

Review of Literature

During last few decades of Nineteenth century when plantation was established in different parts of our planet earth only the advantages of planting trees in large scale was considered. The urge behind the initiation of plantation was nothing but the betterment of humankind, their society and environment and silently for the mother earth. They felt need for planting trees in large scale when they realized the shortage of supply of their required substances from natural forests which were dominant at that time and in a large extent around them. No one raised any question of its consequences and concerns. But rapidly growing interest in developing plantation forests has been accompanied with increased concerns about the potential environmental impacts of plantations in large scale. That makes the environmentalists, conservationists and others concerned to think seriously about its impact on biodiversity and environment. Thus the scientific approaches to detect and evaluate the impacts of large scale plantations were initiated.

4.1. THE GLOBAL SCENARIO

Throughout the Globe several workers studied the plantation forests to understand their ecological consequences. Moir (1966) studied the influence of *Ponderosa pine* on herbaceous vegetation. Sydes & Grime (1981a, b) studied the effects of tree leaf litter on herbaceous vegetation in deciduous woodlands. Hill & Stevens (1981) worked on the density of viable seeds in soils of forest plantations in upland Britain and Crozier & Boerner (1984) tried to understand the effects on distribution patterns in understory herb vegetation under different tree species in mixed mesophytic forest. Kirby (1988) studied the Changes in the ground-cover flora under plantations on ancient woodland sites. Chou (1991) worked on *Pinus radiata* plantation and found perspectives of disease threats in large-scale *Pinus radiata* monoculture in New Zealand. Hansen *et al.* (1991) chalked out the biodiversity in managed forests and highlighted on conservation. Kelty (1992) compared the productivity of monocultures and mixed-species stands.

Impact of plantation on biodiversity and environment was studied by many other workers including Rosoman (1994), Maclaren (1995, 1996), Danielsen & Heegaard (1995), Halpern & Spies (1995), Chiarucci & Dedominicis (1995), Allen *et al.* (1995), McLaren (1996), and Michelsen *et al.* (1996). Freedman (1998) and Freedman *et al.* (1994), found Impacts of plantation on biodiversity in the Greater Fundy Ecosystem. Chritensen & Emborg (1996) studied the biodiversity in natural versus managed forests in Denmark; Pott (1997) on plantation forestry in South Africa and its impact on biodiversity and water; Geldenhuys (1997) on native forest regeneration in pine and eucalypt plantations in the Northern Province of South

Africa; Oberhauser (1997) on secondary forest regeneration beneath *Pinus kesiya* plantations in the northern Thai highlands; Keenan *et al.* (1997) on restoration of plant biodiversity beneath tropical tree plantations in Northern Australia; Hampson & Peterken (1998) on enhancing the biodiversity of Scotland's forest resources through the development of a network of forest habitats; Norton (1998) on indigenous biodiversity conservation and plantation forestry; Bunnell *et al.* (1998) on the problems in forestry and biological diversity. Lamb (1998) highlighted on large-scale ecological restoration of degraded tropical forest lands; and Nixon & Worrell (1999) indicated the impact of plantations on biodiversity.

Mason *et al.* (1999) has worked on the use of native species in plantation forests, Lindenmayer (1999) on biodiversity conservation in managed forests, and Cannell (1999) on environmental impacts of monoculture forests. Scott *et al.* (1999) worked on soil carbon storage in plantation forests and pastures in New Zealand. Brockerhoff *et al.* (2001) estimated biodiversity in New Zealand plantation forests; Yirdaw (2001) on diversity of naturally-regenerated native woody species in forest plantations in the Ethiopian highlands. Peterken (2001) showed the ecological effects of introduced tree species in Britain. Strauss (2001) has studied on the plantations and native Australian forests; Hartley (2002) on rationale and methods for conserving biodiversity in plantation forests; Hofstede *et al.* (2002) studied the impact of pine plantations on soil and vegetation in the Ecuadorian High Andes; and Nagaike (2002) on differences in plant species diversity between conifer (*Larix kaempferi*) plantations and broad-leaved (*Quercus crispula*) secondary forests in central Japan. Humphrey *et al.* (2002) indicated the potential contribution of conifer plantations to the UK Biodiversity Action Plan. Henson (2003) and Henson & Chang (2003) worked on oil palm plantations and its effects including forest loss; Sample (2003) on forest plantations; Quine *et al.* (2003) on plantations; Van Wesenbeeck *et al.* (2003) on strong effects of a plantation with *Pinus patula* on Andean subparamo vegetation; Ehrenfeld (2003) on effects of exotic plant invasions on soil nutrient cycling processes in USA; Nagaike & Hayashi (2004) on effects of extending rotation period on plant species diversity in *Larix kaempferi* plantations in central Japan.

