

Deforestation in Western Ghats: A Study of Konkan Region of Maharashtra

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Abstract

The Western Ghats harbour the most extensive tropical forests in the Indian Peninsula. Geological stability over a long period of time, proximity to the equator, high rainfall have contributed to exceptional biodiversity, ecosystem diversity and endemism. The Western Ghats harbour a wide range of forest biotic communities range from sub-temperate montane wet grasslands and shola forests to dry deciduous forests and xerophytes scrub.

In Western Ghats forest ecosystem and its dynamics have been adversely changing since the colonial maritime trade interests from the 16th century A.D. onwards, when the process of replacement of natural vegetation started in this region. At present deforestation is primarily carried out to satisfy the growing population in terms of space for living, agriculture, transport and related activities. Today conflicts arise between efforts directed towards environmental protection and projects designed towards economic development. Rules and regulations are in place, but strict implementation is lacking due to several reasons. Massive deforestation is carried out initially on private lands, which later exerts pressure on government forests that are better protected.

The present study focuses on Konkan region of the Western Ghats. Western Ghats occupies 12 districts in the state Maharashtra. Out of these districts only four districts those are influenced by Metropolitan city Mumbai are considered for study. These districts are Thane, Raigad, Ratnagiri and Sindhudurg. As per 2011 census there are 47 talukas in these districts and covers area more than 30,000 kms².

An analysis of altitude-wise forest cover is made from Survey of India maps and satellite imagery based land use maps for the period 1970 to 2006. An analysis is carried with the help of Arc GIS Software to get accurate data. A *taluka* wise and altitude wise analysis is carried to understand process of deforestation. An attempt is also made to evaluate various causes of deforestation in this region. The study explores traditional and modern methods applied to forest conservation with the help of primary and secondary data along with a number of field visits.

1.1. Introduction:

Konkan region of the state of Maharashtra is ecologically suited to support a rich forest cover; comprising of mainly Tropical Dry Deciduous to Evergreen forests (Almeida, 1990). However the forest ecosystem and its dynamics have been adversely changing here. With the colonial maritime trade interests from the 16th century A.D. onwards, the process of replacement of natural vegetation started in this region (Srivastava, 1995). At present deforestation is primarily to satisfy the growing population in terms of space for living, agriculture, transport and related activities. Today conflicts arise between efforts directed towards environmental protection and projects designed towards economic

development. Rules and regulations are in place, but strict implementation is lacking due to several reasons. Massive deforestation is carried out initially on private lands, which later exerts pressure on government forests that are better protected. This hill region is losing its forest cover and big threat is posed to the biodiversity (Gadgil -2011).

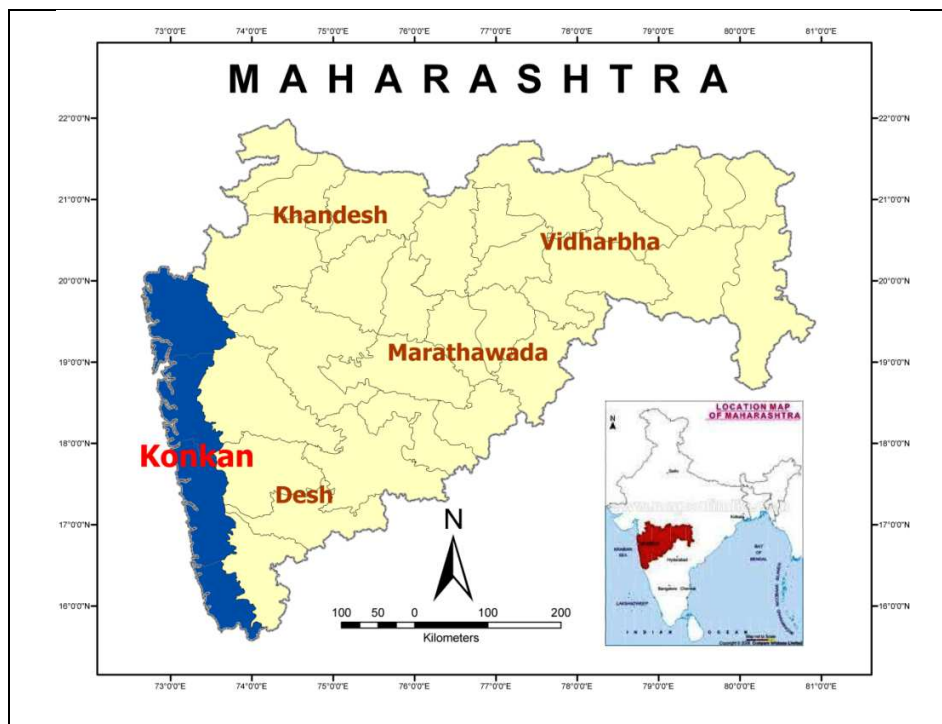
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1.2. Study Area:

