



Diversity and distribution of climbers in relation to their host species in Sundarban biosphere reserve, India

Roshni Chowdhury, Anurag Chowdhury & M. Chowdhury***

Taxonomy of Angiosperm and Biosystematics Laboratory, Dept. of Botany,
University of North Bengal, Darjeeling, West Bengal, India

** Directorate of Forest, Govt. of West Bengal

E-mail: **mono_malda@yahoo.com*

Abstract

The present study explored the floristic diversity and distribution of climber's species in relation to their host species and salinity in the fragile mangrove ecosystem of Sundarban Biosphere Reserve. The climbers and lianas of Sundarban Biosphere Reserve comprised of 11 species belonging to 09 Genera under 05 Families. Few species has been recorded as host specific species. The diversity and distribution of climbers exhibited a wide variation in relation to different host specificity.

Keywords: Sundarban Biosphere Reserve, Fragile ecosystem, Mangrove Climbers, Host species, Ecology.

Introduction

Sundarban is the largest delta of Mangrove ecosystem in the world. It contains extremely rich biodiversity of aquatic and terrestrial flora and fauna. Sundarban Biosphere Reserve is the second largest Biosphere Reserve in India. For its uniqueness and fragile ecosystem, declared as UNESCO World Heritage and Ramsar site. It is the only suitable habitat for majestic swamp Royal Bengal Tiger along with other critically endangered floral and faunal species.

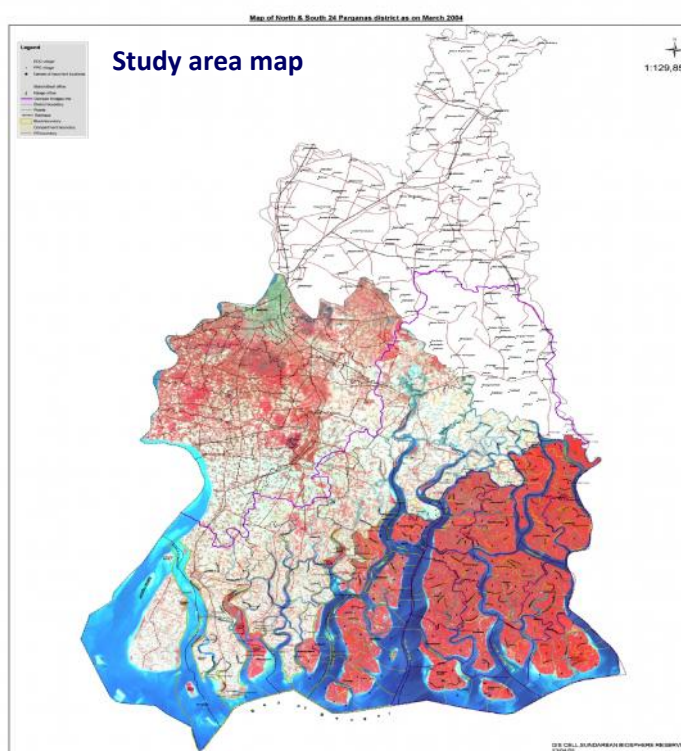
Indian Sundarban is spread over two districts i.e. North 24 Parganas and South 24 Parganas, covering 19 administrative Blocks. The area is dominated by mangrove covered islands and is under the constant influence of the diurnal tides. Mangroves are the specially adapted species of plants which establish themselves along the tidal and saline water zones (Chaudhuri & Choudhury, 1994; Naskar, 1983; Naskar & Guha Bakshi, 1987; Naskar & Mandal 1999). The ecotone region is a highly productive zone of ecosystem in the world and it act as a host for a variety of species.

Plants having distinct features or structures to climb on host for mechanical support are known as climbers. They compete strongly with large trees and shrubs for light, space as well as nutrients (Richards, 1952). Climber plants play significant ecological role in nutrients cycling, forests dynamics and hence establish an essential tropic level within an ecosystem (Rahman, 2020). No such studies have been done earlier from Indian Sundarban. Climbers show a great diversity or variation in connection with their climbing mechanism. On the basis of particular climbing mechanism, it can be divided into the following categories; root climbers, hook climbers, tendril climbers, leaf or stem climber or twiners etc. (Hossain, 2015).

