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Research Papers

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**Studies on Socio-economic aspects of the people at Machilipatnam  
Region and their impact on Mangrove Forests, Krishna District,  
Andhra Pradesh.**

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**Abstract**

*Mangrove Ecosystems play an important role in preventing cyclones and tsunamis at estuaries from entering into interior land and in the economic development of local inhabitants. Mangrove plants have special adaptations such as stilt roots, viviparous germination, salt-excreting leaves, breathing roots, knee roots by which these plants survive in water logged anaerobic saline soils. The study of mangrove ecosystems in the deltaic region of Krishna river, particularly in Machilipatnam coastal region is very less and hence taken up. The data of the people in the selected field stations are gathered. The socio-economic status of the local inhabitants and their dependance on mangroves for their economic growth have been established.*

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**Key Words:** Mangroves, Krishna Mangroves, Socio-economic status,

**1. Introduction:**

The word 'mangrove' is used for salt tolerant plants. Mangroves are specialized ecosystems, capable of living under the influence of salt water, along the estuarine sea coasts and river mouths in the tropical and subtropical regions of the world, mainly in the intertidal zone. These plants are specialized to tolerate high salinity, tidal extremes, high fluctuations in wind, temperature and muddy anaerobic soil with the development of some adaptive morphological characteristics. No other groups of terrestrial plants survive well under such conditions.

The objective of the investigation is to assess the socio-economic conditions of the people living in mangrove areas in around Machilipatnam. The port at Gilakaladindi near Machilipatnam is going to be expanded and hence the present study is carried out to identify the

mangrove patches present in Gilakaladindi and its nearby villages Pedapatnam, Polatitippa and Pallethummalapalem.

**2. Study Area:**

Machilipatnam is between 16°10'N to 16.17°N latitudes and 81°09'E to 81.13°E longitudes on the southeast coast of India and in the east corner of Andhra Pradesh. The northern distributary of Krishna river drains in this area near Hamsaladeevi.

Mangrove vegetation is a fragile ecosystem. Krishna mangroves are changing rapidly due to natural calamities, deforestation, aquaculture, over-exploitation, absence of proper management, conservation etc. Mangrove vegetation is a natural protector from natural threats like cyclones, tsunamis etc. The cyclone in 1977, 1990 and the tsunami in 2004, which devastated Diviseema and Machilipatnam regions respectively, are examples of natural threats. It is proved that mangroves act as natural protectors to

control the cyclonic winds and tsunami waves, with densely populated mangrove vegetation (Banerjee, 1998). Therefore, a detailed study of Krishna mangroves is very important.

The Krishna deltaic region is in tropical humid climate, with hot summers and moderate winters. The hottest months are April, May and June, when the average highest temperature is 33°C. The coldest month is January, when the highest temperature is 23°C. Maximum temperature varies from 23°C to 33°C and the minimum value ranges between 19°C to 23°C during a year. Machilipatnam gets annual rainfall due to the southwest [monsoon](#). The average normal rainfall in the district is 110 cm, as obtained from the data collected by the author<sup>1</sup> from June 2008 to June 2011.

Pedapatnam is a mid-sized village located at a distance of 23 km from Machilipatnam, mandal head quarter in the district of Krishna. Gilakaladindi village is about 5 km east to Machilipatnam. Polatitippa is a mid-sized village located nearly 14 km away from Machilipatnam. Palletummalapalem is a mid-sized village located at a distance of 17 km from Machilipatnam.

### 3. Materials & Methods:

The main field stations are in the arena of Machilipatnam. The starting point of northern tributary of Krishna river, along with other criteria like vegetation structure, inundation frequency and the extent of human interference are taken into account while selecting a main field station. The above criteria have also been selected (according to Smith, 1992) to visualize the factors responsible for the degradation of mangrove belts. Several field visits have been made to study the socio-economic conditions of the people living in the field stations. From the responses of the people to the questionnaire, their socio-economic conditions are studied and analyzed.

### 4. Results & Discussion

Socio-economical aspects and Resource utilization: Mangrove ecosystems are of great ecological importance and function as a natural resource for inhabitants. The high productivity of mangals is utilized over centuries for livelihood, traditional usage and subsistence economy. In the present study, the data are analysed to know how the people in this region utilize the resources for their livelihood and practice their agricultural works, shrimp farming, plantation etc.

Mangrove forests in the study area also serve as diverse habitats for many species, including fish, bird, reptiles, amphibians, molluscs, crustaceans

and many other invertebrates, just like in Godavari mangroves and other deltas. (Brahmaji Rao, 1998).

