Government Polytechnic Jalgaon

Academic Year 2020-21

Course

Environmental studies

Code

22447

Of EJ 5 I

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

GOVERNMENT POLYTECHNIC, JALGAON

(0018)

Program Name And Code : ELECTRONICS &TELECOMMUNICATION

Course Name And Code : ENVIRONMENTAL STUDIES (22447)

Academic Year : 2020-21

Semester : Fifth.

A MICRO PROJECT

On

Prepare The Detail Report On Forest System .

Submitted On _____2020 by the group of 4 students.

Sr. No.	Roll No.	Name Of Student	Enrollment No.	Seat No.
1	11	Prathamesh Saraf	1800180265	
2	23	Mohit Bhangale	1800180288	
3	24	Mandar Patil	1800180290	
4	25	Mohish Khadse	1800180291	

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

Certificate

This Is To Certify That Master Mr/Ms. **Prathamesh , Mohit , Mohish , Mandar** Roll No.**11, 23, 24, 25** Of **5th** Semester Of Diploma In **E&TC.** Of Institute, **Government Polytechnic, Jalgaon (Code:0018)** Has Completed The **Micro Project** Satisfactorily In The Subject environmental studies (22447) For The Academic Year 2020- 2021 As Prescribed In The Curriculum.

Place**: Jalgaon** Enrollment No:-

1800180265 ,1800180288,1800180290,1800180291

Date:-

Exam. Seat No:-

Course Teacher **Head Of The Department** **Principal**

(Electronics of telecommunication department)

Seal of Institution

TITLE

Prepare The Detail Report On Forest System

Submitted By-:

1. Prathamesh Saraf (11)
2. Mohit Bhangale (23)
3. Mandar Patil(24)
4. Mohish Khadase(25)

Under The Guidance Of:

Mr. B. M. chaudhari

INDEX

Forest Ecosystem

An ecosystem refers to a functional unit of nature in which living organisms interact among themselves as well as with the surrounding physical environment. Ecologists look at the entire biosphere as a global ecosystem. Besides, the forest ecosystem is a part of the terrestrial ecosystem

It, however, may vary largely in size i.e. from a small pond to a sea or a large forest. Usually, these are self-sustaining. We can divide the ecosystems into two broad categories, namely, terrestrial ecosystem and aquatic ecosystem.

The terrestrial ecosystem includes desert, grassland and forest ecosystem, whereas pond, lake, wetland and river ecosystem are parts of the aquatic ecosystem.

What is Forest Ecosystem?

A forest ecosystem is a functional unit or a system which comprises of soil, trees, insects, animals, birds, and man as its interacting units. A forest is a large and complex ecosystem and hence has greater species diversity.

Also, it is much more stable and resistant to the detrimental changes as compared to the small ecosystems such as wetlands and grasslands.

A forest ecosystem, similar to any other ecosystem, also comprises of abiotic and biotic components. Abiotic components refer to inorganic materials like air, water, and soil. Biotic components include producers, consumers, and decomposers.

These components interact with each other in an ecosystem and thus, this interaction among them makes it self-sustainable.

Structural Features of the Forest Ecosystem

The two main structural features of a forest ecosystem are:

1. **Species composition:** It refers to the identification and enumeration of the plant and animal species of a forest ecosystem.
2. **Stratification:** It refers to the vertical distribution of different species which occupy different levels in the forest ecosystem. Every organism occupies a place in an ecosystem on the basis of source of nutrition. For example, in a forest ecosystem, trees occupy the top level, shrubs occupy the second and the herbs and grasses occupy the bottom level.

Components of a Forest Ecosystem

The components of a forest ecosystem are as follows:

1.Productivity

The basic requirement for any ecosystem to function and sustain is the constant input of solar energy. Plants are also the producers in a forest ecosystem.

Forest Producers

Let's start your look at forest ecology where energy from the sun enters the system: at the producer level, made up of organisms that can manufacture their own energy from this solar input. Green plants conducting photosynthesis serve as the producers of a forest ecosystem, and in the tropical rainforest of the Amazon, typically arrange themselves in four layers.

The *emergent layer* includes huge trees towering 165 feet or more that are spaced far apart. Beneath these emergent trees lies the main *canopy*, composed of closely spaced trees generally 65 to 165 feet tall. They provide fruits, nectar and seeds for many creatures.

The *understory* supports few plants as it receives very little sunlight. Almost nothing grows on the *forest floor* as it is devoid of sunlight.

There are two types of productivity in a forest ecosystem, primary and secondary. Primary productivity means the rate of capture of solar energy or biomass production per unit area over a period of time by the plants during photosynthesis.

