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## A study on mangrove ecology and socio-economic status of fishing communities in coringa region of East Godavari district, Andhra Pradesh, India

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### Abstract

Mangrove forests are considered as one of the rich ecological resources consists of salt tolerant plants and aquatic faunal species formed in intertidal zones of tropical and subtropical regions. These forests are least concerned and often over utilised by the human communities for their development in the process of housing, aquaculture or agricultural practices. This resulted in gradual change in ecology of mangrove forests and traditional dependency of the fishing communities. Thus the present study reports the ecological status of mangrove forests and the level of dependency of fishing communities in coringa mangroves. The study found that coringa mangroves consist of 34 floral species and the aquatic faunal resources on which the fishing communities primarily depending were identified as 38 species. It revealed that livelihood practices of fishermen community on coringa mangrove forest is being changed by commercial exploitation and growing industrial activity nearby Kakinada city after the recent up gradation of Kakinada sea port. Steps have to be taken to conserve these resources that reap environmental benefits besides providing livelihood to fishermen communities.

**Keywords:** Coringa mangroves, Income generation, fishing community, traditional dependency, subsistence and livelihood

### 1. Introduction

The mangroves form as forests of salt-tolerant species, with complex food webs and ecosystem dynamics [3]. These are specialized ecosystems, capable of living under the influence of salt water, mainly in inter tidal zones of tropical and sub-tropical regions of the world [4, 7, 10]. These are highly important renewable resources providing both raw materials and land for urban development, and aquaculture ventures [5, 8]. The flora and fauna of these mangroves provide tannin, timber, medicine, vegetables, firewood, charcoal, match wood and fodder to the natives for nutritional basis, energy supply and raw materials needed for building houses, wood material for making boats, fishing implements and catching gear [7]. Mangroves provide economic benefits, besides protecting the coastline from natural erosion processes [6]. In India, mangroves occupy an area of 4628 sq.km accounting for nearly three per cent of the world's mangrove vegetation [1], whereas in Andhra Pradesh, Mangrove forests account for only 582 sq.km, representing only about 0.9% of the State's total forest area [4, 8] and occur in estuaries of Krishna and Godavari rivers. The coringa Mangrove forest located in East Godavari district is a tidal bay fed by the Bay of Bengal to the East. Commercial and ecological rich coringa mangrove forests are destructed due to human activities such as aquaculture, agriculture practices (Paddy), urbanization, industrial development, port expansion and forestry uses in mangrove ecosystems [7]. Many research works were carried out here on biodiversity, but there is less focuss on the socio economic status of fishermen communities in this area. Hence, this paper details the studies on the ecological status and income generation of fishermen community and their dependency on the floral and faunal resources.

#### 1.1 Study area

The Coringa mangrove forests, being the second largest (124 sq. km) mangrove ecosystem in the Indian sub-continent occurs in Kakinda-Godavari estuarine area and geographically located in between 16° 50" to 17° 00" Latitudes and 80° 10" to 82° 25" Longitudes (Figure.1). The mean maximum temperature in the region is 34 °C, while the minimum is 24 °C. The monthly mean maximum temperature occurs during May and minimum during December. The region experiences an average annual rainfall of about 980mm.

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These mangrove forests are formed at the Gautami Godavari estuary and named after one of its distributaries by name as Coringa. Siltation from centuries transformed the river mouths into deltaic region that support luxuriant growth of tropical ever green mangrove forests.

