UNIT 7 FORESTRY IN INDIA : LINKAGE WITH AGRICULTURAL SECTOR

Structure

7.0 OBJECTIVES

After going through this unit you will be in a position to:

- appreciate the importance of forests in India;
- identify the initiatives on forestry undertaken by the government through various schemes;
- identify the objectives of national forest policy;
- explain the philosophy of joint forest management; and
- identify the linkages between forests and agriculture.

7.1 INTRODUCTION

Forests play a crucial role in the socio-economic life of the millions who live in forest and rural based subsistence economy in India. Forests not only provide fuel wood, timber, fodder, etc. but also are the life supporting system and abode for the tribes and rural mass living within and on fringes of forests. This sector encompasses about one quarter of the geographic area of the country. India is having just two per cent of world forest area but supporting 16 per cent of world human population and 14 per cent of world cattle population. As compared to other countries of the world, India is thus lagging behind in forest resources both in terms of area coverage as well as per capita area under forests (Table 7.1).

Table 7.1

Forest cover and per capita availability in different regions/countries

Region/ Country	Percentage of forest cover to land area (1995)	Per capita forest area (ha)	Region/ Country	Percentage of forest cover to (1995)	Per capita forest area (ha)
World	26.6	0.64	Nepal	33.7	0.2
Asia	16.4	0.1	China	14.3	0.1
Africa	17.7	0.7	Philippines	22.7	0.1
Europe	41.3	1.3	Sri Lanka	27.8	0.1
USA	23.2	0.8	India	15.7	0.06
Malaysia	47.1	0.8	Bangladesh	7.8	0.02
Indonesia	60.6	0.6	Pakistan	2.3	0.01
Japan	66.8	0.2			

The relevance of forestry sector is all the more pronounced in a developing country like India which has a predominantly agriculture based rural economy. Forests have been offering a wide range of both tangible and intangible benefits essential for the socio-economic development of this country. The history of development of forests in India is however linked with the political history of the country.

7.2 DEVELOPMENT OF FORESTRY IN INDIA

You may be aware that Indian epics give attractive descriptions of forests like *Dandakaranya, Nandanvan, Khandabvan,* etc. and the ancient Hindu culture is said to have its origin from *aranyas* (forests). However, successive political upheavals in the country inevitably had their effect on forests. The first indication of forestry administration was found in 300 B.C. during the reign of Chandragrupta Maurya when a *superintendent of forest* was appointed to protect forests and wild life. Later, during the days of Ashoka also much importance was given to planting trees along the roads and camping sites. In Mughal period, there did not seem to be any interest in the conservation of forests. However, Akbar showed keen interest in planting of trees along canals and roadsides. As population increased, more and more forest areas were cleared for settlement and cultivation. There was thus a gradual depletion of forests. Except a few "royal trees", forests were open to all and people met their requirements of forest produce without any restriction.

7.2.1 Forestry under British Rule

Heavy destruction of forests in India occurred in the later part of the 18th century and early part of the 19th century. In the early years of British Raj, large indents were made on Indian timber. Teak forests along the coast of Malabar were over-exploited to meet the requirements of British Navy following the appointment of a commission in the year 1800 to enquire into the availability of teak wood. Sandalwood from Southern India was sold in European markets. A Conservator of Forests was appointed in 1806 to organize timber supplies from India to European markets. People also met their needs from forests without any difficulty. The general policy was to expand agriculture. The first step for forest conservation began in India with raising of teak plantations at Nilambur, in present day Kerala, in 1842.

In 1855, Lord Dalhousie, then Governor General of India issued a memorandum outlining the rules for the conservation of the forests of the whole country. A qualified forester, Dr. Dietrich Brandis, was appointed as the Inspector General of Forests in 1864. The first Indian Forest Act was drafted in 1865 and the Department of Forest was created in 1866 in India with a view to protect forest resources nationwide. A revised Indian Forest Act came into existence in 1878 and it was made operational in most of the provinces of British India. The Forest Act classified the forests as 'preserved' and 'protected' forests for the first time. In 1894, the Department of Forests issued a circular outlining the future policy for forestry in India. Later on this circular was popularly termed as the *old forest policy*. The first forest school was established in 1878 at Dehradun and provincial forest service commenced in 1891. Thereafter, technical education and training in the area of forestry was organized and expanded. The Imperial Forest Research Institute (now the Forest Research Institute and College) was established in 1906 in Dehradun.

The national character in forest administration was considerably diluted with political changes in 1921 when forests became a *provincial subject* and their administration came into the hands of provincial governments. The gains in the policy and administration of forest conservation received a severe set back during the two World Wars, more particularly in the Second World War. During this period charcoal production was increased to run army trucks. After World War-II, forest based industries cropped up in good number and forest exploitation continued unabated. Forests were also cleared for construction of roads and wooden sleepers for laying down railway lines.

7.2.2 Forestry in Post-independence Period

After Independence with inclusion of princely states with the rest of the country, the task of consolidation of forests, unification of forest laws and extension of scientific management on a reasonably uniform basis became the most important preoccupation of the forest administration at the national and provincial levels. In the early 1950s, most of the states enacted national legislation affecting the land tenure systems and large areas of privately owned forests came under the forest departments of the state. A national Forest Policy was enacted in 1952 with a view to manage forest resources nationwide. Indian Forestry, which was previously in "State List" was included in 'Concurrent List' after the 42nd amendment of the Indian Constitution in 1976. Moreover, according to the 42nd amendment, ten fundamental duties were included for the citizen of India. The 7th fundamental duty of all citizens of India is "*to protect and improve natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures*". On the basis of the above constitutional amendment, three new directive principles were added to the original fourteen directive principles of Indian Constitution. One of the three new directive principles is related to *promotion of natural environment including forests, lakes, rivers and wild life by the State*. Thus the constitutional amendment of 1976 prepared base for more intensive participation of the Union Government in the conservation of Indian forestry. Subsequently, in order to protect forest areas of the country, the Government of India passed the Forest Conservation Act of 1980 and enacted the Indian National Forest Policy in 1988. The constitutional amendments of 1976 are thus considered a landmark in the developmental history of Indian Forestry.