Cusack & Montagnini (2004) studied the role of native species plantations in the recovery of understory woody diversity in degraded pasturelands of Costa Rica whereas Lee *et al.* (2005) on natural regeneration in exotic tree plantations in Hong Kong. Lemenih & Teketay (2005) traced the effects of prior land use on the recolonization of native woody species under plantation forests in the highlands of Ethiopia and Eyecott *et al.* (2006) worked on ecological patterns of plant diversity in plantation forest managed by clear felling in UK; Arrieta & Suarez (2006) on the contribution of Scots pine (*Pinus sylvestris*) plantations for the regeneration of holly (*Ilex aquifolium*) in Mediterranean Central Spain; Carnus *et al.* (2006) on planted forests and biodiversity; Nagaike *et al.* (2006) on plant species diversity in a managed forest landscape composed of *Larix kaempferi* plantations and abandoned coppice forests in central Japan, Newmaster *et al.* (2006) on restoration of floral

diversity through plantations on abandoned agricultural land, Chey (2006) on impacts of forest conversion on biodiversity as indicated by moths, Shi *et al.* (2007) on the effects of diversity of arbuscular mycorrhizal fungi in the rhizosphere of Dipterocarpaceae in natural and plantation forests in China.

Barlow *et al.* (2007a) measured the biodiversity value of tropical primary, secondary, and plantation forests. Koonkhunthod *et al.* (2007) studied on composition and diversity of woody regeneration in a 37 year old teak (*Tectona grandis*) plantation in Northern Thailand, Barlow *et al.* (2007b) on litter fall and decomposition in primary, secondary and plantation forests in the Brazilian Amazon. Marcos *et al.* (2007) compared the community structure and soil characteristics in *Pinus sylvestris* plantations of different ages and a natural pine forest. Aubin *et al.* (2008) and Berndt *et al.* (2008) worked on relevance of exotic pine plantations as a surrogate habitat for ground beetles where native forest is rare, Pawson *et al.* (2008) on non-native plantation forests as alternative habitat for native forest beetles in a heavily modified landscape, Koh & Wilcove (2008) on the destruction of tropical biodiversity through the cultivation of oil palm, Onaindia & Mitxelena (2009) on potential uses of pine plantations to restore native forests in a highly fragmented river basin, Soo *et al.* (2009) on the floristic diversity responses in young hybrid aspen plantations to land-use history and site preparation treatments. Duan *et al.* (2009) traced the differences in plant species diversity between conifer plantations and natural forests in middle of the Loess plateau. Gomez-Aparicio *et al.* (2009) also worked on pine plantations. Al-Nafisi *et al.* (2009) depicted the positive impacts of mangrove plantations on Kuwait's Coastal environment.

Pare *et al.* (2009) worked on regeneration and spatial distribution of seedling populations in Sudanian dry forests in relation to conservation status and human pressure, Hadi *et al.* (2009) on tree diversity and forest structure in northern Siberut, Mentawai islands, Indonesia, Zakaria *et al.* (2009) on the composition of plant communities at six study plots in Penang forest reserves in Malaysia and Gonzales & Nakashizuka (2010) on broad-leaf species composition in *Cryptomeria japonica* plantations with respect to distance from natural forest and others.

Recently Bremer & Farley (2010) worked on plantation forest and their effects on plant species richness. Pawson *et al.* (2013) worked on plantation forests, climate change and biodiversity. Very recently Braun and Vogt (2014) assessed the risks imposed by plantation forestry on plant biodiversity in the Hotspot Central Chile and Li *et al.* (2014) detected the effect of young poplar plantations on understorey plant diversity in China.