The structure of host tree is very important in the determination of climber association (Putz, 1980, 1984b; Muthuramkumar & Parthasarathy, 2001). Some of the host species are not suitable for the attachment of climber species as for example; smooth bark will evade climber plant infestation (Putz, 1980; Putz, 1984b). Climbers play a major role in renewal of forests ecosystem and biodiversity, carbon sequestration, entire-forest transpiration and controlling of soil erosion

(Klinge & Rodriguez, 1973; Putz, 1983). A climber also reduces the surrounding tree damage and further reduces 50% of the post-harvest canopy gaps (Appanah & Putz, 1984). The diversity and distribution of climbers (lianas) are also apparently determined by biotic elements such as the architecture of hosts, climate and soil factor (Balfour & Bond, 1993).

Study Area: The present study was conducted in Mangrove forest of Sundarban Biosphere Reserve. Sundarban is a unique ecosystem which shows the enriched biodiversity. It harbours a large number of critically endangered and endemic floral and faunal species. Several forest blocks or compartment (including tiger bearing areas) has been surveyed for the present floristic enumeration. Major study was conducted in the following areas such as; Herobhanga reserve forest, Ajmalhari reserve forest, West Sundarban Wildlife Sanctuary, Lothian Wildlife Sanctuary, Saptamukhi reserve forest and the buffer areas of Sundarban Tiger Reserve. Studies has also been carried out in the fringe areas of Sundarban.



Methodology for Sampling of Climbers

Floristic survey was executed through random sampling during the years 2019 – 2021 and plants were sampled throughout the year especially in three predominant seasons. Specimens of mangrove climbers and their host species were collected or recorded during high tide from the creeks of Sundarban. All the collected specimens were processed into mounted herbarium specimens following Jain & Rao (1977) and were identified using local floras (Prain 1903; Naskar, 1990), monographs, revisions and also matched at NBU-Herbarium and CAL. For updated nomenclature www.theplantlist.org was consulted for all names. All the voucher specimens and the relevant field note book were deposited at NBU-Herbarium.

Results and Discussion

The present study enlisted a total of 20 climber species and 08 no. of host species from the Indian Sundarbans. These identified species are true mangrove associates which were absolutely distributed in the mangrove forest. The recorded host species were true mangrove species. These

11climbers represent 09 Genera under 05 Families. The collected host species comprises 6 Genera under 4 Families. Most of the species were found in margin of creeks of Sundarbans. In comparison with the middle region of the mangrove forest, water margins show the richest diversity for distribution of Climber species. The climbers *Sarcolobus globosus*, *Finlaysonia obovata* mostly found on specific host i.e. *Phoenix peludosa*, *Ceriops sp* and *Bruguiera sp*. These climber species grows on a wide zone of Salinity i.e. it can survive in low salinity as well as in high salinity. From the present study it has also been observed that few climbers such as *Salacia chinensis* and *Derris trifoliata* badly affects the normal growth of the stems of *Ceriops sp* and *Brugierra sp*. Even in many places *Derris trifoliata* engulfed and even damaged the entire plant of *Phoenix peludosa*. All the collected or recorded climber species has been analysed and graphically presented. Apocynaceae shows the highest number of climber individuals followed by Fabaceae. The scientific name, local name, families, host specificity, distribution pattern, nature of climbing and ecology of the climbers enumerated in a table.

Name& Family	Local Name	Host Species& Family	Distribution	Nature of Climbing	Ecology
<i>Sarcolobus globosus</i> Wall. [Apocynaceae]	Munialata	<i>Phoenix peludosa</i> [Areaceae]; <i>Bruguiera sp</i> [Rhizophoraceae]	Less common, found in the margin of creeks	Annual, Twining herb	It is adapted to all range of salinity zone
<i>Sarcolobus carinatus</i> Wall. [Apocynaceae]	Boro-munialata	<i>Phoenix peludosa</i> [Areaceae]; <i>Bruguiera sp</i> [Rhizophoraceae]	Rarely found in the margin of the creeks	Annual, twining herbs	It is adapted to all range of salinity zone
<i>Finlaysonia obovata</i> Wall. [Apocynaceae]	Dudhelata	<i>Ceriops sp</i> [Rhizophoraceae], <i>Bruguiera sp</i> [Rhizophoraceae]	Common, but found only in the high land of mangrove forest	Perennial, woody climber with papery bark	It is adapted to a specific zone of salinity.

