



STUDY OF TIDAL VEGETATION OF PURBA MEDINIPUR DISTRICT OF WEST BENGAL, INDIA

Dulal Chandra Das^{1*}, Maniklal Pati¹, Ghanashyam Mahato² and Monalisa Das³

¹Department of Botany, Raja N. L. Khan Women's College, Midnapore-721102, Paschim Medinipur, West Bengal, India

²Department of Botany, A.M College, Jhalda, Purulia, West Bengal, India

³Department of Nutrition & Dietetics, Vidyasagar Institute of Health, Midnapore-721102, Paschim Medinipur, West Bengal, India

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Abstract: The coastal part of Purba Medinipur District of West Bengal has wide variation in the composition of vegetation. Its 68 km coastal belt started from the mohana of Rasulpur river at Hijli sarif of Khejuri extended up to the Udoypur beach of Digha border. This tidal zone is the mouth of Bay of Bengal and showed a great variety of aquatic plants. The total coastal belt is divided into 10 sections: Hijli-Sarif Petuaghat, Bankiput, Junput, Haripur, Shoula, Mandarmoni, Tajpur, Sankarpur and Digha for the brevity of investigation. The present comprehensive study reported 23 angiospermic species of which 9 species are mangrove and rest 14 species are mangrove associates. Mangrove species found in high frequency in Hijli-sarif, Petuaghat, Bankiput, Sankarpur and Digha mohana. The richness of tidal vegetation is greatly hampered due to dry fish industries as well as continuous ferry activities of fisherman. At present this tidal vegetation is under severe threat.

Key words: Tidal vegetation; Angiosperms; Purba Medinipur; West Bengal; India.

INTRODUCTION

Knowledge of vegetation and flora of any region is essential for the study of its biodiversity and environment. Indeed a comprehensive and up to date floristic analysis of a region is essential for proper utilization of plant resources of this area and for planning a long term strategy for the welfare of human population. Besides, preparation of floras of smaller areas like district, protected areas, unexplored areas etc, after extensive surveys, is a prerequisite for the revision of the flora of a vast country like India. In order to ensure the protection of all major ecosystems, to minimize damage to the habitats and to safe guard loss of biodiversity, a comprehensive floristic study as well as effective conservation strategies is essential. The vegetation of the tidal zone of the seacoast region of Purba Medinipur of West Bengal is under threat due to many reasons like – immense and unscientific use of chemicals in dry fish industries and pollution due to the fishing harbor etc. The sea coast region of Purba Medinipur District starts from the mouth of Rasulpur river near Hijli Sarif of Khejuri extended upto the Udoypur of Digha border and about 68 km distance. This belt lies between 21°51'27" N to 21°36'50" N latitude and 87°29'88" E to 88°12'40" E longitude.

The investigated area is divided into ten sections. All the sections immersed during tide and openness during flow. Naturally all the herbaceous plants and the base of some shrubs become immersed every day Sea water rises 150 – 200 feet above towards the sea shore and covered almost 500 feet above during full moon, new moon and rainy season. The vegetation pattern is remarkable and the variation was investigated in ten sections thoroughly. West Bengal flora and Midnapore district flora were investigated [1-3] earlier, but there was no information about the

aquatics of the tidal zone of the sea coast of Purba Medinipur district until now. Therefore, the present study is an attempt to assess the composition and variation of aquatic flora of the coastal belt and also to assess the ecological disturbances by dry fish industries, continuous running of fishing boat and to suggest the sustainable utilization and effective conservation measure.

MATERIAL AND METHODS

Extensive field work, literature survey, herbarium scrutiny and critical examination of plant specimens were carried out from 2010 to 2015. The entire aquatic, marshy vegetation of the tidal zone was thoroughly scanned by repeated visits in different seasons of the years. Sampling was done to prepare a complete herbarium for future reference.