4.2. IN INDIAN SUB-CONTINENT

In Indian sub-continent various scientists have worked in the related field i.e. on plantation forests and its impacts on plant diversity in India. Panigrahi *et al.* (1969) contributed to the Botany of the Terai Forests of the Bahraich District of Uttar Pradesh, Singh & Misra (1979) worked on structure and functioning of natural,

modified and silvicultural ecosystem in Eastern Uttar Pradesh; Upreti (1982) studied the phytosociology and state of regeneration of Oak-Forest at Nainital, Das & Ramkrishanann (1985) on the litter dynamics in Khasi Pine (*Pinus kesiya* Royle ex Gordon). Pandey (1986) also worked on litter production and decomposition, mineral release and biochemical diversity of forests and plantation; Parthasarathy & Mahadevan (1987) on floristic account of forest types in Kalakad reserve forest, Western Ghats; Parthasarathy (1988) on phytogeographic analysis of the flora of Kalakad reserve forest Western Ghats; Singh & Singh (1991) on species structure, dry matter dynamics and carbon flux of a dry tropical forest; Gupta & Shukla (1991) on composition and dynamics of associated plant communities of sal plantations; Parthasarathy *et al.* (1992) on plant species diversity and human impact in the tropical wet evergreen forests of Southern Western Ghats; Singh *et al.* (1993) on production and decomposition of leaf litter in Sal, Teak, *Eucalyptus* and Polar forests in Uttar Pradesh; Visalakshi (1995) on vegetation analysis of two tropical dry evergreen forests in southern India; Nayar (1996) on Hotspots of endemic plants of India, Nepal and Bhutan; Parthasarathy & Karthikeyan (1997a, b, c) on diversity of trees and liana species and population structure in a tropical dry evergreen forest, biodiversity and population density of woody species in a tropical evergreen forest and plant biodiversity inventory and conservation.

Gopisundar (1997) worked on abundance, diversity and distribution of ground herbs in a tropical lowland evergreen rainforest at Agumbe, Karnataka; Shankar *et al.* (1998) on ecosystem reconstruction through 'taungya' plantations following commercial logging of dry mixed deciduous forests in Darjeeling Himalaya; Scott *et al.* (1999) on soil carbon storage in plantation forests and pastures; Pandey & Shukla (1999) on plant diversity and community patterns along the disturbance gradient in plantation forests of Sal (*Shorea robusta*); Pandey (1999) on comparative vegetation analysis and Sal regeneration in relation to their disturbance magnitude in some Sal forests. Parthasarathy (1999) studied the tree diversity and distribution in undisturbed and human-impacted sites of tropical wet evergreen forest in southern Western Ghats; Xiong & Nilsson (1999) on effect of plant litter on vegetation; Pandey (2000) on population status and regeneration strategy of some perennial legumes in plantation forests of North-Eastern Uttar Pradesh; Chittibabu & Parthasarathy (2000) on understory plant diversity in a tropical evergreen forest in Kolli hills, Eastern Ghats; Maikhuri *et al.* (2000) on the growth and ecological impacts of different agro-forestry tree species in central Himalaya; Jha *et al.* (2000) on deforestation and land use changes in Western Ghats; Bhat & Murali (2001) on phenology of understory species of tropical moist forest of Western Ghats region of Uttara Kannada district in South India; Pandey & Shukla (2001) on regeneration strategy and plant diversity status in degraded Sal forests; Shankar (2001) on high tree diversity in a sal dominated lowland forest of Eastern Himalaya; Pandey & Shukla (2003) on plant diversity in managed Sal forests of Gorakhpur; Webb & Sah (2003) on structure and diversity of natural and managed Sal forest in the Terai; Sagar *et al.* (2003) on tree species composition, dispersion