### Socio- Economic status of the people in this region:

- There are no people, with an annual income of above rupees one lakh.

- Mangrove forests are playing a vital role for the socio-economic development of the people of this area.

- Molluscan shells are collected from mangrove by fishermen for lime preparation.

- Mangrove twigs are used as firewood by the local people.

- The mangrove wood with high content of tannin is used as timber due to its durability. The pneumatophores of mangrove trees are used by local fishermen for stopper and float making.

- The fruits of *Sonneratia* species are used for beverage preparation.

- Mangrove extracts are used as indigenous medicines, for example, the extracts of *Avicennia* species have tonic effect. Extracts from mangroves seem to have a potential for killing pathogens in humans, animals and plants and for the treatment of incurable viral diseases. Similar observations were made by Kathiresan in 2000 in Sunderbans. (Kathiresan, 2000).

- Mangrove forests play an important role in maintaining healthy coastal environment.

- Mangroves also provide environmental support for the people community.

- Mangrove ecosystem serves as a protection for a myriad of juvenile aquatic species, a habitat for a variety of terrestrial fauna and a source of nutrients in sustaining many complex food chains.

Thus the economic, social and cultural lives of people in these regions are closely associated with the mangrove flora and fauna.

### Land Resource Utilization

The land in this region is mostly wetland and covers mangrove vegetation. The land is used for aquaculture and agriculture (mainly for paddy growing). Some of the aquaculture ponds set up during the early 1990s are abandoned & reconverted into agricultural land in the recent years. Central wetland and upland zones are covered with *Prosopis* trees and sand.

**a) Cropping pattern:** Paddy is the major agricultural crop cultivated in coastal villages near mangrove areas. It is irrigated mainly by means of canals of river Krishna. The forest department has raised casuarina plantations under its "Shelter-belt Programme" along the coast near Pedapatnam and

Gilakaladindi. The returns from these plantations are used to help the villagers.

**b) Aquaculture:** Aquaculture has been practised both in revenue lands and forest areas for many centuries. The fishermen have been following the traditional aquaculture system of Integrated Farming, for rice, fish, prawn and crabs. In some places, paddy fields have been converted to prawn farms; in other areas the same farms have been reconverted to paddy fields. It is mostly tiger prawns that are cultivated in the prawn farms.

**Water Resource Utilization:**

Water present in the mangrove areas has multifarious utilization. The water resources facilitate the distribution of fauna and establishment of viviparous seedlings. The water resources are extensively utilized for fishing and other related maritimal activities.

90% of the fishing activity with an average fishing area of 20 to 25 km<sup>2</sup> is concentrated in the mangrove zones, employing dip-nets across the channels or creeks. The other mode of maritimal activity of the area is collection of Molluscs by shell gatherers, who spend most of their manual days for collecting molluscan shells and live in boats logged in channels temporarily and shift to other places after rear time.

**Salt pans:** In this region water is utilized for salt forming since sea water has high salinity. The salt is prepared by preparing salt pans, which are demarcated fields, each of 10 x10 m area, near the sea shore. These can be seen near Manginapudi beach (Near Machilipatnam), Gilakaladindi and Polatitippa and are used for salt manufacturing.

**Biological Resource Utilization**

The mangrove forests are highly productive ecosystems of biological importance. Local inhabitants utilize the flora and fauna of mangrove vegetation for traditional practices, subsistence economy and for commercial gains. The lists of fishery and vertebrate fauna that are commonly found in the study area are given in tables 1 and 2.