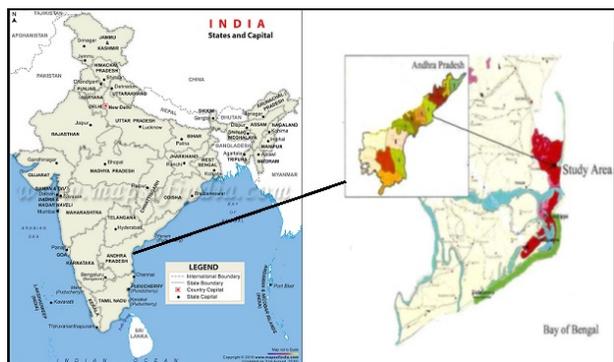


Fig 1: Map showing the Coringa Mangrove forests, Andhra Pradesh, India

### 2. Methodology

The study area was divided into three major zones, each zone is consist of one main field station and four sub field stations of major fishing villages. Three main field stations were established to cover the entire Coringa mangrove area and field studies were conducted from October 2014 through December 2015 in Coringa mangrove forest of East Godavari district, Andhra Pradesh, India. This study used questionnaires to obtain information on the extent of resource utilization and dependency of fishing communities on the mangrove forests of the nearby villages. The questions focused upon the way the different species of mangrove trees are used and aquatic faunal sources for income generation. The 20 inhabitants from the fishing communities in each village in the coringa mangrove forests were interviewed. The aim of the study is to assess the ecological and socio economic status of the coringa mangrove forest and there by identifying the traditional dependency of fishing communities. The state institute of fisheries technology (SIFT) at Kakinada helped us in identification of aquatic faunal species and also helped in finding the mangrove floral species on which these fishing communities depends.

### 3. Results & Discussion

Studies on coringa mangroves revealed that, being the second

largest mangrove forests in India; Coringa consists of 34 species that belongs to a group of 18 families [8]. Of these 15 are true mangroves which require both sea water and river water and 19 are associated species that can survive both in terrestrial and estuarine conditions occur in these wetlands [9]. A checklist of mangrove plant species of coringa mangroves in Godavari are given in Table1. Among 34 species, 19 species are considered as trees, 2 species as shrubs, and 8 species as herbs and 5 species as vines. According to the earlier studies, coringa consists of 15 true mangroves, 6 associated mangroves and 6 marshy grass species [10]. The studies revealed that *Scyphiphora hydrophyllacea* is the true mangrove species considered as endemic to the Godavari mangroves. The species *Sonneratia alba*, *Rhizophora mucronata*, *Bruguiera gymnorhiza* and *Xylocarpus granatum* which are rare mangrove species in Andhra Pradesh. *Tamarix troupii* is an associated mangrove species and considered as rare species was also found in the Godavari wetland [2]. The plant species differ in their uses and popularity.

The survey from the fishing communities was revealed that plant species and their parts are also being used for specific purposes such as making fishing implements, housing constructions and household articles (Table 2).Major occupations of the local inhabitants were mainly classified into three categories; (1) fishing activity of traditional, subsistence and commercial importance (2) daily wage labour in agriculture and shrimp farms and (3) Shell gatherers for lime making, pan preparations for salt making and skilled workers. Major source of income is obtained by involvement in artistry fishing activity and subsistence levels of commercial fishing in river channels and creeks.

A checklist of fishery fauna of coringa mangrove is given in Table 3. Income from each occupation varied as most of the substantial economy comes from fishing with an average earnings ranging from Rs. 5000/- to 10,000/- per month followed by agricultural and aquaculture labour that have an income status varying from Rs. 12000/- to 15000/- and Rs. 2500/- to 5000/- per month. A negligible percentage (3%) of traditional fishermen were engaged in lime making, salt manufacture and earned marginal income from Rs. 500/- to 1000/- per month, remaining skilled workers (2.0%) earn income of Rs. 1500/- to 2000/- per month by fetching work in the nearby urban areas (Table 4).Among other occupations fishing activity was found to be highest (65%), followed by agriculture (30%), lime and salt making (3%) and skilled labour (2%).

Table 1: A Checklist of Plant Species of Coringa Mangroves in Godavari.

S. No	Plant Species	Family	Habit	Vernacular Name
<b>True Mangroves</b>				
1	<i>Avicennia marina</i> (Forsk.) Vierh.	Acanthaceae	Tree	Tellamada
2	<i>A. officinalis</i> L.	Acanthaceae	Tree	Nallamada
3	<i>Avicennia alba</i> Bl.	Acanthaceae	Tree	Vilavamada
4	<i>Lumnitzera racemosa</i> Willd.	Combretaceae	Tree	Thanduga
5	<i>Excoecaria agallocha</i> L.	Euphorbiaceae	Tree	Tilla
6	<i>Rhizophora apiculata</i> Bl.	Rhizophoraceae	Tree	Ponna
7	<i>Sonneratia alba</i> Sm.	Lythraceae	Tree	Peddakalinga
8	<i>Sonneratia apetala</i> Buch. - Ham.	Lythraceae	Tree	Kalinga
9	<i>R. mucronata</i> Lam.	Rhizophoraceae	Tree	Ponna
10	<i>Scyphiphora hydrophyllacea</i> C.F. Garetn.	Rubiaceae	Tree	Nara thanduga
11	<i>Xylocarpus moluccensis</i> (Lam.) M. Roem.	Meliaceae	Tree	Senuga
12	<i>Aegiceras corniculatum</i> (L.) Blanco	Myrsinaceae	Tree	Guggilam
13	<i>B. gymnorhiza</i> (L.) Savigny	Rhizophoraceae	Tree	Kandriga