<i>Derris trifoliata</i> Lour. [Fabaceae]	Kalilata	<i>Phoenix peludosa</i> [Arecaceae], <i>Excoecaria agallocha</i> [Euporbiaceae]	Abundant, Found in the margin as well as entire mangrove forest	Perennial, branched, woody climber	It is adapted to all range of salinity zone
<i>Derris scandens</i> (Roxb.) Benth. [Fabaceae]	Baule-lata	<i>Avicenniasp</i> [Acanthaceae] <i>Bruguierasp</i> Rhizophoraceae]	Rare, Found in the marginal forest of Sundarban delta	Perennial, woody climber	It is adapted to a specific zone of salinity.
<i>Caesalpinia crista</i> L. [Fabaceae]	Kata-lata	<i>Avicenniasp</i> [Acanthaceae], <i>Bruguierasp</i> [Rhizophoraceae]	Common, found in the margin of creeks, sandy beaches, and also found behind the sandy area of mangroves	Climbing shrub, numerous, sharp recurved prickles	It is adapted to all range of salinity but found only in the mesohaline zone of salinity.
<i>Salacia chinensis</i> L. [Celastraceae]	Saptachakra	<i>Ceriopssp</i> [Rhizophoraceae]	Rarely found in the bank of the creeks of Sundarban	Climbing shrub	It is adapted to a specific zone of salinity especially in low salinity.
<i>Acanthus volubilis</i> Wall. [Acanthaceae]	Lata- harguza	<i>Bruguierasp</i> [Rhizophoraceae] , <i>Ceriopssp</i> [Rhizophoraceae]	Very rare, found in the bank of the creeks and sandy beach along with back mangrove	Climbing Semi-erect to climbing herb with thin, wiry, spineless, dark- green stems	It is adapted to a specific zone of salinity especially in low salinity.
<i>Flagellaria indica</i> L. [Flagellariaceae]	Marcharal/ Ban-chanda	Generally large tree such as <i>Avicenniasp</i> [Acanthaceae] , <i>Bruguierasp</i> [Rhizophoraceae]	Commonly found in the coastal and fresh water zone of Sundarban	Semi woody climbing plants	It is adapted to all range of salinity zone
<i>Tylophora indica</i> (Burm. f.) Merr. [Apocynaceae]	Antamul	<i>Phoenix peludosa</i> [Arecaceae]; <i>Excoecaria agallocha</i> [Euporbiaceae]	Rarely found in the bank of the creeks and sandy beach along with back mangrove	A large climbing shrub	It prefers mesohaline to polyhaline zone of salinity.
<i>Pentatropis capensis</i> (L. f.) Bullock [Apocynaceae]	Panchabriti- lata	<i>Phoenix peludosa</i> [Arecaceae]; <i>Excoecaria agallocha</i> [Euporbiaceae]	Commonly found in the coastal and fresh water zone of Sundarban	Twining herb	It is adapted to all range of salinity zone



Photo plate 1: A. *Finlaysonia obovata*; B. Closed view of flowers; C. *Acanthus volubilis*; D. Closed view of fruits; E. *Sarcolobus carinatus*; F. *Sarcolobus globosus*



Photo plate 2: **G.** *Derris scandens*; **H.** *Derris trifoliata*; **I.** Flowers closed view; **J.** Fruits closed view; **K.** *Caesalpinia crista*; **L.** Fruits closed view



Photo plate 3: **M.** *Salacia chinensis*; **N.** Fruits of closed view; **O.** *Pentatropis capensis*; **P.** Physical damage of *Bruguiera sp*; **Q.** Physical damage in *Ceriops sp*; **R.** Physical damage in *Phoenix peludosa*

Though most of the climber species plays an important role in the fragile mangrove ecosystem and contribute the development of the biodiversity of Sundarban. Among the 11 number of species, 03 species were found as aggressive invasive affecting the germination, growth, development and regeneration of other species (e.g., *Heritiera fomes*, *Nypa fruticans* and *Phoenix peludosa*) by twisting or spreading over their branches for mechanical support, moisture, light and nutrients, and sometimes causing direct physical damage to the other species which was recorded during the present study. These species are also responsible for changing the pattern and distributional ranges of other species of Sundarban. These species include- *Derris scandens*, *Derris trifoliata*, *Flagellaria indica*.

Conclusion

Floristic composition and distribution pattern of climbers is related to their host species is very significant in mangrove ecosystem of Sundarban. Salinity, anthropogenic stress and tidal effect were the most important factors that influence the diversity and distribution of Climbers. The present study shows that the unique ecosystem of Sundarban have the great potential in diversity and distribution of climbers. This type of baseline inventory or research work will be helpful for framing the conservation strategies or to prepare management plan of protected areas.

