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PLANT COLONIZATION IN DIFFERENT HABITATS OF THE COASTAL AREA OF SUNDARBANS, WEST BENGAL

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Abstract: The mangrove forest of Sundarbans is interesting for providing the natural habitats of a large number of major and minor elements of mangroves and good number of back mangals or mangrove associated halophytic species. This ecosystem is also unique in terms of halophytic adaptation of specific types of plant species. This study is typically concerned with the colonization of species in relation to tidal amplitude and their abundance in different salinity regimes in the sea-land inter phase zone, regularly being influenced by tidal activities.

Keywords: Mangrove, major element, minor element, back mangal, colonization, tidal amplitude, salinity regime.

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INTRODUCTION

The Sundarbans is the world renowned mangrove forest, situated in the Ganga-Bramhaputra deltaic regions of India and Bangladesh. Total area under the Indian Sundarbans mangrove forest is 4,266.6 sq. km. (Naskar & GuhaBakshi, 1987),out of which about 2,179.05 sq.km. Comprises deltaic land with sparse to dense mangrove forests (Sanyal, 1996). Mangroves are trees and shrubs growing in the sea-land interphase zone, regularly being influenced by tidal activities. The rise and fall of the tidal waves create a dynamic environment which alters daily, monthly and yearly. The varying degree of salinity of the water is perhaps the most important factor, but the tides interact on the mangroves in other ways as well. Influence of temperature, humidity, wind velocity, supply of nutrients andthe levels of oxygen in soil and water may be the other critical factors for mangrove succession and ultimate colonization also. For all these above mentioned factors and different tolerance limit of different mangrove habitat species, they grow in different habitats within this mangrove forest and their specific zones. The mangrove species, representing the colonization process, are from the families Rhizophoraceae, Avicenniaceae, Sonneratiaceae, Meliaceae, Sterculiaceae, Agialitidaceae, Myrsinaceae, Combretaceae, Rubiaceae, Asclepiadaceae, Arecaceae, Araceae, Poaceae etc. All the species are from respective taxonomic units, categorised as major elements, minor elements, mangrove associates and back mangals according to the fact, that they posses as described by earlier workers (Mac Nae,1968, Chapman,1976, Tomlinson,1986, Naskar&Guha Bakshi,1987). These mangrove families have beenmaintaining the ecological balance in this coastal zone of the dynamic ecosystem. They are protecting the intertidal coastal zones from the oceanic surges and cyclonic thrust serving as buffer agent.

Therefore, it is very much urgent and necessary to conserve and protect the members of all major, minormangroves, mangrove associates and back mangalsof Sundarbans ecosystem.

MATERIALS & METHODS

In this vulnerable ecosystem, tidal amplitude and salinity levels are continuously varying throughout the year, according to the seasonal variability of the intertidal coastal zone. Accordingly, a detailed study on plant colonization process in relation to different tidal amplitude and abundance of different plant species in different salinity regimes are representing in table-1 and table-2 respectively, after thorough survey and salinity measurement over the year covering all seasons.

Observations

After thorough study, the colonization of different species in relation to tidal amplitude and salinity regimes are presented in table-1 & 2.

Table-1: Ideal condition (inundation classes) of different species in Indian Sundarbans

