1. INTRODUCTION AND BACKGROUND

1.1 Introduction

1.1.1 In ancient times, before development of agriculture and animal husbandry, man used to satisfy his sustenance needs through forest and wild animals wandering in the forests. His lifestyle and culture was closely associated with forests. He utilized natural resources for meeting his genuine needs. He used to worship nature’s support elements-water, soil, air, fire (energy), sky (space) and natural entities such as trees, wild animals, rivers, etc as gods and goddesses. He considered his moral duty to conserve these resources and could not even imagine, if these resources can be misused.

1.1.2 Population explosion and man made activities arising out of human need and greed are mainly responsible for the plight of the natural resources. Along with the pace of development, human requirements increased many fold and he started over-exploitation of natural resources. With the result, natural resources including forests started degrading with the passage of time.

1.1.3 Forest is a common property resource, which is unevenly distributed over the geographical space. Hence, the costs and benefits of it are not equitably appropriated amongst all sections of the society. Socially and economically under-privileged people, mostly tribals heavily depend on it.

1.1.4 The forest land is not utilized as per Land Capability Classification. Consequently, forest land resource users do not get desired financial returns, on one hand and resource depletes on the other, resulting in reduction of production further. It is, therefore, essential that this vicious circle should be broken through appropriate land use practices.

1.1.5 The forests, on one side, provide environmental benefits to global community, then on the other side, meet the subsistence needs of the forest dependent local community. Therefore, Forest management has always witnessed a tug of war between environmental, ecological & commercial aspect of it to serve the interests of global community and socio-economic justice aspect of it to meet subsistence needs of the local community dependent on forests. The Forest Department in the name of scientific management of forests has laid more emphasis on the environmental, ecological and commercial aspect while rural development agencies responsible for socio-economic development have been harping upon using the forest resource for the benefit of local community. In recent past, this war has been further intensified as Judiciary Wing of the Government has joined for former aspect while Legislative Wing of the Government for latter.
This study aims at in-depth observations, on the efforts of forest conservation and development, that are made in the past and are under-way at present and then to suggest suitable steps by which ecological balance is restored and simultaneously, sustenance needs of forest dwellers are met with in perpetuity.

1.2 Background

The forest is 'an area set aside for the production of timber and other forest produce, or maintained under woody vegetation for certain indirect benefits which it provides, e.g. climate or protective' and Forest Management is 'the practical application of the scientific, technical and economic principles of forestry (BCFT)'.

1.2.1 Functions of Forests

Forests perform environmental and ecological functions on one side while play an important role in providing socio-economic justice to the people living in and around forests. Thus, forests are very useful in providing intangible benefits such as maintenance of ecological balance and attainment of environmental stability and also in providing tangible benefits such as timber, firewood, non-timber forest produce, bamboo etc. to the society.

The services of ecological systems and the natural stocks that produce them are critical to the functioning of the earth’s life support system. They contribute to human welfare, both directly and indirectly, and therefore represent part of the total economic value of the planet. We have estimated the current economic value of 17 ecosystem services for 16 biomes, based on published studies and a few original calculations. For entire biosphere, the value (most of which is outside the market) is estimated to be in the range of US$ 16-54 trillion. Forests, being main component of ecosystem, provide goods and services and exhibit functions as are detailed in annexure-1.1 (Contanza R, 1997).

1.2.2 Importance of Forests

Importance of National Resources Management emanates from the fact that the community suffers most whenever degradation of environment takes place, apart from loss of the national wealth. As experts have time and again opined, many agro-climatic zones are facing severe shortage of water leading to low agricultural output, unemployment and migration that in turn increase stress on the forest resources for fuel, fodder and livelihoods (Rishi, 2002). Forest is a very important natural resource providing direct and indirect benefits to the human society. The environmental services of
forests for the attainment of atmospheric stability and ecological balance are receiving increasing consideration by the scientific and policymaking communities at both national and international levels. The role of forests in the bio-diversity and climatic change conventions, negotiated in association with the United Nations Conference on Environment and Development (UNCED) process, is receiving particular attention. It has been mentioned in the agreement adopted at the United Nations Conference on Environment and Development, at Rio de Janeiro, June, 1992 that all types of forests embody complex and unique ecological processes which are the basis for present and potential capacity to provide resources to satisfy human needs as well as environmental values and as such their sound management and conservation is the concern to the Governments of the countries to which they belong and are of value to local communities and to environment as a whole. Forest resources and forestlands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual human needs of present and future generations. These needs are for forest products and services, such as wood and wood products, fuel, fodder, medicine, food, employment, shelter, water, recreation, habitats for wild life, landscape diversity, carbon sinks and reservoirs and for other products. The vital role of all types of forests in maintaining the ecological processes and balance at local, national, regional and global levels through, inter alia, their role in protecting fragile ecosystems, watersheds and freshwater resources and as rich store houses of biodiversity and biological resources and sources of genetic material for biotechnology products, as well as photosynthesis, should be recognized.

(i) Environmental & Ecological Impact of Forests

Forests influence the climate, play significant role in conservation of moisture, soil and biodiversity and in controlling air pollution. Some of the indirect benefits of the forests to the society, at large, are mentioned as under;