Development of forestry has been assigned a special significance by planners, economists and politicians. Under the Five Year Plans, man-made forests were grown on an unprecedented scale. Forest development found an important place in the national plans. But unfortunately, very meager amount of finance were allotted for its development. Though forestry covers not less than one-fifth of India's geographical area, it has received a meager proportion of budgetary allocations (Table 7.2).

Table 7.2

Forestry in India Under Five Year Plans

Plan Period	Focus	Plan outlay (Rs.Crore)	Afforestation (in lakh ha.)
First Plan (1951-56)	Afforestation and rehabilitation of the degraded forests, plantation of economically and commercially important species suitable for match-wood and other industries, conservation of wildlife.	7.64 (0.39)	0.52
Second Plan (1956-61)		21.21 (0.46)	3.11
Third Plan (1961-66)	High value forest product, better techniques of timber extraction, attaining self-sufficiency in industrial timber, fuel wood and other forest products, plantation of industrially valuable species, plantation of quick growing species.	45.85 (0.53)	5.83
Annual Plans (1966-69)	Plantation of quick growing species, modernizing harvesting and planting techniques.	41.93 (0.63)	4.53
Fourth Plan (1969-74)	Increasing productivity of forests, link up forest development with forest based industries; develop forest as a support to rural economy, self-sufficiency in forest products, especially in major forest products as early as possible.	84.42 (0.54)	7.14
Fifth Plan (1974-79)	Production forestry, large scale man-made forests with the help of institutional financing, farm forestry, complying with recommendations of National Commission on Agriculture (1976) on forestry.	208.84 (0.51)	12.21
Sixth Plan (1980-85)	Conservation of existing forests, countrywide afforestation, social forestry, people's movement in forestry sector, programmes like tree for every child, eco-development force, eco-development camps and agro-forestry.	962.49 (0.71)	46.50
Seventh Plan (1985-90)	Forests for survival, continuation of social forestry programmes further, large scale afforestation of wastelands, creation of more sanctuaries and national parks, expansion of forestry research and training.	1859.10 (1.03)	88.00
Eighth Plan (1992-97)	Integrated Afforestation and Eco-Development Project, Fuelwood and Fodder Project, Non-Timber Forest Produce Scheme, Grants-in-Aid Scheme, Seed Development Scheme, Association of scheduted tribes and rural poor in regeneration of degraded forests on pilot basis in 9 states, Modern forest fire control methods in India.	4081.87 (0.94)	102.14
Ninth Plan (1997-2002)		7390.00 (0.86)	76.40*

***** Estimated figure

Note : Figures in parentheses represent percentage of total financial outlay.

Check Your Progress 1

1) What are the benefits rendered by forests?

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2) Why is the 42nd amendment of the Indian Constitution considered a landmark in the development history of Indian forestry?

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3) Fill in the Blanks.

i) Forest is in ..... list of public administration in India.

(State, Central, Concurrent)

ii) Under Five Year Plans ..... forests were grown on an unprecedented scale.

(natural, man-made)

iii) Forests encompass about ..... of the geographic area of India.

(one quarter, half, two-third)

iv) The first step for forest conservation began in India with raising of teak plantation at ..... in 1842.

(Nilambur, Darjeeling, Sind Province)

7.3 FOREST POLICY IN INDIA

Forest policy connotes the actions of a government for preservation, maintenance and enhancement and optimum utilization of forest resources during a particular period to attain national welfare. Forest policy has to undergo changes according to changed circumstances.

7.3.1 Forest Policy under British Rule

History of forestry in pre-independence India is one of the continuous over exploitation. For the first time in 1855, Lord Dalhousie, the Governor General of India proclaimed a forest policy saying that timber was state property and individuals had no rights or claims on it. In order to implement this policy an Indian Forestry Service was organized whose primary objective was conservation and protection of existing forests.

National Forest Policy, 1894

In the year 1894, the Department of Forest issued a circular (later on popularly known as the *old forest policy*) which formed the basis of future policy for forestry of India. The circular stated that forests of India were the property of the state and they were to be administered to fulfill the objectives of providing benefits to the taxpayers of India as a whole and regulated benefits to the people living within and in the vicinity of forests. The old forest policy categorized forests into four groups, viz., forests to be preserved, forests for commercial use, minor forests and pasture lands.

The British forest policy made provision for the relinquishment of forest area for agricultural use on some conditions. However, the policy notwithstanding, unconditional practices of converting forest areas into agriculture land continued. The tribes of India were never induced to stop the harmful practice of shifting cultivation. Moreover, the practice of illegal cutting of trees and removing timber from forests by the agencies and contractors were sustained. The development of forest communication was neglected during this period. As a result, proper supervision of forests remained a difficult task.

7.3.2 Forest Policy in Post-Independence Period

The national forest policy could not be formulated after attainment of Independence for a period of about five years due to emergence of complicated political, economic and social problems in the country during that period.

A. National Forest Policy, 1952

The Government of India enunciated the first national forest policy in 1952. It was clearly accepted in the policy that the *old forest policy* (1894) still consisted many good ideas but reorientation was required in the policy in view of the changes that took place between 1894 and 1952. The main objective of the Forest Policy Resolution of 1952 was to make development of forests as one of the important national commitments in the larger interest of the economy and human welfare. The policy discouraged indiscriminate extension of arable land by cutting of forests. It proposed classification of forests on a functional basis into (i) protection forests, (ii) national forests, (iii) village forests, and (iv) tree lands. It emphasized on evolving a system of balanced and complementary land use. The policy laid stress on the following:

a) persuading away the tribal people from the harmful practice of shifting cultivation,

b) increasing the efficiency of forest administration by having adequate forest laws,

c) giving requisite training to the forest staff of all ranks,

d) providing adequate facilities for the management of forests and for the conduct of research in forestry and forest products utilization,

e) controlling grazing in forests, and

f) promoting the welfare of the people through forestry.