Primary Consumers

Primary consumers can't manufacture their own energy and instead obtain it by eating green plants. Scientists call such plant-eating animals herbivores. Herbivores may eat a wide variety of different plant materials depending on their physical adaptations and habitat preferences.

In the Amazon, a semi-aquatic rodent known as a capybara, forages on the forest floor and in wetlands for grasses and water plants. Other primary consumers, such as the red howler monkey, live in the rainforest canopy and feed on the leaves, flowers, fruits and nuts of trees.

It is further divided into Gross Primary Productivity (GPP) and Net Primary Productivity (NPP). GPP of an ecosystem is the rate of capture of solar energy or the total production of biomass. However, plants also use a significant amount of GPP in respiration.

Thus, NPP is the amount of biomass left after the utilization by plants or the producers. We can hence say that NPP is the amount which is available for the consumption to herbivores and decomposers. Secondary productivity means the rate of absorption of food energy by the consumers.

Secondary and Tertiary Consumers

Secondary consumers feed on primary consumers (aka herbivores) to obtain the energy originally produced by green plants, while tertiary consumers feed on other secondary consumers.

These meat-eating animals are known as carnivores, and many act *both* as secondary and tertiary consumers depending on the creature they're preying on. The jaguar — the biggest mammalian carnivore in the Amazon — may prey on capybaras, a primary consumer, but also readily hunts such *secondary* consumers as caimans, in which case — as a carnivore eating a carnivore — it plays the role of a tertiary consumer.

Some secondary and tertiary consumers mix up an animal diet with plant matter. For example, the golden lion tamarin, a small monkey, will eat both fruits as well as insects and frogs. Such consumers are known as omnivores.

Predators thrive in all the layers of the Amazon rainforest. Ocelots and jaguars hunt for mammals, reptiles and birds on the forest floor and understory. Harpy eagles and the green snakes called emerald tree boas prey on birds, lizards and mammals for food.

Decomposition

Decomposition is an extremely oxygen-requiring process. In the process of decomposition, decomposers convert the complex organic compounds of detritus into inorganic substances such as carbon dioxide, water and nutrients.

Detritus is the remains of the dead plant such as leaves, bark, flowers and also the dead remains of the animals including their faecal matter. The steps involved in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralization.

In the process of fragmentation, detritivores break down the detritus into smaller particles. In the process of leaching, water-soluble inorganic nutrients descend down into the soil and settle as unavailable salts.

Under the process of catabolism, bacterial and fungal enzymes reduce detritus into simpler inorganic substances. Humification and mineralization processes take place during the decomposition of soil and not detritus.

The process of humification leads to the accumulation of humus which undergoes decomposition at a very slow rate. In the process of mineralization, the humus gets further degraded by microbes and inorganic nutrients are released.

3. Energy flow

Energy flows in a single direction. Firstly, plants capture solar energy and then, transfer the food to decomposers. Organisms of different trophic levels are connected to each other for food or energy relationship and thus form a food chain.

Energy Pyramid is always upright because energy flows from one trophic level to the next trophic level and in this process, some energy is always lost as heat at each step.

4. Nutrient Cycling

Nutrient cycling refers to the storage and movement of nutrient elements through the various components of the ecosystem. There are two types of Nutrient cycling, gaseous and sedimentary.

Types of Forest Ecosystems

Approximately 30 percent of the earth's surface is covered in all different types of forests, according to Elizabeth Mygatt, author of the article, "World's Forests Continue to Shrink." Mygatt goes on to further explain the crucial role that the forest ecosystem plays in maintaining a healthy planet, such as controlling the water cycle and stabilizing soils, assisting in leveling the climate by saturating and storing carbon dioxide, providing a habitat for wildlife and supplying wood, food and medicines. Across the world there are several different kinds of forests. The textbook definition of ecosystem, as stated in "Elemental Geosystems," is, "a self-regulating association of living plants, animals and their non-living physical and chemical environment."

Tropical Rain Forest Definition

In a tropical rainforest days usually last 12 hours, with temperatures averaging around 77 degrees F. A surplus of rain and high insolation (sunlight) are other year-round attributes of a tropical rainforest. Tropical rainforests cover the Amazon region, as well as equatorial regions in Africa, Southeast Asia, the east coast of Central America and elsewhere along the equator. These types of forest ecosystem are characterized by broadleaf evergreen trees, vines, tree ferns and palms.

