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A Study of Human Influence on Forest Association Structure in Eastern Part of Manas Biosphere Reserve

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Abstract

Forests are biologically diverse natural systems that contain some of the world's most diverse biological areas. They provide a diverse range of habitats for plants, animals, and microbes. Forests are essential for environmental, land, and economic sustainability. They are the most important resource for humanity's survival. "Forest is a remarkable creature of boundless generosity and benevolence that makes no demand for its nourishment and gives protection to all beings, even supplying shade to the axe-man who destroys it," says BhagawanGautam Buddha. Forests, the earth's "Green Lungs," serve as energy and nutrient reservoirs, while also enriching soil by providing much-needed organic matter and increasing its water holding capacity. Forests offer man with food, fodder, medicine, fibre, lumber, and a variety of non-wood items, as well as shade and protection, as one of the most important components of the ecosystem. The forest serves as a natural habitat for biodiversity and a storehouse of genetic diversity. Forest conservation is an excellent method of carbon sequestration. If global warming is compared to a worldwide fever, forests not only serve as a potential cure, but their loss also adds to the spread of the disease (Schone and Netto, 2005). Deforestation and forest degradation account for 24% of all anthropogenic carbon emissions and 18% of all greenhouse gas emissions (IPCC, 2000).

Keywords: Biologically, Forests, Storehouse, Deforestation.

Introduction

Due to its different climatic circumstances and geographical features, India, which is one of the world's twelve mega biodiversity zones, is rich in all elements of distinct forest ecosystems at species and genetic levels. In India, approximately there have been reports of 47,000 plant species and 89,451 animal species, with many more yet to be discovered and known to the world (Singh and Choudhury, 2002). The country's forest Association is home to a large amount of the country's flora and fauna. North East India is classified as a biodiversity hotspot because of its floristic variety, which supports a varied range of endangered and endemic wildlife. It is one of the world's 34 biodiversity hotspots, along with the Himalaya and Indo-Burma (Conservation International, 2005). The zone is home to Indo-Malayan, Indo-Chinese, Sino-Malayan, and East Asian floras, as well as a few Bondwoman relics (Rawat et al., 2001).

A variety of reasons, including agricultural growth, industrialization, large-scale timber extraction, climate change, and urbanization, are putting pressure on forests (Geist and Lambin, 2002).

Anthropogenic pressure can result in uncontrollable changes in floral and faunal diversity, habitat, landscape, and soil qualities, as well as significant changes in environmental circumstances (Gupta and Yadav, 2005).

The seriousness of forest depletion and biodiversity has drawn worldwide attention, and the Earth Summit in Rio de Janeiro in June 1992 was the result of this assessment (Singh and Choudhury, 2002). Apart from the loss of biodiversity, the continued loss of forest cover is a major contributor to global warming and climate change. Deforestation has a variety of consequences, including loss of biodiversity (Myers et al., 2000), loss of an important carbon sink (Houghton, 1999), Influences on local and regional climate (Shukla et al., 1990), and negative effects on the livelihoods of people living in tropical forests (Shukla et al., 1990). (Bishop, 1993).

The edaphic environment and microclimate of the area were also affected by the opening of forest areas, resulting in a loss of ecosystem services. Soil temperature, moisture content, and light conditions under the plant canopy all have an Influence on edaphic parameters the success of plant germination and establishment (Evans and Young, 1970, 1972). Through litter-quality feedbacks, plant species influence the pace of nitrogen cycling within an ecosystem (Wedin and Tilman, 1996). Nitrogen in the soil can alter vegetation's geographical and temporal dynamics (Knap et al., 1999). The degree of NPK in open woodland is responsible for the spread of the weed Argemone Mexicana (Ramakrisnan, 1991). Disturbances and environmental variability alter resource availability and supply rates, resulting in niche opportunities. It is the consequences of their proximate density on tree germination, establishment, and/or mortality (Sankaran et al., 2004). Vegetational zones were formed as a result of the establishment and survival of various species. Furthermore, a mosaic of distinct vegetation types results from the gradient of warmth and moisture, in combination with different soil conditions and altitudinal shifts (Hilbig, 1995).

According to the Food and Agriculture Organization of the United Nations (FAO), the globe is losing 7.3 million hectors of forest per year. The global forest cover decreased from 4077 million hectors in 1990 to 3952 million hectors in 2005, according to a comparison between 1990 and 2005. (FAO, 2006). India lost 26,245 square kilometres of thick forest between 2001 and 2003 (State Forest Report, 2003). The Influence of humans on the formation of forest communities.