and diversity along a disturbance gradient in a dry tropical forest region of India; Bhuyan *et al.* (2003) on tree diversity and population structure in undisturbed and human-impacted forest stands of tropical wet evergreen forest in Arunachal Pradesh; Padalia *et al.* (2004) on phytosociological observations on tree species diversity of Andaman Islands; Mishra *et al.* (2004) on anthropogenic disturbance on plant diversity and community structure of a sacred grove in Meghalaya; Sharma (2005) on impact of coal mining on vegetation; Raghubanshi *et al.* (2005) on the invasive alien species and Biodiversity in India; Goutam & Devoe (2006) on ecological and anthropogenic niches of Sal forest and prospects for multiple-product forest management; Kumari & Tripathi (2007) on phytosociological studies of the pteridophytes in Terai forest of North India; Timilsina *et al.* (2007) on community analysis of Sal forests; Reddy *et al.* (2007) phytosociological observations on tree diversity of tropical forest of Simlipal Biosphere Reserve, Orissa; Kumar (2008) on litter decomposition and calcium, potassium release in *Acacia auriculiformis* plantation forest floor; Sukumaran & Raj (2008) on rare, endemic, threatened (RET) trees and lianas in the sacred groves of Kanyakumari district; Mishra *et al.* (2008) on vegetation ecology of the Simlipal Biosphere Reserve, Orissa; Baishya *et al.* (2009) on distribution pattern of above-ground biomass in natural and plantation forests of humid tropics in northeast India, Tripathi & Singh (2009) on species diversity and vegetation structure across various strata in natural and plantation forests in Katerniaghat Wildlife Sanctuary; Rasingam & Parthasarathy (2009) on diversity of understory plants in undisturbed and disturbed tropical lowland forests of Little Andaman Island; Rawat *et al.* (2009) on structure of understorey vegetation in native and exotic plantations of Semi-Arid Regions of Punjab; Kulkarni *et al.* (2009) on biomass production by *Sesbania sesban* L. when grown under different tree environments; Mani & Parthasarathy (2009) on tree population and above-ground biomass changes in two disturbed tropical dry evergreen forests of peninsular India; Bremer & Farley (2010) on plantation and its role to restore biodiversity; Panda (2010) on the role of fungi in relation to litter decomposition associated with *Casuarina equisetifolia* L. in coastal sand dunes of Orissa; Panda *et al.* (2010) on litter decomposition dynamics associated with cashew nut plantation in coastal habitat of Orissa; Thapa *et al.* (2011) on effect of plantation on plant biodiversity and soil status of tropical forest ecosystem in Meghalaya, northeast India.

4.3. IN WEST BENGAL

Most of the works done previously in West Bengal are either on floristic aspects or in the field of ethnobotany and a very few are on ecological aspects of plantation and natural vegetation. Initially the flora and vegetation of Bengal was explored by Hooker (1848, 1854b), Hooker & Thomson (1855), Long (1857, 1858, 1859a, 1859b), Clarke (1876, 1885), King (1886), Haines (1896, 1906), Carter (1917), Cowan (1929b), Prain (1930b), Agharkar & Ghosh (1931), Anonymous (1935, 1960, 1963, 1966a, 1997), Biswas (1940) Shebbeare (1941), Chatterjee (1958a), Ghosh & Daniel (1959), Ghosh (1959), Mehra & Bir (1964), Chaudhuri (1965b), Chandra & Bhattacharyya (1966), Biswas (1966), Hara (1966, 1971), Mathew

(1966, 1969, 1971, 1981), Bennet (1969), Biswas (1971), Basak (1973), Hooker (1972-1897, 1904, 1907), Hara *et al.* (1978, 1979, 1982), Bhattacharyya & Maiti (1983), Krishna & Das (1972), Sain (1959, 1974), Yonzone (1975), Jain *et al.* (1975), Ohashi (1975), Chanda (1977), Kundu *et al.* (1981), Majumdar *et al.* (1984), Mukherjee (1984) and others.

Then Tamang & Yonzone (1982) studied the vegetation of North Bengal. Giri & Nayar (1983b), Das & Chanda (1986), Kundu & Pal (1997), Mukherjee (1998) studied and listed the threatened and endemic plants of Bengal. Kapoor *et al.* (1989) worked on forest and vegetation of Darjeeling Himalayas, A.K. Samanta (1998) on taxonomy and phytosociology of the Angiospermic Climbers of Darjeeling and Sikkim Himalaya.

Maiti & Guha Bakshi (1981), De & Mukhopadhyay (1984) worked on invasion of exotic weeds in West Bengal as well as the Weed flora. Hore & Tripathi (1985), Das *et al.* (1985), C.R. Das (1985), Bhujel (1986), Mukherjee & Deb Roy (1987), Das & Chanda (1987, 1988 & 1990) worked on flowering calendar of the angiospermic flora of Darjeeling hills.

