

Study on the Socio-Economic Influence of the Mangrove Wetlands of North Malabar (Kerala), India

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Abstract: The mangrove wetlands perform several functions such as inundation control, protection from erosion, storm, floods and tidal damage and generate goods and products such as fish and forest resources. These functions are of fundamental importance for society. The present study reveals that the mangrove wetlands of North Malabar provide an Ecosystem Service value of US Dollar 10960 /ha / year, also suggested the way forward for sustainable development.

Key words: wetlands • mangroves • Ecosystem service value • North Malabar

INTRODUCTION

Wetlands are a vital element in the biosphere and produce numerous benefits for society. They provide a critical nursery habitat for many species of fish and wildlife [1]. By temporarily storing large quantities of water, wetlands play an important role in reducing flooding problems and recharging groundwater. They help to maintain water quality by filtering out pollutants and sediments and serve to control erosion by trapping soil washed from nearby uplands. The high productivity of mangrove ecosystems means that they provide ample food supplies to maintain a complex food chain. They therefore provide fertile habitats and nursery grounds for many wild species of commercial importance, including shellfish and fish. Thus, the ecosystem service value is high. There are many challenges to mangrove wetlands, including anthropogenic ones. The mangrove forest found in the wetlands helps to prevent natural calamities such as Tsunami. In addition, wetlands are a source of recreation, timber and other natural products for commercial use [2].

MATERIALS AND METHODS

Sample sites in Valapattanam, Vellikkeel and Kavvayi in North Malabar were selected for the study. Valapattanam is situated at 11° 57' N latitude and 75° 18' E longitude. It lies on the bank of Valapattanam river. Vellikkeel is situated at 12° 0' N and 75° 16' E. Kavvayi lies at 12° 5' N and 75° 13' E on the bank of Kavvayi koyal



Fig. 1: Map showing study area in Kannur District, Kerala, India

(Figure 1). Valapattanam is rich in species diversity of mangroves [3]. The study aims to generate baseline data on the mangroves and wetlands of North Malabar and to review the pattern of resource use in the wetlands in terms of sustainable utilization of resources. This demands an inter-disciplinary approach with components of socio-economic, biodiversity and cartographic appraisal of the landscape units in different localities. Owing to this, the methods of investigation adopted in the present study range from household surveys, a review of the literature, foot surveys of biodiversity studies and ecosystem value analysis. Data was collected through questionnaires and interviews with people from different walks of life – aged people, fisherman and other stakeholders. A detailed survey was conducted to obtain data regarding products, cost of labor, etc. Samples were collected for taxonomical

studies. The method of Costanza *et al.* was followed to determine the ecosystem service value (ESV) [4]. The essence of the ecosystem value approach is to estimate values as subtractions from or additions to income that leave people equally economically satisfied with or without a change in the services provided by the mangrove ecosystem. Challenges and suggestions for sustainable developments are listed from the data. A household survey as part of assessing the importance of wetland-related activities in the occupational pattern of the area was conducted in 50 randomly selected houses belonging to the three Panchayaths (provinces). Criteria used for selection were: proximity to the backwaters, type of soil (whether representing typical wetland alluvium, sand or silt), geomorphic features and features of vegetation of wetlands. Details of occupation, social and organizational affiliations, basic amenities, access to the basic resources and the preferred mode of developmental input and participation of individuals in the people's movement were collected.

RESULTS AND DISCUSSION

The extent of mangrove forest in North Malabar from Calicut to Kasaragod Districts is 3750 ha. Kannur District has the major share of it. A large number of plants and animals depend on mangrove wetlands as their habitat. The mangrove wetlands of North Malabar contain 14 true mangrove species and 40 mangrove associates. The population of birds in the mangrove wetlands is 109 species, of which 34 are migratory. There are 16 species of fishes in the wetlands. The mangrove wetlands have strong linkages with the coastal environment and agriculture and are considered important areas for sustenance of the coastal communities. The stability of the functioning of these ecosystems depends on climate stability and coastal processes. Even a minor change in the global temperature and climate of the area would have a major bearing on the coastal wetlands and also on land-and water-based activities in the region. Most of the true mangroves are medicinally and economically important. Coastal communities are involved in *Kaipad* (salt wetland) cultivation, fishing, shrimp farming, clam collection, crab collection, etc.

