

Project Interim Report 1

Project title:

**Monoculture Plantations in Bangladesh: Consequences for Biodiversity
Conservation and Rural Livelihoods**

Project Site:

Lawachara Protected Area, Bangladesh

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by:

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Monoculture Plantations in Bangladesh: Consequences for Biodiversity Conservation and Rural Livelihoods

Introduction

The biodiversity in the tropics is mainly threatened by land use changes. Moreover, during the last few decades, it has been identified by the ecologists, environmentalists, forest managers that mono-plantations are being raised to reforest the degraded areas. And the species selected mostly the exotic origins that invade the natural ecosystem in the long run. These monoculture plantations that are mostly with exotic species threaten increasingly especially the natural and semi-natural ecosystems those still accommodate a high number of native species. Understanding their threats to native tropical biodiversity conservation is a prime concern for conservationists. Therefore, the aim of this study was to determine the effects of mono-plantation on biodiversity conservation. This study will help the forest and natural resource managers to design a proper and sustainable biodiversity conservation plan for the future. Moreover, the expected outcomes of my study will provide systematic approaches and strategies or guidelines for relevant policy formulation regarding nature conservation.

Hypothesis

I test the hypothesis that stand characteristics (e.g. biodiversity-species richness, regeneration of tree species, basal area) vary with ecosystems with mixed natural forests and monoculture plantations.

Materials and Methods

The study was conducted in Lawachara Protected Area (Figure 1) which is situated north-eastern region of Bangladesh. This region has a good combination of mixed natural forests and monoculture plantations. Moreover, this type of spatially explicit analyses of biodiversity patterns in this heterogeneous ecosystem as well in tropical ecosystems is rare. That is why; this area has been selected for the study. The study followed a representative, rapid, unbiased and systematic sampling procedure on stand characteristics to collect data in the field. To satisfy the potential sampling sites based on terrain attributes, land uses and land cover classes; it used digital elevation models, satellite images of the study area. Species area curve was used to satisfy the plot size and plot numbers. Circular plot of 10m radius was used for detailed data collection on stand characteristics. Finally, the study used multivariate statistical techniques to the gathered bioinformation to find out the consequences of monoculture plantations on biodiversity loss.