The Western Ghats occupies 12 districts of the state Maharashtra. Four districts those are highly influenced by Metropolitan city Mumbai are considered for the present study. These districts are Thane, Raigad, Ratnagiri and Sindhudurg. As per 2011 census there are 47 *talukas* in these districts. This coastal hilly region is occupying an area of 30125 kms².

The study region extends from 15^o42'N.to20^o15'N, stretching approximately over a distance of 500 kms with a variable width of 40-60 kms. This coastal hilly plain is a littoral land characterized by ridges running parallel to the coast in the North and transverse in the South. It is crossed by numerous small rivers flowing to the west (Map - 1.1). Average annual rainfall in Konkan is 261 cms and it occurs in 89 days of year mainly in monsoon months.

Map – 1: Location of Study Area



1.3. Methodology:

An analysis of altitude-wise forest cover is made from SOI maps (1970), satellite imagery based land use maps of Maharashtra Remote Sensing Centre (1988-89) and National Remote Sensing Centre maps on theme *Bhoosampada* (2005-06) maps. All these maps give reasonably good account of forest cover of last 45 years. Survey of India toposheets and satellite imagery based land use maps are analyzed with the help of GIS technique for this purpose. An attempt is also made to evaluate various causes of deforestation in this region. The study explores traditional and modern methods applied to forest conservation with the help of primary and secondary data along with a number of field visits.

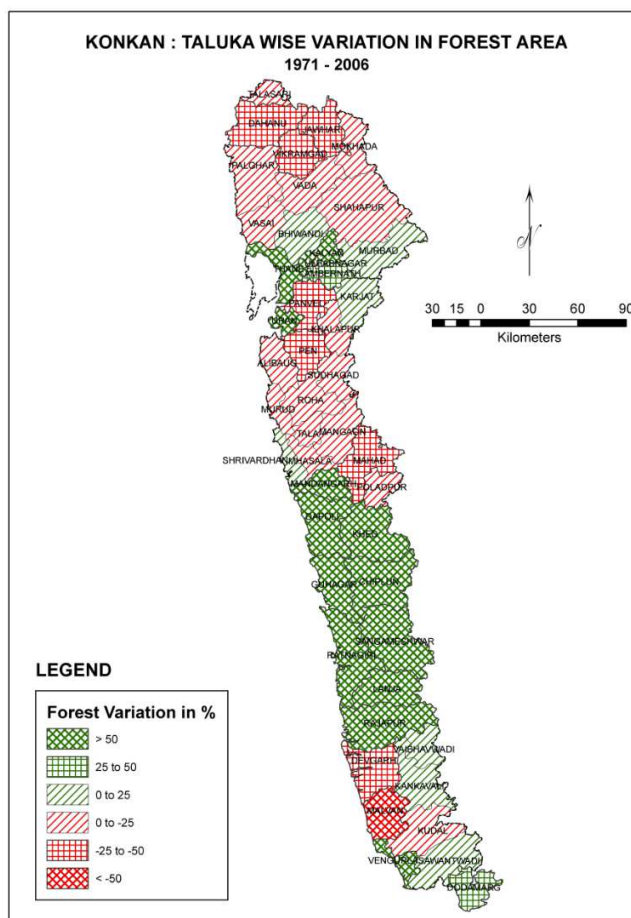
1.4. Deforestation in Konkan:

Two types of analysis had been carried out at *taluka* level to understand changes in forest cover.

