Mangrove museum - a nucleus for conservation, training and educating people about the value of Sundarban mangrove forest of Bangladesh

Bulletin
7
MANGROVE SERIES

Dr. Md. Masudur Rahman

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
BANGLADESH FOREST RESEARCH INSTITUTE
MANGROVE SILVICULTURE DIVISION
KHULNA, BANGLADESH
2018

Sponsored Public Goods Research (SPGR)
Project Implementation Unit (PIU)
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Foreword

This bulletin entitled “Mangrove museum - a nucleus for conservation, training and educating people about the value of Sundarban mangrove forest of Bangladesh” gives information about the natural mangrove forest and its ecosystems. The intention of this bulletin is to provide mangrove conservation knowledge, so that wherever the visitors of the mangrove museum go back they will not only appreciate these impressive recollections but also do whatever possible to protect and safeguard mangroves. It is functioning towards its vision of sharing traditional and contemporary knowledge of the mangroves and its ecosystems, which are essential for the survival of humankind.

The collections of the mangrove museum are used to raise awareness of visitors to the natural world using ‘the real thing’. It can be achieved through displays and exhibitions, working with schools, colleges and universities and other specialists. Whilst the collections are of great value to education and awareness of natural mangrove forest and its ecosystems in its widest sense, the museum contributes much more than through its displays and events. I convey my sincere thanks to the author to prepare this important document.

I hope that researchers, foresters, students, NGOs and visitors will find this bulletin a useful publication.

Dr. Khurshid Akhter
Director
Bangladesh Forest Research Institute
Chattogram, Bangladesh

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Mangrove museum - a nucleus for conservation, training and educating people about the value of Sundarban mangrove forest of Bangladesh

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Abstract
A mangrove museum was established at the Divisional Head Quarter of Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna in 2001 having 55 flora and 50 fauna specimens and twenty three wood samples of mangrove tree species as well as twenty five herbarium specimens of mangrove species. Establishment of a mangrove museum is very much essential for preservation and demonstration of the flora and fauna specimens of the Sundarban to the students, researchers and general people of the country which may create awareness and can help protect and preserve the Sundarban ecosystem. The museum may act as a hub for conservation training for adults, and educating children about the value of mangroves. For the mangrove museum to retain their relevance and become positive partners in the sustainable development of natural mangrove ecosystems, they should use their unique resources and potentials to become more responsive to the dynamics of the Sundarban ecosystems and climate change.

Introduction
Museum is from the Latin word "Museion" and can be pluralized as museums. A museum is a building where historical arts, artifacts, works, sculptures, objects of cultural or biological interests are stored, preserved, studied and shown to the public. Interesting and valuable objects that have historical stories and values are collected and kept in the museum. They are educational and at the same time centers of amusement.

Museums ensure understanding and appreciation for various groups and cultures. They promote better understanding of our collective heritage and foster dialogue, curiosity and self-reflection. Further, they serve to help future generations comprehend their history and recognize the achievements of those who came before them.

Many things that were being taught in classes as theory can be studied further by visiting the museums. There is a believe that what we see stays longer than what we read. Seeing what is being taught in class helps in retaining knowledge. Museum also exposes more that are being taught by teachers. They serve as research avenues and venues where histories and dates can be traced and found. Museums provide a unique interactive experience of getting up close to things we usually only see in books, newspapers or on the television. Museums are also a significant factor in attracting tourists to an area and can therefore be instrumental in helping the local economy in terms of supplying a passing trade as well as offering local people employment.