(i) Control on Air Pollution: Forests are world’s best and very effective pollutant sink. But their capacity to discharge this function depends on their area, distribution, composition and the condition of crop. Forests are living organisms, which besides maintaining their heat and water economy exert an influence upon their surroundings, being themselves influenced by these in return. Forests moderate through sheltering and blanketing effects the ambient temperatures, retard wind flow and increase the humidity by releasing water in the atmosphere in transpiration. Forests are the consumers (sinks) of carbon dioxide vis-à-vis oxygen producer during photosynthesis. It is realized that the importance of trees with regard to carbon dioxide is not in its short rotation time circulating through leaves’ litter and soil humus, but is in the locking up of carbon in wood over a long duration. Forests are an important
component of the global carbon cycle. Forest ecosystems contain more than half of all terrestrial carbon. They account for about 80% of the exchange of carbon between terrestrial ecosystems and atmosphere. According to the World Resource Institute (1998), frontier forests take up tremendous amount of carbon dioxide (CO₂), therefore, they are an important factor in regulating earth’s climate. Recent calculations suggest that the frontier forests store approximately 430 billion metric tones of carbon (from CO₂) more carbon than is likely to be released by fossil fuel burning and cement manufacture over the next 70 years or so (World Resource Institute, 1998). Trees because of their big size, of the innumerable leaves and branches, work as a barrier in catching dust, airborne particles and injurious fumes emitted and due to transpiration cool the ambient high temperatures. In short, trees serve as sinks for air pollutants. Forest soils remove gases from the atmosphere via several microbial, chemical, and physical processes. The soils function as efficient sink for carbon mono-oxide and play a dominant role in regulating the concentration of this gas in the atmosphere. Other gases removed are sulphur dioxide, ammonia, some hydrocarbons and mercury vapour.

(ii) Climatic Amelioration: Forests influence on solar radiation, temperature, rainfall, evaporation, atmospheric humidity, etc. Consequently, they play vital role in amelioration of climate.

**Solar Radiation:** Forest cover reduces the intensity of solar radiation reaching the forest floor in an inverse proportion with its density, i.e. the denser the cover, the lower the intensity of solar radiation reaching the forest floor. As the amount of light affects temperature, atmospheric humidity, soil moisture regime, it has great influence on the vegetational growth and regeneration of various species.

**Temperature:** Forest cover makes the temperature, both of air and soil, more equable than it is in the open. This is due to the fact that forest cover acts as a screen and prevents sunrays from directly heating the air and the soil inside the forest. During the night, this screen prevents the loss of heat by radiation. This results in decreasing the maximum temperature during the day and increasing the minimum temperature during the night. The bare ground gets heated up by insolation and loses heat by radiation more rapidly than the ground under forest cover. Therefore, the temperature of soil under forest cover is higher during winter and lower during summer than that in the open.

**Rainfall:** Though influence of forest in increasing the total rainfall of a place has been disputed, there is no doubt that forests exercise considerable influence in increasing the number of rainy days over limited regions. Studies made by Rangnathan (1949) at Nilgiri in Tamil Nadu State revealed that the number of rainy days increased from 374 before afforestation to 481 after afforestation. Puri (1960) also observed reduction in number of rainy days after deforestation in Chhota Nagpur plateau of Bihar (now in Jharkhand). Increase in number of rainy days has beneficial effects on the forests.
**Wind:** A strip of trees and shrubs reduces wind velocity considerably. The reduction in wind velocity, the height and distance to which it is affected, is dependent on the height of trees and their density. That is why the wind-breaks are established around orchard and shelter-belts are raised in the areas experiencing wind erosion or desiccating effects of cold winds. It has been estimated that inside the forest, the reduction of wind velocity may be from 20 to 60% of that in the open.

**Evaporation:** As forests reduce solar radiation reaching the forest floor and consequently temperature and wind velocity inside, they reduce evaporation of moisture from forest floor. Reduction in evaporation depends upon the type of forest, its age, density as well as the moisture regime of the soil. However, it has been estimated that evaporation from forest floor may be 10 to 80% of that in the open.

**Effect on Humidity:** As forests keep on drawing water from inside the earth and transpiring it in the atmosphere, they have a favorable effect on humidity. It has been estimated by Seth as cited by Khanna (1977) that a sal (*Shorea robusta*) forest of 37 years age and containing 778 trees per hectare transpires about 1200 mm of water annually. Thus, forests increase humidity of adjoining areas. Warren (1941) observed that while humidity of tree-less Ranchi plateau dropped to 5 in hot dry summer that of Chaibassa in the neighborhood of Shinghbhum forests never dropped below 50.

Forests maintain the ratio of nitrogen, oxygen and carbon dioxide in the atmosphere through nitrogen cycle, oxygen cycle, carbon cycle respectively. They maintain nutrients through nutrient cycle and also help regulate moisture regime through hydrological cycle. The trees also absorb many poisonous and hence harmful gases and dust from the atmosphere. Trees moderate the temperature, control winds and humidity and thus regulate the climate to some extent.

**(iii) Soil and Moisture Conservation:** Trees roots allow rainwater to percolate deep into the ground. The leaf-litter of trees adds nutrients to the soil and also keeps the soil porous like a sponge. Rate of run off is reduced. Under different forest areas, the infiltration rates varied considerably depending upon the condition of the forest floor. Sal (*Shorea robusta*) forests at Dehradun with good leaf-litter showed very high rate of infiltration (9.00 cm in the first hour, 5.90 cm in the second hour and 5.85 cm in the third hour), while the Sal forests with little leaf-litter and compact surface showed low rates of infiltration (3.71 cm in the first hour, 2.20 cm in the second hour and 2.00 cm in the third hour), (Patnaik and Virdi, 1962). The effects of various types of vegetal cover in reducing run off and loss of soil has been compared by Howard as cited in the book titled Forest Protection (Khanna, 1998) are shown in table-1.1.
Table-1.1: Comparison of 'loss in precipitation' and 'loss of soil' under different vegetal cover

<table>
<thead>
<tr>
<th>Kind of soil cover</th>
<th>Loss of precipitation (in proportion of)</th>
<th>Annual loss of soil per acre (in proportion of)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest with normal ground cover</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Forest with poor ground cover</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Well managed pasture</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Grass land</td>
<td>10</td>
<td>130</td>
</tr>
<tr>
<td>Completely bare ground</td>
<td>25</td>
<td>3250</td>
</tr>
<tr>
<td>Agriculture crops</td>
<td>25</td>
<td>3250</td>
</tr>
</tbody>
</table>