Human Influence on forest structure is now a global issue, with serious consequences for biodiversity and humanity. The phrase "human Influence" refers to the effects of various anthropogenic activities or disruptions in the environment or ecosystem as a result of resource extraction. Disturbances frequently have a large Influence and act quickly, resulting in the removal of large volumes of biomass. Major disturbances can be defined as the destructive Influences of human Influence on the ecosystem, such as forest removal. Disturbing factors can have a big Influence on ecosystems right away, and they can change the natural forest a lot structure of the Association These effects can last for a long time as a result of these and the consequences on species populations. The forest floor, on the other hand, is frequently cluttered with dead debris. The quantity of newly growing flora in the gap areas generated by human activities is aided by the decomposing materials and ample sunshine. In most human-caused forest fires, a part of the nutrients previously stored in plant biomass is swiftly returned to the soil as the biomass burns. Flush floods, on the other hand, in damaged forests can cause soil nutrients to be washed away, affecting the budding plants. Some species, on the other hand, are better suited to exploiting newly disturbed habitats by utilizing the remaining soil nutrients. Plants having the ability to grow quickly can soon take advantage of the lack of competition. Shade-tolerant trees such as pine and cherry

have been documented to swiftly fill in forest gaps left by fire, wind, or human disturbance in the Northeastern United States. They are tolerant of standing water and often predominate in floodplains where other species are wiped off on a regular basis. Forest opening, according to Bezbarua (2007), is important in the replacement of shade-tolerant plant communities with sun-loving species. Saxena found severe changes in natural forest vegetation owing to human influence in India as well (1991). Forest layers in Northeast India's Namdapha National Park have shifted dramatically as a result of forest exploitation (Nath et al., 2004). Reserves of Biosphere UNESCO's Man and Biosphere Programme launched the biosphere reserve programme in 1973-74 with the primary goal of identifying representative ecosystems that are still in pristine condition and strengthening their conservation efforts, in contrast to various categories of protected areas established to conserve forest resources under various protection acts. Biosphere reserves are protected places that reflect natural ecosystems from various biogeographically regions of the world.

Provinces that have received international recognition for their contributions to conservation, scientific knowledge, and human value in support of long-term development.

Man is an integral part of the biosphere reserve, and its preservation is predicated on the inherent fulfilment of man-nature harmony. Biosphere reserves are intended to address one of the most pressing issues: balancing biodiversity conservation, economic and social development, and the preservation of cultural values (Rai, 2000). They also constitute a means of sustaining the gene pools of species of plants, animals, and microbes in their entirety, according to Singh and Choudhury (2002), by reserving representative sections of diverse natural ecosystems around the world for conservation and research. In general, a biosphere reserve is divided into two parts: the core and the buffer zone. While the core zone is completely unaffected, the buffer zone has a variety of human interference patterns for general control of the entire area.

The first biosphere reserve was established in India in 1986. On the 14th of March, 1989, the neighbouring areas of western Assam at the foothills of the Bhutan Himalayas in the Indo-Bhutan border flanked by Sankoshriver in the west and Dhansiri river in the east were proclaimed Manas Biosphere Reserve due to its unique landscape biodiversity and cultural value. It is Assam's first biosphere reserve, the second in northeast India, and the sixth in India's total of eighteen biosphere reserves.

The research region's vegetation pattern is noted to be different, depending on climatological aspects as well as topography influences. The general vegetation pattern of India was characterized by Champion and Seth (1968), and the following types of vegetation were seen in the study region according to his classification.

a) Northern Secondary Moist Mixed Deciduous Forests (3C/C32s1)
b) Northern Secondary Moist Mixed Deciduous (1B/C1 and 2B/C1) Evergreen Forests
c) Savannah Woodland with Low Alluvium (31S1)
d) Wet Alluvial Grassland of the East (Tarai formation)
e) (4E/RS1) Riparian Fringing Forest
f) Forests of KhairSissoo (5/1s2)
g) Bamboo Brakes (Secondary) (2/2s1)
h) (1/E1) Cane Brakes

The Problem is stated

The mystic Manas Biosphere Reserve, which serves as a habitat for numerous endangered and indigenous flora and animals, has been subjected to extreme biotic pressure as a result of the region's ongoing political unrest since 1988. The biosphere reserve is also recognized as a tiger reserve, an elephant reserve, and a significant bird habitat. The elephant corridor, or historic elephant migration paths, runs through the buffer on the Indo-Bhutan bhabarterai environment, from the Buxa tiger reserve in west Bengal to the protected areas of Arunachal Pradesh. Unfortunately, the forest resources in the eastern buffer of the biosphere reserve have been severely depleted over the last 18 years as a result of heavy tree felling and collection of firewood, thatch and grasses, medicinal plants, and wildlife poaching by forest mafias taking advantage of the unstable political situation.