**Table -1 : A List of Fishery Fauna of Commercial Importance in the Study Area**

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. dohsoni</i>	Brown Shrimp
	<i>Macrobrachium monoceros</i>	Freshwater Prawn
	<i>M. rosenberghii</i>	Giant freshwater Prawn
b.	Lobsters	
	<i>Panulirus sp.</i>	Deep sea lobsters
	<i>Thomus orientalis</i>	sand lobsters
c.	Crabs	
	<i>Scylla serrata</i>	Mud crab
	<i>S. trangantharcel</i>	Sea crab
	<i>Charbidis cruciata</i>	Sea crab
2	Molluscs	
a.	Cephalopods	
	<i>Sepia sp.</i>	Cuttle fish
	<i>Loligo sp.</i>	Squid
b.	Bivalves	
	<i>Perna indica</i>	Brown mussel
	<i>P. viridis</i>	Green mussel
	<i>Vellorita cyprinoides</i>	Clam
	<i>Anadara gramosa</i>	Clam
	<i>Crossostrea madrasensis</i>	Clam
	<i>Katehnia optima</i>	Oyster
c.	Gastropoda	
	<i>Achatina fulica</i>	
	<i>Cerithidea fissatilis</i>	Giant African sand snail
3	Fishes	
	<i>Rastrelliger kanaguru</i>	
	<i>Mugil cephalus</i>	Mackerel
	<i>Lates calcarifer</i>	Mullet
	<i>Epinephalus sp., Nemipterus sp.,</i>	Purches
	<i>Pomprus argenteus</i>	White pomfret
	<i>P. niger</i>	Black pomfret
	<i>Sardinella longiceps</i>	Sardina
	<i>S. fimbriata</i>	Sardina
	<i>S. gibbosa</i>	Sardina
	<i>Euthynnus affinis</i>	Tuna
	<i>Scorpaenocorax guttatus</i>	Seer fish
	<i>Periophthalmus crysocephalus</i>	Mud fish

**Table -2: A List of Vertebrate Fauna of Wild Life Importance in the Study Area**

Group	Name of the Species	Common Name	Status
Amphibians	<i>Rana hexadactyla</i>	Skaper frog	Common
	<i>R. cyanopleuris</i>	Common frog	Common
	<i>Bufo melanostictus</i>	Toad	Common
Reptiles	<i>Microtilia ornata</i>	Tree frog	Rare
	<i>Lepidochelys olivacea</i>	Olive-ridley	Rare
	<i>Kachuga tectum tentotica</i>	Reed turtles	Common
	<i>Lissonyx punctata</i>	Terapin	Common
	<i>Varanus bengalensis</i>	Monitor lizard	Rare
	<i>Amphisma stollata</i>	Land snake	Common
	<i>Natrix piscator</i>	Fresh water snake	Common
	<i>Drophis pulverulentus</i>	Green snake	Rare
	<i>Naja naja</i>	Common cobra	Vulnerable
	<i>Bungarus caeruleus</i>	Common krat	Vulnerable
	<i>Piperia russelli</i>	Viper	Vulnerable
	<i>Anilina naja</i>	Darters	Resident
Birds	<i>Phalacrocorax niger</i>	Little cormorant	Local, Migratory
	<i>Egretta garzetta</i>	Little egret	Resident
	<i>Bubulcus ibis</i>	Cattle egret	Resident
	<i>Ardeola grayii</i>	Pond heron	Resident
	<i>Larus himantophalus</i>	Black headed gull	Migratory
	<i>Tringa glareola</i>	Sand piper	Migratory
	<i>Numerius arguta</i>	Curlew	Migratory
	<i>Ceryle rudis</i>	Pied kingfisher	Resident
	<i>Alcedo althia</i>	Common kingfisher	Resident
	<i>Anas aitus</i>	Pintail	Migratory
	<i>Actypodia</i>	Shoveler	Migratory
	<i>Acroca</i>	Common teal	Migratory
	<i>Tringa nebularia</i>	Green shank	Migratory
	<i>T. totanus</i>	Common red shank	Migratory
<i>Rostratella bengalensis</i>	Painted snipe	Local, Migratory	
Mammals	<i>Recurvirostra avosetta</i>	Avocet	Migratory
	<i>Macaca mulatta</i>	Rhesus monkey	Vulnerable
	<i>Lutra perspicillata</i>	Watter otter	Endangered
	<i>Felis chaus</i>	Fishing cat	Endangered
	<i>Canis aureus</i>	Jackal	Vulnerable
	<i>Vulpes bengalensis</i>	Indian fox	Vulnerable
	<i>Hemipus bengalensis</i>	Mongoose	Common
	<i>Dactylopsax</i>	Tree shrew	Common
	<i>Funambulus pennant</i>	Squirrel	Common
	<i>Pteropus giganteus</i>	Flying fox	Common
	<i>Lepus nigricornis</i>	Hare	Vulnerable
<i>Mus bulgia</i>	Field mouse	Common	
<i>Rattus rattus</i>	Field rat	Common	

**a) Traditional Practices:** Traditional utilization of flora and fauna by local inhabitants fall into different categories. The main resources are formed from the plant communities of different species (Table 3) for house making, fishing articles, domestic usages, personal consumption, medicinal practice and as cattle fodder.

