

Assessing the change in biodiversity of *Dewapara Sal (Shorea robusta)* Forests of Bangladesh

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Abstract

The overall objective of the study was to assess the change in biodiversity of *the Dewapara Sal* forests of Bangladesh. Both primary and secondary data were used in this study. It was found that the exotic tree species replaced the indigenous species. Currently, climbers are absent in these forests. There is no trace of coarse woody debris and mycorrhizal association. Consequently, the species richness, the diversity index (Shannon-Wiener index) and evenness (Pielou's index) were very low. Due to poor species richness, the concentration of dominance (Simpson index) was very high. The Asiatic Black Bear, Sambar Deer, Spotted Deer, Barking Deer and Red Frog disappeared just four decades ago. The Leopard Cat, Fishing Cat, Jungle Cat, Indian Civet and Capped Langur reached extinction in recent years. The study recommended an integrated conservation strategy to avoid further degradation.

Keywords: Sal Forest, extinction, species richness, conservation, diversity index, evenness

Introduction

The Sal (*Shorea robusta*) occurs on the southern slopes of the Himalayas in Nepal, India and Bangladesh. In India, Sal occupies the northern and central regions separated by the Gangetic Plain. Terai (lowland) is considered the main Sal growing region of Nepal (Rahman 2009). The major portion of Sal forests in Bangladesh is located in the central parts (Mymensingh, Tangail and Gazipur). Sal Forest is the most threatened and vulnerable ecosystem in Bangladesh (Rahman *et al.* 2007, 2008, 2009, 2010). Until the beginning of the 20th century, these forests existed as a continuous belt with rich floral and faunal diversity. Gradually increasing population put tremendous pressure on this ecosystem and changed the scenario (Rahman 2021,2022; Rahman and Vacik 2009, 2010). These forests at present are under occupation and the remaining stands are of poor stocking. The massive destruction of the Sal forests of Bangladesh occurred during the last 40 years. Biodiversity has declined rapidly and many species have disappeared. The Sal forests are acutely impacted by over-exploitation, deforestation, excessive litter collection, encroachment, indiscriminate collection of economically important plant species (i.e., medicinal, fodder etc.), and other forms of anthropogenic disturbances. Natural Sal forests have been converted into plantation forests, rotational forests, exotic woodlands, rubber gardens, banana gardens, pineapple orchards, rice fields, homesteads and other agricultural fields. Dewapara Sal forest is under the Dholapara range of Tangail. A few decades ago, it was attached to Madhupur Sal forests as a continuous forest belt. The total area of forest land is 1500 acres, out of which 800 acres have forest coverage. Only a 10-acre area has Sal patches and the rest 790-acre is occupied by a 10-year-long rotational plantation forest. The Sal patches are highly degraded, fragmented, mostly denuded and made mono-species based. This area falls under the bio-ecological zone of the Madhupur Tract. The soil represents highly oxidized reddish-brown clay containing ferruginous nodules and manganese spots. The whole forest areas are fragmented by an intricate network of depressions in a honeycomb pattern layout. The depressions are generally cultivated with paddy. Homesteads, cultivable lands and forests are mixed which makes forest boundary demarcation and maintenance extremely difficult. The study aimed to examine the change in biodiversity of the Dewapara Sal forest over time.

Methodology

Both primary and secondary data were used for this study. The secondary data were collected from the *Dholapara* range office of the Tangail Forest Department. Local people were personally interviewed to identify the flora and fauna. A focus group discussion was done incorporating the respondents from diverse stakeholders. The diameter at breast height (DBH) and height of the tree were measured. Pielou's index and Simpson's index were calculated.

Biodiversity at present

Flora

Among the natural tree species, Sal is found sporadically in the above-mentioned 10-acre area. With few exceptions, the diameter at the breast height (DBH) of the Sal trees ranges from 10-30 cm. The height of the mature Sal tree did not exceed 20 m. No other natural Sal associates were present in this forest area. The rotational plantation forests were dominated by *Acacia* (*Acacia auriculiformis*), *Mangium* (*Acacia mangium*) and *Eucalyptus*. The exotic species in the plantation forests were uniformly distributed, whereas Sal was randomly distributed in patches. Natural regeneration (ephemeral, established seedling and sapling) was absent. Few juvenile Sal trees were found occasionally. Without the continuity of natural regeneration, it is not possible to maintain a natural ecosystem. *Bhite* and *Mouhati* are the dominant shrubs in both Sal patches and plantation forests. Among the herbs only Basket Grass, Foxtail and Love Thorn are available in this area. Climbers are absent in these forests. There is no trace of coarse woody debris and mycorrhizal association. Consequently, the species richness, the diversity index (Shannon-Wiener index) and evenness (Pielou's index) were very low. Due to poor species richness, the concentration of dominance (Simpson index) was very high.

