Nandakumar, M. Rajagopalan, and K. P. George, Mangroves of India: Biodiversity, Conservation and Management, Marine Fisheries Information Service, Technical and Extension Series, Ser. No. 183, pp 8-15, 2005.
6. Giridhar Malla, Paromita Ray, J. A. Johnson and K. Sivakumar, First Photographic Record of Common Palm Civet *Paradoxurus hermaphroditus* from the Mangroves of Andhra Pradesh, India, Small Carnivore Conservation, Vol 57, pp 10-13, 2019.
7. G. M. Narasimha Rao, Distribution, Conservation and Future Prospects for Halophytes in Godavari Estuary of Andhra Pradesh, Human Development and Natural Resource Managements, pg. 140-151, 2018.
8. Govardhan S. Ubale and Dr. R. B. Patil, Importance of Mangroves in Devbagh Coastal Area, Sindhudurg District, Maharashtra, The Konkan Geographer, Vol 17, pp. 13-14, 2017.
9. Mangrove Cover, Chapter 3, India State of Forest Report, 2017.
10. M Haritha, K.A.S. Nisha and P. S. Raja Sekhar, A Study on Mangrove Ecology and Socio-economic Status of Fishing Communities in Coringa Region of East Godavari district, Andhra Pradesh, India, International Journal of Fauna and Biological Studies, 4(1), pg. 01-04, 2017.
11. Mangroves of Andhra Pradesh- Identification and Conservation Manual).
12. Nisha R. Mugade, Jagdish B. Sapkale, Ethnoecological Study of Mangroves along the Estuaries of Rajapur and Devgad Tehsils, Coastal Maharashtra, International Journal of Oceans and Oceanography, Vol 11, no. 1, pp. 31-44, 2017.
13. P Raghavan, K. Kathiresan, P. M. Mohan, K. Ravichandran, R. S. C., Jayaraj and T. S. Rana, Ensuring the Adaptive Potential of Coastal Wetlands of India- the Need of the Hour for Sustainable Management, Wetlands Ecology and Management, 2020.
14. Sarang K T, The Attitude of Local People Towards the Conservational Importance of Mangrove Wetland and Development Around Kavvayi Wetland Ecosystem, Kerala, India, International Journal of Innovative Research and Advanced Studies, Volume 7, issue 11, pg. 9-12, November 2020.
15. Sahu S.C, Suresh H. S, Murthy I K and Ravindranath N. H., Mangrove Area Assessment in India: Implications of Loss of Mangroves, Earth Science and Climatic Change, 6:5, pp. 1-7, 2015.