Hydrological studies carried out in hill forest of sal (Shorea robusta) coppice forest near Dehradun have indicated that the average run off was about 42% and the water flowing out was of high purity (Ghosh et.al., 1979). Considering about 20% of the rainfall as loss by interception by forest cover, about 38% of the rainwater is conserved in the soil, partly in the upper soil and partly in the sub-soil. Ignoring half of the quantity of rainfall that seeps into the soil to make streams perennial, the other half which remains in the top soil would have been lost if there was no forest cover. Forests control floods to a great extent and this is of great importance in view of the fact that every year floods cause colossal damage in the world. Trees bind the soil through their roots. Forest canopy prevents raindrops falling directly on soil and causing splash erosion. The humus formation increases the microbial activity. Thus forests: -

- Prevent soil erosion and landslides.
- Improves soil fertility.
- Replenish ground water.
- Regulate flow of water in the streams emerging out of forest so damage due to floods in rainy season and droughts in summer is reduced.

In short, forests in hills ensure the prosperity in the down streams.

(iv) Conservation of Biodiversity: Forests play vital role in maintaining the ecological system as they are the rich store houses, which conserve biodiversity. By virtue of their importance as habitats, forests, especially tropical forests, figure prominently, in efforts to conserve biological diversity. It has been estimated that half of the world’s biological diversity is contained in forests and that probably more than four-fifth of many groups of plants and animals are found in tropical forests. An estimated 12% of the world’s forests are in protected areas, which have long been considered the cornerstone of biological diversity conservation (FAO, 2001). According to the report of the World Resource Institute, the frontier forests are large, relatively intact forest ecosystem. They represent undisturbed
forest areas that are large enough to maintain all of their biodiversity, including viable population of wide ranging species associated with each forest type. Frontier forests are large and natural enough to ensure the long-term survival of their plant and animal species, including the biggest mammals with the most extensive home ranges. As secure habitats for native species, frontier forests are invaluable refuges for global biodiversity (Walt Reid and Kenton Miller, 1989). Over the past two decades, it has become major issue on the international agenda and conservation of biological diversity has become a feature of forest policy and planning throughout the world.

(ii) Socio-Economic Contribution of Forests

According to Clark & Guhathakurta (1994), wood demand in India was 264 million cu.m. in 1988, of which 90% was for fuelwood (46% of India's household energy). Forests are a main source of fodder and non-timber forest products (NTFP) such as oils, medicinal plants, silks, resins, dyes, fibres and leaves. Many rural dwellers, particularly woman, are employed in forestry or collection of NTFP. Although the contribution of the forestry sector to GNP often has been estimated at less than 2%, this figure does not take into account its numerous non-market and external benefits or the vast amounts of fuelwood collected in the form of twigs and sticks or the fuelwood and timber that are harvested illegally. Though the forests contribute little (<0.2% of GDP) in terms of financial returns, yet its importance for meeting the sustenance needs of the society, particularly forest dependent community cannot be undermined. The forests are closely linked with the traditions and lifestyle of the tribals. Describing the socio-economic contribution of forests, Sharma (2004) feels that moving away from the income or consumption criteria, many a times poverty has been equated with lack of livelihood security. The forests have a role in providing livelihood security to forest dependent community.

(i) Food Security: Realizing that food is the basic physiological need of the human being, food security continues to be the core concern of livelihood security. Food security envisages adequacy, stability, as well as economic and physical access to food to all people at all times. There may be enough food but if the poor do not have access to it, food security will not be complete. Forests directly contribute to the food basket of the people in the form of edible fruits, flowers, gum, leaves, roots, tubers, etc. During the lean agricultural season, even the agricultural communities supplement their food requirement from forests. Furthermore, income generated from the sale of surplus Non Wood Forest Products (NWFPs) enable the poor to have access to food. In Indian rural context where mixed farming is in vogue, cattle are an important component of the socio-economic set up. In the complex chain of the food web, cattle are the secondary food producers, too. They derive their food
from the forests, which they convert into animal proteins in the form of milk, fat, meat and other dairy products to be used by human beings. Although, excessive grazing pressure, more importantly the one beyond the carrying capacity, has been viewed by foresters as a constraint, people’s protected area (ppA) endeavours to accommodate multiple use of natural resources on a sustainable basis so that food resources are available to the people as well as cattle.

(ii) Health Cover: Forests have been a source of invaluable medicinal plants. Even when no synthetic medicines existed, our forefathers depended on herbs and medicinal plants and their derivatives to cure common ailments. Our age old traditional Indian System of Medicines, one of the ancient medicine practices known to the world, derive most of its formulations from plants and plant extracts that exist in the forests. The general forest degradation process adversely affects the resource base of medicinal plants, both in terms of quality and quantity. The problem is compounded by the market driven harvesting without any concern for regeneration and conservation. In this process, essential components of a plant such as bark, roots, flowers and fruits are indiscriminately collected, leading to degradation and depletion and even extinction of a particular species, if proper remedial measures are not taken. It is estimated that 10% of all plants species and 21% of mammal species are currently endangered in India. ppAs address the issue of health cover by evolving a feasible mechanism for in-situ /ex-situ conservation, domestication propagation, and non-destructive harvesting.

The World Health Organisation (WHO) has estimated that 80% population of developing countries relies upon traditional medicines- mostly plant drugs-for their primary health care needs (Fransworth and Soejarto as cited by Singh AP, 2003).

(iii) Augmenting Rural Income: With a judicious mix of interventions such as development of irrigation facilities, application of improved and modern agricultural practices, and creation of other income generation activities based on non-destructive use of locally available natural resources, the possibility of creating dependable wage labour can be enhanced. The initial entry point activity would be to create awareness among the local people about their latent strength, availability of natural resources and potential of using them on a sustainable basis by technological upgradation.

