ABSTRACT

Biodiversity is the part and parcel of our daily life and livelihood and forms the major resources upon which future generations in different communities and nations depend. Biodiversity secures life sustaining goods and processes and is the foundation for human health. All animals including man are almost totally reliant on plants, directly or indirectly for their survival. It supports all, – food security, dietary health and livelihood sustainability. Plant diversity forms the essential foundation of most of our terrestrial ecosystems. But the depletion of biodiversity is one of the major threats to the existence not only for humankind but for the entire biosphere.

Generally the term plantation is used as an abbreviation for Plantation forest (i.e. Planted forest) and/or Forest Plantation. Plantations cover 5 % of global forests, supply about 35 % of the world's round-wood. They may also play an important role in alleviating pressure on natural forests for timber and fuel wood production. Plantations cover wide parts of the earth's surface and in 2000 it was about 187 million hectares, which is now greatly exceeds that of the native natural forests and the process is progressing at high rate all over the globe. This is much more prominent in some European countries and about 70 % of the total forest area in United Kingdom is Plantation.

India is one of the ten most forest-rich countries of the World along with the Russian Federation, Brazil, Canada, USA, China, Democratic Republic of the Congo, Australia, Indonesia and Sudan. India's forest cover grew at 0.22% annually during 1990 – 2000 and at 0.46 % per year during 2000 – 2010. India's forest cover has increased from 68 mha (24% of the total area of the country) to 69.8 mha in 2012. This increase in forest cover is mainly due to the rapid expansion of plantations and for arrest of depletion of forests.

Initiation of cultivation of tea, its rapid expansion, different developmental activities, increases in population started to degrade the forest cover of Terai –Duars region of Bengal. With the rapid decline of forest cover in Terai and Duars region, mainly with the Governmental initiatives, plantations of some selected species have been raised over wide areas in different times. Majority of these plantations are monocultural or with few species only. Most of the species used for plantation are commercially viable, tree in habit, many exotics, and form dense and continuous canopy within three to five years. None of these features, in fact, is in favour of the reclamation of natural vegetation and thereby do not support the conservation activities. The inter relationship of plantation forests and biodiversity is quite complex

and that become more complex when the issue of the effects of plantation forests over the biodiversity is considered.

Plantation affects biodiversity and environment both ways, direct and indirect. Rapidly growing interest in developing plantation forests is one of the most important reasons of replacing and clearing of environment friendly natural forests which positively impacts physical and biological environment as well as the biodiversity of the area.

Rapidly growing plantation forests have been accompanied by increased concerns about the potential environmental impacts. The concern also focus on the potential loss of soil fertility and productivity in case of short harvest rotations, risks associated with introducing exotic elements and catastrophic pest infestations. Developing monoculture plantations and the implications of replacing natural forests and associated flora and fauna lead to the formation of vegetation which became biologically very less diverse.

In question of impact of plantations on biodiversity, all the environmentalists, sponsors and others who are concern with the plantation forests, biodiversity and its conservation, get separated into two groups. One group holds the opinion that plantation forests enhances or favours biodiversity whereas the second lot opposes the first group of thinkers.

The present work was proposed to trace the impacts of plantation forests on plant diversity of Terai-Duars belt of West Bengal. Terai - Duars region of West Bengal is the Sub-Himalayan or foot hills region of the Indian state that extends from Nepal to Assam. Geographically this area is located from 26°16′00" N to 27°00′00" N latitudes and from 87°59′30" E to 89°53′00" E Longitudes and bordered by Hilly region of Darjeeling district and Bhutan to the North and by Cooch Behar, North Dinajpur and Bangladesh to the South. The entire Terai-Duars belt is a part of the *Eastern Himalaya* which is renowned for its diverse and rich biological resources. This zone is regarded as one of the most resource rich centres of Bengal and its diverse habitats are ideal home for a large number of flora, fauna and microbes. The present dissertation was designed to assess the influences of plantation forest on phyto-diversity of the study area and the main theme behind the selection of methodology is to compare different types of plantation with adjacent natural vegetation that was predominant in entire Terai-Duars belt and considered to be the standard land-use pattern. The comparison emphasized on the vegetation structures and phyto-sociological attributes along with a number of other aspects. Three-tire Nested Quadrate (20m x 20m for trees or canopy; 5m x 5m for shrubs or under-storey and 1m x 1m for ground cover) was adopted for sampling vegetation (Misra, 1968; Shimwell, 1971; Tripathi & Misra, 1971; Phillips, 1959; Malhotra, 1973; Das & Lahiri, 1997 and Kadir, 2001)

Random sampling plot survey has been done in consecutive three seasons during Pre-Monsoon, Post-Monsoon and in winter. From the present survey it was found that the plantation affected biodiversity in different ways. It reduced species

diversity by unifying the vegetation and species richness also. It increased the concentration of dominance of few species and thus homogenizes the vegetation. Plantation soils were found to be different from the soil from natural forests. Allelopathic assay of some commonly planted species on selected herbs were performed and it was expressed that teak had strong allelopathic effects on that test herbs. It reduced germination percentage, inhibited shoot, roots and seedling growth etc. Other test trees also showed some short of effect. Not only that few exotic species were surveyed for their impacts on local biodiversity and it was revealed that the exotic alien species also hamper biodiversity by homogenizing the local diversified flora by reducing the species richness and species diversity and increasing uniformity of vegetation and thus hampered the local ecosystem also. Recording of NTFPs and medicinal plants, showed the richness of this tract of marshy vegetation in NTFPs contents and the medicinally important plant species. Not only in NTFPs contents, but the belt was found to be very rich in tribal community and traditional knowledge systems. Terai and Duars region was found to harbour a number of RET elements also.

In conclusion it can be said that different type of plantations affected plant diversity in different sites in different ways. Mixed plantation which had similarity with natural vegetation affected the phytodiversity in lesser extent than the teak, jarul-benteak, jarul, and sal-chilauni plantation. Thus it is to mention that for the sake of biodiversity and ecosystem of this resources rich area, creation of plantation mainly the monoclonal plantation should be avoided in and around the natural forest which are the unique home to numerous plant species.