The important features of the forest policy resolution of 1952 are as follows:

a) In order to achieve self-sufficiency, forest earnings should be increased at a higher rate.

b) It lays stress on evolving a system of balanced and complementary land use.

c) It emphasizes the need for establishing tree lands for the amelioration of physical and climatic conditions.

d) It provides for progressively increasing the areas of grazing, timber for agricultural implements and firewood to release cattle dung for use as manure.

e) It proposes the classification of forests on a functional basis.

f) It recognizes the importance of forests in the development of a balanced economy and reiterates that an adequate share of land be earmarked for the growth of forests.

g) It lays stress on evolving appropriate policies and measures to encourage the development of forests with a view to developing agriculture, forest based industries and increasing the land under them to step up the export of forest commodities.

The National Forest Policy, 1952, rightly emphasized optimum use of forest land. Optimum use consisted of balanced and complementary use of forest resources. It required detailed survey, continuous planning and careful execution. Special attention was paid on promotion of protective forests as they play a vital role in checking soil erosion, conserving moisture, controlling floods and sand dunes, and promoting physical and climatic balance of the country. The policy also emphasized on the expansion of tree cover in land owned by government, public as well as by private agencies.

B. National Forest Policy, 1988

Indian Forestry, which was previously in the "State List" was included in the 'Concurrent List' after the 42nd amendment of the Indian Constitution in 1976. As a matter of fact, the amendments necessitated the formulation of the second National Forest Policy, so that the Union Government might adopt more assertive role for the promotion of forestry sector. Also there had been profound changes in the Indian economy between 1952 and 1988, which adversely affected environmental stability as well as ecological balance including atmospheric equilibrium of India. The second national forest policy was enunciated in December 1988.

The basic objectives the National Forest Policy, 1988 are:

i) Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country.

ii) Conservation of the natural heritage of the country by preserving natural forests with vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country.

iii) Control of soil erosion and denudation in the catchments of rivers, lakes and reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for the retardation of siltation of reservoirs.

iv) Increase in the forest/tree cover in the country through massive afforestation and social forestry programmes, especially on all denuded, degraded and unproductive lands.

v) Meeting the requirements of fuelwood, fodder, minor forest produce and small timber of the rural and tribal populations.

vi) Increase in the productivity of forests to meet essential national needs.

vii) Efficient utilization of forest produce and maximizing substitution of wood.

viii) Creation of people's movement with the involvement of women, for achieving these objectives and to minimize pressure on existing forests.

The policy laid emphasis on i) protection of existing forests and forest land; ii) increasing forest and vegetation cover on hill slopes, in catchments of rivers, lakes and reservoirs and ocean shores and on semi-arid, arid and desert tracts; iii) discouraging diversion of good and productive agricultural lands to forestry in view of the need for increased food production; iv) encourage planting of trees alongside roads, railway lines, rivers and streams, canals, and on other unutilized lands under State/corporate, institutional or private ownership; and v) raising green belts in urban/industrial areas as well as in arid tracts. The national goal was to have minimum of one-third of the total land area under forest or tree cover. In the hills and in mountainous regions, the aim was to maintain two-third of the area under such cover in order to prevent soil erosion and land degradation and to ensure the stability of the fragile eco-system. A massive need-based and time-bound programme of afforestation and tree planting, with particular emphasis on fuelwood and fodder development, on all degraded and denuded lands in the country, whether forest or non-forest land, was the national

imperative. Diversion of forest land for any non-forest purpose was subject to the most careful examinations by specialists from the standpoint of social and environmental costs and benefits. Projects like construction of dams and reservoirs, mining, industrial development and expansion of agriculture, etc. which involve diversion of forest land were required to at least provide funds in their investment budget for regeneration/ compensatory afforestation.

7.4 CHANGING NATURE OF FORESTY IN INDIA

Forests have acquired increasing importance in the recent past not only for their social and economic benefits but also for the ecological and environmental functions. Accurate and updated information on forest resources thus have gained relevance. In a country like India where forests are rich and diverse, collection and compilation of information on forest covers, growing stock, annual increment, species composition, biodiversity, non timber forest produce, etc. is a daunting task. Initially, those areas were considered as forest lands which are statutorily notified as forest though may not necessarily bear forest cover. The broad categories of such legal status of forest area are *reserved*, *protected* and *unclassed* forests. These are owned and managed by the Forest Departments. With the advancement of technology, forest cover of the country was assessed using remote sensing technology of visual interpretation technique through satellites. The Forest Survey of India (FSI) did the first exercise with 1981 to 1983 as data period and the report was published in 1987. Since then, forest cover is being assessed biennially by the FSI.

The forest cover of the country is broadly classified into three classes, namely *dense forest*, *open forest* and *mangroves*. All lands with tree cover of canopy density of 40% and above are called dense forests. On the other hand, all lands with tree cover of canopy density between 10 and 40 per cent are called open forests. The salt tolerant forest ecosystems, found mainly in tropical and sub tropical inter-tidal regions, are known as mangroves. As per the latest survey, India has 63.73 million hectare of forest cover constituting 19.3 per cent of the geographic area, out of which 37.74 million ha (11.48%) is dense forest, 25.50 million ha (7.76%) open forest and 0.49 million ha (0.15%) mangroves. Madhya Pradesh accounts for the largest forest cover of the country, i.e., 20.68% followed by Arunachal Pradesh (10.80%), Orissa (7.38%), Maharashtra (7.32%) and Andhra Pradesh (6.94%). The seven Northeastern states taken together have 25.70% of the total forest cover in the country.

In Table 7.3 we present the changes in area under forest cover since the beginning of the First Five Year Plan. You can see from the table that the average annual loss of forest cover has been very little during the past couple of decades and there has been an increase in forest cover off late. The credit for this goes mainly to regeneration of forestry through social forestry measures, conservation of forest resources, and more importantly, people's awareness of the need for conservation and participation in regeneration of forest cover.