Tribal population depends heavily on NTFPs for income and subsistence. One reason NTFPs are so important for tribals is that they have been pushed toward more and more marginal areas. Since agriculture yields are lower and more uncertain in marginal areas, the reliance on NTFPs is high, both for food security during seasonal shortages and famine periods as well as for household medicines and income needs (Clark & Guhathakurta, 1994).
In Gujarat, the economic contribution of forests, as revealed by the recorded revenue, is dismally low i.e. 0.05% of Gross Domestic Product. This is partly because a small fraction of the total contribution of forests only gets recorded. Marketing and Economic Consultancy Services (METRIC), Pune has carried out a study on Socio-economic Impact and Contribution of Forestry Sector in Gujarat in the year 2005. The findings of the study reveal that tangible aggregate contribution of Forestry Sector is approx. Rs.1000/- crore per annum. The contribution of grazing and fodder was found to be the highest of all components. The average contribution due to grazing and fodder was nearly 83%. The next highest average contribution was about 11% for firewood. The average contributions for timber, MFP and bamboo were estimated to be 2.5%, 3.0% and 0.4% respectively. The per capita contribution was varying from nil (Gusar Village of Panchmahals District) to nearly Rs 5162 per annum in village Rinchhad in Danta taluka of Banaskantha District. According to Verma (1999), contribution of forests through wood production is dismally low that works out to only 0.07 cmt/ha/year for timber and 0.6 M.T/ha/year for firewood. Mondal (2005) has also observed that in 25 selected villages for study of Sabarkantha district in Gujarat, the contribution of grass was Re. 5.52 lakhs as against Re. 0.25 lakh from other minor forest produces i.e. only 5% of the contribution through grass.

A recent study regarding the impact of MFP collection on the socio-economic life of tribals conducted by Tribal Research and Training Institute (Gujarat Vidyapitha), Ahmedabad has shown about 35 percent of the earning of the tribals in the Panchmahals District of Gujarat State was from these items. Some other studies also indicate the potential of MFP for tribal economy (Roy Burman, 1982).

Nobody- locally, regionally or globally- contends against retaining a specified area under forestland use. It is accepted that forests are required for their direct and indirect uses, such as timber, firewood, food, fodder, medicinal plants, moisture conservation and so on, whether this importance is realized or not, everybody, whether staying near or away from a forest, is in some way the recipient of the forest benefits. Forests, therefore, must be protected to the extent possible (Banerjee, 2004).

1.2.3 State of Forests

The scientific community all over the world has realized the importance of forests primarily for rendering the environmental and ecological functions and has arrived at a consensus that minimum 33% of the geographical area should be kept under forest cover. The acceptance of this principle by India gets reflected in National Forest Policy, 1988. The relevant portion of the policy reads;

"4.1 The National goal should have a minimum of one-third of the total land area of the country under forest or tree cover. In the hills and in mountainous regions, the aim should be to maintain two-
third of the area under such cover in order to prevent erosion and land degradation and ensure the stability of the fragile eco-system.”

(i) Forest Land

According to State of World Forests (FAO, 1999), a brief account of forest status in different parts of the world is presented in the Table-1.2. India is a forest poor country. It has merely 0.06 ha per capita forest area (one tenth of world average). The situation of Gujarat is still worse. It has only 0.04 ha per capita forest area (one fifteenth of world average and two third of Indian average).

Table- 1.2: Forest Cover and Per Capita Availability in Different Regions/ Countries

<table>
<thead>
<tr>
<th>Region/Country</th>
<th>Percentage Of Forest Cover To Land Area (1995)</th>
<th>Per Capita Forest (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>26.6</td>
<td>0.64</td>
</tr>
<tr>
<td>Asia</td>
<td>16.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Africa</td>
<td>17.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Europe</td>
<td>41.3</td>
<td>1.3</td>
</tr>
<tr>
<td>China</td>
<td>14.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2.3</td>
<td>0.01</td>
</tr>
<tr>
<td>Nepal</td>
<td>33.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>7.8</td>
<td>0.02</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>27.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>60.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>47.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Philippines</td>
<td>22.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Japan</td>
<td>66.8</td>
<td>0.2</td>
</tr>
<tr>
<td>USA</td>
<td>23.2</td>
<td>0.8</td>
</tr>
<tr>
<td>India</td>
<td>15.7</td>
<td>0.06</td>
</tr>
</tbody>
</table>


In 1947, the year of India’s Independence, the government owned forests covered an area of 40 million ha, but by the mid 1970s it had increased to 76.5 million ha (23.42% of the geographical area of the country) due to takeover of forests of erstwhile princely states, Zamindari forests, and areas under land ceiling acts in the states. But in 1980s the process of diverting forest lands to other purposes also started taking place and by 1980, the year when Forest Conservation Act came into existence, nearly 4.5 million ha of forests had been diverted for agriculture and other uses. Fortunately, the legal instrument of enforcement of Forest Conservation Act has retarded the pace of rapid diversion of forests land to other purposes. India has now nearly 76.84 million ha of recorded forest area (FSI, 2001).
(ii) Forest Cover

According to the Forest Survey of India’s (FSI) Report of 2003, the country now has only 20.64% (67.83 million ha) of land area under forest cover against the forest policy requirement of 33%. Of this, 1.56% (5.12 million ha.) is very dense forests with more than 70% canopy density, 10.32% (33.93 million ha) is moderately dense forests having canopy density between 40% and 70% while 8.76% (28.78 million ha) open forests. Out of 29 states and 6 union territories in the country, 13 states (out of which 7 lies in north-east region) and 2 union territories only have required 33% of geographical area under forest cover. Further, 92% districts (443 out of 589 districts in the country) do not have required forest cover of 33% and more than one third of districts have forest cover less than 5% only. In 123 districts (out of 589 districts) in the country that are categorized as hill districts, the average forest cover is 38.34% as against the requirement of 66.67%. Further, except hill region of North-eastern states and West Bengal state, in whole hilly regions of the country, the forest cover is less than the policy requirement of two-third of geographical area.