Normally 3-4 specimens of each species of flowering or fruiting stages were collected and the life form photographs were prepared. Relevant field notes were made on the spot, noting down interesting and diagnostic features of plants. Due attention was paid to plants of medicinal, economic importance as well as plants of rare occurrence, biotic pressure on plants, small industrialization and ecological disturbances also. The historical and geographical information was collected from DLRO & the BLRO office of the district. The aquatic vegetation of the tidal zone of the sea coast belt was investigated by walking on foot. All the collected specimens were properly processed, preserved and mounted on herbarium sheets following the standard and modern herbarium technique [4]. Specimens of all plants were critically identified in CNH at Howrah with the help of books, Journals, floras, revisions, monographs and authentic specimens [5-22]

*Corresponding Author:

Dr. Dulal Chandra Das,

Associate Professor,

Department of Botany, Raja N. L. Khan Women's College,
Midnapore-721102, Paschim Medinipur,

West Bengal, India.



and housed in the Raja N. L. Khan Women's college Herbarium. For up to date, author citation Brummit and Powell [23] was followed.

Floristic diversity

An analysis of aquatic flora in the tidal zone of sea coast of Purba Medinipur revealed 23 Species under 21 genera and 15 families, of which 9 species are truly mangrove and rest 14 species are mangrove associates (Table-1).

Table 1: List of investigated taxa

S.No.	Name of Taxa	Family	Mangrove Species (M) / Mangrove Associate (A)
1.	<i>Acanthus ilicifolius</i> L.	Acanthaceae	A
2.	<i>Aegiceras corniculatum</i> (L.) Blanco	Myrsinaceae	M
3.	<i>Aponogeton natans</i> (L.) Engl. and Krause.	Aponogetonaceae	A
4.	<i>Avicennia alba</i> Blume	Avicenniaceae	M
5.	<i>Avicennia marina</i> (Forssk) Vierh	Avicenniaceae	M
6.	<i>Avicennia officinalis</i> L.	Avicenniaceae	M
7.	<i>Bruguiera gymnorrhiza</i> (L.) Savigny	Rhizophoraceae	M
8.	<i>Ceriops decandra</i> (Griff) Ding Hou	Rhizophoraceae	M
9.	<i>Cyperus rotandus</i> L.	Cyperaceae	A
10.	<i>Echinochloa crus-galli</i> (L.) P. Beauv	Poaceae	A
11.	<i>Excoecaria agallocha</i> L.	Euphorbiaceae	M
12.	<i>Fimbristylis barbata</i> (Rottb.) Benth	Cyperaceae	A
13.	<i>Halosarcia indica</i> (Willd) Paul G. wilson	Amaranthaceae	A
14.	<i>Heliotropium curassavicum</i> L.	Boraginaceae	A
15.	<i>Nicotiana plumbaginifolia</i> Viv	Solanaceae	A
16.	<i>Pandanus odoratissimus</i> L.f.	Pandanaceae	A
17.	<i>Porteresia coarctata</i> Takeoka	Poaceae	A
18.	<i>Rhizophora mucronata</i> Lamk	Rhizophoraceae	M
19.	<i>Rumex dentatus</i> L.	Chenopodiaceae	A
20.	<i>Sesuvium portulacastrum</i> (L.)L.	Aizoaceae	A
21.	<i>Sonneratia apetala</i> Buch. Ham	Sonneratiaceae	M
22.	<i>Spinifex littoreus</i> (Burn.f.) Merr	Poaceae	A
23.	<i>Suaeda maritima</i> (L.) Dumort	Chenopodiaceae	A



***Aegiceras corniculatum* (L.) Blanco**



***Avicennia alba* Blume**



***Avicennia marina* (Forssk) Vierh**



***Ceriops decandra* (Griff) Ding Hou**



Halosarcia indica (Willd.) Paul G. Wilson



Nicotiana plumbaginifolia Viv



Bruguiera gymnorrhiza (L.) Savigny



Cyperus rotundus L.



Avicennia officinalis L.



Echinochloa crus-galli (L.) P. Beauv



Excoecaria agallocha L.



Heliotropium curassavicum L.



Sesuvium portulacastrum (L) L.



