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14

LAND AND SOIL RESOURCES

The nation's wellbeing, be it social, economic or political depends mostly on the available resources and their optimum utilisation. Resource is the matter or substance which satisfies human wants at a given time and space. Before any element can be designated as a resource three basic pre-conditions must be satisfied. They are; the knowledge, technical skills and demand for the material or services produced. If one of these conditions is not satisfied the particular substance remains unutilised. Let us explain it through one example. From time immemorial, water is present on the earth. But it became a source of energy when people acquired the knowledge and technical skills for hydel power generation. It is therefore human ability and need which gives importance to a particular resource and not their mere physical availability. So the basic concept of resources is also related to human well-being.

India is endowed with abundant resources. An integrated effort is being made in our country to make the best use of the existing resource potential. It helps to meet the demands of a growing population and also provides opportunities for employment. Simultaneously, it acts as an indicator for the levels of development. In this lesson we will study two vital resources i.e. Land and Soil.

OUTCOMES

After studying this lesson, learner:

- explains the significance and distribution of land and Soil resources;
- analyses the Land Use Pattern;
- discuss the characteristics of soil types with their uses;
- explains the problems related to land and Soil resources with suitable/appropriate solutions;
- suggests the methods of land resource management and Soil conservation.

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14.1 LAND RESOURCES

Land is our basic resource. It includes all the features and processes of the land, which can be used to fulfil certain human needs. Throughout history, we have drawn most of our sustenance and much of our fuel, clothing and shelter from the land. It is useful to us as a source of food, as a place to live, work and play. It has different roles. It is a productive economic factor in agriculture, forestry, grazing, fishing and mining. It is considered as a foundation for social prestige and is the basis of wealth and political power. It has many physical forms like mountains, hills, plains, plateaus, lowlands and valleys. It is characterised by climate from hot to cold and from humid to dry. Similarly, land supports many kinds of vegetation. In a wider sense, land includes soil and topography along with the physical features of a given location. It is in this context that land is identified closely with the natural environment. However, it is also regarded as space, situation, factor of production in economic processes, consumption goods, property and capital. Soil is considered a core component of land resource and the foundation of all agricultural development and ecological sustainability. Soil is a complex, dynamic form of living system and its suitability varies from one region to another.

Before studying in details let us know shome of the important terminologies related to land use:

- Land under miscellaneous tree crops and groves include all cultivable land which is not included under net area sown, but is put to some agricultural use. Land under casuarina trees, thatching grass, bamboo, bushes, other groves for fuel, etc. which are not included under orchard are classed under this category.
- Forest area is land under natural or planted stands of trees of at least 5 metres in situ, whether productive or not, and excludes tree stands in agricultural production systems and trees in urban parks and gardens.
- Culturable Waste Land: This includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years.
- Land Put to non agricultural Use: This category of land includes barren lands, uncultivable land put to non agricultural uses, land occupied by buildings, roads and railways or under water.
- Unculturable Land is which cannot be brought under cultivation except at an exorbitant cost is classified as unculturable whether such land is in isolated blocks or within cultivated holdings.
- Barren land : The land which cannot be used for cultivation is called barren land such as hilly terrains, deserts and ravines etc.

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- Current Fallow : This is the land which is left without cultivation for one or less than one agricultural year. Following is a cultural practice adopted for giving the land rest. The land recoups the lost fertility through natural processes.
- Fallow Lands other than Current Fallows : This includes all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years.
- Net sown area is the total area sown with crops and orchards. It represents an area in which total crops are grown only once in a year.

India is well endowed with cultivable land which has long been a key factor in the country's socio-economic development. In terms of area, India ranks seventh in the world, while in terms of population it ranks second. Arable land includes net sown area, current fallow, other fallow and land under tree crops. Arable land covers a total area of 167 million hectares which is 51 % of the total area of the country.

The physical features in India are diverse and complex. There are mountains, hills, plateaus and plains which produce varied human response to the use of land resources. About 30% of India's surface area is covered by hills and mountains. These are either too steep or too cold for cultivation. About 25% of this land is topographically usable which is scattered across the country. Plateaus constitute 28% of the total surface area but only a quarter of this is fit for cultivation. The plains cover 43% of the total area and nearly 95% of it is suitable for cultivation. Considering the differences in proportion of surface area, we can conclude that about two third of the total land area is usable for cultivation. Moreover, soils, topography, moisture and temperature determine the limits of cultivability and the quality of arable land is determined by these factors. As a result of this, half of the surface area is cultivated. This proportion is one of the highest in the world.