Fauna

Among the bird species, the Common Mayna (*Shalik*), Spotted Dove (*Ghughu*) and Oriental Magpie Robin (*Doyel*) are found occasionally. Fox and Squirrel are rarely distributed in this ecosystem.

Biodiversity in the past

Flora

Tree: Even 40 years back the Sal Forest was the richest biodiversity spot in Bangladesh. Sal was the dominant species followed by *Bangajari*, *Gandhigajari*, *Sindhuri*, *Datoi*, *Ajuli*, *Dudh Koroi*, *Bhutum*, *Bohera*, *Haritaki*, *Arjun*, *Sonalu*, *Cheshra*, *Jiga*, *Jogini Chakra*, *Kaika*, *Sidha*, *Sajna*, *Amloki*, *Roina*, *Lalmoina*, *Tamal*, *Khailadamor*, *Kak dumur*, *Faska dumur*, *Olotkomol*, *Chatim*, *Neor*, *Minjiri*, *Pakor*, *Shilabadi*, *Haldu*, *Kurchi*, *Mohuya*, *Kharajora*, *Kanaidinga*, *Kukurchita*, *Katakhai*, *Udhal*, *Sheora*, *Pahariamra*, *Awal*, *Koroch*, *Bajna*, *Joina*, *Debdaru*, and *Behula*.

Shrub: *Anaigota* was the dominant species followed by *Fulkhari*, *Monkata*, *Chokoi*, *Piralo*, *Chutkigota*, *Chhitki*, *Bishkanthali*, *Tagor*, *Bhite*, *Nishinda* and *Mouhati*.

Herb: Sun grass was the dominant species followed by *Soti*, *Bishkachu*, *Fulkori*, *Basket Grass*, *Ufatlangra*, *Foxtail*, *Carpet Grass* and *Thankoni*.

Climbers: *Bidipata* was the dominant species followed by *Gaza Pipul*, *Pipul*, *Shimul Lata*, *Patilalau*, *Paniyalata*, *Dumurlata*, *Chai*, *Kumarilata*, *Harjora*, *Shotomuli*, *Natakaranj*, *Keoyakanthal*, *Makal*, *Bishuti*, *Telakucha*, *Meta Alu*, *Bish Alu*, *Garro Alu*, *Gachh Alu*, *Jhum Alu*, *Shuori Alu* and *German Lata*.

Mycorrhiza: Different genera of mycorrhiza were associated with matured Sal trees. *Russula* was the most frequently occurring followed by *Amanita*, *Laccari* and *Scleroderma*.

Fauna

Once upon a time, these forests were very rich in faunal diversity. During the late nineteenth century Elephants and Rhinoceros became extinct from this ecosystem. The Asiatic Black Bear, Sambar Deer, Spotted Deer, Barking Deer and Red Frog disappeared just four decades ago. The Leopard Cat, Fishing Cat, Jungle Cat, Indian Civet and Capped Langur reached extinction in recent years. This was the paradise of different indigenous biodiversity.

Conservation for the future

- Strictly controlling further logging of Sal
- Afforestation and reforestation by early successional Sal species
- Zoning the forest lands into core, buffer and peripheral zones
- Initiating conservation programme at core zone
- Gap filling by Sal associates
- Facilitating natural regeneration in adjacent areas of Sal patches
- Protecting newborn seedlings or ephemerals from destruction
- Stopping the removal of old trees and deadwood from the forest to increase the population of different bird species and to initiate mycorrhizal associations
- Stopping further encroachment
- Rehabilitating the forest people outside the forest areas
- Creating public relations for nature conservation
- Creating alternative livelihoods for the forest people
- Supply of alternative fuel sources in the adjacent areas
- Demarcation of forest land and forest coverage
- Clear felling of all exotic trees after maturing into merchantable timber size
- Stopping further plantations of exotic species as they adversely affect the natural ecosystem
- Initiating income-generating activities through microcredit programmes to minimise the tremendous human pressure on forest

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