Basu & Paul (1989), Das & Lahiri (1990, 1997), Chakraborty (1991, 1996), Grierson & Long (1983, 1984, 1987, 1991, 1999), Das & Lama (1992), Patra *et al.* (1992), Mondal (1992), Noltle (1994, 2000), Samanta (1995, 1996, 2006a, 2006b), Das (1995, 2004), Bhattacharyya (1996), Mahata *et al.* (1998), Mukherjee & Chaudhuri (1998), Chakravarty *et al.* (1999), Basu & Pradhan (2000), Rai (2001), Das *et al.* (2002), Rai & Das (2002, 2005), Saha (2005) further studied on composition and diversity of Bengal flora. Kundu (2006) studied and listed the threatened and endemic plants of Bengal.

Then different aspects of flora of West Bengal was further explored by Maiti (2004), Das & Ghosh (2007), Bhunia *et al.* (2008), Kumar *et al.* (2009), Panda *et al.* (2009). Das *et al.* (2008) worked on Plant resources in the protected areas and proposed corridors of Darjeeling. Naskar (1986) studied the *Avicennia* L. plantation and its role on brackish water fisheries.

Chaudhury (1964), Sengupta (1967c), Yonzone *et al.* (1981), Yonzone & Mondal (1982), Mukherjee & Rai (1984), Yonzone *et al.* (1984, 1985, 1996), Pal (1988), Basnet & Chetri (1999), Basu & Gautam (2002), Rai & Bhujel (2002), Chetri *et al.* (2005), Panda (2006, 2009), Rai *et al.* (2007a, 2007b) and Soren *et al.* (2008) worked on ethnobotany of Bengal whereas Biswas & Chopra (1940) on common medicinal plants of Darjeeling and the Sikkim Himalayas. Biswas (1956a) worked on common medicinal plants of Darjeeling and Sikkim Himalaya and Rai *et al.* (2008) invented the medicinal trees in lower hills of Darjeeling.

Only few workers studied the ecological aspect of West Bengal forests. Sarkar (2003) worked on Indian plant biodiversity and their conservation, Anonymous (1964b) on nursery and plantation, Banerjee (1992) on ecological status of *Shorea robusta* of West Bengal. Roy Choudhury (1956) recorded the progress of

forestry in Bengal. Das & Lahiri (1997) compared the ground covering vegetation among different types of contiguous vegetation on Tiger Hill in the Darjeeling district. Das (2002) recorded the naturalization of 114 species of exotics in the vegetation of Darjeeling Hills. Bhakat & Maiti (2003) studied the invasion of exotic species causing displacement and destruction of plant diversity in four contiguous district of South West Bengal. Das *et al.* (2010a) enlisted the medicinal plants in three MPCAs in Terai and Duars.

4.4. IN TERAJ-DUARS OF WEST BENGAL

Terai-Duars region of west Bengal lying at the foot of Himalaya was explored by different botanist from different parts of the world. Gamble (1875, 1878), Prain (1903a), Burkill (1916) worked on the Terai - forests, Cowan & Cowan (1929), Cowan (1929a), Anonymous (1957) on trees of Duars and Terai. Chaudhuri (1960a, b) studied on Principal grasses and grassland habits of North Bengal, Datta (1964) on common weeds of Darjeeling, Mukherjee (1965, 1972) on the vegetation of the Jalpaiguri district of West Bengal. Chaudhuri (1969, 1970) critically analysed the vegetation of North Bengal and its special ecological features. Anonymous (1970) worked on the Buxa Forest Division, Ghosh & Ghosh (1978) on the flora of Buxa division of Jalpaiguri district (Duars), Sikdar (1981b, c, 1984a, 1985) on flora and the Vegetation and Flora of Jalpaiguri District.