Porteresia coarctata Takeoka



Sonneratia apetala Buch. Ham



Rhizophora mucronata Lamk



Pandanus odoratissimus L. f.



Suaeda maritima (L.) Dumort



Acanthus ilicifolius L.

DISCUSSION

Thorough and detailed investigation of the tidal vegetation in different seasons of the consecutive five years in the ten different tidal sections of the coastal belt had been done and the 23 types of angiospermic species had been enumerated.

a) Hijli Sarif: It is about 1.5 km extended from Hijli-Sarif to Petuaghat. Here two types of mangroves *Avicennia alba*, *Avicennia marina* were found to grow only along with *Porteresia coarctata*, *Sesuvium portulacastrum*, *Suaeda maritime* of mangrove associates. In this belt except the ferry boat no dry fish industries were found.

b) Petuaghat: It is about 4.5 km extended from Petuaghat fishing harbour to east site of Bankiput. Out of seven types of mangrove *Avicennia alba*, *Aegiceras corniculatum*, *Bruguiera gymnorrhiza*, *Ceriops decandra*, *Excoecaria agallocha* grow abundantly and *Avicennia marina* and *Rhizophora mucronata* grow sparingly along 4 km and rest 1 km is covered by the grasses. The predominant grasses *Fimbristylis barbata*, *Porteresia coarctata* and other associated species *Acanthus ilicifolius*, *Pandanus odoratissimus*, *Sesuvium portulacastrum*, and *Suaeda maritime* were found to occur all over the belt. In this belt except the ferry boat no dry fish industries were found.

c) Bankiput: It is about 3 km extended from Petuaghat to Bankiput and all the 9 types of mangroves like *Avicennia alba*, *Avicennia officinalis*, *Avicennia marina*, *Aegiceras corniculatum*, *Bruguiera gymnorrhiza*, *Ceriops decandra*, *Excoecaria agallocha*, *Rhizophora mucronata*, *Sonneretia apetala* and grow abundantly all over the area of the sea coast zone. Among them *Excoecaria agallocha* and *Rhizophora mucronata* were found in lesser frequency. Among the associates *Acanthus ilicifolius*, *Porteresia coarctata*, *Sesuvium portulacastrum* and *Suaeda maritime* grow abundantly almost throughout the section and *Halosarcia indica* and *Pandanus odoratissimus* grow sparingly. The predominant grass *Porteresia coarctata* covers the floor of this section. The anthropogenic pressure and the erosion of coastal border were minimized, but the vegetation cover was maximized.

d) Junput: It is extended from the west border of Bankiput to Junput about 8 km coastal areas. Here 3 types of the mangrove species like *Avicennia marina*, *Bruguiera gymnorrhiza*, *Sonneretia apetala* grow abundantly along the 3 km area. In this belt *Sesuvium portulacastrum*, and *Suaeda maritime* were spreading abundantly all over the sea beach where as *Acanthus ilicifolius* and *Porteresia coarctata* occur sparingly. *Pandanus odoratissimus* grows on the upper side of the

seashore. A chemical-(Chlorpyrifos 20%EC) leached out from the dry fish industries and spread over the muddy and sandy surface of this belt and the surface of the soil and water become green. The ferry boats, tractors and vans as biotic factors and the chemical pollutant of the dry fish industries tremendously hampering the richness of vegetation.

e) Haripur: It is about 5 km extended from west site of Junput to Baguran-Jalpai. Out of 5 km only 1 km was covered by 6 types of mangroves: *Avicennia alba*, *Avicennia marina*, *Bruguiera gymnorrhiza*, *Ceriops decandra*, *Excoecaria agallocha*, *Rhizophora mucronata* where *Rhizophora mucronata* was dominant and *Avicennia marina* was infrequent. The rest 4 km sea beach was covered with *Sesuvium portulacastrum* and *Suaeda maritime* where *Acanthus ilicifolius*, *Pandanus odoratissimus* and *Porteresia coarctata* occur sparingly. In this belt fishing boat movement and leaching of Chlorpyrifos 20%EC from the dry fish industries also hampered the richness of vegetation.