Many tropical rainforests are known for their incredible biodiversity. Jungles like the Amazon are home to thousands of different types of species. Those include animals that crawl along the ground, like insects, lizards and rodents, as well as those that swing through the trees, like monkeys. Tropical rainforests also house vicious predators like anacondas and jaguars.

Tropical Seasonal Forest

Located on the edges of rainforests are the tropical seasonal forests that receive dwindling and irregular rainfall. Some of the key parts of a forest in this zone are broadleaf evergreen

trees, some deciduous trees and thorn trees. Deciduous trees lose their leaves during the winter.

Temperate Evergreen and Deciduous Forest Biome

Found in North America, Europe and Asia, temperate evergreen and deciduous forests tend to blend together at times. Needleleaf and broadleaf trees inhabit the forests. In southern and eastern areas that are fervent with evergreen pines, controlled forest fires still take place as the natural cycle of forest re-growth and enrichment.

They are called temperate forests because of their weather conditions. Compared to the extreme heat and humidity of a tropical rainforest, temperate evergreen and deciduous forests have moderate climates, with pleasantly warm summers and bearably chilly winters.

Boreal Forest

Boreal forests are home to many of the plants and animals typically thought of as forest-dwellers, such as:

- foxes
- moose
- reindeer
- bears
- squirrels
- wolves

Plants like fungi, mosses and lichen do well in the boreal climate, because they are tough enough to survive what can often be extremely cold, icy winters.

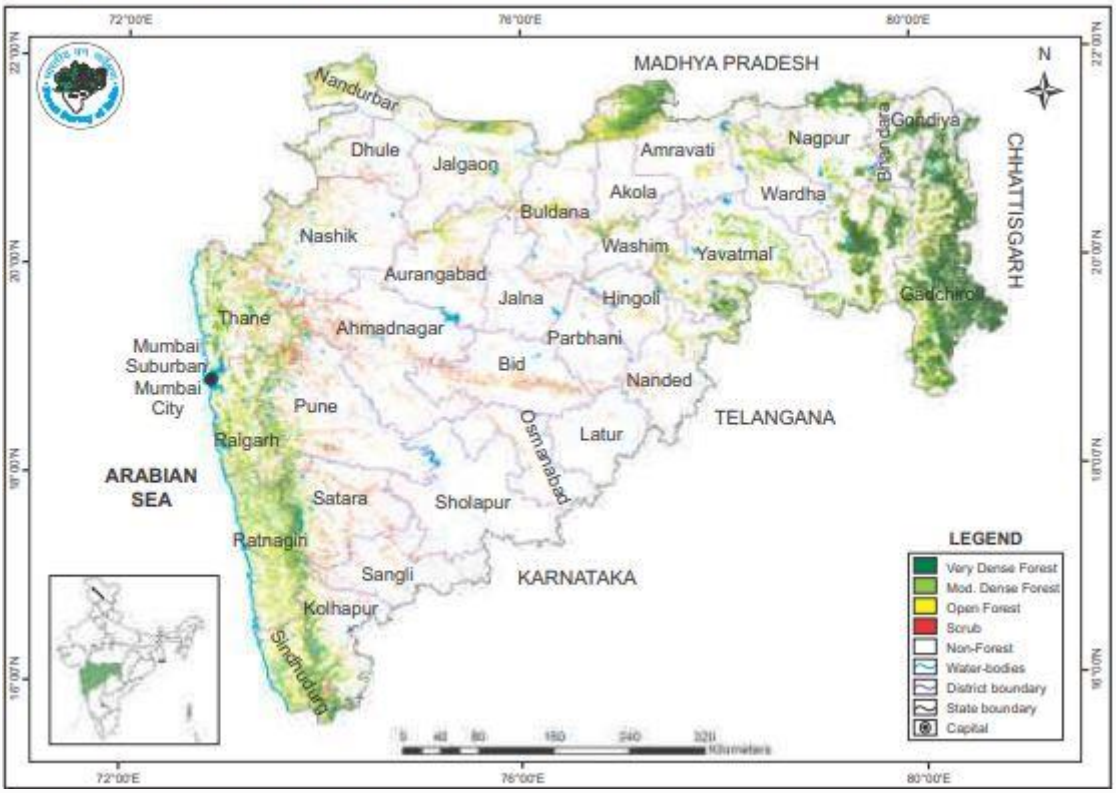
Savanna and Woodland

Savanna and woodland ecosystems have a susceptibility to fires and the ability to rejuvenate and re-grow. Prevalent in South America, Africa and Australia, savannas and woodlands are characterized by vast areas of grasslands, bush thickets and clusters of sparse trees with flattened crowns.

