MANGROVE WOOD BORERS: DISTRIBUTION AND ABUNDANCE OF AN UNDERSTUDIED FAUNAL COMMUNITY WITH SPECIAL EMPHASIS ON SOUTH ANDAMAN ISLANDS, INDIA.

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Abstract

This study enhances our understanding of marine wood borer density and diversity in the Andaman Islands' mangrove ecosystem, revealing new records and emphasizing Andaman and Nicobar Islands as a marine biodiversity hotspot. A total of 11 species were observed from the study area, species restriction was noticed in the present investigation based on wood and geographical locations. A total of four species namely *Spathoteredo obtusa*, *Bankia gracilis*, *B. campanellata* and *Lyrodus massa* have been observed as new records from the Andaman mangroves of which *Spathoteredo obtusa* was new record to Indian mangroves. Live wood was mostly attacked only by the isopod borer *S. terebrans*, whereas dying and dead wood was dominated by molluscan borers. It highlights the need for further research on marine wood borers across different mangrove species and control measures. Continued exploration might uncover new species in remote and protected areas. Preliminary data aids future in-depth studies on marine wood borers. The research focuses on the distribution and diversity of marine wood borers in Andaman Islands, noting mangrove damage near to the seaward edge but finding landward edge mangroves unaffected. Future studies should explore conservation strategies and timber resistance to borers.

Introduction

- Mangrove ecosystems support diverse communities, including permanent and temporary residents. These organisms, ranging from herbivores to decomposers, depend on mangroves for attachment, shelter, or nutrients, interacting in both beneficial and harmful ways (Nagelkerken *et al*., 2008).
- Mangrove fauna and flora exhibit strong ecological specialization, differing significantly from organisms in nearby coastal areas.
- Marine wood borers, known as "termites of the sea," include shipworms, piddocks, pill bugs, and gribbles. They cause deterioration of wooden structures in marine environments (Singh and Sasekumar, 1994).

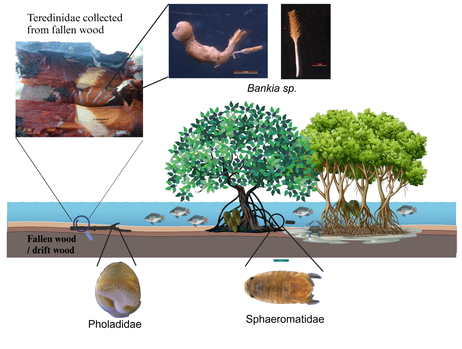


Fig. 1.1 Illustrates marine wood borers in Mangrove ecosystem

Methodology

- Mangroves of the Andaman and Nicobar Islands are categorized into four habitats: mangrove islets, coastal mangroves, creek side mangroves, and landward edge mangroves (not influenced by tides). *Rhizophora apiculata* and *R. mucronata* are most dominant in Andaman Islands.

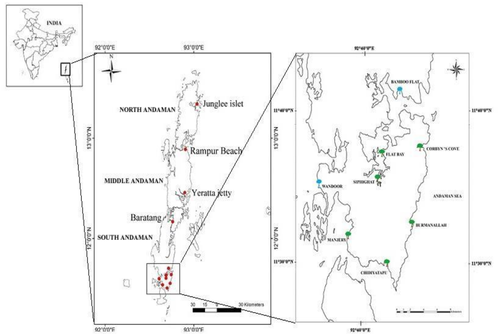
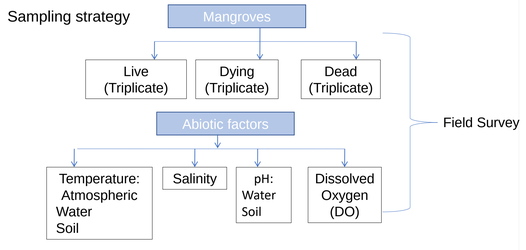


Fig. 1.2 The map depicting the study areas in Andaman Islands



- Sample collections were focused on three categories: dead wood (fallen mangrove wood), dying wood (logs attached to living trees), and live wood (affected roots).
- The lengths of dead and dying wood ranged from 27 to 45 cm, while live wood measured 12 to 35 cm.
- Mangrove wood samples (live, dying, dead) were quickly transported to the laboratory, cleaned with tap water, and opened using a hammer and chisel. Teredinids were carefully extracted with forceps to collect pallets and all possible individuals.
- The organisms were preserved in a 70% ethanol and glycerine mixture (3:1) and identified under a stereo zoom microscope using identification keys (Turner, 1966; 1971).
- Community structure was assessed using indices like Shannon diversity, Simpson dominance, Margalef's species richness, and Pielou's evenness. Multivariate analyses included Bray-Curtis similarity and SIMPER. Species data were log-transformed (log(x+1)) to minimize the impact of rare and abundant species, using tools like Primer 6, PAST, and IBM SPSS version 16.

Results

- During the present study, a total of 11 species (9 belonging to the phylum Mollusca and 2 from phylum Arthropoda) were recorded, among which the family teredinidae was represented with 8 species namely *Bactronophorus thoracites*, *Nausitora hedleyi*, *Spathoteredo obtusa*, *Dicyathifer manni*, *Bankia gracilis*, *Bankia sp*., *Lyrodus pedicellatus* and *L. massa* and the family Pholadidae was represented by a single species, *Martesia striata*.
- Family Sphaeromatidae was represented with two species viz., *Sphaeroma triste* and *S. terebrans*.
- The marine wood borers in the study area showed great diversity in the creek proximity region and less diversity in the creek region.