While research into the floristic and ecology of various plant communities as well as wildlife habitat has been ongoing or partially completed in the biosphere reserve's core and western buffers, the eastern buffer has remained untouched due to a persistent insurgency problem and a lack of law and order. Kanjilal conducted the first floristic research of the Manas Biosphere Reserve (1934-1940). Jain and Hajra (1975) identified 401 plant species from India, including angiosperms and pteridophytes the reserve's most important areas Kataki made another addition to the list of flora &Barua (1989) from the Manas biosphere reserve's core area. Some researchers reported on floral and ecological investigations in the disturbed and undisturbed forest communities of the biosphere reserve's western buffer and core zones (Biswas et al., 1991; Baruah, 1992; Hajra and Jain, 1996; Baishya, 1998; Hajra and Baishya, 2002; Bezbarua, 2007; Baruah et al., 2003).

The biosphere reserve's periphery is primarily populated by tribal people. The medicinal plants of the Manas Biosphere Reserve are mostly used by tribal people in nearby communities (Phukan et al., 2003). In the eastern buffer, a few short surveys on capped langur distribution (Bezbarua, 2008) were conducted. There is also extensive encroachment in the eastern buffer, which has resulted in forest fragmentation (Bezbarua, 2008). The endangered Asian elephant, regal Bengal tiger, and their prey, notably the capped langur, have lost substantial habitat due to environmental degradation and forest fragmentation. The forest degradation in the area resulted in two immediate environmental hazards: I a serious human-elephant conflict that resulted in elephant and human deaths and injuries, as well as crop and household damage, and (ii) a worsening of the region's current water shortage. Even the 80-year-old traditional water distribution system maintained by local villagers has been severely harmed, and people are being forced to increase their volunteer service and financial contributions in order to obtain water. It should be noted that since 1930, local inhabitants from 70 villages have been volunteering to share water from the river Pagaldiya by temporarily blocking and opening various natural and human-made drainage systems. The people claimed that overexploitation of the forest could be to blame for the recent drop in water levels. The drying of multiple deep tube-wells erected by the government in a short period of time demonstrates this. Important biodiversity attributes in the forest are feared to be eliminated before they can be studied and evaluated.

REVIEW OF LITERATURE

In different places of the world, the human Influence on the forest Association and its resources is a source of concern. A variety of reasons, including agricultural growth, industrialization, large-scale timber extraction, climate change, and urbanization, are putting pressure on forests (Geist and Lambin, 2002). Unfortunately, there have been few research on the effects of human pressure on forest characteristics in the buffer zones of the Manas Biosphere Reserve, which is part of the 34 biodiversity

hotspots throughout the world. It includes aspects of Indo-Malayan, Indo-Chinese, Sino-Malayan, and East Asian floras, as well as remnants of Gondwana (Rawat and Wikramanayake, 2001). The biosphere reserve's different forest types are home to globally threatened and endangered species such as the Royal Bengal tiger, Asian elephant, Indian Gaur, and arboreal species such as the capped languor. Unfortunately, since the late 1990s, the biosphere reserve has lost some of its biodiversity qualities due to political upheaval and rebel operations in and surrounding it. There was no previous data base to determine the level of harm to plant Association structure and habitat nature (Bezbarua, 2007). Since 1992, UNESCO has designated Manas as a world heritage site that is "in risk." The centre of the reserve, which covers 391 square kilometres and is surrounded by buffer woods, was designated as a Manas World Heritage Site in 1985 for its unique rich biodiversity and cultural value. The importance of the core zone was given to the appraisal of biodiversity and its conservation, as directed by UNESCO and many stakeholders at the government level, as well as suggestions from conservation organizations. Despite ongoing anthropogenic activity in Manas' buffer zone, relatively little field research has been conducted to assess human Influences on the ecosystem.

Plant biodiversity and ecological services, particularly at the Association level, are extremely important (Bezbarua, 2007).