A) Taluka level changes in forest cover from 1971 to 2006:

The map shows that out of total 47 talukas 22 talukas have shown increase in forest cover whereas 24 talukas shown decline in forest cover in study period. In one taluka there is no change in forest cover.

Map -2: Taluka Wise Changes in Forest Cover 1971-2006



Source: Dongre P.R. 2012

Surprisingly urban talukas such as Thane, Kalyan and Uran had shown substantial increase in forest cover along with all talukas of Ratnagiri district. Minor increase in forest cover had been also observed in Bhiwandi, Murbad, Karjat, Shrivardhan, Vaibhavwadi, Kankavali and Sawantwaditalukas. Increases in forest cover in most of these talukas except Ratnagiri are due afforestation programmes, formation of protected areas and control on deforestations. In Ratnagiri substantial increase in forest cover is due to non-reporting of forest in the maps of 1970s, ban on charcoal making and shifting cultivation.

Substantial decline in forest cover had been observed in Malvan, Dahanu, Jawhar, Vikramgad, Panvel, Pen, Mahad and Devgadtalukas. In most of these talukas decline in forest is mainly due to urbanization, expansions of agricultural land, development of transport and upcoming developmental projects.

B) Changes in forest cover with reference to altitude at district level:

From the demographic study of Konkan it has been observed that pressures of human activities are increasing in the region. Metropolitan city Mumbai plays an important role in land-use changes here. Most of the human activities initially start along the coast and then move towards the higher altitudes. As a result natural resources first get depleted in lower altitude and then in uplands. Konkan which is a coastal plain is not an exception to this.

Maximum area of Konkan lies in the zone between 10 mts to 300 mts. In this zone there was maximum degradation of forest in Thane, Raigad and Sindhudurg districts. Only Ratnagiri district shows substantial increase in forest cover in all the zones, whereas Raigad shows decline in forest in all the zones. Altitudinal zone wise details of forests are given below:

1. Zone between 0 to 10 meters: The land in between mean sea level and 10 meters contour is generally coastal region with inter-tidal zone, mudflats, marshy land and sea cliffs. This zone covers 7.5% land of the Konkan. In this zone forest cover had increased by 21 kms² in the study period. Except Raigad, in all the other districts, there is marginal increase in the natural vegetation cover. This may be due to the efforts taken by government and NGOs towards conservation of mangroves. Factors like developments of ports, reclamation in Navi Mumbai and upcoming international airport in this zone may be responsible for continued loss of forest in Raigad.

2. Zone between 10 to 150 meters: In Konkan 62% land area falls in this altitude zone. Except Ratnagiri district, there was substantial decline in forest cover in this zone. Maximum decline in forest cover in this zone was seen in Thane (224 kms²) followed by Sindhudurg and Raigad. Thane is adjoining district of Mumbai and very well connected with it by railways and roadways. Rapid expansion of urban population of Mumbai in low-lying areas is main cause of deforestation.

In Ratnagiri district forest in this zone had increased by 336 kms². This increase in forest cover is mainly due to reporting of vegetation in district after 2001. Overall there was loss of 173 kms² in this zone. The main causes behind decline in forest cover are pressures due to human activities, as this is the most accessible zone. This zone has maximum population density, maximum number of settlements, agricultural land and quite good transport network.