14.2 LAND USE AND LAND USE PATTERN

Land Use is the function or functions that humans apply to the land available to them or in other words the various uses the available land is put into by human beings. The study of land use is the study of how the land is managed, according to human needs. The layout or arrangement of the uses of the land is referred to as "land use pattern". The land may be used for agriculture, forest, pasture etc. Land use is determined by physical factors such as relief, terrain, climate, soil, vegetation and Socio-Economic factors such as density of population, technical know how, skill and levels of literacy.

1. Out of the total geographical area (328 million hectares), land utilisation statistics are available for 305 million hectares only. The balance 23 million hectares remains unsurveyed and inaccessible. The relevant statistic is given in Table 14.1. From the

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table it is clear that there are 5 major types of land utilisation in India. They are: Forest land, Net sown area, Land not available for cultivation, Fallow land and Other cultivable land excluding fallow land.

The significant features of land utilisation are:

(a) high percentage of area suitable for cultivation;

(b) limited scope for further extension of cultivation and

(c) small area under pastures despite a large bovine population.

Year	Geographical Area (Thousand Hectares)	Reporting area for land utilisation statistics (col.4+7+11+14+15)	Forests	Not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net area Sown
				Area under non-agricultural uses	Barren & unculturable land	Total (col.5+6)	Permanent pastures & other grazing lands	Land under misc. tree crops & groves (not incl.	Culturable waste land	Total (col.8+9+10)	Fallow lands other than current fallows	Current fallows	Total(Col.12+13)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2009-10	**328726**	**307408**	**71555**	26158	17177	**43334**	10340	3214	12945	**26499**	10838	16009	**26847**	**139173**
2010-11	**328726**	**307483**	**71593**	26400	17175	**43575**	10305	3200	12647	**26152**	10323	14277	**24600**	**141563**
2011-12	**328726**	**307392**	**71599**	26308	17217	**43525**	10314	3161	12637	**26111**	10665	14512	**25177**	**140980**
2012-13	**328726**	**307491**	**71571**	26503	17071	**43573**	10260	3181	12643	**26085**	11037	15292	**26328**	**139934**
2013-14	**328726**	**307797**	**71828**	26911	16943	**43855**	10265	3186	12387	**25837**	10694	14157	**24851**	**141426**
2014-15	**328726**	**307781**	**71756**	26942	16992	**43934**	10262	3104	12416	**25782**	11090	15091	**26181**	**140128**
2015-16	**328726**	**307752**	**71866**	27077	16945	**44022**	10261	3093	12286	**25639**	11308	15410	**26718**	**139506**
2016-17	**328726**	**308316**	**72020**	27838	16985	**44823**	10340	3124	12238	**25702**	11270	15086	**26356**	**139415**
2017-18	**328726**	**307767**	**72047**	27326	16992	**44319**	10338	3167	12287	**25792**	11621	14809	**26430**	**139180**
2018-19	**328726**	**307787**	**72011**	27344	17168	**44512**	10376	3154	12219	**25749**	11633	14531	**26164**	**139351**

Source: Land use statistics at a glance; 2009-10 to 2018-19; Ministry of Agriculture and farmers welfare department of Agriculture & Farmers Welfare Directorate of Economics & Statistics; November, 2021.

The above table portrays a timeline graph of various uses under which land has been put into. It's a trend from 2009-10 to 2018-19. We can very clearly observe that the Forest area has shown an increasing trend with the afforestation drives going on very seriously throughout the country. Permanent Pastures as well as Barren and unculturable land and Fallow land have seen a slight rise. There has been a decline in Net Sown Area although in between it did rise (2013-14 and 2014-15), this rise and fall is negligible. There is a remarkable rise in the category of land put to non-agriculture use. The decline in land put to agriculture, along with the rise of non-agricultural land can be attributed to the overgrowing population which requires land for institutional, residential, recreational purposes.

Land use is a dynamic process. The land use pattern of any area changes over time due to a number of factors such as increasing population, changes in cropping system and technology, socio-economic development etc.