14	<i>Bruguiera cylindrical</i> (L.) Bl	Rhizophoraceae	Tree	Urudu
15	<i>Ceriops decandra</i> (Griff.) W. Theob.	Rhizophoraceae	Tree	Togara
<b>Mangrove Associates</b>				
16	<i>Hibiscus tiliaceus</i> L.	Malvaceae	Tree	Attakanara
17	<i>Clerodendrum inerme</i> (L.) Gaertn.	Lamiaceae	Tree	Pisingi
18	<i>Thespesia poulneoides</i> (Roxb.) Kostel	Malvaceae	Tree	Ganguravi
19	<i>Tamarix troupii</i> Hole	Tamaricaceae	Tree	Palivelu
20	<i>Acanthus ilicifolius</i> L.	Acanthaceae	Shrub	Alchi
21	<i>Dalbergia spinosa</i> Roxb.	Fabaceae	Shrub	chillinga
22	<i>Sesuvium portulacastrum</i> (L.)	Aizoaceae	herb	
23	<i>Suaeda nudiflora</i> Moq.	Amaranthaceae	herb	Elakura
24	<i>Salicornia brachiata</i> Miq.	Amaranthaceae	herb	
25	<i>Suaeda maritima</i> (L.) Dumort.	Amaranthaceae	herb	Elakura
26	<i>Fimbristylis ferruginea</i> (L.) Vahl	Cyperaceae	herb	
27	<i>Aeluropus lagopoides</i> (L.) Trin	Poaceae	herb	
28	<i>Myriostachya wightiana</i> (Nees ex Steud.) Hook.f.	Poaceae	herb	Dhaba gaddi
29	<i>Porteresia coarctata</i> (Roxb.) Tateoka	Poaceae	herb	Yellu gaddi
30	<i>Sarcolobus carinatus</i> Wall.	Apocynaceae	Vine	Bala boddu theega
31	<i>Ipomoea pes-caprae</i> (L.) R.Br.	Convolvulaceae	Vine	
32	<i>Ipomoea tuba</i> (Schltdl.) G. Don	Convolvulaceae	Vine	Tella teega
33	<i>Caesalpinia crista</i> L.	Fabaceae	Vine	rachis
34	<i>Derris trifoliata</i> Lour.	Fabaceae	Vine	Nalla Teega

**Table 2:** Utilization of Mangroves for Traditional, Subsistence and Commercial purposes.

Scientific name	Commercial	Traditional	Subsistence
<i>Avicennia officinalis</i>	Tan in leather industry	Fuel, Cattle fodder	Roof wall making
<i>Avicennia marina</i>	Medicinal	Washing	
<i>Avicennia alba</i>	Rice Mortar, Water pipes	Timber, Firewood	
<i>Lumnitzera racemosa</i>	Timber, Pile sticks	Poor Firewood	
<i>Excoecaria agallocha</i>	Paper pulp	Wood, fish poison	Match Wood
<i>Xylocarpus moluccensis</i>	Timber wood	Poor fire wood	Furniture tannin, oilseed
<i>Aegiceras corniculatum</i>		Poor fire wood	
<i>Rhizophora apiculata</i>	Timber wood	Fishing stakes, firewood	Charcoal
<i>Rhizophora mucronata</i>	Medicinal	Medicines for Diarrhoea, dysentery and light wine	
<i>Bruguiera gymnorhiza</i>	Timber wood	Fishing stakes, Firewood and charcoal	Tannin
<i>Ceriops decandra</i>	Timber wood	Firewood, tannin, bark medicinal value	Adhesive from bark
<i>Scyphiphora hydrophyllacea</i>		Fencing posts, tool handles, firewood	
<i>Sonneratia apetala</i>	Match wood		
<i>Acanthus ilicifolius</i>		Blood purifier, dressing for boils	
<i>Dalbergia spinosa</i>		Fuel	
<i>Derris trifoliata</i>		Weak fish poison	
<i>Suaeda maritima</i>		Leafy vegetable	
<i>S. monoica</i>		Leafy vegetable	
<i>Aeluropus repens</i>		Cattle fodder	
<i>Myriostachya wightiana</i>		Roofing, Thatching and Cattle fodder	