3. Zone between 150 to 300 meters: Around 18 % land in Konkan falls in this altitudinal zone. Again except Ratnagiri in all other districts, there was substantial decline in forest

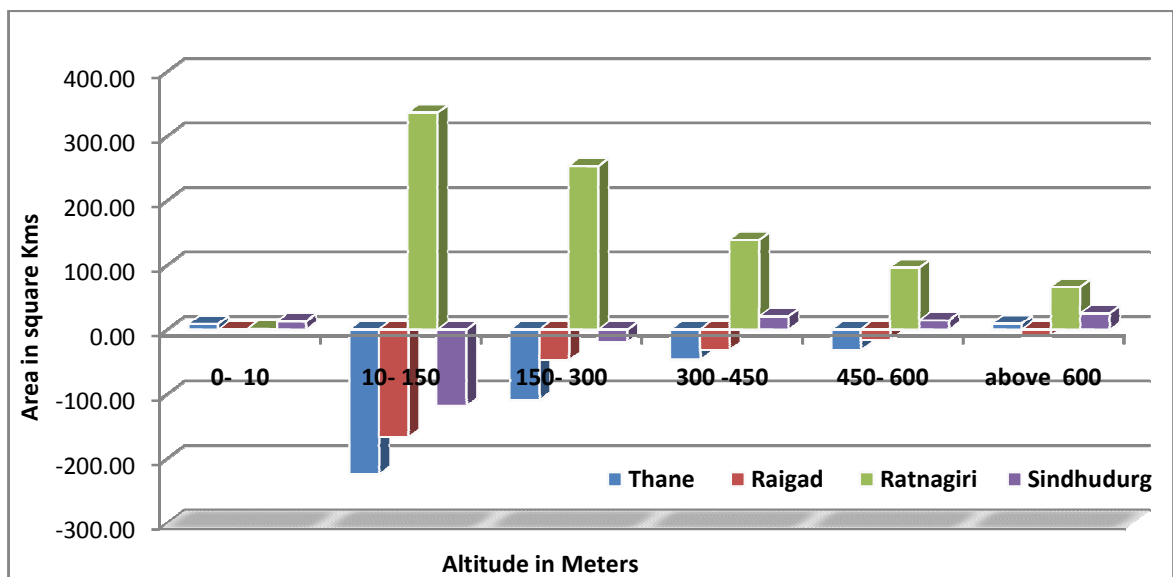
cover in this zone. Maximum decline in forest cover in this zone was seen in Thane (109 kms²) followed by Sindhudurg and Raigad. In Ratnagiri district forests of this zone increased by 253 kms². Overall there was gain of 78 kms² of forest in this zone.

4. Zone between 300 to 450 meters: In Konkan 7% land area falls in this altitude zone. Except Ratnagiri and Sindhudurg districts, there was substantial decline in forest cover in this zone. Maximum decline was observed in Thane (46 kms²) followed by Raigad. In Ratnagiri district forest of this zone had increased by 139 kms² and in Sindhudurg by 20 kms². Overall there was gain of 82 kms² of forest in this zone. The main cause behind decline in forest cover in Thane and Raigad is due to increasing human population and pressure on plateau with the development of transport. In Ratnagiri and Sindhudurg there is gain in forest cover due to recent plantations and conservation measures. In these two districts a very limited population lives in this zone.

5. Zone between 450 to 600 meters: Only 3% land area falls in this altitudinal zone in Konkan. Thane and Raigad districts show substantial decline in forest cover in this zone. Maximum decline in forest cover in this zone was observed in Thane (32 kms²) followed by Raigad (16 kms²). In Ratnagiri district forest in this zone had increased by 96 kms² and in Sindhudurg by 14 kms². Overall there was gain of 63 kms² in this zone and it was mainly due to forest cover recording in Ratnagiri district. Increasing accessibility due to improvement in transport network in Northern Konkan resulted in loss of forests in this zone.

6. Zone above 600 meters: Just 2% land area falls in this altitude zone in Konkan. Again except Ratnagiri in all other districts, there was substantial decline in forest cover in this zone. Maximum decline in forest cover in this zone was observed in Thane (9 kms²) followed by Raigad (9 kms²). In Ratnagiri district forest of this zone had increased by 66 kms² and in Sindhudurg by 25 kms². Overall there was gain of 91 kms² in this zone in Konkan.