f) Shoula: It is about 4 km extended from Baguran-Jalpai to Shoula. Three types of mangroves like *Avicennia alba*, *Avicennia marina*, *Sonneretia apetala* were found to grow along with *Aponogeton natans*, *Acanthus ilicifolius*, *Pandanus odoratissimus*, *Porteresia coarctata*, *Sesuvium portulacastrum* and *Suaeda maritime* where *Avicennia alba* was predominant. In this section dry fish industries and ferry boat movement were also found.

g) Mandarmoni: It is about 15 km extended from west site of Shoula to Mandarmoni. Here two types of mangroves like *Avicennia alba* and *Sonneretia apetala* were found infrequently and the only grass *Porteresia coarctata* was predominant. The associated mangroves were *Acanthus ilicifolius*, *Pandanus odoratissimus*, *Sesuvium portulacastrum* and *Suaeda maritime*. In this belt the pressure of fishing boat movement, hoarding of tourists and dry fish industries was high.

h) Tajpur: It is about 7 km extended from west site of Mandarmoni to Sankarpur where 3 types of mangroves like *Avicennia alba*, *Avicennia marina* and *Bruguiera gymnorrhiza* were found to grow only and the associated species like *Pandanus odoratissimus*, *Porteresia coarctata*, *Sesuvium portulacastrum* and *Suaeda maritime* were infrequent. The only associated species *Acanthus ilicifolius* was predominant. In this belt boating activities for fishing, encroachment of the tourist spot, huge vehicles carrying the tourists were tremendously affected the tidal vegetation.

i) Sankarpur: This section is 10 km and favorable for 3 species of *Avicennia* only (*Avicennia alba*, *Avicennia officinalis*, *Avicennia marina*) and grew in high

frequency where *Avicennia alba* was present in high frequency. The other associated species *Acanthus ilicifolius*, *Pandanus odoratissimus*, *Porteresia coarctata*, *Sesuvium portulacstrum* and *Suaeda maritima* were found to grow in high frequency. This section was also severely disturbed by manmade activities.

j) **Digha:** This section is about 10 km and extended from Digha Mohana to Udoypur of Digha border. The floristic diversity is very much high in Digha Mohana. Seven types of mangroves like *Avicennia alba*, *Avicennia officinalis*, *Avicennia marina*, *Bruguiera gymnorhiza*, *Ceriops decandra*, *Excoecaria agallocha* and *Sonneretia apetala* grow abundantly along the 4 km area of this section. The associated members at Digha mohana were *Aponogeton natans*, *Acanthus ilicifolius*, *Halosarcia indica*, *Heliotropium curassavicum*, *Pandanus odoratissimus*, *Sesuvium portulacstrum* and *Suaeda maritima* along with *Porteresia coarctata*, *Spinifex littoreus* grasses. Near Digha border of this belt *Nicotiana plumbaginifolia*, *Cyperus rotundus*, *Echinochloa crus-galli*, *Rumex dentatus* were found to occur. Besides these two sites the old and new Digha areas were devoid of tidal species due to the development of urbanized tourist spot.

It has been observed that the belts where the mangroves were present the probability of soil erosion of sea shore was lesser than the belt where mangroves were absent.

Conservation measures

To maintain the status and quality of plant diversity and increase the richness of the vegetation in the tidal zone of Purba Medinipur District, following measures should be taken as early as possible.

- a) Stopping the destruction of mangroves by the people.
- b) Stopping the use of chemicals in dry fish industries and measure should be taken to stop the bleaching of chemicals to the saline soil of tidal zone.
- c) Increase the awareness among the people regarding the necessity and potentiality of the mangroves as well as tidal aquatics for preventing the seashore erosion and to minimize the intensity of the forces of the wave of the tidal water.
- d) In order to minimize the damages of tidal vegetation and to sustain the plant biodiversity in the tidal zone, the central coastal authority of India as well as state government should take necessary steps right now.

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