Others who worked on flora of Terai Duars belt are - Sikdar & Ghosh (1981), Sikdar & Samanta (1983), Sikdar *et al.* (1983), Sikdar & Rao (1984) on the flora of Buxa forest division, Jalpaiguri district, Safui *et al.* (1985) on flora of Duars, Chaudhuri & Chakraborty (1976) on genetic and specific diversity of the vegetation of North Bengal, Das *et al.* (1982), Das (1986) on the Floristics and Palyonology, Aditya & Ghosh (1989) on flora of Terai-Duars, Banerjee (1992, 1993) on Plant Resources of Jaldapara rhino Sanctuary, Bhujel & Yonzone (1994), Hegde (1994), Bhujel (1996).

Das (1996) rediscovered *Streptocaulon sylvestre* Wt. – an endangered and little known endemic plant of Eastern India. Das & Lahiri (1997) performed phytosociological studies of the ground flora in different types of vegetation. Das (1998) worked on the floristic and palynology. Bist & Katham (1999), Bhujel *et al.* (2001) on floras, Bhujel & Das (2002) endemic status of the dicotyledonous flora of Darjeeling District, Basnet (2004) on common weed flora in forest plantation of Darjeeling hills of W.B, Datta *et al.* (2002) on aquatic macrophytes of Apalchand Reserve in the Jalpaiguri, Ghosh *et al.* (2004) on weed flora of tea gardens of Darjeeling – terai, Kadir & Das (2002) on habitat of *Streptocaulon sylvestrie* an endemic and critically endangered Asclepiad, Shradha *et al.* (2004), Paul (2008b) on flora, Bandyopadhyay & Mukherjee (2005a) on Diversity of aquatic and wetland vascular plants, Bandyopadhyay *et al.* (2006) also worked on flora of Terai Duars, Bandyopadhyay & Mukherjee (2008) on trees and shrubs of Koch Bihar district, Bandyopadhyay & Mukherjee (2010) on diversity of climbing plants, Das *et al.* (2010b) worked on floristic aspect.

Several author worked on ethnobotany and tribes of Terai - Duars of West Bengal. Aditya & Ghosh (1988), Bandyopadhyay & Mukherjee (2005b, 2006), Bandyopadhyay *et al.* (2005), Bhujel *et al.* (1984a, 1984b), Chakraborty *et al.* (2008), Chaudhuri *et al.* (1982a,b), Chowdhury & Das (2007) , Das (1998), Das *et al.* (1983a, 1983b), Dixit *et al.* (1978), Ghosh (1986), Ghosh & Das (2004, 2007a, 2007b, 2007c), Mandal & Yonzone (1987), Mohanty (2008), Molla & Roy (1984, 1985, 1996), Mudgal *et al.* (1999), Mukherjee & Mukherjee (1987), Srivastva *et al.* (2003), Yonzone (1996), Das & Raha (1967), Sanyal (1955) worked in the field of ethnobotany and medicinal plants and Anonymous (1980) worked on Totos of Jalpaiguri district.

Anonymous (1997a) worked on forest resources of Darjeeling District, Banerjee *et al.* (2000) on minor forest products of Buxa Tiger Reserve, Kadir & Das (2007) on endangered and endemic plants, Kadir *et al.* (2009) on ecology of sub Himalayan grass land, Pandit *et al.* (2004) on Non-timber forest produces from Jaldapara Wild Life Sanctuary, Shebbeare (1961) on Nothern Bengal 'Taungyan' plantation. Recently Sarkar *et al.* (2010b), Sarkar and Das (2010, 2011, 2012) and Sarkar (2011), Moktan & Das (2014) explored the ethnobotanical aspects of Duars whereas Saha *et al.* (2013) have estimated the medicinal plants of this area.

Das *et al.* (2010a, b) surveyed the Medicinal Plants from Terai and Duars of West Bengal and documented *Piper* L. (Piperaceae) in Terai, Duars and the hills of Darjeeling and Sikkim Himalayas and published a checklist of Angiospermic Climbers of Darjiling and Sikkim parts of Eastern Himalaya including Terai and Duars. Mitra *et al.* (2010) showed the efficacy of some East Himalayan Medicinal Plants on ethanol induced gastric ulcer in albino rats. Sarkar *et al.* (2010b) documented the ethnobotany of *Kirat Parab* of *Magar* Community in Buxa Duar area. Ghosh & Das (2011) recorded useful and poisonous tea garden weeds from the Darjiling District. Das & Yadav (2011) reported about the distribution of *Gnetum montanum* in Terai and Duars belt.