Fig.-1. Konkan - Altitude Wise Changes in the Forest Cover (1970 – 2006)



Source: Dongre P.R. 2012

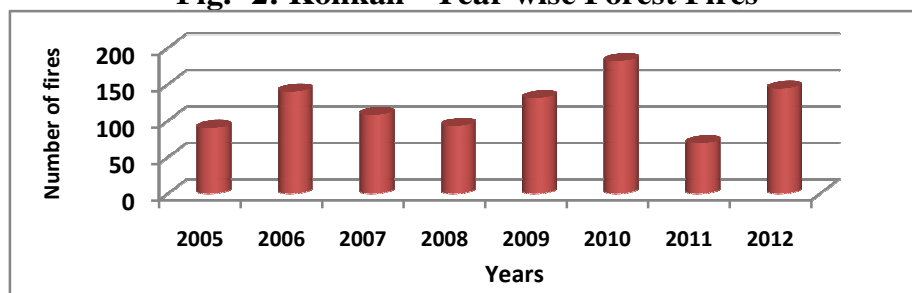
1.5. Causes of Deforestation:

1. Harvesting of products from the forest: Timber and firewood constitute major forest produce in Konkan. Important timber yielding trees of Konkan region are Teak, *Khair*, *Ain*, *Hed*, *Kalam*, *Bonda*, *Shisav*, *Tivas*, *Kakad*, *Bibala*, *Asana* and *Beheda*. The important items of minor forest produce for Konkan are *Tenduleaves*, *Apta* leaves, *Grass*, *Hirda*, *Mohati* fruits, *Mohati* flowers, *Karvi*, Gum, medicinal plants etc. In year 2009-10 Thane Circle sold timber of Rs. 140 lakhs, fire wood of Rs.56 lakhs and minor forest products of Rs.44 lakhs (Forest Department, 2011).

2. Illegal felling of trees: The available records indicate that incidences of illicit cutting of trees are increasing in Konkan. Around 3494 cases of illicit tree felling and transport of wood registered in Konkan in year 2009-10. More than 70% cases of illicit tree felling remains undetected and the offender does not receive any punishment. This is a serious concern and needs to be attended to as early as possible. Some of the causes behind illicit cutting are the increasing prices of timber, poverty of forest dwellers, nexus between forest mafia and forest staff and delay in punishments (Forest Department, 2010).

3. Forest fires: Forest fires constitute a major threat to the forests as the vegetation of the study region is mostly dry and deciduous. These types of forests are prone to fires in the dry season that starts in February and ends in June. In Konkan, nearly all the forest fires are considered incendiary in origin. The important man-made causes of fire are - conversion of forestland to agricultural land, making land suitable for grazing, easy collection of minor forest products, hunting during dry season, conflicts over land rights, negligence by commuters and others. As per the records of FSI fire incidences increased in Konkan from 2005 to 2010.

Fig. -2: Konkan - Year wise Forest Fires



Source: Forest Survey of India, 2012

4. Encroachment on forestland: Encroachments are a major cause for the loss of forests in Konkan. Several people are responsible for this – land mafia to urban citizens to poor rural families. Many of these encroachments are done for the purpose of cultivation, animal grazing, settlements and other activities. Maximum number of encroachments takes place around urban centers and in areas of high tribal population concentration. More than 43,000 encroachments were reported in Konkan region on forest land up to the year 2010. Total area under encroachment is more than 3886 ha.

5. Diversion of forest land for non-forestry uses: Forest Conservation Act 1980 is a Central Act, envisaging restricting the use of forest land for non-forestry purpose. It is a regulatory Act and states that the forest land cannot be used for non-forestry purposes, without prior approval from the Government of India. It is applicable to all forest land, irrespective of its ownership. In Konkan there were a total of 278 cases sanctioned by Ministry of Environment and Forest and diverted more than 9090 ha of forest land to non-forestry purposes in period 1981-2008.