**b) Subsistence Utilization:** Biological resources of mangrove forests are also used as 'subsistence' to local people for their livelihood. Major source of economy is by selling timber, charcoal, firewood and fodder. The monthly

house-hold consumption either for domestic use or for subsistence has been individually estimated for firewood & charcoal and timber.

Table 3- Importance of Mangrove Species utilization for different species in the study area

S.No	Scientific Name	General uses and Medicinal Importance	Traditional	Subsistence
1	Acanthus ilicifolius	Aphrodisiac, asthma, diabetes, rheumatism, snakebite	Medicinal	Snakebite
2	Aegialities rotundifolia	Timber, wood, for construction, honey collection	Wood	Honey collection
3	Aerieras comiculatum	Furniture making, asthma, diabetes, leaves are used as fish poison, wood for fishing boats	fish poisoning	Fishing boats
4	Avicennia alba	Antifertility, skin diseases, ulcers, contraceptive, fodder and fuel wood	Washing	Fuel wood & Fodder
5	Avicennia marina	Astringent, small pox, fodder, fuel wood, timber, honey collection	Timber	Fire wood
6	Avicennia Officinali	Diuretic, leprosy, relieving ulcers, aphrodisiac	Fuel & Fodder	Roof & Wall making
7	Bruguiera cylindrical	Timber, fuel wood, hepatitis, tannin	Timber	Tannin
8	Bruguiera gymnorhiza	Hypocotyls eaten as vegetable, fodder, wood for fishing boat, firewood	Fishing stakes	Hypocotyle as vegetable
9	Ceriops decandra	Timber, malaria, fruit paste are used against ulcers, fuel wood, honey collection	Timber	Honey collection
10	Clerodendrum ineme	Fiber from stem are used against stomach pains and also as antiseptic	Medicinal	Fiber
11	Derris trifoliata	Stimulant, anti-spasmodic	Medicinal	week fish poison
12	Excoecaria agallocha	Milk latex is used against paralysis	Fish poisoning	Match wood
13	Hibiscus tiliaceous	Leaf decoction is used as dysentery & laxative, firewood, wood for boat, cabinet & fancy works	Fishing boats	Fancy works
14	Lumnitzera racemosa	Asthma, antifertility, snakebite	Snake bite	poor fire wood
15	Rhizophora apiculata	Astringent for diarrhea, skin diseases, fodder, bark is used for tanning, nausea, fuel wood	Fishing stakes, piles, pit forks	Fire wood, Charcoal
16	Rhizophora mucronata	Hepatitis, diabetes, firewood, tannin	Diabetes	Tannin
17	Salvadora persica	Leaves are used in salads, leaf decoction for asthma, cough, rheumatism	Medicinal	food additive
18	Sonneratia apetala	Fruits are edible, fodder, timber, fuel wood	fuel wood	Timber
19	Suaeda maritima	Hepatitis, eaten as leafy vegetable	Medicinal	Leaves
20	Xylocarpus granatum	Malaria, timber, firewood, insect bite	poor fire wood	Furniture

**Socio-economic aspects of Pedapatnam:**

Most of the people belong to the backward community namely "Yadavas". Their main occupation is hunting for prawn seedling in the sea, sheep rearing and agricultural labour work. Some families own 2 to 3 acres of cultivated land and others half-acre to 1 acre. They use the land for paddy growth, which mainly depends on rain. In the case of scanty rains ground nut (peanut) crop is grown. The fishermen go to the sea for fishing with boats through Upputeru.

About 25 families depend on sheep growing. Government is lending money for sheep growth and getting it repaid. They go to agricultural labour work to nearby village during rainy seasons.

It has a population of 3000 living in 700 households. Out of 700 houses 478 are of RCC roof and 220 are kutcha houses. The RCC houses are built with the aid given by the State Government under the schemes Indiramma pathakam, World Vision of India, Social Service Organisations like Reconciliation Christian Ministry (RCM).

Most of the families have more than 4 members. Male to female sex ratio is 1.06: 1. About 45% of the population is literates.

**Socio-economic aspects of Gilakaladindi:**

Most of the people are fishermen. They are dependent on fishing, agricultural labour work and collection of prawn seedlings from the sea. Some

families own 5 to 10 acres of cultivated land and others 1 to 3 acres. They use the land for paddy growth, which mainly depends the Krishna river distributary and rain water. Fishermen go to the sea for fishing with boats through river distributary.