During the beginning of planning era in India, commercial aspect was predominant under forestry plantations. The aim was to supply raw materials to forest based industries, which ultimately would strengthen the industrial base of Indian economy. Later on stress was also laid on growing fuelwood, small timber for farm implements and house construction, cottage industries, etc. under *social forestry* programmes in order to release the pressure from natural woods. The oil crisis in the early 1970s concentrated more attention on regeneration of renewable energy resources like forests/firewood. The National Commission on Agriculture also gave emphasis on tree cropping and urged for concerted efforts by the government, the people and the banking industry in this respect. The National Forest Policy, 1988, envisages massive afforestation and social forestry programmes on all denuded, degraded and unproductive

lands to achieve the target of bringing one third of national geographic area, i.e., about 110 million hectare land under forest cover. This implies that approximately, 30 million hectares of non-forest wastelands are to be brought under tree cover. This could be possible only by promoting farm-forestry, community forestry and agro-forestry by government agencies, NGOs and individuals. The National Wasteland Development Board designed special programmes and schemes for this purpose. The National Afforestation and Eco-development Board (NAEB), created in July 1992, also promoted various schemes to enhance the forest cover. We will discuss these programmes below.

Table 7.3
Forest Cover in India

Data period	Forest cover (million ha.)	Percentage to geographic area	Average Annual change in forest area
1951–52#	73.4	22.33	
1961-62#	69.0	20.99	- 0.44
1975-76#	74.7	22.73	- 0.29
1981-82#	74.7	22.73	0.00
1981-83*	64.08	19.49	
1985-87*	63.88	19.43	-0.05
1987-89*	63.93	19.45	0.03
1989-91*	63.93	19.45	-0.001
1991-93*	63.89	19.45	-0.025
1993-95*	63.34	19.27	-0.27
1996-98*	63.73	19.39	0.13

 # Recorded forest area : All lands statutorily notified as forest though they may not necessarily bear tree cover.

*** Forest cover :** All lands with a tree canopy density of more than 10 per cent though they may not be statutorily notified as forest area.

7.4.1 Integrated Afforestation and Eco-Development Projects (IAEPS) Scheme

This scheme is intended to promote afforestation and development of degraded forests by adopting an integrated watershed-based approach. This 100% Centrally Sponsored Scheme envisages micro-plan preparation by a multi-disciplinary team in consultation with the local people. During the Eighth Plan period under this scheme an area of about 2,89,917 ha. was covered with a total expenditure of Rs. 203.12 crore.

7.4.2 Fuelwood and Fodder Project Scheme

This scheme is meant for augmenting the production of fuelwood and fodder in 229 identified fuelwood deficient districts of the country to meet the needs of the communities. The cost of raising the plantations of fuelwood and fodder is shared equally between the Central and the State Governments. Under this scheme an area of about 3,87,216 ha. was covered with a total expenditure (central assistance component) of Rs.154.19 crore during the Eighth Plan period.

7.4.3 Non-Timber Forest Produce Scheme

The scheme provides for financial assistance to state governments for increasing the production of non-timber forest produce (NTFP), including medicinal plants by raising plantations. This 100% Centrally Sponsored Scheme has a focus on creation of NTFP plantation assets in tribal areas. During the Eighth Plan period an area of about 1,06,170 ha. was covered with a total expenditure of Rs. 56.47 crore under this scheme.

7.4.4 Grants-in-Aid Scheme

Promotion of people's participation in afforestation activities is a mandate of the NAEB. Under this scheme, non-governmental organizations (NGOs) are assisted financially for taking up afforestation and tree planting in public and private wastelands adjoining forest areas and building upon people's movement for afforestation. A total of 338 projects were sanctioned and Rs. 7.51 crore was released to voluntary agencies during Eighth Plan period.

7.4.5 Seed Development Scheme

Developing facilities for collection, testing, certification, storage and use of quality seeds for afforestation purposes is the aim of this scheme. The scheme also aims at establishing seed certification protocol in the long run, which would ultimately increase the productivity of forests. Under this scheme a total amount of Rs. 7.80 crore was released to States/UTs during Eighth Plan period.

7.4.6 Afforestation under 20-Point Programme

NAEB, in the Ministry of Environment and Forests, is the nodal agency for fixing targets and monitoring the achievements for afforestation and tree planting activities under point 16 of the 20-Point Programme. During the Eighth Plan period under 16 (a) (Seedling distribution) 501.07 million seedlings were distributed and under 16 (b) (area coverage) 4.56 million ha. of area was afforested bringing the total national area covered under afforestation to 7.03 million ha.

7.4.7 National Afforestation Programme

To improve upon the afforestation in India, the Ministry of Environment and Forests has decided to merge all the existing schemes, viz., Integrated Afforestation and Eco-Development Projects Scheme (IAEPS), Area Oriented Fuelwood and Fodder Projects Scheme (AOFFPS), Conservation and Development of Non-Timber Forest Produce, including Medicinal Plants (NTFPS), and Association of Scheduled Tribes and Rural Poor in Regeneration of Degraded Forests (ASTRP) into one - National Afforestation Programme. The dovetailing of the programmes is expected to reduce multiplicity and ensure better percolation of the benefits. The restructured programme is proposed to be implemented through a two-tier set-up comprising Forest Development Agencies (FDAs) and Joint Forest Management Committees (JFMCs) during the Tenth Five Year Plan.

Check Your Progress 2

1) What are the basic elements considered in a forest policy?

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2) What are the basic objectives of the National Forest Policy,1988?

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3) Distinguish between *forest land* and *forest cover*.

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7.5 JOINT FOREST MANAGEMENT

Social forestry programmes were very effective during the early 1980s. However, they lost the vigour during the later part of the decade. People's participation in enacting the forest promotion schemes was felt more necessary. Although the National Forest Policy, 1988, redefined the objectives of forest management, it did not envisage any direct role for the people in day-to-day management of forests. It implicitly believed that government. alone should control forests, with changed objectives. The arguments in favor of management of forests by government are:

1) Forest management is associated with a wider range of externalities, as these provide external benefits to the rest of the ecosystem.

2) Forest department operatives have often argued that the management of forests requires a level of professional training and scientific competence that is outside the capacities of peasants and forest users.

3) The time horizons of forest management would favor public ownership and public investment.

4) It will allow major economies of scale and a long-term planning framework.