Table 1.1 Species occurrence of marine wood borers in south Andaman

Family	Species	BN	CT	MJ	FB	SG	CC	WD	BF
Teredinidae	*Bactronophorus thoracites*	*	*	*	-	-	*	-	-
	Nausitora hedleyi	*	*	*	-	-	*	-	-
	Spathoteredo obtusa	*	*	*	-	-	*	-	-
	Dicyathifer manni	*	*	*	*	-	-	-	-
	Bankia gracilis	*	*	*	*	-	-	-	-
	Bankia sp.	*	*	*	-	-	-	-	-
	Lyrodus pedicellatus	*	*	*	-	-	-	-	-
	L. massa	*	*	*	-	-	-	-	-
Pholadidae	*Martesia striata*	-	-	-	*	-	*	-	-
Sphaeromatidae	*Sphaeroma triste*	-	*	-	-	-	-	-	-
	S. Terebrans	-	*	*	*	*	*	-	-

BN: Burmanallah; CT: Chidiyatapu; MJ: Manjery; FB: Flat Bay; SG: Sippighat; CC: Corbyn's Cove; WD – Wandoor; BF – Bamboo Flat (*indicates the presence species; - indicates the absence of species)

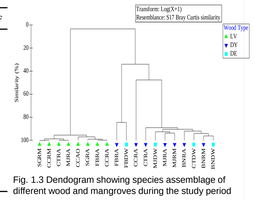


Fig. 1.3 Dendogram showing species assemblage of different wood and mangroves during the study period

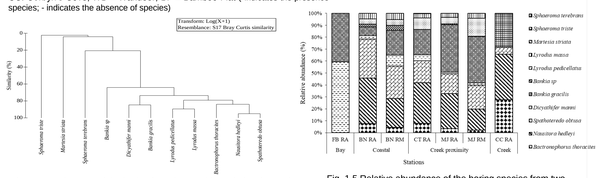


Fig. 1.4 Dendrogram of the boring faunal assemblage during the study

Fig. 1.5 Relative abundance of the boring species from two mangrove species of the dying wood in south Andaman.

Table 1.2 Mean (± SD) and range values of environmental variables during the study period at South Andaman.

Stations	Environmental variables					
		AT(°C)	SWT(°C)	SS (PSU)	SWpH	DO mg.l^{-1}
CT	Mean ± SD	29.21 ± 2.32	29.31 ± 2.55	18.08 ± 10.96	7.12 ± 0.60	3.56 ± 1.13
	Range	26 – 34	26 – 34	4 – 35	6.2 – 8.2	1.8 – 5.41
BN	Mean ± SD	29.19 ± 1.96	29.75 ± 2.13	30.25 ± 4.18	7.47 ± 0.79	3.48 ± 0.96
	Range	26 – 33	27 – 35	22 – 36	6.2 – 8.5	2.1 – 5.41
MJ	Mean ± SD	28.96 ± 2.54	29.06 ± 2.88	28.75 ± 5.93	7.43 ± 0.66	3.60 ± 1.01
	Range	24 – 34	21 – 34	15 – 35	6.1 – 8.2	2.1 – 5.41
FB	Mean ± SD	29.13 ± 2.54	29.35 ± 1.94	24.63 ± 9.48	7.16 ± 0.65	3.55 ± 1.18
	Range	25 – 35	26 – 34	9 – 36	5.9 – 8.1	1.5 – 5.30
SG	Mean ± SD	29.06 ± 2.89	29.10 ± 2.80	20.96 ± 10.90	7.33 ± 0.53	3.56 ± 1.22
	Range	22 – 35	24 – 35	5 – 33	6.24 – 8.1	1.2 – 5.30
CC	Mean ± SD	28.13 ± 2.23	28.00 ± 2.64	13.17 ± 5.53	7.06 ± 0.59	3.81 ± 1.14
	Range	23 – 33	23 – 33	6 – 23	5.9 – 8.05	1.8 – 5.52
WD	Mean ± SD	28.38 ± 2.41	29.00 ± 2.13	15.92 ± 10.86	7.21 ± 0.56	3.61 ± 0.89
	Range	24 – 34	25.5 – 34	5 – 35	6.3 – 8.14	1.7 – 4.96
BF	Mean ± SD	28.25 ± 2.61	28.08 ± 2.08	22.25 ± 9.97	7.16 ± 0.61	3.56 ± 1.15
	Range	24 – 34	25 – 33	5 – 35	6.2 – 8.2	1.1 – 5.07

Wider impacts of the work

- This study provides a primary and systematic data for the distribution, abundance and diversity of marine wood borers from Andaman mangroves, India.
- The present study reported new records from this region such as *S. obtusa* (Marimuthu et al., 2015), *B. gracilis* and *B. campanellata*.
- To elucidate from different mangroves and different substratum of the intensity of marine wood borers are yet to be explored by the future researchers.
- Naked clams (Shipworms), once considered pests, are now being explored as a sustainable and nutritious future food source

Conclusion

- A total of 11 species were observed from the study area. Species restriction was noticed in the present investigation based on wood and geographical locations (stations)
- A total of four species namely *Spathoteredo obtusa, Bankia gracilis,B. campanellata* and *Lyrodus massa* have been observed as new records from the Andaman mangroves of which *Spathoteredo obtusa* (Marimuthu et al., 2015) was new record to Indian mangroves.
- Live wood was mostly attacked only by the isopod borer S. terebrans, whereas dying and dead wood was dominated by molluscan borers.
- Spatial variation in the occurrence of borer species was observed during the study.
- Landward edge mangroves were free from borers attack whereas creek region was dominated by isopod borers (*S. terebrans*) whilst coastal region mangrove was free from isopod borers. Spatial diversity was high at creek proximity region.
- Temporally high diversity was noticed during North East Monsoon (NEM).

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