

**Impact of anthropogenic pressures on moist deciduous forest of**

**Thithimathi, Kodagu**

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**Abstract**

The present investigation on the “Impact of anthropogenic pressures on moist deciduous forest of Thithimathi, Kodagu” was undertaken to study the impact of human interference on species composition, forest structure and regeneration pattern in six hamlets that are proximal and distant to the settlements of moist deciduous forest during 2005-06. The results of the study revealed the existence of small differences in species richness, Shannon’s diversity index, basal area and density among the hamlets. This could be due to the similarities in vegetation type for all the hamlets. On the contrary, the species richness, Shannon’s diversity index, basal area and density were less in the areas close to the settlement within hamlet compared to the areas which are away from the settlement. The average disturbance index was adopted and the disturbance parameters were classified into major (canopy opening, weeds, cut stump and grazing), moderate (lopping, wild animals dung, footpath and domestic animals dung) and minor (fire, litter collection and soil removal). The hamlets 1 and 5 showed normal girth distribution, unlike the other hamlets which showed irregular distribution. This could be due to the amount of cumulative disturbance. However, the regeneration classes showed regular and normal distribution. The results of socioeconomic survey revealed that people mainly depend on forest for fuelwood, fodders and NTFPs. Due to the anthropogenic pressures weeds like *Lantana camara and Chromolaena odorata* has occupied most of the understory area. The study indicates that the moist deciduous forest of Thithimathi is under pressure from settlements surrounding them. There is an urgent need to provide better protection and management by involving the local communities.

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**VI. SUMMARY**

**The results obtained in the present study entitled “Impact of anthropogenic pressures on moist deciduous forest of Thithimathi, Kodagu”** **are summarized in this chapter.**

* The forest far from the settlements recorded high species richness and diversity compared to the hamlets closer to the forest area. But within the hamlets, the areas proximal to the settlements showed less richness and diversity compared to the distant location.
* Due to the variation of average disturbance, the numbers of individual trees were higher in Hamlet 5 and least in hamlet 4. The proximal area to the settlements showed less number of trees and there was gradual increase in the number of trees when we move into the forest since cumulative disturbance was lower.
* Since hamlet 5 was dominated by *Tectona grandis* plantation, higher number of trees as well as density was recorded. Hamlet 2 had lowest density and basal area. Similarly, the density and the basal area were less in the proximal areas to the settlements and both increased as we go deep into the forest.
* *Vitex altissima* tops the list of dominant species in the first hamlet. In third and fourth hamlet the dominant species were *Lagerstroemia microcarpa* and *Terminalia crenulata.* However *Tectona grandis* was the dominant in second, fifth and sixth hamlets. *Tectona grandis* was also dominant in third and fourth hamlets and *Eucalyptus spp* was one of the dominant species in the fifth hamlet.
* The average disturbance value index was adopted to classify the disturbance parameters in different Hamlets as well as proximal and distant areas to the settlements. The average disturbance value index clusters the disturbance parameters into three categories. Major disturbances such as canopy opening, weeds, cut stumps and grazing.
* The moderate disturbances were lopping, wild animal’s dung, footpath occurrence and domestic animal’s dung. The minor disturbances were fire, litter collection and soil removal.
* Girth class distribution showed only 1 and 5 hamlets had a typical reverse-J shaped curve indicating the normal forest structures. All other hamlets had irregular patterns of distributions of stems indicating a high level of disturbance.
* Regeneration studies indicated a richness of 45 species in the six hamlets. The third Hamlet close to the settlement showed high species richness and diversity value. Whereas, fifth hamlet showed less species richness as well as Shannon’s diversity index. Similarly, there were drastic increases in both species richness and Shannon’s diversity index from proximal to distant areas from the settlement areas.
* The anthropogenic disturbance had an impact on the total number of seedlings. However, the Hamlet 6 had more number of individuals as well as density per hectare. Whereas, fifth Hamlet had least number of seedlings and density. On the other hand, proximal area had less number of seedlings and density. Whereas, the distant area from the settlements had more number and density of seedlings.
* The relative density and relative frequency of regenerated species showed that first and third hamlets were dominated by *Cassia fistula*. The hamlets 2 and 6 were dominated by *Melia dubia*. Whereas, *Grewia tiliaefolia* was dominant in Hamlets 4 and 5.
* Cumulative disturbance index was computed considering the average value of all disturbance parameters. The increasing level of CDI resulted in decreased regeneration density of the population. The trend line of CDI showed a higher density of regeneration in low and medium level of CDI and decreased drastically with higher CDI.
* In all Hamlets, the distribution of regeneration classes followed the reverse J- shaped curve. The first Hamlet (distant) showed that there were similarities in I and II classes. Whereas, the other Hamlets had higher proportion of individuals in class I and this was attributed to the high disturbance in the proximal Hamlets to the forest.
* One of the expected consequences of the anthropogenic disturbance is the higher proportion of invasive herbs and shrubs. Herbs had more density than the shrubs for the moist deciduous vegetation in six Hamlets. Thus, all the six hamlets were dominated by the Grass spp with different percentage. The abundance of shrubs in all the six Hamlets gives an indication about the kind of disturbance and different invasive species such as *Lantana* *camara and Chromolaena odorata .* Due to the invasive herbs and shrubs, the species composition of forest was altered and tree density was very low compared to the density of herbs and shrubs.
* Socioeconomic survey was undertaken to know the impact of anthropogenic factors on moist deciduous forest. The results indicate that daily wages earned was around Rs. 80 / family and was the main source of income. But they were dependent on the forest to meet their needs. Livestock rearing in all settlements was common.The common animals reared were cattle, goats and sheep. There was huge dependency on the forest as source of fodder (99 % ) and fuelwood (100 %) collection from the forests. Most of the biomass removed from the forest was in the form of twigs, poles and fallen branches. The NTFPs collected were *Mangifera indica,* *Emblica officinalis*, *Cordia dichotoma* and *Zizyphus jujube.*
* It is inferred that the forests in and around Thithimathi is highly affected by the settlements around due to the biotic interferences. Though the intensity of impact varied with settlements, at the beginning and away from the individual settlements the forests had been altered with respect to their structure and regeneration.