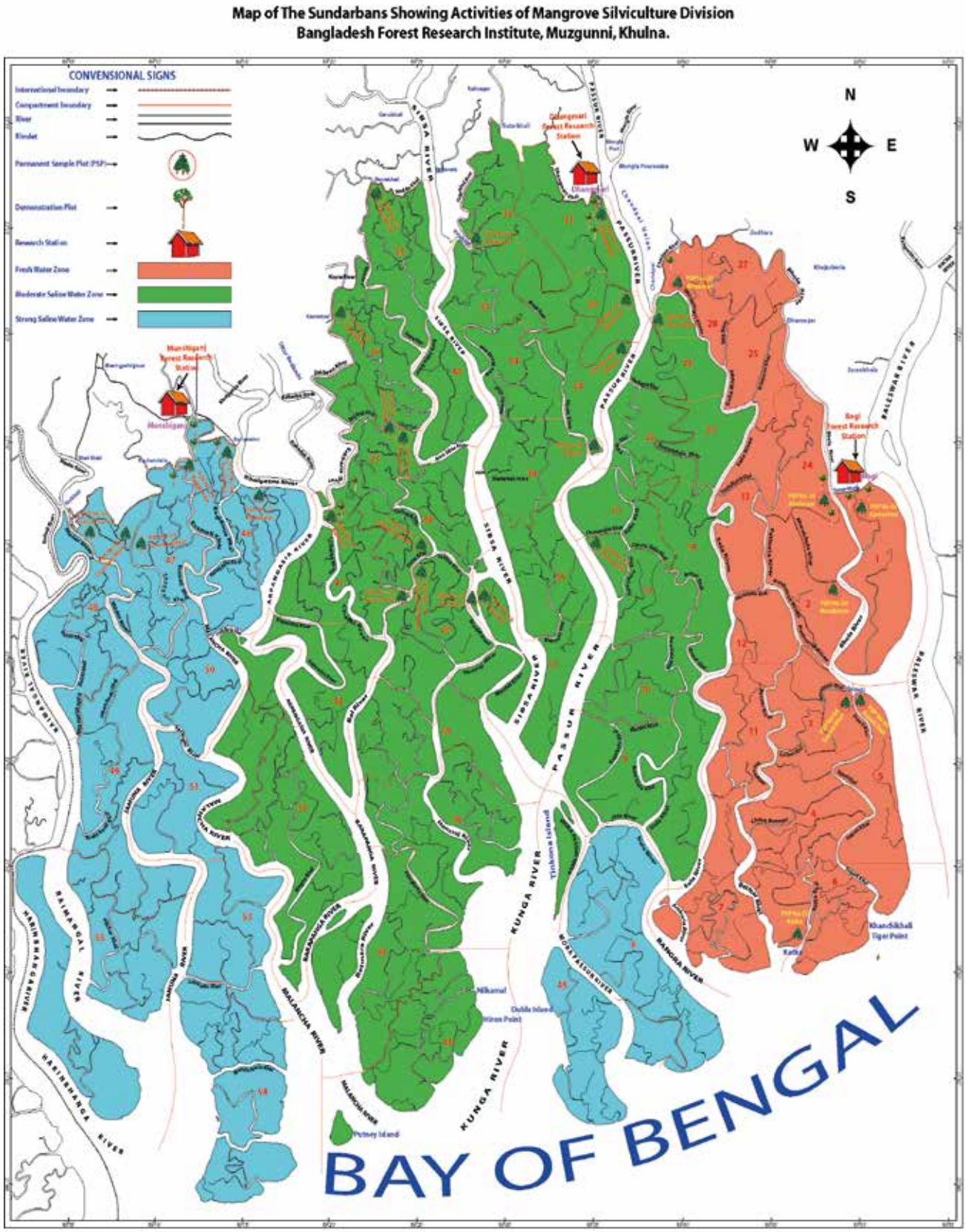

Figure 1. Map of the Sundarban.

The Sundarban is a large natural mangrove forest of Bangladesh. It is situated at the south west end of the country along the coastal belt. It covers an area about 10,000 km² in the delta of the rivers Ganga, Brahmaputra and Meghna is shared between Bangladesh (60%) and India (40%). In Bangladesh part of the Sundarban about 4,143 km² of a total 6,017 km² is landmass and the remaining 1,874 km² are water bodies in the form of numerous rivers, canals and creeks of widths varying from a few metres to several kilometres which are mostly tidal in nature and are connected to estuaries (Chaffey et al. 1985). It is the world's largest coastal wetlands. A map of the Sundarban (Bangladesh part) is shown in figure 1. The Sundarban had a long history of conservation and Management. Establishment of a mangrove museum is very much essential for preservation and demonstration of the flora and fauna specimens of the Sundarban to the students, researchers and general people of the country which may create awareness and might help protect and preserve the Sundarban ecosystem.

It's not just an impact experience for younger generations, though; museums truly create opportunities for bridging the generation gap from both sides. People living adjacent to the Sundarban from older generations often appreciate the chance to discuss the things that happened in their lives decades ago, and it's heartwarming for them when children and young adults ask questions and express an interest in their lives. The character of a mangrove museum is to collect objects and materials from the natural mangrove forest of the Sundarban, preserve them, research into them and present them to the public for the purpose of education, create awareness for conservation of natural mangroves and enjoyment.