The situation in Gujarat state is still worse. According to the Forest Survey of India’s (FSI) Report of 2003, the state has only 7.62% (1.49 million ha) of geographical area under forest cover against the forest policy requirement of 33%. Of this, very dense forest is 0.76 % (0.01 million ha), moderately dense forest; 4.15% (0.06 million ha) and open forests; 5.73% (0.08 million ha). Out of 25 states in Gujarat, only two districts namely Dangs and Narmada have more than 33% geographical area under forest cover.

The forest cover, however, has increased both at country as well as State level. The forest cover in India has increased from 63.88 million ha in 1989 to 67.85 million ha in 2003. Similarly, forest cover in Gujarat has increased in the corresponding period from 1.19 million ha to 1.49 million ha. The change in forest cover in the country and in Gujarat during last one and half decade can be seen from the table-1.3 below (FSI, 2003);
Table 1.3: Change in Forest Cover in India and Gujarat during 1989-03. (Area in Sq. km.)

<table>
<thead>
<tr>
<th>Year of SFR</th>
<th>Total forest area</th>
<th>Change over previous report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>India</td>
<td>Gujarat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>India</td>
</tr>
<tr>
<td>1989</td>
<td>638 804</td>
<td>11921</td>
</tr>
<tr>
<td>1991</td>
<td>639 364</td>
<td>11907</td>
</tr>
<tr>
<td>1993</td>
<td>639 386</td>
<td>12044</td>
</tr>
<tr>
<td>1995</td>
<td>638 879</td>
<td>12320</td>
</tr>
<tr>
<td>1997</td>
<td>633 397</td>
<td>12578</td>
</tr>
<tr>
<td>1999</td>
<td>637 293</td>
<td>12965</td>
</tr>
<tr>
<td>2001</td>
<td>675 538</td>
<td>15152</td>
</tr>
<tr>
<td>2003</td>
<td>678 333</td>
<td>14946</td>
</tr>
</tbody>
</table>

(iii) Biodiversity

India is the biggest democracy in the world having the seventh largest geographical area (328.7 million ha) and second largest population (about 1,000 million). There is much diversity in India’s geographical features: the towering Himalayas in the north; the Thar desert, Aravalli hills and semiarid plains in the west; the Vindhyachal mountains in the centre; the Deccan plateau in the south; the Western and Eastern Ghats with coastal plains to the east and west, and a variety of biodiversity in the northeast region (Mukerji, A.K, 2004).

India is one of the 12 mega diversity countries in the world with a vast variety of flora and fauna, commanding 8% of world’s biodiversity. It supports 16 major forest types, varying from the Himalayan Alpine pasture and temperate forests to sub-tropical forests to tropical evergreens to mangroves in the coastal areas. India also has two biodiversity hotspots in the northeastern states and the Western Ghats (Mukerji, A.K, 2004).

Around 60% to 70% of world’s biodiversity is found in India and other mega diversity countries put together. India possesses 7.35 of the total world animal species and 6% of flowering plant diversity of the world of which one-third is endemic to India. More than 86,870 animal species are identified in India. Some 14% of its 1232 bird species, 47% of its 496 reptile species and 62% of its 209 amphibians are unique to India. About 10% of the total mammalian fauna i.e. 404 species are endemic.
to country. About 40% of insect species are endemic to the Indian region, whereas over 40% of Indian leaches, freshwater sponges and mollusks also exhibit endemism (Anon, 2004).

Gujarat has a rich bio-diversity owing to its geographic and climatic variations and ranks 6th in the country in terms of biological diversity. Of the animal species found in India, 24% of fishes, 24% of reptiles, 37% of birds and 27% of mammals are found in Gujarat. Out of the 86,000 animal species found in the country, 3,054 species are found in the state. Gujarat is the only state where 3 big cats- Asiatic lion, tiger (found till recently but now got extinct) and leopard are found. Many endangered species and species on the verge of extinction are found to reside in Gujarat. Of the 8 mammalian species belonging to the endangered category, 2 species- Asiatic Lion and Wild Ass are seen only in Gujarat. Out of the plant species diversity like microbes, algae, fungi, pteridophytes, bryophytes, gymnosperms and angiosperms, which constitute 46,286 species in India, 4320 species are found in the state. (Anon., 2004).

1.2.4 Problems of Forest Management

With about 2.5% of world’s geographic and 1.8% of the forest area, India at present, supports 16% of the planet’s human population (1,000 million) and 18% of the domestic animal population (500 million). About 41% of the forest cover of the country is degraded, and the dense forests are losing their crown density and productivity continuously. A large number of India’s livestock population grazes in forests, causing serious damage to forest regeneration and productivity. The use of forests beyond its carrying capacity and encroachments are the main causes behind the continuing degradation of forests (MoEF, 1999). At present, 70% forests have deficient natural regeneration and 55% are prone to fires (FSI, 1999).

Due to rapid increase in human population from 390 million (1950) to 1 billion in 2001 and domestic animals from 350 million to 500 million in the same period, the demand supply gap for forest produce has increased. Mukerji (2004) described the reasons responsible for degradation of forestland as under:

- Loss of nearly 4.5 million ha. Since 1950 for agriculture and other uses.
- Per capita forest area is only 0.064 ha, one-tenth of the world average of 0.64 ha. The need for increasing forest/tree cover from existing 19.34% to 33% of the land area. (FSI, 1999).
- The growing stock in Indian forests is 4,740 million cubic metres with a productivity of 0.7 cubic metre per hectare per year against a world average of 2.1 cubic metre per hectare per year. This is mainly due to non-cycling of biomass in forest soil, fire, grazing, over-exploitation. etc. (NFAP, 1999).
- 78% of the forest area is subjected to heavy grazing, adversely affecting productivity and regeneration. (NFAP, 1999).
- On an average, 51% of forest area suffers from occasional forest fire. (NFAP, 1999).
- Nearly 10 million ha of forest area is subjected to shifting cultivation.
- The availability of forest biomass per capita is only 6 tonnes in India against an average of 82 tonnes in other developing countries.
- Land use changes (area under agriculture was 118 million ha in 1950 and now 142 million ha).