Socio-Economic Influence On Local People: The Kannur District has a population of 24 08 956. The population of Kunhimangalam is 17 279 and that of Cherukunnu is 16 246. Sample studies were carried out in different regions of the three places of study. Sample analysis was done on

1200 people, of whom 590 were males and 610 females. Out of a total of 760 earning individuals, 400 were males and 360 were females. There are about 60 people who own the land in the Valapatanam area. Valapatanam covers about 67.71 ha of Pappinissery Panchayath. A part of the marshland was under cultivation until a decade ago. Increase in salinity, land reclamation and profit loss are the main reasons for giving up cultivation. The stakeholders of this area can now be classified into: a. Fishermen b. Those involved in shell mining and processing c. Coir retting workers d. Sand miners e. Ferry service f. Crab catchers.

Fishermen: There are about one hundred fishermen in the Valapatanam area. Rented boats are used for fishing. Two persons use a single boat. Rent for the boats varies from Rs. 300–400 for one month. The best season for fishing is December to June. Each fisherman can earn about Rs. 50 to 100 per day. A trap called a *pedal*, which is made of ribs of the leaves of coconut palm, is also used for fishing. It is mainly women who use these traps in shallow areas. Women make small mud enclosures in the shallow areas and use the traps during ebbs to trap shrimps by rolling the *pedal* in an operation called *therekkal*. Some old fishermen revealed the above-mentioned facts. According to these fishermen, destruction of mangroves has reduced the availability of fishes considerably. The season for prawn catching is from December to June. The price of the prawn varies from Rs. 80–150 per kg. The prawn catching sites are auctioned by the *Panchayath*.

Those Involved in Clam Collection and Shell Mining and Processing: More than 80 families are involved in this. *Elembakka* (clam – *Meretrix casta*) are collected from the wetlands near to mangroves. One *paatta* (tin containing 5 kg) costs Rs. 20. Clam mining is done from January to June. There is good demand for clams and they are transported to Kasaragod and Karnataka. One can mine 30 tins a day. Two people use one boat. '*Uchuli*' or the shells of clams are collected by traveling in boats. Rs. 40 per day is paid as rent for the boat. Working hours are in the morning from 6–10 a.m. Shells can be mined throughout the year. They get a price of Rs. 20 per tin containing 20 kg shells. There is a choolah (boiler) owned by a family in Madakkara where the shells are made into lime powder. Mavoor rayon factory uses large amounts of shells for the treatment of industrial waste. Lime powder is used for whitewashing the houses. Some local people explained the details.

Coir Retting Workers: Coir retting is small-scale work in the Valapatanam area. The wetland is auctioned for lease for retting purposes. About 5 acres of land near Valapatanam bridge are now used. Mangroves are destroyed to a limited extent to prepare the land for retting of coconut husks. A worker gets Rs. 80–150 per day. The owner sends the fiber to coir factories and fiber bed industries. The launch of synthetic fibers and machine operated retting has reduced the demand for traditional fibers. Some people who live in this area were interviewed to obtain the details.

Sand Miners: Sand mining causes destruction of the river bed of Valapatanam. It causes landslide and leaching out of well water from the adjoining land. Still, about 30 people are involved in sand mining activities. The *Panchayath* provides licenses to mine the sand by collecting a fee for it. Sand is mined mainly from the thuruth (small island), bridge area, Pappinissery and Madakkara. One boat of sand costs Rs. 40/-. About 20 loads are collected each day. The sand is transferred to a lorry waiting at the river bank at the bridge area. One worker can earn Rs. 3000 per month after deducting the boat rent.

Ferry Services: In some places ferry services are conducted for transport from one bank of the river to the other. The *Panchayath* gives permission for ferry services by levying a fee. The service is available from 6 a.m.

to 7 p.m. The usual ferry charge is Rs. 2.50 per head. There may be 12–20 people traveling in a boat. Average daily income is around Rs. 300.