The strong case for exclusive government management of forests is weakened because government mechanism alone is not in a position today to enforce its property rights on forests. Forests are subject to intense pressure from human, livestock and urban markets. Over-exploitation of forests by people, which has increased in the last few decades, is caused by several factors. These are:

1) Increasing marginalisation of small landowners has forced them to seek new avenues of income like head loading.

2) As village commons deteriorated, villagers turned to government forests as substitutes.

3) Government policies raising commercial plantations further restricted the people from the forest resource. The orientation of forest lands from the people who

need it for satisfaction of their needs, and consequently forestry turning into open access lands has been one of the main causes of degradation.

Realizing these realities, the Government. of India introduced the participation of people in managing forests by issuing a Joint Forest Management (JFM) resolution in June 1990. It encouraged the forest departments to involve people in the management of forests. The resolution specifies the rights of the protecting communities over forest land. Those protecting forests are to be given usufructs like grasses, laps and tops of branches, non-timber forest produce and a portion of the proceeds from the sale of trees when they mature. (This varies from 20-60% of timber sold.) The order exhorts the state forest departments to take full advantage of the expertise of committed voluntary agencies for building up meaningful people's participation in protection and development of degraded forest land. According to JFM philosophy, the forest people interaction was conceptualized to harmonize the interest of people and long-term sustainability in a mutually supporting manner.

The JFM programme has now become the central point of future forest development projects funded by the Government of India and donor agencies like World Bank, SIDA and DFID. As many as 25 states in India have started practicing Joint Forest Management and about 36,130 forest protection committees are managing a total of 10.25 million hectare of forest land. The involvement of local communities in JFM is the maximum in the states of Madhya Pradesh, Bihar, West Bengal and Orissa.

7.6 FOREST AGRICULTURE INTERLINKAGES

The term agriculture has a wider meaning which includes cultivation of crops, livestock breeding, fishing, forestry, dairy and poultry farming, etc. In this context, the agricultural land use refers to the land used for production purposes, which has a spatial dimension. When loss of forests was felt through i) loss of biodiversity; ii) ecological imbalance; and iii) environmental hazards the necessity for restoring forest wealth and green cover on the earth was utterly felt. Forestry started to be practiced as a form of agriculture in i) non-forest lands; ii) village commons; and iii) private lands even interfacing with agriculture. The philosophy of forests has changed its colour from natural regeneration to manmade commercial cultivation of tree crops. Forestry is complementary to agriculture: (i) ecologically by way of regulation of soil, soil nutrient, water and microclimate, and (ii) economically through efficient utilization of the underemployed rural and tribal human power. Both forestry and agriculture are interlinked in many a way. Forestry agriculture interlinkages can be studied on the basis of their interface in land use, human ecosystem and ecological ecosystem (see Fig. 7.1).

7.6.1 Land Use Pattern

Land is the primary requirement for both forestry as well as agriculture. Under classical forestry, land under forest cover was cleared for agricultural practices. To say otherwise, forestry has given way for agricultural expansion. Under community forestry, tree crops are grown in non-forest areas and farmlands. In other words, agriculture has given room for forestry along with other farm practices. A range of agro-forestry possibilities exists in which trees, crops and livestock are grown symbiotically, each benefiting the other. Where agriculture and forestry are combined, the practice is called *agrosilviculture*. On the other hand, *silvipastoral* systems involve the combination of forestry and livestock and *agrosilvipastoral* systems are the combination of agriculture, forestry and livestock. All the agro-forestry land management systems aim at i) conservation of ecology, ii) optimization of land use with intentions to produce desired commodities, iii) protection from damages from external agencies like wind and running ground water, and iv) improvement of the site.