This diversion has removed buffer community areas adjoining the forest/grassland.

There has been a very low allocation (less than 1%) under plan budgetary outlay, to the forestry sector development in spite of forests covering nearly 20% of the land area of the country.

The government manages almost 98% of the forests in India of which more than half is allocated for timber production. Trees in these forests were allowed to grow into a marketable size, felled and then auctioned. The timber so produced finds their way to industries, paper and pulp factories, townships, and so on. This method of forest management in some form or other is followed throughout the world. However, this management method and disposal arrangement did not work in populated countries such as India, as need of the local people, while accepted in principle was strangely overlooked in practice. These overlooked people, especially those traditionally dependent on forests, disturb them for subsistence, firewood and small timber, cattle grazing. Sometimes, they deliberately burn or cut forests. Natural or artificial regeneration in the felled gap was expected to replace, in due course, the trees felled but unfortunately the success could not be achieved to the desired level. Thus the scientific system of forest management was realized to be faulty (Mukerji, A.K., 2004).

According to Guhathakurtha (1993), population growth, institutional problems, environmental degradation and estimate undervaluation of forest resources, have resulted in dramatic deforestation. Clark & Guhathakurta (1994) describe the reasons of forest degradation in India and say, “India's forests are under immense pressure and rapidly being degraded. One of the reasons is the severe land scarcity in India which is increasing with the rapid population. Indigenous population earlier farming in valleys or practicing shifting cultivation relatively fertile forest areas have become marginalised and have moved to farm more fragile areas on shorter cycles. Poor farmers and landless populations encroach on forest areas, hoping that as in the past their holdings will eventually be regularised. Many poor families have also become dependent on forests for household fuel needs and to supplement their incomes through sale of fuelwood and other forest produce. Other important pressures on the forests are State Government's demands for revenue from the forests and for timber pulp and fuelwood to
supply industries and urban consumers. Forests have also come under pressure from organised illegal felling.”

1.2.5 Forest Management initiatives

According to Mukerji (2004), management of forests in India could be traced to ancient days with its reference found in Kautilya’s Arthshashtra. However, the scientific era of forest management was introduced in pre-independence years and forestry management systems were adapted suiting the changing conditions of forest resources vis-à-vis externalities. Though various forest acts and policies were framed and amendments were made to incorporate the changing forestry scenario in the nation; but disinvestments in forestry continued owing to growing population and increasing pressures on forestry resources.

The foundation of scientific and organized forestry was laid when Sir Dietrich Brandis, a German forester, was appointed as the first Inspector General of Forests of India in 1864 and first Indian Forest Act was passed in 1865. The Act was revised in 1878 and provided for formation of Reserved Forests (RFs) and Protected Forests (PFs) followed by forest settlement to record the rights of the local people. A comprehensive Forest Act was passed in 1927, which is still in force.

Preparation of a Working Plan for forest management was initiated in 1884 to ensure sustained harvesting of timber within the limits of annual incremental growth followed by regeneration operations and protection. However, the removal was far more exceeding the rejuvenation capacity of the forests. The clear felling system of forest management was mostly adopted on the assumption that the forest would regenerate naturally in due course of time. This was the time when forests were looked upon as a renewable resource with plentiful capacity. Unfortunately, this legacy was continued in free India too for almost 2-3 decades after independence. The attempts of supplementing natural regeneration with artificial regeneration (seed sowing and afforestation) were also made. The system worked for quite a long time till the availability of timber from natural forests was adequate to meet the market demand. Thereafter, some modifications in forest management such as ‘Simple Coppice System’, ‘Coppice with Reserves’ and ‘Coppice with Standards’ were also practiced where;

- Prominent tree species were of economic value and found to have good coppicing power.
- Natural regeneration of economic species through seed was inadequate.

When forest area which had inadequate proportion of coppicing species, after clear felling, started getting denuded, the afforestation, especially with fast growing tree species, was undertaken with a concept to put forest area under maximum productive use and to meet the growing demand of timber.
However, in those days there was no concept of biodiversity and ecological gains from forests were subordinated to economic returns from forests.

The first National Forest Policy was adopted by a GOI resolution of October 19, 1894. The thrust areas were to:

- Ensure maintenance of adequate forest cover for general well-being of the country.
- Meet needs of the local people.
- Collect the maximum revenue after meeting local needs.
- Give priority to permanent cultivation over forestry for land.

The last provision resulted in large-scale clearing of forestland for agriculture and other purposes.

An independent India saw a lot of new political initiatives, and large forest areas of princely states and Zamindari were taken over by the State, the growing demand of forest produce and land called for a new approach that led to the adoption of the Forest Policy of 1952. It was considered the most comprehensive policy in the world at that time. It also provided intrinsic rights on land under forests and recommended that 33% of total land area of the country should be brought under forest or tree cover.