Land Degradation

Land resources are under immense pressure in India due to growing demand from an exploding population and the impacts of climate change. Increase in demand on land resources is escalating manifold due to human needs. The ecosystem is also impacted as a result of this

pressure on land. All these factors lead to land degradation.

Land degradation is often defined as the long-term loss of ecosystems and their productivity caused by human activities which cannot be recovered unaided. It may also refer to the destruction or deterioration or depletion of the health of terrestrial ecosystems, thus affecting the associated biodiversity, natural ecological processes and ecosystem resilience. It also leads to the reduction or loss of biological/economic productivity of croplands, pasture, woodland, forest, etc. and various other types of land uses.

DO YOU KNOW?

It is estimated that during the last 40 years nearly one-third of the world's arable land has been lost to erosion and continues to be lost at a rate of more than 10 million hectares per year. -UNCCD Report

Fig. 14.1 Deforestation

The causes of land degradation can be broadly divided into two: the natural causes include earthquakes, tsunamis, droughts, avalanches, landslides and mudflow, volcanic eruptions, floods, tornadoes, and wildfires etc.; human induced causes include rapid urbanisation, deforestation, overgrazing, faulty irrigation practices, urban sprawl , pollution from industries, quarrying and mining activities.

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Out of the total land area, as many as 175 million hectares suffer from degradation. Land degradation is caused largely by soil erosion, but also by water logging and excessive salinity. The most serious threat to the soil is posed by deforestation. Heavy rainfall during the monsoon damages the soils. Steep slopes encourage rapid runoff leading to soil erosion especially on the southern slopes of the Himalayas and the western slopes of the Western Ghats. Major portions of the Himalayas are prone to landslides and erosion. Wind erosion is prevalent in Rajasthan, gully erosion in Chambal Valley, Chotanagpur, Gujarat, Sub-montane Punjab Himalaya. Water logging and salinisation which constitute the second major threat to soil have already consumed 13 million hectares and threaten many more. The lands affected are mostly situated in canal irrigated areas. They have suffered because of the absence of adequate drainage. Land is also degraded due to mining operations in many parts of the country. The total land area affected is about 80 thousand hectares by mining. Urban encroachment on good quality agricultural land is another problem by which the amount of land used for agriculture is steadily declining. In other words, there is a tough competition between agriculture, urban and industrial development. There are social conflicts that are arising out of the rights to occupy and transfer of land. The tenant cultivators face major disincentives such as the fear of eviction, the insecurity of tenure, high rents and inadequate surplus to invest. Land ceiling laws have not been implemented with adequate strictness.

Land Resource Management

The major land problems include land degradation due to soil erosion, water logging, salinisation, mining operations and urban encroachment on good quality agricultural land. To deal with these problems, the country has adopted a two-fold approach; physical and social. Physical reclamation of land is achieved through developing sub-surface drainage systems of water-logged land and is followed by scientific rotation of crops. Similarly, land rendered useless by river action and river floods are also reclaimed after necessary treatment to restore their fertility and texture. Physical reclamation of desert lands calls for more sustained efforts. It requires introduction of suitable natural vegetation and a canal or well irrigation or even both. It helps to raise the water table. Social approach on the other hand is reflected through state legislation aiming at overall rural reconstruction, promoting agriculture and its productivity in particular. Consolidation of land holdings is one measure among many. It provides necessary motivation and empowerment of a tiller by confirming on him the rights of land tenure/ownership. Elements of social exploitation are promptly removed e.g. absentee landlords. Thus legislation is used to ensure social justice.

Remote sensing data have shown that about 200 square kilometres of the Gulf of Kachchh have been covered by sedimentation. The National Remote Sensing Agency has estimated 53 million hectares (16%) as wasteland in the country. Among the states and UTs the highest incidence of wastelands is recorded in Jammu and Kashmir (60%) followed by Rajasthan (38%), Sikkim and Himachal Pradesh (37% each) and Gujarat (17%). The Government of

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India constituted the National Wasteland Development Board in 1985 with a view to enhancing productivity of wastelands. It includes the programe of afforestation of 5 million hectares per year. India does not have a shortage of land. But, land reform policies need to be reoriented for further increase in food production.