1st zone	**Inundated during all high tides (30 days/month) – river flats, mud flats &river slopes.** **(Silted up rapid formative zone)**	***Avicennia spp., Sonneratia spp., Aegiceras sp., Acanthus sp., Rhizophorasp., Scyphiphora sp., Nypa sp., Aegialitis sp.,*** ***Porteretia sp., Suaedasp., Salicornia sp., Crinum sp., Cryptocoryne sp., Cyperus sp., Fimbristylis sp., Sesuvium sp.***	**Major & minor elements of mangrove and mangrove associates.**
2nd zone	Inundated during medium high tides (20 days in a month) – river bank & ridge forest. **(Occasionally eroded steep land)**	*Rhizophora sp., Bruguiera sp., Ceriops sp., Kandelia sp., Lumnitzera sp., Brownlowia sp., Xylocarpus sp., Phoenix sp., Dalbergia sp., Derris sp.,* *Excoecaria sp., Sarcolobus sp., Acanthus sp., Heritiera sp., Scyphiphora sp., Viscum sp., Macrosolen sp.*	Major & minor elements of mangrove and mangrove associates
3rd Zone	Inundated during normal high tides (15 days in a month)- ridge forest. **(Flat land with dense vegetation)**	*Ceriops sp., Avicennia sp.,* *Heritiera sp., Aegialitis sp., Xylocarpus sp., Excoecaria sp., Caesalpinia sp., Cynometra sp.*	Minor elements, Mangroves associates & back mangroves
4th Zone	Inundated during spring tide (10 days in a month)-ridge forest. **(Flat lands with dense/ sparse vegetation and salty patches)**	*Excoecaria sp., Ceriops sp., Clerodendrum sp., Hibiscus sp., Thespesia sp., Acrosticum sp., Cynometra sp., Heliotrophium sp.*	Minor elements,Mangroves associates & back mangroves
5th Zone	Inundated during abnormal/ equatorial tides (5 days in a month, during monsoon & summer)- ridge forests, sparse vegetation& reclaimed/ naked areas.	*Sessuvium sp., Solanum sp., Heliotrophium sp., Hibiscus sp., Thespesia sp., Acrostichum sp., Tamarix sp.,*	Back mangals

6th Zone	Above the tidal reaches- deltaic regions of the lower Ganga delta colonised with mangroves, mesophytic, halophytic and xerophytic plants [about 1100 angiosperms are reported by Naskar,1993 from lower Ganga regions of 24 pgs (S & N), West Bengal]	Non littoral plants

Table-2: Abundance of different mangrove species in relation to different saline regimes.

Name of plant species	Salinity Range (ppt)
Avicennia alba	9.25 -10.42
Avicennia marina	9.40- 47.19
Avicennia officinalis	9.95 -11.25
Bruguiera gymnorrhiza	6.08 -7.80
Bruguiera cylindrica	*9.21-12.20*
Bruguiera sexangula	7.80-9.40
Rhizophora mucronata	9.25-11.40
Rhizophora apiculata	10.41-12.20
Ceriops decandra	13.13-15.80
Ceriops tagal	7.60-9.20
Sonneratia griffithii	13.14-14.25
Sonneratia apetala	14.15-16.25
Sonneratia caseolaris	4.00-5.54

Lumnitzera racemosa	11.90-12.45
Scyphiphora hydrophyllacea	8.10-10.25
Aegialitis rotundifolia	6.95-8.70
Aegiceras corniculatum	10.21-13.13
Excoecaria agallocha	18.89-20.21
Nypa fruticans	18.59-20.23
Phoenix paludosa	27.73-30.11
Xylocarpus mecongensis	7.52-9.31
Xylocarpus granatum	18.77-19.21
Heritiera fomes	13.92-15.11
Brownlowia lanceolata	10.98-13.48
Porteresia coarctata	2.15-3.82

DISCUSSION

It is very much well known that this unique ecosystem is under threatened conditions due to direct human activities as well as natural disasters. Ultimately, we are loosing the resourceful materials, both living and nonliving, from this Sundarbansmangals and destroying the sustainability of the ecosystem drastically(Bose, 2009). Therefore, the management in a sustainable way should be taken up to protect and conserve the components of the ecosystem, to keep its pristine glory (Anonymous,1996). From this study, it is clear that depending upon the tidal inundation, the river flats, mud flats, river slopes, eroded steep land, ridge forests, flat lands are colonizedby different groups of major, minor mangroves, mangrove associates and back mangal species. Besides, salinity regime of different species are variable in different zones

and it is noted that *Porteresiacoarctata, Sonneratiacaseolaris* and *Xylocarpusmekongensis* prefer less salinity. *Avicennia* spp. tolerate a high salinity range and grow in different tidal inundated zones; *Phoenix paludosa* can grow in high salinity zone of the ecosystem.The preferred salinity regimes of other species are variable accordingly. So this study reflects a clear idea about the suitability of tidal inundation and salinity regime favourable for plant colonization in this ecological area and certainly helpful for future planning as well as proper management to maintain the sustainability of coastal area of theSundarbans, West Bengal.

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