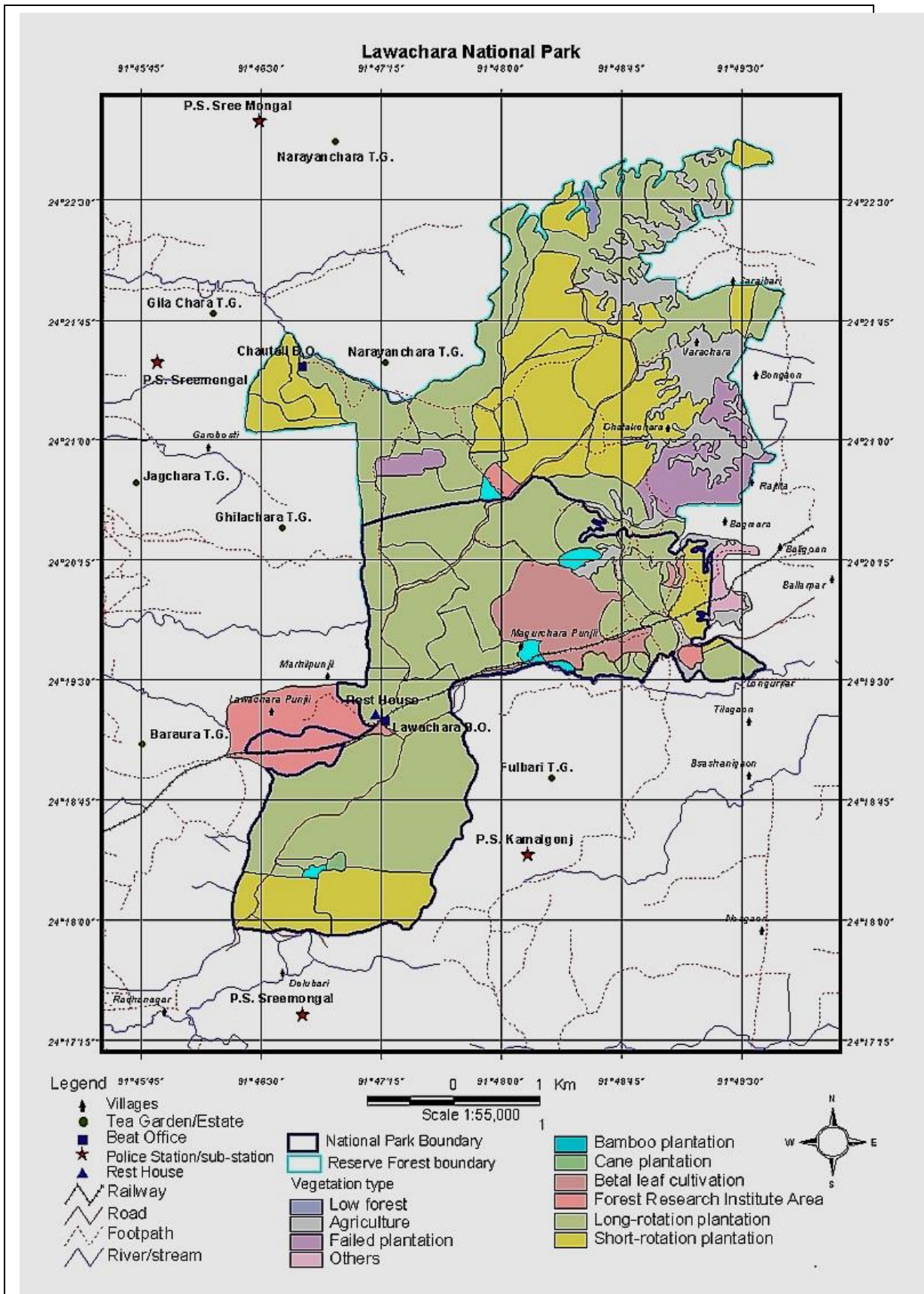


Figure 1: Map of the study area

Results and Discussion

The attitude of mixed natural forests is mostly old growth forest patch with higher number of native tree species. The forest is very rich with different type of trees, herbs, shrubs and vines. On the other hand monoculture plantation is comprised of by some short rotation first growing species like *Acacia auriculiformis*, *Acacia mangium*, *Aquillaria agallocha* and a few patch of *Artocarpus chaplasha*. Species richness in mono plantation area about half of considering mixed natural area (Figure 2). This means that distribution and abundance patterns of plant species vary with ecosystems with mixed and mono plantations. The highest species diversity occurs in the natural forests and decreases in human introduced mono plantations.

The increasing pattern of basal area monoculture plantations to mixed natural ecosystems indicates the productive diversity (Figure 3). This terrestrial pattern of increasing basal area occurred due to the selection of certain exotic tree species in mono-plantations. From biodiversity conservation viewpoint mixed natural forest better attributed then monoculture practices. Species richness as well as basal area, both are greater in natural forest which is managed as national park then the monoculture plantation of reserved area. Regeneration status also exhibit higher peak in mixed natural forest rather than monoculture (Figure 4). Mixed Natural forests are more diverse than planted forests while the (Stephens & Wagner, 2007; Carnus *et al.*, 2003).

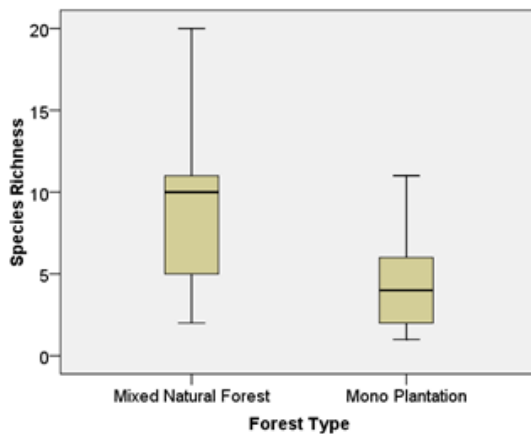


Figure 2: Species Richness in mixed and mono plantations

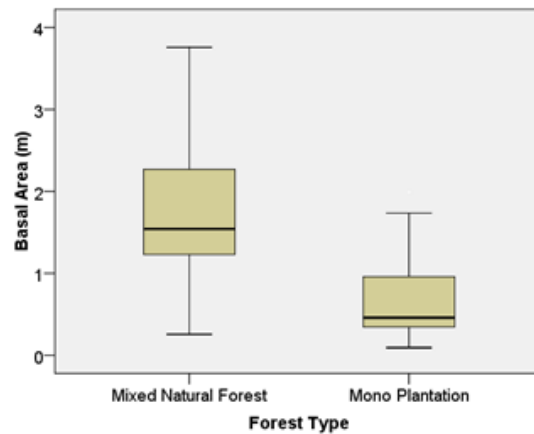


Figure 3: Basal Area in mixed and mono plantations

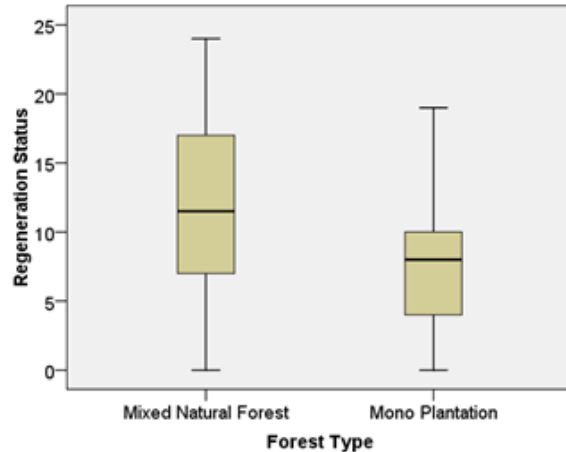


Figure 4: Regeneration of tree species in mixed and mono plantations

Conclusion

This project is expected to lead country's first attempt to identify the patterns of conversion of ecosystems into monoculture plantations and their effects on biodiversity in Bangladesh forest ecosystems as well as to assess their effects on rural livelihoods. This interrelationship among mixed natural forests, mono-plantations and biodiversity has been derived from the project will open the scope to answer many critical but important research questions underlying into the biodiversity monoculture relationship of conservation biology in tropical forest ecosystems.

These methodological approach and the experiences from this study will help forest managers, planners and policy makers to design a biodiversity and natural resource conservation plan which will control the conversion of forests into monoculture plantations, optimize biodiversity and nature conservation through ensuring people needs. As conversion into monoculture plantations is a human induced environmental change, this study will also help to improve local and regional environmental conditions.

References

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2. Stephens, S.S. & Wagner, M.R. (2007) Forest plantations and biodiversity: a fresh perspective. *J. For.* 307-311