There is an urgent need to take up appropriate management action to ensure that the forests are protected. If the current pressures are not reduced, it may result in the increased man animal conflict which is very common around this forest.

**I. INTRODUCTION**

Deforestation is a global phenomenon as a result there is a loss of about 15 million hectares of forests every year. Deforestation over the period 1980-1990 reached 8.2 per cent of total forest area in Asia, 6.1 per cent in Latin America and 4.8 per cent in Africa. Deforestation mainly takes place in developing countries, particularly in tropical areas, due to the population pressure. With increased population, there would be more families in search of land for agriculture or looking for fuelwood or timber. Thus, more deforestation and higher pressures to degrade forests makes intuitive sense. Larger numbers of tribal population would also mean that more labourers would be available, forcing wages down and making activities that need labour, which result in larger pressures on the forest ( Arnoldo, 2000)**.**

It is estimated that at the current rate of deforestation and degradation, about 20 per cent of the tropical forest by the year 2020 and more than 50 per cent of the same by the year 2024 is likely to be lost (Wilson, 1989).The last quarter of the 20th century had witnessed an alarming rate of deforestation of the tropical forests of the world and its impact on their biodiversity. The land area constitute only seven per cent of the earth, tropical forests contain over 50 per cent of the earth’s biodiversity. Almost all the tropical forests lie in the economically underdeveloped and densely populated countries of the world; consequently the forests in these regions face extreme pressures due to increasing demands on the forest resources. It’s widely recognised that, continuing deforestation of the tropical forest is expected to lead to profound global consequences, including changes in the climatological patterns and the distribution of biodiversity (Ravikanth *et al.*, 2000).

India has two of the world’s biodiversity hot spots in the forests of the Western Ghats and in the Eastern Himalayas. Further, it is considered as one of the 12 megabiodiversity centres in the world. This richness of the biota is undermined by the population that the forests have to sustain. The population makes tremendous pressure in the forest area for agriculture, plantation, and perennial crops. With the current forest holding, in India, there is approximately only 0.08 ha of forest area per person compared to the world average of about 0.8 ha per person.

The present condition and the distribution of forest vegetation has been greatly affected by living organism, both plant and animals. Thus, the vegetation of a place is the result of not only the climate, soil and topography of the place but, also the community life of living organism. The biotic factors have profound influence on the vegetation not only by their direct interaction but, also through their effect on abiotic factors, and therefore determine the nature of vegetation that can exist in the place (Khanna, 1996). To estimate the impact of human interference, the hypothesis which is assumed that forest sites proximal to human settlements are relatively more disturbed than sites distant from the settlements. This assumption depends on the fact that the cost of harvesting forest resources increases with distance from the settlement area (Uma Shankar *et al*., 2003).

Western Ghats of peninsular India, a green lung between Bay of Bengal and Arabian sea plays a vital role in conserving biodiversity in southern India. Nilgiri Biosphere Reserve (NBR) in Western Ghats is a major floristic region of southern India. The most important factors affecting the natural regeneration in the forest and cause its degradation are fire and indiscriminate grazing. The biodiversity of NBR started getting deteriorated from 1832 onwards with the impact of the human population and the introduction of exotic species. Since 1949 up to 1992, 92.3 per cent area decreased under the shola forest, and 100 per cent decrease in the area under grassland (Anon, 2002a).

The earlier studies carried out elsewhere have shown that the anthropogenic pressures exerted profound impact on forest ecosystem Ajai Misra (2001) reported that in moist deciduous forests at Thithimathi, the regeneration was unsatisfactory and seedling density was observed to be very low. Further the uncontrolled grazing has caused loss of regeneration and degradation of forests.

UmaShankar *et al.* (1994)reported that there is immense pressure on India’s forests due to the rise in human as well as cattle population. Human population constitutes about 18 per cent of the world’s population and 15 per cent of the world’s livestock, but consists of only 2 per cent of the geographical area, 1 per cent of forest area and 0.5 per cent of pasture lands. The Non-Timber Forest product species constitute an important source of livelihoods for rural people in most human dominated forest landscapes in tropical countries. However, this human dependence on forest for livelihoods results in reducing the species productivity or decline in ecosystem function Uma Shankar *et al.* (2004).

The anthropogenic pressure on moist deciduous forest of Thithimathi is exploited by different means such as fuelwood collection, timbers, NTFP, grazing, and fire. All these are considered as the most destructive factors on the forest. With this background and with the aim of providing basic input to develop management strategies for conservation of this unique habitat, the present investigation was carried out with the following objectives:

1. To assess the impact of anthropogenic interference on the changes in the forest stand, structure and diversity.
2. To assess the impact of anthropogenic interference on the regeneration status
3. Developing strategies for sustainable management.



