



ASSESSMENT OF SUPPORTING ECOSYSTEM SERVICES IN MIXED HUMID SUBTROPICAL FOREST OF WEST BENGAL, INDIA

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ABSTRACT: Humid subtropical forest known as Bethua Dohori Reserve Forest (BDRF) of West Bengal, India has been chosen for the study which is an extended deer park and is highly rich in biodiversity. Forest comprises of sal (*Shorea robusta*), teak (*Tectona grandis*) and sirish (*Albizia lebbbeck*) as dominant species and plantation area comprises *Accacia auriculiformis*. Encroachment at BDRF is highly noticed in recent years due to anthropogenic activities. The objective of the study is to assess the supporting ecosystem services through assessment of nutrients in soil, green leaves and leaf litter in natural and planted patches. From analysis it is revealed that nutrient is efficiently used in natural forest than compared to plantation site. Potentiality of supporting services in natural forest is higher than plantation sites. Nutrient concentration in leaf debris is elevated at plantation site that indeed depicts low nutrient use efficiency (NUE). Similarly, N nutrient retranslocation efficiency (NRE) is increased than P and K. Results also confirm rapid mineralization of N than P and K. Above all, improper nutrient cycling with nutrient limitation of P and K is observed with site dependent and between species differences and anomaly in supporting services in terms of nutrient cycling is noticed in the area.

Keywords: Supporting ecosystem services, nutrient use efficiency, nutrient re-translocation efficiency

Abbreviations: BDRF- Bethua Dohori Reserve Forest, DBH - diameter at breast height, AGB - above ground biomass, NUE- nutrient use efficiency, NRE - nutrient re-translocation efficiency.

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Forests play an important role in maintaining ecological balance. The functioning of forest

ecosystem is governed by several factors viz. temperature, rain fall, availability of nutrients, flow of energy and materials within as well as between each components of the system. Ecosystem provides several services viz. provisioning, regulatory, supporting and cultural services to mankind and environment (TEEB, 2010). Conversion of natural-to-planted forests in the tropics and subtropics is evident in recent years (Ainembabazi and Angelsen, 2014; Zamorano-Elgueta et al., 2015). One of the management strategies adopted in forestry sector is plantation which has gained an important place in global forest estate. Assessment and valuation of ecosystem services have grown its interest globally in recent years (Braat and De Groot, 2012;) but the first study on ecosystem services estimation was conducted by Costanza et al. (1997).

Most of the studies have been concentrated to provisioning, regulatory and cultural services due to lack of suitable assessment and valuation framework

for each ecosystem services. However, in our study, an initial approach to assess supporting services of forest ecosystem in terms of nutrient cycling potentiality at natural and planted forests is undertaken.

The supporting ecosystem services imparts nutrient and energy transfer in soils from biological matter and initiates nutrient cycling through litter fall which contribute to soil nutrient storage bank in large proportion (Gray and Schlesinger, 1981). Decomposition of litters which produces organic matter is an important factor for soil formation as well as nutrient cycling processes (vanWesemael, 1993). Functional state of forest can be assessed through estimation of nutrients in litter-fall and the study can be used for formulating proper management strategies by forest managers, ecologist, environmentalist and environment planner (Johnsson, 1995; Robert et al., 1996). Although litter fall nutrient study gives functional state of forest, nutrient use efficiency index would also be used as soil nutrient indicator (Xu et al., 2003; Biswas and Khan, 2011). Few studies have been conducted on litter fall production, seasonality and energy transfer, acting as input-output system of nutrients in tropical dry deciduous forest in India