Because of pollution and deforestation, many types of forests around the world are in need of extra protection. It's important to remember how important a role forests play in the planet's ecosystem, and to do what you can in order to help the conservationists fighting to protect the plants and animals that live within the world's forests.

Forest Survey of Maharashtra

FIGURE 11.16.3 Forest Cover Map of Maharashtra



Situated in the western peninsular region of the country, Maharashtra has geographical area of 3,07,713 sq km, which is 9.36% of the geographical area of the country. The State lies between 15°35' N to 22°02' N latitude and 72°36' E to 80°54' E longitude and state is bordered by Gujarat & Madhya Pradesh in the north, Chhattisgarh in the east, Telangana, Karnataka and Goa in the south and Arabian sea on the west. The State has three physiographic zones namely Deccan Plateau, Western Ghats and West Coast. It experiences a tropical monsoon climate with hot, rainy and cold weather seasons and dry summers. The annual rainfall ranges between 400 mm to 6,000 mm and the annual temperature varies from 25°C to 27°C. The State is drained by number of rivers which include Godavari, Bhima, Narmada, Tapti, Koyna and Krishna. The State has 35 districts, amongst which 12 are tribal and 7 are hill districts. As per the 2011 census, Maharashtra has a population of 112.37 million accounting to 9.28% of India's population. The rural and urban population constitutes 54.78% and 45.22% respectively. The tribal population of the State is 9.35%. The population density of the State is 365 per sq km, which is close to the national average. The 19th Livestock census 2012 has reported a total livestock population of 32.48 million in the State.

Land Use Pattern

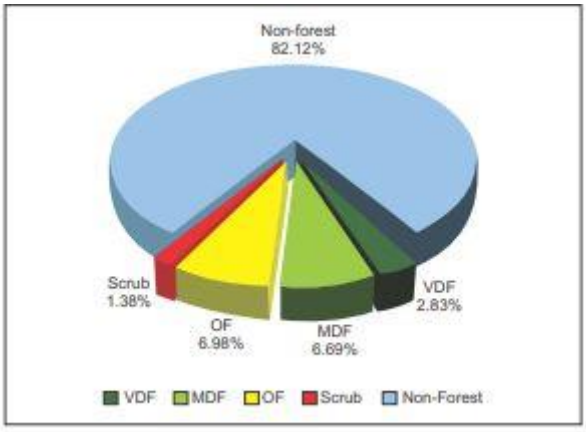
Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	30,771	
Reporting area for land utilization	30,758	100.00
Forests	5,201	16.91
Not available for land cultivation	3,209	10.43
Permanent pastures and other grazing lands	1,249	4.06
Land under misc. tree crops and groves	249	0.81
Culturable wasteland	919	2.99
Fallow land other than current fallows	1,188	3.86
Current fallows	1,399	4.55
Net area sown	17,344	56.39

A Brief Overview of Forestry Scenario

Maharashtra, the third largest State in the country is ranked second among the States in terms of the recorded forest area. Western Ghats of the State have very rich biodiversity. As per the Champion & Seth Classification of Forest Types (1968), the forests in Maharashtra belong to six Forest Type Groups which are further divided into 17 Forest Types. The high rural population of the State depends on the forests considerably for livelihood and basic needs. The State forest department encourages the village communities and other stakeholders to participate in plantation activities. Several initiatives have been undertaken by the State Forest Department like training the farming communities; the concept of easy farming through 'Maharashtra Green Tube Channel' wherein the farmers could learn the advance technologies of agriculture and forestry related activities through online media. In a first of its kind, a 24-hour toll free helpline number 1926 called 'Hello Forest' has been set up to provide information regarding plantations, protection and mass awareness. The Forest Department has created a mobile application called 'My Plants' to record details of the plantations such as numbers, species and location into the Forest Department's data base. To encourage public participation, the SFD has initiated the 'Maharashtra Harit Sena or Green Army, which is a body of dedicated volunteers to participate in the plantation, protection, and related activities. Recorded Forest Area (RFA) in the State is 61,579 sq km of which 49,546 sq Km is Reserved Forests, 6,733 sq km is Protected Forest and 5,300 sq km is Unclassed Forests. In Maharashtra, during the period 1st January 2015 to 5th February 2019, a total of 3797.16 hectares of forestland was diverted for nonforestry purposes under the Forest Conservation Act, 1980 (MoEF & CC, 2019). As per the information received from the SFD, a total area of 1,47,814 ha has been notified as reserved forests during 2014 to 2019. Six National Parks, 48 Wildlife Sanctuaries and 6 Conservation Reserves constitute the Protected Area network of the State covering 3.03% of its geographical area.