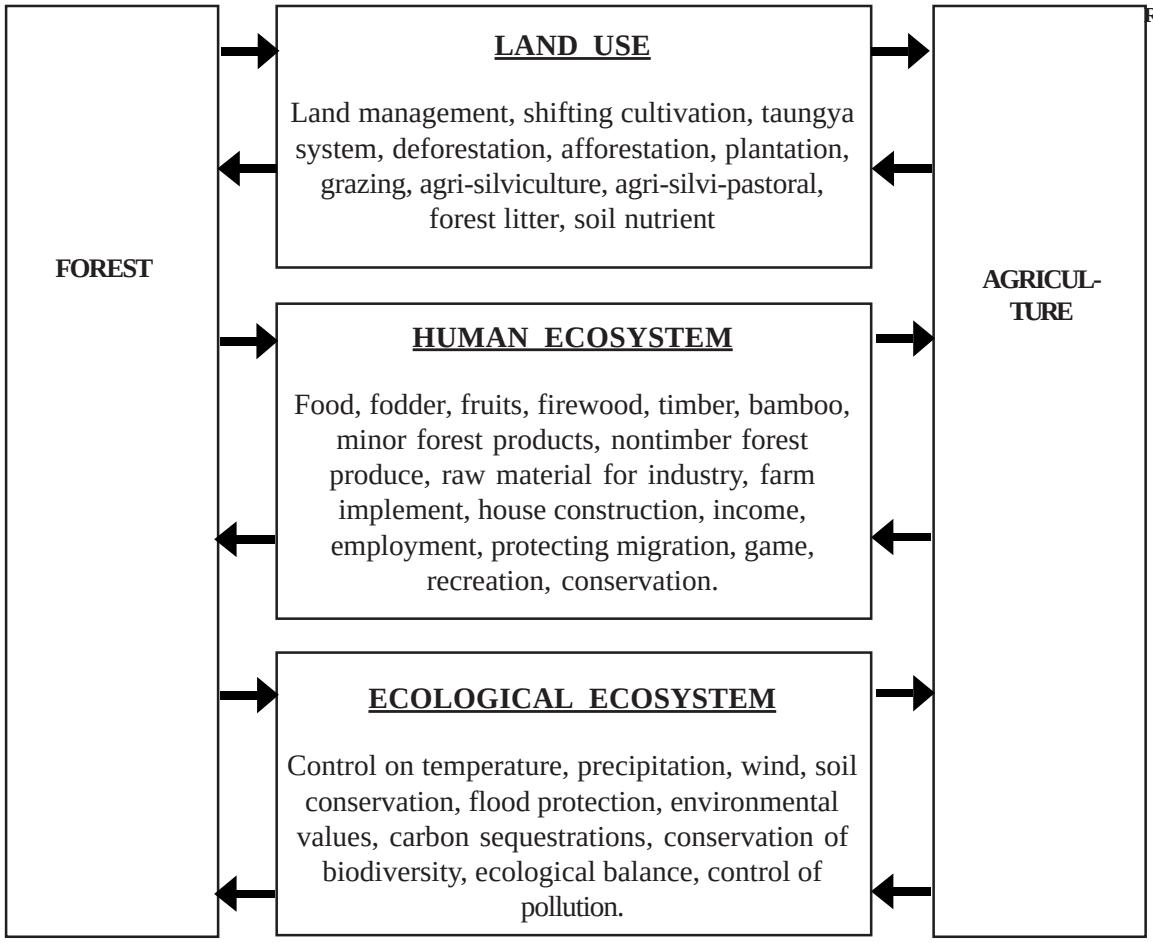

Fig. 7.1: Forest & Agriculture Inter-linkages

a) ***Shifting Cultivation***

Shifting cultivation is the oldest form of agro-silviculture. It is a *slash and burn* farming technique in which an area of forest is felled and burned, and crops grown in a primitive way on the cleared land for two or three years. Thereafter, forest is allowed to return on the discarded land over a fallow period of 10-15 years, during which soil fertility is restored, before it is cut again for practicing shifting cultivation. It is one of the most primitive form of farming agricultural crops. It is believed to have originated in the Neolithic period around 7000 BC and still extensively practiced by the tribes in forest areas. It is commonly known as 'Milpa' in Central America, 'Zande' in Africa, 'Chena' in Ceylone, 'Kaigin' in the Philippines, 'Tsembaga' in the Papua New Guinea. In India it is known as 'Jhum' in Assam, 'Adiabik' in Arunachal Pradesh, 'Hooknismog' in Tripura and 'Podu' in Orissa. The yield under shifting cultivation is generally very low. This does not help the tribes in getting adequate returns from the land. Instead it causes irreparable damage to the valuable forest wealth.

b) ***Taungya* System**

Taungya is another form of agro-silvicultural land management system, which is mainly practiced in forest land. This practice was developed in Burma with a view to raise forest plantations virtually free of cost. In India also the practice has retained the name and is being practiced in states like Uttar Pradesh, Madhya Pradesh and Kerala. Under this practice, the forest land, after clear felling, is leased to a prospective farmer who is given all the facilities to stay on the farm and cultivate the clear felled area for a year before he is asked to raise forest plantations in a specific design as approved by the forest department. Because of the stored fertility the farmer harvests bumper crop for the first year, which is an attraction for the *taungyadar*. In the

second year he carries out forest plantations along the lines as directed by the forest department and continues to cultivate in between the plantation lines. In most of the cases the cultivation is continued for a period of one or two years after planting trees because thereafter the plants suppress the agricultural crop. Thereafter, the taungyadar shifts to another adjacent patch of clear felled forest land for carrying out similar operations. The system of management is so designed as to permit continuity of work.

In some of the states, this practice has now been given up. The main reason is that the taungyadars neglect tree planting and concentrate mainly on agriculture and later on refuse to leave the area. This practice has done a lot of harm to the forest preservation in some of the states in the country.

c) ***Social Forestry***

Social forestry is a potential approach to minimize unsustainable withdrawals from forests by way of producing fuel wood, fodder and timber in conjunction with agricultural crops on non-forest land. The concept of social forestry was introduced in India by the National Commission on Agriculture in 1976 although it was in vogue in different forms and different contents for a long time. The Forest Department defines social forestry as growing of trees on lands not held by the Forest Department. The basic objective behind this approach is to develop fuel-food-fodder production system on uncultivable land such that this would meet the needs of rural population for small timber, fuel and fodder; and also could minimize the pressure on forests. Social forestry can be practiced along canals, railway lines, roadsides, village common lands, village approach roads, camping grounds, school yards, community buildings, etc. Social forestry covers farm forestry, extension forestry, agro forestry, afforestation, recreation forestry, etc. The forms of social forestry along with their subdivisions have been explained in Fig. 7.2.