Crab Catchers: Ring nets tied with chicken legs are used for crab (*Scylla serrata*) catching. The season for crab catching is from December to May. The crab catchers get a good catch at night. Rented canoes for Rs. 400 per month are used for this purpose. Currently, about nine small boats are involved in crab catching. Two persons go in a boat. Three to four crabs are caught in a ring net. A good catch is available during high tide. The price of the crab varies according to its size. ‘Neelakkalan’ is the large-sized one which costs Rs. 200•kg–1. The ordinary type will cost Rs. 30•kg–1. Each boat can catch 3–10 kg in a day. Each fisherman can earn Rs. 1000 to 2500 in a month. The best catch is available near the mangrove area.

Ecosystem Service Value: Global wetlands are called “the nursery of much life” because they are one of the most valuable resources for life on earth. They are the source of nutrition and habitation for many species. Wetlands are the world's most productive acres for nutrition in the food web and are particularly efficient converters of solar energy. The plants present in the wetlands convert sunlight into plant material and produce oxygen as a by-product. This production is an integral part of

Table 1: Ecosystem service values of mangrove wetlands (in US \$•ha–1•year–1).

Sl. No.	Services	Value US Dollars/ha
1	Ecosystem function in terms of dry matter•ha–1•year–1	150
2	Fish and shellfish habitat	2000
3	Waterfowl and other birds' habitat	1200
4	Wildlife habitat	1000
5	Pollution filtration	460
6	Protection against Tsunami and wave damage	1500
7	Heavy metal removal	100
8	Oxygen production (20 kg•ha–1)	40
9	Nutrient production and recycling	450
10	Chemical pollution absorption	300
11	Aquatic production	350
12	Microclimate regulation	800
13	World climate regulation	100
14	Flood control	600
15	Erosion control	800
16	Groundwater and recharge supply	60
17	Energy source	80
18	Livestock grazing	30
19	Fishing	90
20	Fertilizer industry	50
21	Recreation and aesthetics	500
22	Preservation of gene pool	200
23	Scientific research	100
	Total	10960

the interdependent system of a food web. The benefits of wetlands are many and generally recognized to include: (1) ecosystem function; (2) fish and shellfish habitat; (3) waterfowl and other birds' habitat; (4) wildlife habitat; (5) pollution filtration; (6) protection against Tsunami; (7) heavy metal removal; (8) oxygen production; (9) nutrient production and recycling; (10) chemical pollution absorption; (11) aquatic production; (12) microclimate regulation; (13) world climate (ozone layer) regulation; (14) flood control; (15) wave damage protection; (16) erosion control; (17) groundwater and recharge supply; (18) energy source; (19) livestock grazing; (20) fishing; (21) fertilizer industry; (22) hunting and trapping; (23) recreation; (24) preservation of the genetic inventory; (25) aesthetics and (26) scientific research [5]. From this list of areas that wetlands affect, it is no wonder that global wetlands play a vital role in the earth's ecosystem. By analyzing all the factors related to the ecosystem, the service value is calculated (Table 1) as per the method of Costanza *et al.* [4]. As North Malabar has a total of 3750 ha of mangrove wetlands, the ecosystem service value per year can be calculated as $10\ 960 \times 3750 = 41\ 100\ 000$ US \$. Approximately, it is equal to Rs. 164 crores and 40 lakhs.

Challenges to Mangrove Wetlands: The challenges to mangrove wetlands are: (1) Mangrove ecosystems have been exploited by a wide range of human activities and many livelihoods and local economies are strongly dependent upon access to mangrove resources (2). Wetland reclamation is often carried out illegally due to the shortage of land in and around cities, which increases the risk of urban encroachment and squatting in marginal mangrove areas (3). Mangroves may also be reduced by actions ranging from the construction of water-based recreational or residential facilities, such as canal estates, to the conversion of natural ponds for aquaculture (4). In addition, mangrove areas are also lost through indirect actions, often carried out upstream in a catchment area, which impact on the quantity or quality of water supply to the site.

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