Forest Cover

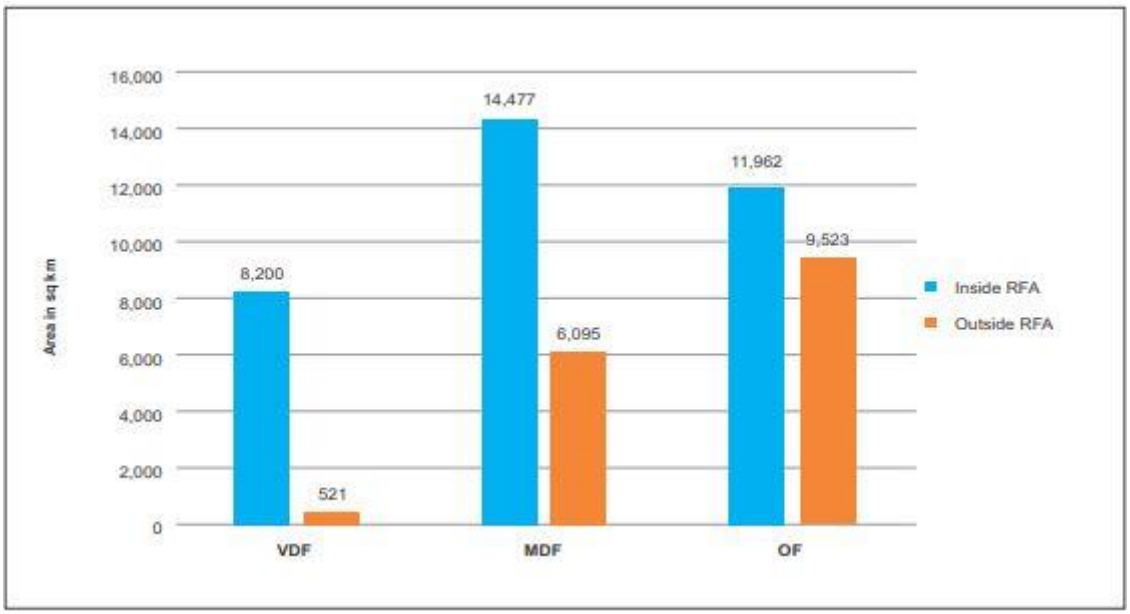
Based on the interpretation of IRS Resourcesat-2 LISS III satellite data of the period Oct 2017 to Jan 2018, the Forest Cover in the State is 50,777.56 sq km which is 16.50 % of the State's geographical area. In terms of forest canopy density classes, the State has 8,720.53 sq km under Very Dense Forest(VDF), 20,572.35 sq km under Moderately Dense Forest (MDF) and 21,484.68 sq km under Open Forest (OF). Forest Cover in the State has increased by 95.56 sq km as compared to the previous assessment reported in ISFR 2017.



Forest Cover inside and outside Recorded Forest Area (or Green Wash)

Forest Cover inside the Recorded Forest Area (or Green Wash)				Forest Cover outside the Recorded Forest Area (or Green Wash)			
VDF	MDF	OF	Total	VDF	MDF	OF	Total
8,200	14,477	11,962	34,639	521	6,095	9,523	16,139
23.67%	41.80%	34.53%		3.23%	37.77%	59.00%	

The State has reported extent of recorded forest area (RFA) 61,579 sq km which is 20.01% of its geographical area. The reserved, protected and unclassed forests are 80.46%, 10.93% and 8.61% of the recorded forest area in the State respectively. However as the digitized boundary of recorded forest area from the state covers 56,373.92 sq km and the analysis of forest cover inside and outside this area is depicted below