There are multiple compelling reasons to investigate plant phenology, including restoration ecology, survival success, and the efficacy of various weed control stages and crops (Bezbarua, 2007). Temperature, light, moisture, soil nutrient, and genotype can all influence the transition from vegetative to reproductive growth at the start of blooming. Franklin and Bach (2006) studied intraspecific phenologicalsynchronisation in zoosporous trees from northern Australia's monsoon forests. Das and Chandra researched the angiosperm flora of Darjeeling Hill's flowering calendar (1987). Borah (1998) investigated the phenology of Kaziranga National Park's plant species, whereas Bezbarua (2007) documented the phenology of selected plants in the core zone.

Forest Association diversity is vital for biodiversity conservation in the Manas Biosphere Reserve, which is located in the foothills of the eastern Himalayas on the Indo-Bhutan border. One of the fundamental factors describing ecosystems and a key component of ecosystem processes is species diversity (Hutchinson, 1959; Schulze and Mooney, 1994; Larsson, 2001; Loreau et al., 2002; Scherer-Lorenzen et al., 2005). Schmidt (2005) addressed the reasons for variances in forest Association plant species diversity. The forest has been able to control a variety of environmental characteristics, such as managing the rates of turbulent water and diversifying the distribution of water supply. Annual floods, according to Baruah et al. (2004), had a critical influence in the diversity, distribution, and composition of wetland vegetation in Kaziranga National Park. The complex forest ecosystem was formed as the Bhabar zone in the foothills and riparian grasslands gradually evolved through time. Despite the fact that the forest types in the area are diverse,

Manas, knowing the state of the forest ecosystem is critical for managing the forest-dependent animals and their habitat (Bezbarua, 2007).

Due to enormous anthropogenic pressure, natural forest cover has been diminishing in various parts of the world. According to the Food and Agriculture Organization of the United Nations (FAO), the globe is losing 7.3 million hectors of forest per year. The global forest cover decreased from 4077 million hectors in 1990 to 3952 million hectors in 2005. (FAO, 2006). Although total forest cover increased slightly (0.65 percent) between 2001 and 2003, India lost 26,245 square kilometres of deep forest during the same time period (FSI, 2003). During the political unrest that erupted in 1989, the

woodlands of the Manas biosphere reserve were also badly destroyed. In the previous 20-25 years, several densely forested areas have been transformed to open forest, including degraded land. Natural or biotic disturbances that open the forest result in changes in plant Association dynamics at the top layer as well as the undergrowth. Kemball investigated forest dynamics in relation to logging pressure in south eastern Manitoba, Canada (2005). Canopy opening caused by forestry thinning would encourage the growth of undergrowth (Ratnayake, 2005). In forests, dwarf bamboo generated dense undergrowth, especially in open areas (Toyooka et al., 1981; Noguchi and Yoshida, 2005). The opening of the canopy caused by illegal or legal forest extraction would result in an increase in light intensity, which would modify the demography of the undergrowth population.

One of the most crucial environmental considerations is the amount of light available (Lieffers and Stadt, 1994). Storey vegetation provides excellent indications for site conditions, human Influence, and forest dynamics, making it a useful and simple instrument for measuring and evaluating biodiversity and characterising sustainable or ecosystem-based forest management (Schmidt, 2005). Selective tree species have been targeted for timber and fuel wood during logging operations. In Due to the lack of better lumber yielding trees as a result of continual deforestation, smugglers had to settle for second best timber (Bezbarua, 2007). The majority of timber-producing or non-timber-producing plants have also been utilized as fuel wood. Since a result, tree diversity and Association have been altered, as less important plants will now play a larger part in forest ecosystem dynamics. One of the key elements that influences plant communities in natural ecosystems and the state of soil nutrients is disturbance (Armesto and Pickett, 1985). Because the chemical composition of soil is largely determined by the form of plants, change in species composition is one of the major causes for determining the status and release of nutrients in soil (Mishra and Laloo, 2006).

The microclimate of the area is also affected by the openness of the forest owing to human activity, such as soil qualities, temperature, and moisture content. For natural ecosystems, the relationship between soil and vegetation has been crucial. The intimate association between the natural evolution of the plant and the development of the soil has been highlighted by Braun- Blanquet (1934). (Sharma et al., 2010a). Sharma et al. (2009a, 2009b, 2010a, 2010b, 2010c) and Gairola (2009a, 2009b, 2010a, 2010b, 2010c) recently published research on phytosociology and soil-vegetation interrelationships in distinct forest types of the Garhwal Himalayan region (2010). Sundarpandian and Swamy (2004) looked into the dynamics of soil organic matter and carbon balance in the Western Ghats' disturbed tropical forest ecosystem. Nitrogen in the soil can alter vegetation's geographical and temporal dynamics (Knap et al., 1999). Because of forest exploitation, the forest strata in Namdapha National Park have changed dramatically (Nath et al., 2004). Through litter-quality feedbacks, plant species influence the pace of nitrogen cycling within an ecosystem (Wedin and Tilman 1996, Evans et al., 2001). The difference in altitude that linked various soil organic matter and NPK availability influenced the pattern of forest plant variety (Tomer and Tripathi, 2004). In the Nokrek biosphere reserve of Meghalaya, the Influence of human activities on plant variety and soil qualities has been well studied.