Mission

Through incomparable collections, rigorous research and dynamic public outreach, we explore the infinite richness and complexity of history of Sundarban. Knowing more about natural mangroves gives us the tools to make better decisions about mangrove resources. It provides the basis for new technologies and developments, and promotes a better understanding of how we affect, and are affected by, the natural world. In addition to preserving these precious specimens for future generations, the collection is a vital resource for scientists. By examining past patterns of species distribution, climate change and extinction, mangrove research helps scientists understand natural events that occur during environmental changes and assists in predicting future consequences.

Our Promise

Those who connect with the Mangrove Museum will be inspired by history of Sundarban to explore the natural mangrove forest of Bangladesh.

Our Position

We are a mangrove museum of local rank known for evidence-based insights, inspiring visitor experiences and real and relevant engagement with Sundarban's past, present and future.

Our Approach

We identify and act on collaborations with local and national partners that advance the strategic positioning and objectives of the museum. We cultivate meaningful relationships with visitors, members, donors, partners and stakeholders who are philosophically and financially committed to the vision and mandate of the museum and wish to play a part in its life and future. At the museum, we use the past to prepare for the future.

Materials and Methods

Establishment of a mangrove museum housing representative flora and fauna of the Sundarban are to be organized and maintained. Collect and preserve the representative specimens of flora and fauna from the Sundarban are to be done. Demonstration the specimens of flora and fauna to the students, teachers, researchers and general people of the country which may create awareness and might help protect and preserve the Sundarban ecosystem.

Establishment of Mangrove Museum

A mangrove museum was established at Divisional Head Quarter of Mangrove Silviculture Division, Khulna in 2001 having 55 flora and 50 fauna specimens and twenty three wood samples of mangrove tree species etc. The Mangrove Museum situated at Divisional Headquarter of Mangrove Silviculture Division, Bangladesh Forest Research Institute, Muzgunni, Khulna is shown in figure 2.

Figure 2. Mangrove Museum at Divisional Headquarter of Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna.

A list of collected wood samples of mangrove tree species is given in table 1. Museum room is modernized and furnished with iron racks, multipurpose almirah, display boards and xylarium cabinet.

Table 1. Collected wood samples of mangrove tree species.

Sl. No.	Scientific Name	Family	Vernacular Name	Type of plant
1.	*Aegiceras corniculatum*	Myrsinaceae	Khalisha, khalshi	Shrub or small tree
2.	*Amoora cucullata*	Meliaceae	Amur	Small tree
3.	*Avicennia alba*	Avicenniaceae	Morcha baen	Small tree
4.	*A. marina*	Avicenniaceae	Sada baen	Small tree
5.	*A. officinalis*	Avicenniaceae	Baen	Tree
6.	*Bruguiera gymnorrhiza*	Rhizophoraceae	Kankra	Tree
7.	*Bruguiera sexangula*	Rhizophoraceae	Lal kankra, bakul kakra	Tree
8.	*Ceriops decandra*	Rhizophoraceae	Goran	Shrub or small tree, usually coppices
9.	*Cynometra ramiflora*	Leguminaceae	Shingra	Small tree
10.	*Excoecaria agallocha*	Euphorbiaceae	Gewa	Tree
11.	*Excoecaria indica*	Euphorbiaceae	Batla, batul	Small tree
12.	*Ficus sp.*	Moraceae	Jir	Tree with aerial roots
13.	*Heritiera fomes*	Sterculiaceae	Sundari	Tree
14.	*Kandelia candel*	Rhizophoraceae	Bhat kathi, gura, gurae, gural	Sm all tree
15.	*Lumnitzera racemosa*	Combretaceae	Kirpa, kripa	Small tree
16.	*Phoenix paludosa*	Palmae	Hantal	Thorny palm
17.	*Rhizophora mucronata*	Rhizophoraceae	Garjan, jhana	Tree with stilt roots
18.	*Sapium indicum*	Euphorbiaceae	Hormoi	Small tree
19.	*Sonneratia apetala*	Sonneratiaceae	Keora	Tree
20.	*S. caseolaris*	Sonneratiaceae	Choyla, ora, soyla	Small tree
21.	*Tamarix indica*	Tamaricaceae	Jhao, nonajhao	Small tree
22.	*Xylocarpus granatum*	Meliaceae	Dhundul	Small tree
23.	*X. mekongensis*	Meliaceae	Passur	Tree

Herbaria traditionally are composed of leaves, flowers and fruits of plant specimens. Lesser known botanical collections are those with wood samples from lignified plants. These collections are called "*xylaria*" (singular "*xylarium*", in French mostly called "*xylothèque*"). They have a reason to exist on their own, possibly apart from herbaria, mainly because the importance of wood in the living nature and in the material culture cannot be overestimated.