District	Geographical Area (GA)	2019 Assessment				% of GA	Change wrt 2017 assessment	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Ahmadnagar[T]	17,048	0.00	68.82	198.07	266.89	1.57	-3.11	557.39
Akola	5,673	11.00	108.44	220.93	340.37	6.00	1.37	16.00
Amravati[T]	12,210	618.89	1,461.53	1,087.35	3,167.77	25.94	-0.23	112.76
Aurangabad	10,131	20.00	106.26	441.67	567.93	5.61	-2.07	171.29
Bhandara	4,087	170.86	563.13	264.93	998.92	24.44	-7.08	18.57
Bid	10,693	0.00	13.00	151.03	164.03	1.53	-10.97	362.79
Buldana	9,661	25.00	143.95	422.65	591.60	6.12	-3.40	162.00
Chandrapur[T]	11,443	1,323.03	1,559.44	1,171.99	4,054.46	35.43	-32.54	44.23
DhuleT	7,195	0.00	68.57	232.70	301.27	4.19	-6.73	111.37
Gadchiroli[T]	14,412	4,699.29	3,307.73	1,909.92	9,916.94	68.81	-87.06	24.58
Gondiya	5,234	888.61	732.23	317.75	1,938.59	37.04	15.59	32.25
Hingoli	4,827	0.00	9.00	101.01	110.01	2.28	-0.99	49.23
Jalgaon[T]	11,765	51.00	347.94	747.90	1,146.84	9.75	2.84	94.51
Jalna	7,694	0.00	9.65	26.83	36.48	0.47	-1.52	51.21
Kolhapur[H]	7,685	64.00	1,020.44	701.88	1,786.32	23.24	-9.68	102.83
Latur	7,157	0.00	0.04	12.98	13.02	0.18	1.02	19.67
Mumbai	157	0.00	0.00	3.00	3.00	1.91	0.00	0.00
Mumbai Suburban	446	0.00	67.00	72.86	139.86	31.36	-0.14	0.43
Nagpur[T]	9,892	401.06	902.56	696.76	2,000.38	20.22	-18.62	73.68
Nanded	10,528	58.00	442.91	435.85	936.76	8.90	2.76	123.08
Nandurbar[T]	5,955	0.00	404.15	791.84	1,195.99	20.08	3.99	30.00
Nashik[TH]	15,530	0.00	346.34	730.21	1,076.55	6.93	8.55	337.66
Osmanabad	7,569	0.00	2.08	47.58	49.66	0.66	2.66	47.43
Parbhani	6,214	0.00	3.57	36.86	40.43	0.65	-7.57	47.78
Pune[TH]	15,643	0.00	760.93	949.93	1,710.86	10.94	2.86	508.03
Raigarh[H]	7,152	13.00	1,250.34	1,676.12	2,939.46	41.10	22.46	77.60
Ratnagiri[H]	8,208	33.00	1,892.01	2,287.89	4,212.90	51.33	46.90	3.36
Sangli	8,572	0.00	95.00	55.13	150.13	1.75	0.13	171.03
Satara[H]	10,480	117.00	569.68	591.69	1,278.37	12.20	2.37	365.70
Sindhudurg[H]	5,207	88.82	1,391.73	1,347.43	2,827.98	54.31	138.98	32.27
Solapur	14,895	0.00	5.50	44.17	49.67	0.33	1.67	60.72
Thane[T]	9,558	0.00	1,300.11	1,697.98	2,998.09	31.37	35.09	261.07
Wardha	6,309	9.97	410.03	441.95	861.95	13.66	-1.05	55.93
Washim	4,901	5.00	101.89	189.87	296.76	6.06	-2.24	31.65
Yavatmal[T]	13,582	123.00	1,106.35	1,377.97	2,607.32	19.20	1.32	98.39
Total	**3,07,713**	**8,720.53**	**20,572.35**	**21,484.68**	**50,777.56**	**16.50**	**95.56**	**4,256.49**

Forest degradation

Forest degradation is a process in which the biological wealth of a forest area is permanently diminished by some factor or by a combination of factors. "This does not involve a reduction of the forest area, but rather a quality decrease in its condition."The forest is still there, but with fewer trees, or less species of trees, plants or animals, or some of them affected by plagues. This degradation makes the forest less valuable and may lead to deforestation. Forest degradation is a type of the more general issue of land degradation. Deforestation and forest degradation continue to take place at alarming rates, which contributes significantly to the ongoing loss of biodiversity.[1]

Drivers of deforestation and forest degradation by region, 2000–2010, from the Food and Agriculture Organization publication The State of the World's Forests 2020. Forests, biodiversity and people – In brief.

Since 1990, it is estimated that some 420 million hectares of forest have been lost through conversion to other land uses, although the rate of deforestation has decreased over the past three decades. Between 2015 and 2020, the rate of deforestation was estimated at 10 million hectares per year, down from 16 million hectares per year in the 1990s. The area of primary forest worldwide has decreased by over 80 million hectares since 1990. More than 100 million hectares of forests are adversely affected by forest fires, pests, diseases, invasive species drought and adverse weather events.

Interpretations of the term

Deforestation is much worse than forest degradation, but it is clear and visible. On the contrary, forest degradation may start and go on without showing clear effects. It is difficult to measure and even the very term is controversial. In a paper[4] submitted to the XII World Forestry Congress, 2003, Jean-Paul Lanly states: "The situation is even less satisfactory regarding forest degradation due in particular to the imprecision and multiple, and often subjective, interpretations of the term". In 2009 Lund[5] identified more than 50 definitions of forest degradation.