Prabhu and his colleagues (2004). A mosaic of distinct vegetation types comes from the gradient of temperature and moisture, in combination with different soil conditions and altitudinal differences (Hilbig, 1995). The shade-tolerant vegetation composition was influenced by the post-disruption light environment (Kemball et al., 2005). Disturbances and environmental variability alter resource availability and supply rates, resulting in niche opportunities. It's the Influences of their proximate density on tree germination, establishment, and death (Sankaran et al., 2004). The degree of NPK in

open woodland is responsible for the spread of the weed ArgemoneMexicana (Ramakrisnan, 1991). The natural vegetation of the Indian subcontinent has been dramatically altered as a result of human intervention (Saxena, 1991).

Himalayan trees have an essential role in softening the harshness of the climate, cooling and purifying the air, safeguarding the soil, stabilising hill slopes, and storing vast quantities of soil nutrients (Sharma et al., 2010). Various attempts have been made in the region to restore and regenerate degraded forest. However, the rate of success is quite low, and it is clear where local communities have taken the lead. The natural regeneration of tree species has been studied in Shillong's subtropical broadleaved forest (Barik et al., 1992, 1996), Arunachal Pradesh's tropical wet evergreen forest (Bhuyan et al., 2001), the Kumaun Himalayan forest (Saxena and Singh, 1984), and degraded Sal forests in north-eastern Uttar Pradesh (Pandey and Shukla, 2001). Chaubey and Sharma (2013) used a holistic approach to study the dynamic of natural Shorearobusta regeneration and proposed management inputs to support it, particularly in Madhya Pradesh. Nag and Gupta (2014) investigated natural regeneration of Sal (Shorearobusta) in a dry deciduous forest in West Bengal.

Successful tree regeneration is determined by three primary factors: I the ability to begin new seedlings, (ii) the ability of seedlings and saplings to germinate, and (iii) the ability of seedlings and saplings to germinate the ability of seedlings and saplings to survive, and (iv) the ability of seedlings and saplings to grow (Good and Good, 1972). These factors can be measured to have a better idea of how a forest Association's species regenerate (Bargali et al., 2013). Several writers have forecasted the regeneration state of tree species based on their population's age and diameter structure (Khan et al., 1987; Bhuyan et al., 2003). Shorearobusta regeneration in relation to soil pH (Gupta, 1953), accumulation of leaf litter in moist forests (Champion and Seth, 1968), damage by wild animals (Sirkar, 1954), effect of grazing closure (Chaubey and Jamaluddin, 1989), shrubby growth and ground flora richness (Khan and Gupta, 1960), and the effect of standing crop (Khan and Gupta, 1960) are among the topics covered in the (Chaubey and Sharma, 2013). Srivastava (1963) investigated the phytosociology of Shorearobusta woods in Uttar Pradesh, India, with a focus on regeneration. Microclimatic differences in a naturally regenerating Shorearobusta forest in West Dehradun were explored by Dabral et al. (1980). Tree seedling establishment in a forest Association is also influenced by the size of the tree fall gap (Whitmore, 1978; Broksaw, 1985; Welden et al., 1991; Barik et al., 1992), herbivory (Kobe, 1999), low light (Kobe, 1999), low nutrient levels (Holl, 2002), and deer browsing (Whitmore, 1978; Broksaw, 1985; Welden et al., 1991 (Boerner and Brinkman, 1996). Reduced rainfall, grazing, and cow trampling have a negative Influence on the seedling population (Saxena and Singh, 1984; Yadav, 2001).

Forest tree regeneration at various levels of disturbance in various forest sites also contributed considerably to the diversity, dynamics, and function of the forest. Different workers examined forest dynamics in connection to tree species regeneration. Through structural change, succession initiation, and habitat variety development, European forests offer the driving force for forest dynamics and regeneration (Pickett and White 1985; Quine et al., 1999). In comparison to control regions or treatments without scarification, scarification considerably improved tree germination and survival (Mäkitalo, 1999; Karlsson and Orlander, 2000; Wurtz, 2001) &Zasada, 2001; Béland et al., 2003), implying that it is a beneficial approach for forest regeneration and restoration. Surface soil compaction by machinery is thought to enhance ground hardness (Buckley et al., 2003) and reduce growth, most likely through inhibiting root extension (Miyoshi, 1978). Scarification intensity may have a substantial detrimental

Influence by removing numerous dispersed and buried seeds from the site (Hayashida and Koyama, 1990).