Among the economic products that had been shown at this time were samples of valuable mangrove timber species (*Aegiceras corniculatum, Amoora cucullata, Avicennia alba, A. marina, A. officinalis, Bruguiera gymnorrhiza, Bruguiera sexangula, Ceriops decandra, Cynometra ramiflora, Excoecaria agallocha, Excoecaria indica, Ficus sp., Heritiera fomes, Kandelia candel, Lumnitzera racemosa, Phoenix paludosa, Rhizophora mucronata, Sapium indicum, Sonneratia apetala, S. caseolaris, Tamarix indica, Xylocarpus granatum and X. mekongensis*), all collected from the Sundarban mangrove forest of Bangladesh.

Since the *xylarium* should be for scientific reference, it is very important that the specimens could be studied microscopically. Hence it needs to be completed with so called derivative collections that consist of thin microtomic sections and microscopic images of the wood anatomical features.

Scientific wood collections incorporate as many woody plants as possible the gateways are being opened for many research disciplines that all show interest in wood and contribute to the sustainable use of the mangrove forest ecosystems and this of the most important material that they produce. These disciplines include next to forestry, tree physiology and ecology, archaeology, paleontology, ethnography and art history. Hence, wood is bridging easily the gap between natural and human sciences, probably towards the only scientific way to a sustainable and sound use of the ecosystems that compose the world where we live in.

The stem disk collections of the Tervuren *xylarium* provided the study material for research aiming at an ecological evaluation of the ecosystem health specially Verheyden carried out the research on the growth patterns of mangrove trees in Kenya and this study demonstrates the potential of *Rhizophora mucronata* as an environmental proxy (Verheyden 2004).

Wood science of mangrove species and in particular the analysis of *xylarium* samples can contribute to the assembly of information that should underpin management plans aiming at a sustainable production of goods and services of the Sundarban mangrove forest of Bangladesh. This can be done through research both of an ecological and of a technological nature. Indeed *xylaria* or wood collections permit information gathering on both the material characteristics and the carrying capacity of the forest ecosystem.

Figure 3. *Xylarium* of mangrove tree species shown in the Mangrove Museum at Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna.

Xylarium of mangrove species are shown in figure 3. The dimension of *xylarium* sample is: 10 x 6 x1 cm for small specimens and 16 x 10 x 2 cm for large specimens of mangrove tree species following international standard.

Researchers also collect herbarium specimens during their time in the Sundarban. Herbarium specimens are plants that have been pressed, dried, identified, and accessioned into a museum collection. Each preserved specimen is labeled with information about where and when it was collected. These specimens capture unique information about species ecology and form. As libraries of biodiversity, herbaria are essential to understanding how plant populations and species distributions change over time. Herbarium specimens serve as a road map back to populations, allowing researchers to revisit the same sites years later to see if those trees are still present or if the plant community has changed. Twenty five herbarium specimens of mangrove species were prepared. Twenty three wood samples of mangrove tree species were prepared and preserved in the museum. One number of tiger hide and one piece of deer hide were reprocessed and stuffed as well as demonstrated in the mangrove museum. One documentary film of Sundarban was prepared, 300 still pictures were printed and 100 pictures were laminated. Previously collected flora and faunal specimens from the Sundarban were maintained in the museum.

Figure 4. Stuffed Royal Bengal Tiger in the Mangrove Museum at Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna.

Bengal Tiger one of the largest living cats on earth, belongs to family Felidae, order Carnivora. The Bengal Tiger (*Panthera tigris tigris*) is recognized as the national animal of Bangladesh and is renowned as the Royal Bengal Tiger. It is called so because of its royal look and is available in Bengal or Bangladesh (*Sundarban*). It is without doubt the most fascinating wild animal today. A stuffed Royal Bengal Tiger is shown in figure 4.

Figure 5. Stuffed spotted deer in the Mangrove Museum at Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna.