**Table 3:** A checklist of Fishery Fauna of Coringa Mangrove Forests

Group	Scientific Name	Common Name
1. Crustaceans		
a. Prawns	<i>Penaeus indicus</i>	White prawn
	<i>P. monodon</i>	Tiger prawn
	<i>P. semisulcatus</i>	Flower Prawn
	<i>P. merguensis</i>	-
	<i>Metapenaeus affinis</i>	King Prawn
	<i>M. monoceros</i>	Brown Shrimp
	<i>M. dobsonii</i>	Brown Shrimp
	<i>Macrobrachium monoceros</i>	Fresh water Prawn
	<i>M. rosenbergii</i>	Giant Fresh water prawn
b. Lobsters	<i>Panilurus Sp.</i>	Deep sea Lobsters
	<i>Thenus orientalis</i>	Sand Lobsters
c. Crabs	<i>Scylla serrata</i>	Mud Crab
	<i>S. tranguibarcil</i>	Sea Crab
	<i>Charybdis cruciata</i>	Sea crab
2. Molluscs		
a. Cephalopods	<i>Sepia Sp.</i>	Cuttlefish
	<i>Loligo sp.</i>	Squid

	<i>Perna indica</i>	Brown Mussel
b. Bivalves	<i>P. viridis</i>	Green Mussel
	<i>Meretrix meretrix</i>	Clam
	<i>Villorita cyprinoides</i>	Clam
	<i>Anadara granosa</i>	Clam
	<i>Crassostrea madrasensis</i>	Oyster
	<i>Katelysia opima</i>	
c. Gastropods	<i>Achatina fulica</i>	Giant African sand snail
	<i>Cerithidea fluviatilis</i>	
3. Fishes	<i>Rastrelliger kanagurta</i>	Mackerel
	<i>Mugil cephalus</i>	Mullet
	<i>Lates calcarifer</i>	
	<i>Epinephelus Sp.</i>	
	<i>Nemipterus Sp.</i>	
	<i>Pampus argenteus</i>	White Pomfret
	<i>P. niger</i>	Black Pomfret
	<i>Sardinella longiceps</i>	Sardine
	<i>S. fimbriata</i>	Sardine
	<i>S. gibbosa</i>	Sardine
	<i>Euthunnus affinis</i>	Tuna
	<i>Scomberomorus guttatus</i>	Seer fish
	<i>Periophthalmus chrysocephalus</i>	Mud fish

**Table 4:** Occupational Status and Monthly Income Generation of fishing Community at Coringa mangroves

Major Occupation	Mode of Activity	Monthly Average Income (Rs.)
Fishing	Traditional	5000 to 10000
	Commercial	5000 to 10000
	Subsistence	5000 to 10000
Aqua Culture	Shrimp/fish Farm Labourers	2500 to 5000
Agriculture	Labourers	12000 to 15000
Lime and Salt Makers	Shell gatherers & Salt pan Workers	500 to 1000
Skilled Labours	Boat repairs etc.	1500 to 2000

**4. Conclusion**

The mangrove forests are highly productive ecosystems of biological importance. The economy status of the coringa is reflected by the source of income, primarily fishing. This income indicates fishing communities’ need mangroves for their existence, which in turn requires attention to safeguard these areas. This study, found that the coringa mangrove provides livelihood to the surrounding villages, besides providing many environmental benefits such as coastal protection, carbon sequestration and medicinal values from plants. The future generation also gets benefited, if it is managed sustainably. Thus, conservation and management are immediate steps to be taken for protection of these important mangrove ecosystems.

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