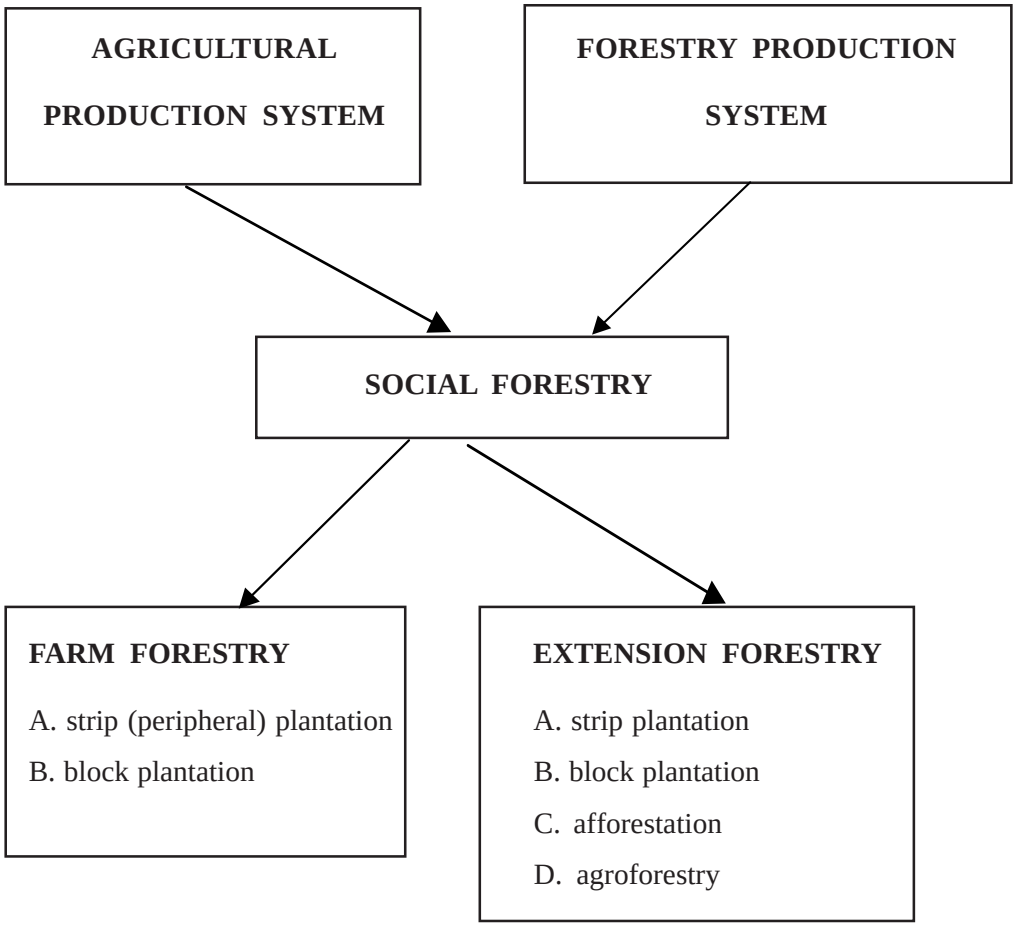

Fig. 7.2 : Social Forestry

The broad objectives of social forestry are as follows:

i) Fuel wood supply to rural areas and replacement of cow dung, which may be better used as manure;

ii) Small timber supply for rural housing and agricultural implements;

iii) Provide timber for construction, etc.

iv) Provide green fodder to the livestock and green manures to enrich soil fertility;

v) Protect agricultural fields against wind and wild animals; and

vi) Meet the recreational needs of the rural population.

d) ***Farm Forestry***

Practice of forestry in farms or village lands with integration of other farm operations is known as farm forestry. Farm forestry is one of the major forestry initiatives in recent times. In common usage, it refers to growing trees by individual farmers on their farmland, usually as cash crops. This is accomplished by relatively resource rich farmers, through commercial production using high level inputs, better technical package and short duration species. On the contrary, the low input approach to farm forestry is for relatively resource-poor farmers with the objective of obtaining small yet attractive returns with minimal additional investment. The beginning of farm forestry in India was made in the states of Tamil Nadu and Gujarat in the early 1970s. Later on it was extended to other parts of the country.

Peripheral Plantation **:** It consists of plantations of one or two lines of trees along the field boundaries in all or some sides. Peripheral plantation has many advantages: i) it does not occupy much space, ii) does not demand management skills, iii) provides supplementary income, and iv) it is a resource to meet petty but urgent needs of the farmer. Plant species like *eucalyptus*, *acacia catechu* (khair), *poplar*, *moringa olifera*, etc. are generally preferred for peripheral plantation.

Block Plantation **:** It is the most widely practiced design of tree planting on farms. Under this system, the farmers plant tree species as a crop on their land. Though all groups of farmers practice this system it is generally preferred by the large farmers as they have relatively high land holdings. The high cost of cultivation and long gestation period also act as hindrances for the small and medium farmers to adopt block plantation on large scale.

e) ***Extension Forestry***

Extension forestry refers to growing mixed forestry comprising raising of grass and leaf fodder, fruit trees on suitable wastelands, panchayat lands and village commons. Afforestation of degraded forest land and raising of plantations of quick growing species on sides of roads, railway lines, canal and river banks, etc. also form part of extension forestry. These activities are mainly conducted by the government departments, NGOs, village communities, etc. with financial support from government sources as well as external funding agencies.

f) ***Strip plantation***

Plantation of trees on strips or lines is the simple explanation of strip plantation. There are five types of strip plantation currently followed in India. These are roadside plantations, rail side plantations, canal-bank plantations, river-bank plantations and foreshore plantations. The basic objectives behind adopting strip plantation are to:

- provide shade to travelers
- enhance aesthetic values of roads, rail lines, canal banks, etc.
- augment supply of fuelwood and fodder

- make use of unutilized land on both sides of the road, rail lines, canals, etc. for productive purposes
- generate employment and contribution to the state revenue
- maintain ecological balance and green house effect.

g) ***Agro Forestry***

Growing trees in agriculture is the simple explanation for agro-forestry but the basic concept is entirely different. Agro forestry system is a blend of the forest ecosystem and the agricultural system. It is a land use system, which enables the farmer to produce food and wood and at the same time conserve the ecosystem. Agro forestry is an approach to combine both agriculture and forestry that allows tree-crop interface in the same plot of land. This is a concept of multiple or mixed cropping pattern. In tropical countries like India, agro-forestry has special relevance for its capacity to control soil erosion, enriching soil nutrient and fertility through litter fall, etc. In agroforestry one of the major considerations is to identify species that are compatible with the soil, agro-climatic and crop conditions. Due importance is always given to those species which improve the productivity of the site under agroforestry system.

7.6.2 Forest in Human Ecosystem

Since time immemorial forests have been an integral part of human ecosystem. It is nature's greatest bounty to the humankind. Human civilization was largely dependant on forests for food and shelter. Forests have been serving as the life supporting system for human being since the beginning of life on earth. With the advancement of agriculture, industrial development and urbanization, people though moved away from the forest related economic activities, their dependence on forest resources is still discernible. Even today in the developing countries like India large section of rural population, particularly tribes and those living on the fringes of forests, live in a forest based subsistence economy and depend on forests for meeting their various day to day needs.

Forests confer a host of direct and indirect benefits to human beings. It is the abode for tribes and people living in the fringes of forests. Nevertheless, forests provide food, fodder, fruits, nuts for sustaining life for many. Timber, bamboo and other wood are extensively used for construction of house and household goods as well as agricultural implements in agro-based rural economy. Firewood still constitutes the largest source of fuel for cooking and heating in rural areas. The minor forest products (MFPs) and other non-timber forest products (NTFPs) extend food and income support for farm labourers. Agriculture is a seasonal activity in most parts of the country. Distribution of land resources is also quite unfavourable to a large section of population as most of them are landless labourers or marginal landholders. The landless labourers and marginal as well as small farmers largely depend on forest resources. Forests support them with off-season employment opportunities by way of collecting MFPs, NTFPs; and through plantation and other forest developmental activities undertaken by Forest Departments. This in turn stops migration of farm labour to urban centers.