The mangrove museum employed local taxidermist to stuff and mount a Royal Bengal Tiger and a spotted deer into life-like positions. Although we no longer employ a taxidermist we do still occasionally commission a piece of work. The museum has always practiced ethical taxidermy and will continue to do so. This means we only acquire wild animals which have died through natural causes and these are given to us by the Bangladesh Forest Department who find them in the Sundarban Mangrove Forest of Bangladesh. Sundarban is the natural habitat of the world's spotted deer. Deer is very common in the Sundarban. It is one of the most beautiful dear in the world. A stuffed spotted deer is shown in figure 5.

Figure 6. Specimens of mangrove plant species shown in the Mangrove Museum at Mangrove Silviculture Division, Bangladesh Forest Research Institute, Khulna.

The trees of the Sundarban exhibit hydrophytic and halophytic adaptations which facilitate survival in water logged and saline conditions. The Sundarban mangrove forest is very rich in biotic diversity than other mangrove forests of the world. A total of 334 species of plants were identified belonging to 245 genera of Spermatophytes and Pteridophytes from the Sundarban forest and the adjoining areas (Prain 1903). But at present nearly about 66 Angiospermic and Pteriodophytic species are found in the Sundarban (Chaffey et al 1985). The Sundarban flora belongs to Indo-Malaysian Sub group and characterized by the abundance of *Heritiera fomes, Excoecaria agallocha, Ceriops decandra, Bruguiera spp., Sonneratia apetala* etc. (Chapman 1975). Fleshy fruits and plant parts of major mangrove species' specimens and twenty five fish specimens were collected from the Sundarban and preserved in the museum (Figure 6).

Figure 7. Pictorial view of mangrove nursery in the Sundarban.

Figure 8. Pictorial view of experimental plantations with mangrove species (*Kandelia candel*) for improvement of mangrove ecosystems in the Sundarban Mangrove Forest of Bangladesh.

There are some new approaches of research activities in the Sundarban Mangrove Forest of Bangladesh for enrichment of mangrove ecosystems and sustainable management of the forest. Pictorial view of mangrove nursery and experimental plantations in the Sundarban are shown in Figure 7 and 8.

Figure 9. Dr. Khurshid Akhter, Director, Bangladesh Forest Research Institute visited Mangrove Museum at Khulna in February 2018.

The mangrove museum can be used as an educational tool for school children. Hundreds of students, researchers and visitors visit the mangrove museum every year. Dr. Khurshid Akhter, Director, Bangladesh Forest Research Institute visited Mangrove Museum at Khulna in February 2018 (Figure 9).

The Mangrove Museum is instrumental to research programs in Bangladesh for sustainable management of mangrove ecosystems. For many people undertaking research, museums provide an unrivalled wealth of information and resources as well as access to archives, scholars and highly trained professionals. Throughout its history, the Mangrove Museum has always supported a greater understanding of natural environment and a scientific approach for conservation of the mangrove forest of Bangladesh.

Conclusion

The new mangrove museum can be used as an educational tool for school children of Bangladesh. The hope is that valuing Sundarban mangrove forests will become hard-wired into the culture of the next generation of Bangladesh to help preserve the country's coastal forests for posterity. It is also instrumental to mangrove research program in this country. For many people undertaking research, museum provides an unrivalled wealth of information and resources. Though there is general agreement that museums should excite, thrill, fascinate and inspire their audiences with real objects, there is a particular resolve for museums to maintain both a rigorous and scholarly knowledge of their own collections, and a continually questioning approach to their own mission. Mangrove biodiversity and conservation has received significant importance in the recent past as research has increased the understanding of values, functions and attributes of mangrove ecosystems and the role they play in providing important ecological services and livelihoods for the mangrove associated communities. Thus the mangrove museum has a lot to offer their respective communities, no matter what their focus. There's simply nothing quite as immersive as visiting a museum, gaining an in-depth perspective of the region, historical event, culture, art, or something else, particularly when technology is combined to blend the real world with the digital and the past with both the present and the future.

Acknowledgements

I would like to express my special gratitude and thanks to the National Agricultural Technology Program (Phase-2), Bangladesh Agriculture Research Council, Dhaka for funding support. I would like to express my deepest appreciation to all those who provided me the possibility to complete this bulletin. Furthermore I would also like to recognize with much indebtedness the crucial role of all the members of the Mangrove Silviculture Division, Bangladesh Forest Research Institute for establishment and management of the Mangrove Museum.

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