Assam is one of the major states in North East India, and it serves as a gateway to the region's other highland states. The landscape's diversity in topography, valleys, and climate allow the world's most endangered flora to thrive. The rich flora of the forest has piqued the interest of botanists since the early nineteenth century, when the renowned Assam tea delegation of N. Wallich, W. Griffith, and J. McClelland visited (1823). Robinson (1841) offered the region's floristic description. The Flora of Assam (Kanjilal, 1934-40) was the start of Indian botanist Kanjilal's botanical investigations (Haridason, 2003). A number of botanists contributed to the study of the state's flora (Rao and Rabha, 1966; Kar and Panigrahi, 1963; Kataki and Panigrahi, 1964; Jain and Hajra, 1975; Rao, 1974). Kanjilal conducted the first floristic research of the Manas Biosphere Reserve (1934-1940). From the reserve's main areas, Jain and Hajra (1975) identified 401 plant species, including angiosperms and pteridophytes. Kataki and Barua (1989) added to the list of plants by collecting plants from the Manas biosphere reserve's core area. Floristic and ecological investigations in disturbed and undisturbed forest communities of the biosphere reserve's western buffer and core zones were also published in the literature by various researchers (Biswas et al., 1991; Baruah, 1992; Hajra and Jain, 1996; Baishya, 1998; Hajra and Baishya, 2002, Baruah et al., 2003, Bezbarua, 2007). The medicinal plants of the Manas biosphere reserve are mostly used by tribal people in nearby communities (Phukan et al., 2003). There are also several along the Indo-Bhutan border.

Objectives the study

The study's ultimate goal is to assess the state of the forest Association structure in Manas Biosphere Reserve's eastern buffer. The following are the specific objectives:

1. To describe the various forest communities found in Manas Biosphere Reserve's eastern boundary.
2. To look at the distribution of forest communities in relation to soil qualities.
3. To determine how anthropogenic activities have changed the forest Association structure.
4. To assess the efficacy of possible forest restoration initiatives spearheaded by local NGOs and tribal people.

Hypothesis

Here are some working hypotheses to consider.

1. The forest cover has shrunk as a result of overexploitation, resulting in increased openness in forest regions. The openness of the woodlands has an Influence on the area's edaphic environment and microclimate, resulting in a loss of ecosystem services and biodiversity.
2. In different topographical (altitude) variations, changes in soil qualities are related to varied land uses and forest density.
3. Anthropogenic disturbances and forest degradation cause significant changes in canopy cover and species diversity.
4. Local people's participation in conservation and NGOs' conservation actions can assist restore forests and limit environmental damage.

Methodology

A base map of the entire study area was created from the start using remote sensing data and Survey of India topographic maps. It was used to conduct a field survey for spot verification using a

portable GPS. A working plan for data collection on forest Association structure, different levels of human disturbance on forests, soil sample collection, and data related to forest restoration work initiated by local communities and NGO workers was prepared based on the field survey, which covered all significant features of different study sites. In Chapter III, the methodology is described in detail, including base map construction, ecological data collecting and species identification, soil sample collection and soil nutrient analysis, and so on.

Importance of research

Human Influence on forest ecosystems is now a global issue, and its consequences pose a significant threat to biodiversity and humanity. The continuous loss of forest cover as a result of agricultural expansion, industrialization, large-scale timber extraction, urbanization, and local people's overexploitation of non-timber forest products poses a serious problem of biodiversity loss, as well as increased global warming and climate change. Floristic and biological research of the forest Association in the western buffer and core zone are ongoing or partially completed, while the eastern half of the Manas Biosphere Reserve has remained unaltered despite ongoing forest extraction posing a serious environmental threat. As a result, it is critical to assess the Influence of human involvement on the forest Association and its environment in the eastern buffer zone as soon as possible. The database will undoubtedly assist the state government's forest department and other stakeholders in developing the biosphere reserve's necessary action plan or management plan for environmental and forest Association conservation, resulting in the reduction of human-elephant conflict, improved water management, and biodiversity conservation. The thesis should be organized in a certain way.

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