Previously to this August 2017 editing, the Wikipedia page Forest degradation was redirected to Secondary forest, a forest which has re-grown after a timber harvest. This is a confusion: a secondary forest may be perfectly healthy, and a primary forest may be suffering degradation.

The term "permanently" also poses some difficulties: a forest affected by a mild seasonal drought may experience a loss of its biological wealth, but if it is seasonally reversed, then it is not considered degradation. On the contrary, a severe prolonged drought may seriously degrade a forest and make human intervention advisable to limit damages.

Difficulties which hamper the assessment of degradation

According to Lanly,[1] there are 3 difficulties:

- the different choices of the initial state of reference or baseline;
- the chosen criteria: health, biodiversity, production capacity; and
- the opinion on the evolution prospects: will the final result of the process be desirable or undesirable?

For mapping forest degradation in Bolivia, Müller et al consider areas where only between 30% and 70% of the original forest cover remains. If less than 30% remains, the area is considered as deforested, and if more than 70% remains, the forest is considered intact.

Davidar et al.[1] also think that "Loss of dense and moderately dense forest cover is suggestive of forest degradation." but for the moment no parameter exists "that indicates at what speed forests become degraded and how long it will take for the ecosystem to degrade beyond the point of recovery."

Causes

The Dominican Center for Agricultural and Forest Development[7] lists the following causes of forest degradation:

- Excessive extraction of forest products like timber, charcoal or resin.
- Road building: after it has been built, the road favours soil erosion.
- Open mining: the area where extraction takes place is, of course, completely deforested, but also the surrounding zone suffers a degradation of its fauna and flora.
- Expansion of urban areas.

Davidar et al.[6] add another:

- Livestock grazing: goats or sheep eat tree seedlings, thus slowing natural forest regeneration.

Earth Eclipse,[8] a platform of environment research articles, adds the following causes:

- Acid rain
- Pests and diseases
- Air pollution. Degradation for this cause is specifically called[1] *Waldsterben* (German word) or forest death.
- Forest fragmentation: a large forest is broken up in smaller woods, which destroys the habitat of large animals.
- Land pollution
- Soil erosion (*see image above*) and sedimentation

Finally as an additional cause:

- Excessive or unrespectful tourism

Forest Conservation: Useful Methods for Forest Conservation

Forest Conservation: Useful Methods that can be used for conservation of Forest!
Where geographical conditions permit vegetation to take the form of trees, the forest is one of the major forms of the natural landscape.

The forest resources are valuable as an integral part of the ecosystem, from the commercial point of view, and as providers of shelter to wildlife. Today forests provide the raw materials for over 5,000 products worth about 23 million dollars.

They support industry which employs 1.3 million people. In fact, forests are still the natural habitats of several species of plants and animals, as well as of several tribal groups of the world. But, the most unfortunate setback came in the form of commercial exploitation, which resulted in mass destruction of forest cover year after year.Originally, over two-fifth of the land area of the earth, exclusive of the Polar Regions, or about 1,200 million hectares was covered with natural forests. But, now more than one-third of this area has been robbed by man of its natural protective cover and has been turned into barren land.

The history of the exploitation of forests is as old as man himself, but during earlier times it was balanced through a natural growth process because at that time forest cutting was done for personal or community use only. But with the expansion of agriculture, forest lands have been cleared.

More destruction has been done after industrial revolution and urbanisation. During the colonial period commercial exploitation began and this was the main cause of the depletion of forests.

:

The commercial use of forests nowadays has reached such an extent that it has become a threat to the environment in the form of:
(i) Increase in temperature,

(ii) Lesser precipitation,

(iii) Increased rate of soil erosion,

:

(iv) Increase in frequency and volume of floods,

(v) Loss of soil productivity,

(vi) Extinction of several species,

(vii) Non-availability of several essential forest products, and

:

(viii) Imbalance in ecosystem.

The harmful effects of deforestation are so much that all over the world people and authorities have realised that forest resources must be conserved properly in order to protect the ecosystem.

The forest is a national resource and a social asset. It yields a great social profit which lies wholly outside the realm of business. But, at present, most of the forests of the world are so over-used that experts predict dire calamities in the not-too-distant future and irreparable damage on a catastrophic scale. If properly used and put on a sustained yield basis, it will be one of man's greatest resources and for this; conservation of forest is the only alternative.