It was for the first time in 1960s that it was realized that the pressure on forests is more than they can cope up with and the concept of Social Forestry started taking root in India. In 1970s, especially after Stockholm convention on forestry in 1972 in which India under the leadership of the then Prime Minister, Mrs Indira Gandhi participated, the concern for forest conservation was felt. This can be seen in Government of India’s following actions;

- In 1972, Wildlife (Protection) Act came into existence. The Act provided the earmarked areas (sanctuaries & National Parks), exclusively, for protection of wildlife. The restriction on forest land usage by the locals was strengthened.
- In 1972, the National Commission on Agriculture (NCA) recommended raising of large-scale plantations in degraded forest areas and through social forestry in community and private lands to meet the growing requirement for timber and firewood. It also suggested formation of Forest Development Corporations (FDCs) to use bank finance (NABARD) at 7% interest. States established FDCs and raised nearly 1 million ha of plantations by the mid-1980s. It recommended large-scale social forestry projects as part of rural development programme.
- In 1976, with the 42nd amendment in the Constitution, ‘forests’ was brought under a concurrent list.
- In 1980, Forest Conservation Act came into existence in order to retard the pace of diversion of forest lands for other than forestry use. The Act made it mandatory for the states to take approval from Ministry of Environment and Forests (MoEF) before diverting any forestland for non-forestry purpose.
- Government of India put moratorium on clear felling of natural forest in 1986.
- In 1988, National Forest Policy, 1988 was promulgated in which emphasis was laid on ‘attainment of Environmental Stability’ and ‘maintenance of Ecological balance’ as the principal aim of forest management. This policy also laid foundation of involving people in forest management.

(i) Social Forestry

Social forestry programme was initiated with an aim to educate the people as to what to plant, how to plant on their farms with or without other crops; along roads, railway, canals; in village commons and wastelands; around villages, houses, market places and other public places with an idea to put to better use the hitherto unused or uneconomically used lands including degraded forest lands.

In a sense, social forestry was practiced for a long time, by farmers long before official programmes were initiated. The farmers of the Kashmir Valley have been raising willows and poplars on their farm boundaries largely to meet their needs of fuelwood and packing cases for as long as our memory goes. Similarly, farmers of Tamil Nadu and Karnataka have been raising plantations of Casuarina and Pongamia on poor lands close to urban centres. However, the early seventies may be taken as the watershed when the Government of India, on the report of the National Commission on Agriculture (NCA) published on social forestry in August 1973, having realized the impeding crisis situation, gave a great stimulus and encouragement to the Social Forestry Programmes in the country by granting liberal subsidies to the state governments. The Government of India advocated to the World Bank to extend financial assistance to social forestry projects in India as the Government of India attached higher priority to social forestry in the country in December, 1975 but the World Bank did not agree to the request of Government of India on the plea that social forestry being non-commercial forestry, did not fit into philosophy of the World Bank Financing. However, after a lapse of about three years i.e. in 1978, the World Bank saw the wisdom in the priorities assigned by the Government of India and revised its approach to forestry sector and gave a place of pride to social forestry activities in developing countries including India. Later on other donor agencies such as SIDA (Swedish International Development Agency), USAID (United States Agency for International Development),
CIDA (Canadian International Development Authority) and DANIDA (Danish International Development Authority) became anxious to assist such projects. Social Forestry became very popular with donor countries because of its possible great social impact. Gujarat and Uttar Pradesh were the first to formulate detailed projects for World Bank assistance. These projects became operative in 1980 and 1979 respectively. Later on Social forestry was included in the new 20-point Programme (Item No. 12) of the country to accord a high priority to afforestation and social forestry including farm forestry.

In Gujarat, 'Van Mahotshav', an annual 'Festival of Trees' was inaugurated in 1950 (Anon., 1973) with the hope that it would create tree consciousness and generate enough enthusiasm among the people to undertake organized tree planting. The Social Forestry programme also encompassed the concept of Van Mahotshav as foreseen by the late K.M. Munshi, the then Minister for Agriculture in 1950 in its gambit. In 1969, Gujarat launched a community forestry programme and embarked on establishment of fuel wood plantations along roadsides and canal banks. In 1970, Gujarat Forest Department started raising seedlings for distribution to give impetus to 'Farm Forestry'. In 1974, Gujarat Forest Department undertook plantations on village common lands for the first time and a separate administrative wing to deal with the establishment of plantations outside forest reserves on public and private lands in rural areas was established. In 1980 World Bank aided project of community forestry project was initiated. Since then Social Forestry Programme has been implemented in the state of Gujarat. Under this programme, strip plantations along road, railway, canal, village woodlots social security through plantations, rehabilitation of degraded farm land seedling distribution activities have been carried out.

(ii) Participatory Forest Management

Apart from reducing harvest from traditional forest areas, government also took initiatives to enhance tree cover in community lands including degraded forests and on private landholdings in a big way through social forestry and Vanmahotshav programmes. However, it was soon realized that the participation of locals in forest management and even in conservation of protected areas was thought a necessity. The first policy-level decision was taken in the resolution passed in the meeting of the Central Board of Forestry held in December 1987. The Prime Minister, in his address as the Chairman of the committee, stressed the need for effective people’s participation in forest protection and management. This was also reflected in Resolution No. 25, which states, “This meeting resolves that by 31.3.90 every village will have a plan for regeneration of forests and the restoration of ecological
balance. This plan will be drawn up and implemented with full participation of Village Panchayats or other such bodies.”

In 1988, the new Forest Policy was adopted, which covered all the sustainable management approaches subsequently provided in the “Forest Principles” adopted at Rio Earth Summit in 1992. This policy had a few unique features in its main objectives, which were:

- Maintenance of environmental stability and restoration of the ecological balance, soil and water conservation.
- Conserving the natural heritage and genetic resources.
- Increasing the productivity of forests to meet first local and then national needs.
- Creating massive people’s movements to increase and protect forest and tree cover to achieve the objective of reducing pressure on existing forests and meeting people’s need on sustained basis.
- Deriving economic benefits must be subordinated to these principal aims.
- Laid emphasis on bringing 33% of the country’s land under forest/tree cover (66% in the hills).

Ministry of Environment and Forests (MoEF) issued detailed guidelines on June 1, 1990 (annexure-1.2), which clearly laid down the procedure for people’s involvement in forest conservation and management through appropriate village level institution and under a proper scheme. It also laid emphasis on a procedure of sharing of usufructs and a share of the net sale proceeds on the lines already adopted in West Bengal.