Different authors have reported a number of taxa for the first time from this region. Das *et al.* (2010c) reported *Acampe papilloa* (Lindley) Lindley var. *flava* Das *et al.* (var. nov.) from the Duars region. Chowdhury *et al.* (2011) reported the occurrence of *Soliva anthemifolia* (A. Jussieu) R. Brown (Asteraceae) in Eastern India. Moktan *et al.* (2012) newly recorded *Oplismenus undulatifolius* (Arduino) P. Beauvois [Poaceae] for West Bengal. Rai & Das (2012) recorded *Primula kingii* G.Watt (Primulaceae) which is a new record for West Bengal. Chowdhury *et al.* (2013) recorded *Ludwigia peruviana* (Linnaeus) H. Hara [Onagraceae] for first time in West Bengal. Ghosh *et al.* (2013) rediscovered *Hibiscus fragrans* Roxburgh (Malvaceae) from Jaldapara National Park in Duars of West Bengal. Chowdhury & Das (2014) recorded *Hygrophila erecta* (N.L. Burman) Hochreutiner [Acanthaceae] which is also a new record of occurrence for West Bengal, India. Chowdhury *et al.* (2015) newly reported *Murdannia keisak* (Hasskarl) Handel-Mazzetti (Commelinaceae) as new record.

Chowdhury & Das (2011) comparatively analysed the herbaceous plants in some Natural and Plantation forests of Terai and Duars region. Moktan & Das (2011) analysed the dominance-diversity and Species richness of herb species in the foothill forests of Kurseong. Rai & Das (2011) recognized the forest types in lower hills of Darjiling Himalaya using satellite and ground truth data. Nirola & Das (2011) worked on Cyperaceae A.L. Jussieu of Darjeeling. Sarkar & Das (2012) estimated the contribution of forest flora in rural livelihood: a study of Jayanti, Buxa Tiger Reserve. Biswas *et al.* (2012) worked on flora of Gossaihat Beel, Jalpaiguri Forest Division. Moktan & Das, (2012) Phytosociologically characterized the forested vegetation in the sub-tropical region of Darjiling Himalaya. Shukla & Chakravarty, (2012) described humid tropical foothill forest in Indian eastern Himalayas. Chowdhury & Das (2013) recorded aquatic and semi-aquatic macrophytic diversity of the river Karala at Jalpaiguri. Moktan & Das (2013) analysed diversity and distribution of invasive alien plants along the altitudinal gradient in Darjiling Himalaya, India. Choudhury *et al.* (2013) worked on diversity of *Cinnamomum* Schaeffer (Lauraceae) in Terai and Duars region of West Bengal, India. Biswas *et al.* (2013) worked on floristic diversity of Rasik Beel and its adjoining areas in Coochbehar district of West Bengal. Shukla *et al.* (2014) estimated the plant diversity at Chilapatta Reserve Forest of Terai Duars in subhumid tropical foothills of Indian Eastern Himalayas. Choudhury *et al.* (2014) worked on diversity of *Litsea* Lamarck [Lauraceae] in Terai and Duars regions of West Bengal. Chettri *et al.* (2014) studied ethnobotanical of the Tea garden workers of Darjiling Hills. Moktan & Das (2014) worked on plant species richness and phytosociological attributes of the vegetation in the cold temperate zone of Darjiling Himalaya. Saha *et al.* (2014) Surveyed for NTFP plants of the Gorumara National Park in the Jalpaiguri district of West Bengal. Chowdhury & Das (2014, 2015) worked on sustainable utilization of wetland leafy vegetables of Terai and Duars, West Bengal, India and on ethnopharmacological survey of wetland plants used by local ethnic people in Sub-Himalayan Terai and Duars of West Bengal. Sarkar & Das (2015) recorded use of floral elements in Jainti under Buxa Tiger Reserve in West Bengal, India. Roy & Das (2015) worked on ethnobotany of Rajbanshi cuisine from the northern part of West Bengal.

Notable works on impacts of plantation on phytodiversity of this region are really lacking. That's why present study was designed to trace the impacts of plantation forests on the plant diversity of the Terai and Duars region.