6. Expansion of urban settlements: Expansion of urban settlements in the urban-rural fringe leads to deforestation or large scale felling of trees. In this zone the trees are cut to cater to the timber needs of rapidly growing population. Rapid urbanization is taking place in Thane and Raigad districts due to the influence of Metropolitan Mumbai. In Thane district the number of urban centers increased from 23 in 1991 to 35 in 2001. In this period the area under urban settlements increased from 727 Kms² to 824 kms². In the same period in Raigad district urban centers increased from 19 to 26 and land under urban settlement increased from 163 kms² to 195 kms². Very rapid urbanization and land use changes have been observed in Mumbai Metropolitan Region in the last two decades. In the last 20 years, built-up area increased by more than 200 %, whereas industrial area increased by 38%. About 40% decline in forest land is observed in Mumbai Metropolitan Region, mainly in sub-regions like Thane, Vasai, Kalyan, Uran, Khalapur and Panvel. Here large areas of private forest have been converted in to built-up areas.

7. Infrastructure development: Infrastructure has an impact on physical and socio-cultural aspects and has strong links with environmental sustainability. Each sector of infrastructure generates positive and negative impacts on the natural environment. Over all, in year 2011, total area affected by dams was more than 26,000 ha which includes large tracts of forest land. Similarly large scale deforestation is also taking place due expansions of roads, constructions of canals, ports, power stations etc.

8. Mining and quarries in Konkan: Mining also is a cause of deforestation, usually in areas immediately adjacent to the mine. There can, however, be significant impacts from sudden increase in population in and around mining settlements and from the effects of mining such as flooding and damage from mine tailings. Mining activities have caused chemical pollution of rivers, while growth of mining settlements has directly contributed to forest clearance as well as indirectly contributed to clearance for fuel wood. As per District Socio-economic abstracts there are more than 1450 mines and quarries are in operation in the Konkan region.

9. Fuel wood: In Konkan, wood is the main fuel for cooking food and for providing heat. In Konkan, up to 1985, large forest areas were cut to produce charcoal for local consumption as well as for needs of Mumbai and Pune markets. Today charcoal is not the main source of fuel in Konkan but wood remains an important cooking medium in rural areas.

In Konkan, 55.85% households were using firewood as their main source of fuel for cooking. The use of firewood is above 75% in rural areas and less than 50% in urban areas (DCH, 2001). The dependency on fire wood as well as availability of firewood is more in rural areas of Ratnagiri and Sindhudurg districts. Firooza Pavri made a study in Raigad district, and found that on an average 135 kg fuel wood is used by a household in

a single week. This means that, in Konkan, people are burning about 20, 57, 24,340 Kg of fuel wood in a week. Most of this wood is either collected from trees around the fields or from the forests.

1.6. Corrective Measures:

Forests being living resources, the flora and fauna continually undergo subtle changes. In total absence of biotic factors, forests can regenerate on their own. However, in the present scenario of forests being subjected to excessive biotic pressures forests cannot regenerate on their own. Hence, supplementing regeneration through artificial means by seed sowing, planting, etc. is necessary. In the region plantations are carried out by Forest Department, Social Forestry Department, Forest Development Corporation, Maharashtra Industrial Development Corporation and other organisations. But still the efforts are not adequate and large numbers of land patches are barren.

Sacred natural sites are almost certainly the world's oldest form of habitat protection. Faiths have a profound impact on attitudes to protection of the natural world through their philosophy, teachings, investment choices, approaches to the land they control, and religious-based management systems (Dudley and others, 2009). As per the assessment carried out by Bombay Natural History Society in 1999, there are more than 2290 sacred groves in Konkan. **1.7. Conclusion:**

Land in Konkan was well covered by forest in the past. Large scale deforestation had been carried out during the British period. The colonial government also carried out large scale teak plantation by clear felling the natural vegetation. After independence there was massive deforestation to expand agricultural fields and to make charcoal for the urban centers. Government of India has formed various forest conservation Policies and forest protection Acts to protect existing forest. But improper implementation of these policies and lack of skilled-devoted staff are factors unable protect the forests. Furthermore, ever increasing demand for wood and land poses continued threat to the forest ecosystem. Efforts made through plantations, afforestation and regenerations are not sufficient to increase forest cover of the region up to 33% which has been targeted by policy makers. Public awareness, active involvement of people, motivated forest staff, active support from state government and local political leaders are the need of the hour in order to conserve existing forest and to expand the forest cover in Konkan.

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