Acknowledgment

The first and corresponding authors are thankful to the Directorate of Forest, Govt. of west Bengal for logistic support.

References

Appanah, S. and F.E. Putz. 1984. Climber abundance in virgin dipterocarp forest and the effect of pre-felling climber cutting on logging damage [Peninsular Malaysia]. *AGRIS*, 47(3): 335-342.

Balfour, D.A. & W.J. Bond. 1993. Factors limiting climber distribution and

abundance in a southern African forest. *J. Ecol.*, 81(1): 93-99.

Chaudhuri, A.B. & A. Choudhury. 1994. *Mangroves of the Sundarbans. Vol. I. India, The IUCN Wetlands Programme.* Bangkok: IUCN. 247 pp.

Hossain, G. M., Rahman, M. S., & Khan, S. A. 2015. Species Composition, Richness, Density and Distribution of Climbers in Relation to Salinity in Sundarbans Mangrove Forest of Bangladesh, International Journal of Chemical, Environmental & Biological Sciences (IJCEBS) Volume 3, Issue 1 (2015) ISSN 2320-4087.

Jain, S.K. & Rao, R.R. 1977. *A Handbook of Field and Herbarium Methods.* Today & Tomorrow's Printers and Publishers, New Delhi.

Klinge, H. and W.A. Rodrigues. 1973. Biomass estimation in a central Amazonian rain-forest. *Acta Cient. Venez.*, 24(6): 225-237.

Muthuramkumar, S. & N. Parthasarathy. 2001. Tree-liana relationships in a tropical evergreen forest at Varagalaiar, Anamalais, Western Ghats, India. *J. Trop. Ecol.*, 17(3): 395-409.

Naskar, K. 1990. Aquatic and semi-aquatic plants of the lower gangetic delta. Daya Publishing House, Delhi. p. 408.

Naskar, K. R. & R.N. Mandal. 1999. *Ecology and Biodiversity of Indian Mangroves.* New Delhi: Daya Publishing House. 754 pp.


Naskar, K.R. and D.N. GuhaBakshi. 1987. *Mangrove Swamps of the Sundarbans – An Ecological Perspective.* Calcutta: Naya Prakash. 263 pp.

Naskar, K.R. 1983. Halophytes and their unique adaptations on the Sundarban Mangrove Swamps. *Journal of Indian Society for Coastal and Agricultural Research* 1(2): 91-105.

Prain, D. 1903. *Bengal Plants. Vols 1 & 2.* Messrs. West, Newman & Co. London.

Putz, F.E. 1980. Lianas vs. trees. *Biotropica.* Natural history of lianas and their influences on tropical forest dynamics. Ph. D. diss. Cornell University 12: 224-225.

- Putz, F.E. 1983. Liana biomass and leaf area of a "tierra firme" forest in the Rio Negro Basin, Venezuela. *Biotropica*, 15(3): 185-189.
- Putz, F.E. 1984b. The natural history of lianas on Barro Colorado Island, Panama. *Ecology*, 65(6): pp. 1713-1724.
- Rahman, A. U., Khan, S. M., Saquib, Z., Ullah, Z., Ahmad, Z., Ekercin, S., Mumtaz, A. S.&Ahmad, H. 2020. Diversity And Abundance Of Climbers In Relation To Their Hosts And Elevation In The Monsoon Forests Of Murree in The Himalayas, *Pak. J. Bot.*, 52(2): 601-612.
- Richards, P.W. 1952. *The Tropical Rain Forest* Cambridge Univ. Press, Cam.
- Wetland Flora of West Bengal by Dr. M. Chowdhury and Dr. Anurag Chowdhury, 2022.

Access this Article in Online	
	Website: www.ijarbs.com
	Subject: Biodiversity
Quick Response Code	
DOI: 10.22192/ijarbs.2023.10.01.017	

How to cite this article:

Roshni Chowdhury, Anurag Chowdhury & M. Chowdhury. (2023). Diversity and distribution of climbers in relation to their host species in Sundarban biosphere reserve, India. *Int. J. Adv. Res. Biol. Sci.* 10(1): 212-220.

DOI: <http://dx.doi.org/10.22192/ijarbs.2023.10.01.017>