In addition the MoEF, in view of the recommendation of the “Standing Committee on JFM” issued a supporting circular on February 21, 2000 (annexure-1.3), for strengthening the JFM programme in the country. The main features are:

- Providing legal status through registration of JFM Committees under the Societies Registration Act of 1860.
- Women should constitute 50% of the membership of the general body and at least 33% of the JFM Executive Committee (EC). A woman must hold at least a post of President, Vice President or Secretary.
- JFM may also now cover good forest area (40% crown density and above) upto 100 ha and within 2 km. of the village in each case.
- The normal Working Plan should have a JFM overlapping working circle with flexible guidelines for the preparation of JFM micro-plans covering both good and degraded forests.
- Setting up of district level JFM conflict resolution working groups.
In the year 2000-01, a new pilot scheme named Forest Development Agency (FDA) (annexure-1.4) was initiated by the MoEF to undertake all the integrated village afforestation and eco-development activities in and around nearly 17,000 villages. These were situated close to forests, and people were dependent on forest resources for sustenance. The basic objectives, of the scheme which was in due course meant to cover all the above villages in a phased manner, were to:

- Arrest and reverse the trend of forest degradation through appropriate development programmes.
- Provide sustainable, assured employment opportunities to tribal and other weaker sections of the society through sustainable harvesting of forest produce and development activities.
- Create durable community assets for socio-economic development.
- Ensure direct fund flow from GOI forestry development schemes to the implementing agencies of micro-plans i.e. JFM committees.
- Provide funds for entry point and promotional activities, for example water harvesting structures, creation of village level roads, construction of schools, etc, to ensure mobilization of local stakeholders to undertake forest protection and development activities.
- Organize training for local stakeholders’ human resource development, for example maintenance of accounts, blending of local and technical knowledge for implementing sustainable forest harvesting and development, especially of NTFPs, equitable sharing of benefits, conflict resolution, etc.
- Involve the village community in planning and execution of all works.
- Co-ordinate activities of all JFM committees in a forest division and provide them technical policy and marketing support.
- Create an effective mechanism to ensure that the medium of FDA is used by all government departments to reach the beneficiaries for various development programmes.

This is a major policy reform aimed at ensuring full financial and administrative empowerment of the local JFM committees for managing their own natural resources. This will ensure co-ordination amongst all development departments and projects for integrated planning and execution on the pattern of the District Rural Development Authority (DRDA).

Participatory Management in Gujarat: Structured efforts of people’s participation in Gujarat can be traced as back as 1949 when Forest Labours Co-operative Societies (FLCs) were established with the aim of increasing financial returns to forest laborers, and encouraging responsibility among tribal people for the management and conservation of forest. This was the first mile-stone erected for benefit sharing mechanism between the state (Forest Department) and the forest laborers.
The efforts to involve local community in forest protection were informally started with the advent of Social Forestry programme in the State. However, the programme was initiated formally on pilot scale in the year 1991, in pursuant to Government of India’s circular dated June1, 1990, for the rejuvenation of degraded forests through people’s participation. The Government Resolution on JFM dated 13/03/1991 was first initiated on pilot scale and only for degraded forests. It was modified vide Government Resolution dated 27/06/1994 (annexure-1.5) making it applicable to whole state. The scope of JFM was then extended to good forests vide Government Resolution dated 17/12/2005 (annexure-1.6).

Thus, efforts have been made to elicit people’s participation in forest conservation and development, both at individual level as well as at institution level; formally as well as informally; on private land holdings as well as on community lands including forests, with and without government assistance.

1.2.6 Recent developments affecting forest management

(i) The Constitution (Seventy-third Amendment) Act, 1992: The Act has empowered Gram Sabha to exercise powers and functions at village level as the legislature of State (Art-243A of the constitution). The article 243G provides for planning and implementation with respect to forest produces- fuelwood, fodder and minor forest produce.

“243G. Subject to the provisions of the Constitution, the Legislature of the State may, by law, endow the Panchayats with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may be specified therein, with respect to-

(a) The preparation of plans for economic development and social justice;
(b) The implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule. The Eleventh Schedule includes 29 matters including the following;  
   - Social forestry and farm forestry,
   - Minor forest produce,
   - Fuel and fodder.”

(ii) The Provisions of the Panchayats (Extension to Scheduled Areas) Act, 1996: This is an Act to provide an extension of the provisions of part IX of the Constitution relating to the Panchayats to the Scheduled areas. In scheduled areas, in addition to the powers vested in Gram Sabha by 73rd
Constitutional Amendment, the customary rights are recognized and ownership right of minor forest produce has been vested in Gram Sabha. Pursuant to above Central Acts, Gujarat Government has amended The Gujarat Panchayat Act in the year 1993 and again in 1998, adopting the provisions of the Central Acts.

(iii) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is a step forward in the direction of providing ‘Social and economic justice’ to the local community as it provides right to protect, regenerate or conserve or manage any community forest resource which they have traditionally protecting and conserving for sustained use. However, in the name of undoing historical injustice during the colonial period, recognition of forest rights to individuals and that too on the basis of opinions in Gram Sabha rather than written proof or records may be disastrous as it will open a Pandora box in the direction of privatization of common property resource.

(iv) Judiciary Point of View: The Apex Court, Supreme Court of India, has held in T.N.Godavarman Thirumalpad Vs Union Of India & Others, Writ Petition (Civil) No.202/ 1995, order dated 12-12-1996, “....The word “forest” must be understood according to its dictionary meaning. This description covers all statutory recognized forests, whether designated as reserved, protected or otherwise for the purpose of section 2(i) of the Forest Conservation Act, 1980. The term “forest land”, occurring in section 2, will not only include “forest” as understood in the dictionary sense, but also any area recorded as forest in the government record irrespective of ownership....”. This Supreme Court order has thus extended the applicability of Forest Conservation Act, 1980 to such wooded areas, which were not declared legally forests. This verdict, which has had wide repercussions on forest management, is a step forward in the direction of ‘environmental and ecological’ aspect of forests.