The village as a whole has about 100 fishing boats. The fishermen travel on boats for about 28 kms into the sea for fishing. The fishing is done in two directions - one towards Nagayalanka in Krishna District and the other towards Narasapuram in West Godavari District. The average time they spend on sea for fishing ranges from 4 hours to one week. Their average earning in a single trip ranges from Rs.30,000 to Rs.70,000 as against their expenditure of Rs.50,000 per trip. During the ban period for fishing they do miscellaneous works like boat repairs etc.

About 250 other families exclusively depend on fishing in the mangrove creeks. They travel on small boats into the creeks for fishing in the forest area. They do agricultural labour work in the paddy fields whenever they do not go for fishing.

It has a population of about 4500 living in about 1400 households. Out of 1400 houses nearly 1200 are of RCC roof and the remaining kutcha houses. The RCC houses are built with the aid given by the State Government under the schemes Indiramma pathakam, World Vision of India, Social Service Organisations like Reconciliation Christian Ministry (RCM.)

Most of the families have more than 4 members. Male to female sex ratio is 1.08: 1. About 32% of the population is literates.

**Socio-economic aspects of Polatitippa:**

Most of the people are fishermen. They are dependent on fishing, agricultural labour work and collection prawn seedlings from the sea. Most of the families exclusively depend on fishing in the mangrove creeks. There are no other practices like aquaculture, agricultural in this village. Mangrove nursery is present in this village. Fishermen go to the sea in boats through canals for fishing.

It has a population of 3000 living in 650 house-holds. Out of them, only about 100 are of RCC roof and the remaining are kutcha houses. The RCC houses are built with the aid given by the State Government under the schemes Indiramma pathakam and World Vision of India.

Most of the families have more than 4 members. Male to female sex ratio is 1:1. About 31% of the population is literates.

**Socio-economic aspects of Pelletummalapalem:**

Most of the people are fishermen. Bharat Salt Refineries Ltd., which is a salt refinery industry, is situated in this village in 5500 acres. Most of the people are daily labour in this industry. Nearly 1000 people are working in it. The work in the industry starts from 3 O' clock in the early morning and closes by 9 a.m. In the rest of the day, people go for agricultural labour work and collecting prawn seedlings from the sea. They go to work in nearby village, which is about 5km distance, to work in paddy fields. Some people go to the sea in boats through canals for fishing.

It has a population of 1650 living in 430 households. Most of them are of RCC roof. The RCC houses are built with the aid given by the State Government under the schemes Indiramma pathakam and World Vision of India.

Most of the families have more than 4 members. Male to female sex ratio is 1.02:1. About 90% of the population is literates.

The social status of the people in all the four villages and house-hold utilization of plants is estimated and the details are given in Table 4.

From the data, the living conditions and dependency on mangrove forests are analysed and the relationship between utilization of resources and socio-economic conditions in each field station are compared.

Along with the present socio-economic status and utilization of resources, the impact of the proposed developmental activities on mangrove vegetation and the future socio-economic status of the people, are predicted for this region. The state Government proposes port construction in Gilakaladindi. In Polatitippa big projects like Thermal Power Project, Unnati Paper Mills etc. are proposed. The land is also allotted for these projects. Bharat Salt Refineries Ltd., is a big project in Pallethummalapalem, existing in a campus of 8000 acres and a Thermal Power Plant of a capacity of 1000 MW is proposed at Kona, a nearby village of Pallethummalapalem.

**5. Conclusions:**

The socio economic conditions of the local inhabitants is not up to the expected level to enhance their conditions developmental activities should be taken by the State government. The proposed industries in this region need conservation and regeneration of mangroves in different patches. Planning and Management practices to restore the socio-economic conditions and dependency of people on mangroves in this region are essential.

**6. Acknowledgements:**

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Table -4: Socio-economical status in Region of the Study area

Socio-economical status in the Study Area					
Detail data	Pedapatnam	Gilakaladindi	Polatitippa	P.T.Palem	
House Hold	700	1400	652	430	
Total Population	2862	4245	2767	1650	
Sex ratio	Male	1450	2200	1384	850
	Female	1371	2045	1383	800
Family Size	<4	195	382	126	54
	>4	414	692	422	320
Major Occupation	Cultivation	173	5	8	101
	Agriculture labour	682	700	92	372
	Fishing	250	775	300	100
	Salt pans & Salt industry	100	120	200	800
Literate Population	45%	32%	31%	90%	
Annual Income	<60000	350	674	330	555
	60000 - 100000	1100	725	1054	1381
	> 100000	--	--	--	--