7.6.3 Ecological Ecosystem

Forests serve as a part of the climatic system and sustainable biodiversity. Forests have a vital role to play in i) reducing global warming, ii) balancing oxygen and carbon dioxide ratio, iii) increasing precipitation, iv) reducing local temperature, and v) moderating climatic extremes. The role of forests in retarding the water run-off, distributing rainfall, preventing soil erosion, reducing wind damage and safeguarding water supplies is often valued more than their output of wood. Forests sustain the ecological balance. The microclimate of an area mostly depends on topography and

vegetation within broad limits, established by forests. They exercise a positive influence on the ecological parameters. This influence increases with the increase in the density of the forests and the foliage. Forests i) discipline the rivers, ii) control the floods, iii) maintain the springs, iv) prevent erosion by water and wind, and v) keep the air cool and clean. In recent times the ecological relevance of natural wilderness has surpassed the economic significance of forests.

Check Your Progress 3

1) Fill in the blanks.

   a) The Government of India introduced the Joint Forest Management Resolution in .....

      (June 1990, July 1982, September 1988)

   b) The Forest Protecting Committees under JFM enjoy the right over .....

      (cutting and selling of trees, usufructs selling of forest land)

   c) Shifting cultivation is a ..... farming system.

      (slash and burn, hit and run)

2) Write short notes on:

   a) Farm Forestry

   b) Strip Plantation

   c) Agrosilvipastoral System

   d) Ecological relevance of forests.

7.7 LET US SUM UP

Forests play a crucial role in the socio economic life of the millions who live in a forest and rural based subsistence economy in India. Forests not only provide fuel wood, timber, fodder, etc. but also are the life supporting system and abode for the tribes and rural mass living within and fringes of forests. This sector encompasses about one quarter of the geographic area of the country. However, management of forests have been very poor during the past few decades. Forests in India were cleared for augmenting agricultural land and developmental needs like construction of roads and dams.

The pressure on forests has been beyond its carrying capacity. It has been thus the concern of the development planners to make productive use of the wastelands and other forest as well as non-forest land such that it would not only regenerate forest cover but also earn income and employment to the local people in addition to revenue to the government. It would also support restoring the ecological balance and minimize the pressure on natural forests. Efforts were initiated with laying down forest policies for sustainable management of natural forests and generation of manmade forests. During the early years of planning in India, commercial aspect was predominant under forestry plantations. The aim was to supply raw materials to forest based industries, which ultimately would strengthen the industrial base of the Indian economy. Later on stress was also laid on growing fuel wood, small timber for farm implements and house construction, etc. under *social forestry* programmes. The National Commission on Agriculture also gave emphasis on tree cropping and urged for concerted efforts by the government, the people and the banking industry. People's participation on large scale in Joint Forest Management and other social forestry practices has minimized the felling of natural forests and has helped regeneration of forest cover towards sustainable forest development.

7.8 KEY WORDS

Agrisilviculture : It is a land management system where plantation of tree crops and agriculture are practiced simultaneously on the same plot of land. Thus, this system represents a combined production system of wood and agricultural crops.

Agrosilvipastoral : It is a three dimensional production system designed for the concurrent production of agricultural crops, forest crops and fodder for rearing of domesticated animals on the same plot of land.

Bio-diversity : It entails all forms of biological entities inhabiting the earth including all varieties of plants, animals, birds, micro and macro organisms, and even genetic materials like seed and germplasms.

Ecological balance : It is the optimum combination of animate (biotic: plant and animal kingdom, human) and inanimate (abiotic: climatic, edaphic, hydrographic, physiographic) environmental factors which determine the process of living organism and their distribution on the earth.

Externalities : These are the gains and losses sustained by others as a result of action initiated by producers or consumers or both for which no compensation is paid. These are some times called third party effects, neighbourhood effects or spillovers. Examples: soil erosion, climatic changes, etc. are externalities resulting from clearing of forests.

NTFPs : (Non-Timber Forest Products) refer to all forest products excluding timber products like poles, log, veneer, etc. NTFPs include bamboo, leaves, fruits, roots, and other minor forest products.

Silvipastoral : It refers to the land management system in which tree crops are managed for the production of wood as well as for the rearing of domesticated animals. In this system, the animals are kept and permitted to graze within the forests. Thus, this system represents a combined production system in which wood and animals are raised.

Soil erosion : It refers to loss of topsoil of a land surface. Wind and running ground water are the chief agents of soil erosion. Loss of vegetation cover (deforestation) causes rapid erosion of topsoil.

Village commons : It refers to land areas where a community or all the villagers have exclusive rights on use and access without ownership rights. Examples: Panchayat lands, pasturelands, etc.

7.9 SOME USEFUL BOOKS

Agrawal, V. P., 1998, *Forests in India*, Oxford & IBH Publishing Co., New Delhi.

Desai, V., 1991, *Forest Management in India – Issues and Problems*, Himalaya Publishing House, Delhi

Jha, L. K., 1994 , *India's Forest Policies*, Ashish Publishing House, New Delhi

Jha, L.K. and P. P. Sen, 1991, *Social Forestry*, Himalaya Publishing House, New Delhi

Sharma, B. L. and R. L. Vishnoi, 2000, *Perspective on Social Forestry*, Daya Publishers, New Delhi

7.10 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Please see Section 7.1

2) Please see Sub-section 7.2.2

3) (i) Concurrent list, (ii) man-made, (iii) one quarter, (iv) Nilambur

Check Your Progress 2

1) Please see Section 7.3

2) Please see Sub-section 7.3.3

3) Please see Section 7.4

Check Your Progress 3

1) (a) June 1990, (b) usufructs, (c) slash and burn

2) (a) Please see Sub-section 7.6.5, (b) Please see Sub-section 7.6.7, (c) Please see Section 7.6.1, (d) Please see Section 7.8