Methods of Forest Conservation:
The following steps should be taken for the conservation of forests:
Regulated and Planned Cutting of Trees:
:

One of the main reasons of deforestation is commercial felling of trees. According to an estimate, about 1,600 million cubic metres of wood have been used for various purposes in the world. Although trees are considered as perennial resource, when exploited on a very large scale, their revival cannot be possible.

Therefore, cutting should be regulated by adopting methods like:
(i) Clear cutting,

(ii) Selective cutting, and

:

(iii) Shelter wood cutting.

The clear cutting method is useful for those areas where the same types of trees are available over a large area. In that case, trees of same age group can be cut down in a selected area and then marked for replantation.

In selective cutting only mature trees are selected for cutting. This process is to be followed in rotation. Shelter wood cutting is where first of all useless trees having been cut down followed by medium and best quality timber trees.

The time gap between these cuttings is helpful in re-growth of trees. In regulated cutting only one-tenth of the forest area is selected for use and rotational system is always followed for their protection.

The forest can be managed in such a way that a timber crop may be harvested indefinitely year after year without being depleted. This technique is called the 'sustained yield' method adopted by many countries of the world.

Control over Forest Fire:
Destruction or loss of forest by fire is fairly common; because trees are highly exposed to fire and once started it becomes difficult to control. Sometimes, the fire starts by natural process, i.e., by lightning or by friction between trees during speedy winds, while in most cases it is started by man either intentionally or unintentionally.

:

According to an estimate, during the period from 1940 to 1950, in the US alone, fires consumed an average of 21.5 million acres of timber yearly and as many as 1,175,664 cases of forest fires occurred during 1955 to 1964 period.

Throughout the world, forest fire is common and in most cases they were begun by man. As John D. Guthrie, former fire inspector of US Forest Service has written: "To stage a Forest Fire you need only few things – a forest, the right atmospheric conditions, and a spark either from a lightning bolt or a match in the hands of a fool or a knave. The formula is simple – the larger the forest, the drier the air, the bigger the fool, the bigger the fire you will have".

In order to save forests from fire it is necessary to adopt latest techniques of firefighting. Some of the fire suppression techniques are to develop three metre wide five lanes around the periphery of the fire, back fires, arrangement of water spray, fire retardant chemicals should be sprayed from back tank and if possible by helicopters. There must be a trained staff of firefighters to control the fire.

Reforestation and Afforestation:
The sustained yield concept dictates that whenever timber is removed, either by block cutting or by selective cutting, the denuded area must be reforested. This may be done by natural or artificial methods. Similarly, any forested land which has been destroyed by fire or mining activities should be reforested. In rugged terrain aerial seeding is the method of choice.

Besides all this, fresh afforestation programmes should be started. New plantations will not only increase the forest cover but also help in making up the eco-balance. For afforestation, selection of trees should be done according to local geographical conditions and care must be taken during initial growth of the trees.

Check over Forest Clearance for Agricultural and Flabitation Purposes:
Most of the present-day agricultural land was once forested and then cleared for the use of agriculture. But now it has reached the stage where further clearance will be dangerous for the entire ecosystem.

:

There are tribals in some parts of Asia, Africa and South America, where shifting cultivation is still a part of their system of land procurement. According to an estimate, about 40 million sq km of land is used for this purpose by 200 million tribals of the world.

For the conservation of forest, this should be checked and an alternative system should be suggested to them. Similarly, for the development of villages, towns and cities, forest lands have been cleared and this process continues to this day causing loss of forest cover. This also should be checked and green belts around cities should be developed.

Protection of Forest:
The existing forests should be protected. Apart from commercial cutting, unorganised grazing is also one of the reasons. There are several forest diseases resulting from parasitic fungi, rusts, mistletoes, viruses and nematodes which cause the destruction of trees. The forests should be protected either by use of chemical spray, antibiotics or by development of disease resistant strains of trees.

Proper Utilisation of Forest Products and Forests:
Generally, forests have been cut for logs and rest of the tree – stump, limbs, branches and foliage, etc., are left out in the forest as worthless debris. Further waste occurs at the sawmill. There is a need to use all this waste material. Now several uses have been developed and products like waterproof glues, board, etc., can be obtained.

Similarly, forests can easily be used or developed as tourist centres. By using them as tourist centres the country can earn substantial foreign exchange. This practice has been adopted by many countries, both developed and developing.

The concepts of ‘national park’ and ‘game sanctuary’ have now become popular and every country has developed its unique forest area as a ‘national park’. In India alone, there are as many as 21 national parks. This scheme is a good method of forest conservation.