There is a need to achieve Zero Net Land Degradation (ZNLD) which means the achievement of a state of land degradation neutrality. Achieving it involves a combination of reducing the rate of further degradation of land and offsetting newly occurring degradation by restoring the productivity and other ecosystem services of currently degraded lands.The ZNLD is best achieved by the introduction and promotion of Sustainable Land Management(SLM) practices on a global basis.

Sustainable Land Management practices include the integrated management of crops (trees), livestock, soil, water, nutrients, biodiversity, disease and pests to maximise the delivery of a range of ecosystem services. The objective is to maximise provisioning services (e.g. food, water, energy) while enhancing the resilience of land resources and the communities which depend on them. Adopting simple and affordable techniques which can stop land degradation and replicating them at the global level can have a major impact. Practices such as agro-forestry and sustainable agriculture, can boost yields and prevent future land degradation. For example- In Zimbabwe, water harvesting combined with conservation agriculture increased farmers' gross margins 4-to-7-fold and increased returns on labour 2-to-3-fold compared to standard practices. These practices have had the greatest success in regions with lower rainfall.

To fulfil the demand of increasing population, rather than bringing new land under managed ecosystems, productivity should be enhanced from land that is already devoted to agricultural production. While enhancing productivity from land already under production through land restoration, laws and policies and educational programs must also be followed to protect/ preserve/conserve natural ecosystems against indiscriminate cutting of firewood, grazing, etc. Protection and enhancement of vegetation cover are essential to control soil erosion. Afforestation of denuded lands with adaptable species is essential to conserve soil and water which also helps in strengthening the nutrient cycle.

Community-Based Traditional Approaches - There is an increasing realisation that local communities have an important role to play in land management. Customary SLM practices in forested, agricultural and pastoral regions are prevalent in many parts of India. These practices are jointly supported by government policies/programmes and also by local community participation. These regulatory frameworks have the potential to reduce the causes and effects of Land degradation processes.

Some of the measures to prevent degradation and restore degraded lands are mentioned below:

Notes

- Afforestation as well as reforestation
- Sustainable pastures and livestock management
- Narrow strip planting, Use of Windbreaks and Shelterbelts
- Optimum utilisation of water for irrigation
- Proper use of fertilisers and pesticides
- Growing salt tolerant soils in saline land
- Sustainable mining practices
- Proper discharge of industrial effluents
- Proper management of wastelands

INTEXT QUESTIONS 14.1

1. Name any five types of land use.
2. Name the land which is left without cultivation for one or less than one agricultural year.
3. What are human induced causes for land resource degradation?

14.3 SOIL RESOURCES

Soil is defined as the upper layer of the earth composed of loose surface material. It is a mixture of many substances including an endless variety of minerals, remnants of plants and animals, water and air. It is the end product of continuing interaction between the parent material, local climate, plant and animal organisms and elevation of land. Since each of the elements varies over space, soils also differ from place to place. Soil is an important segment of our ecosystem, as it serves as an anchorage for plants and a source of nutrients. Thus, soil is the seat, the medium and fundamental raw material for plant growth. Through its relative fertility, it affects man's economic activities and shapes the destiny of our country. When the soil is lost, property and culture are also lost. Therefore, it is a valuable national and fundamental earth resource of the country.

A Soil Profile

A soil profile is a vertical cross-section of the soil, made up of many layers running parallel to the surface. These layers are known as soil horizons. The soil is arranged in a number of layers or horizons during its formation process. Thus the Soil Profile consists of layers or horizons.

Soils typically have six horizons. From the top down, they are Horizon O,A,B,C and R. Each horizon has certain characteristics. O Horizon is the top most layer, made up mostly of leaf litter and fresh organic matter. The A Horizon is made up of decomposed organic matter, micro organisms such as earthworms, fungi, bacteria etc. The B Horizon consists of less humus, but more minerals. The C Horizon is made up of broken bed rocks and R Horizon is the compact bedrock region.

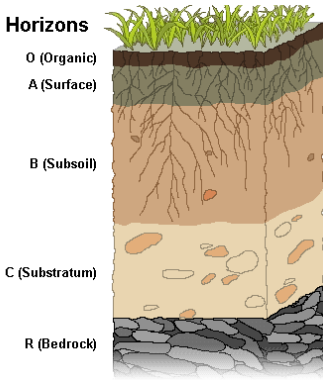

Fig. 14.2 Soil profile

B. Major Soil Types and Distribution

The soils of India are broadly divided into following six types:

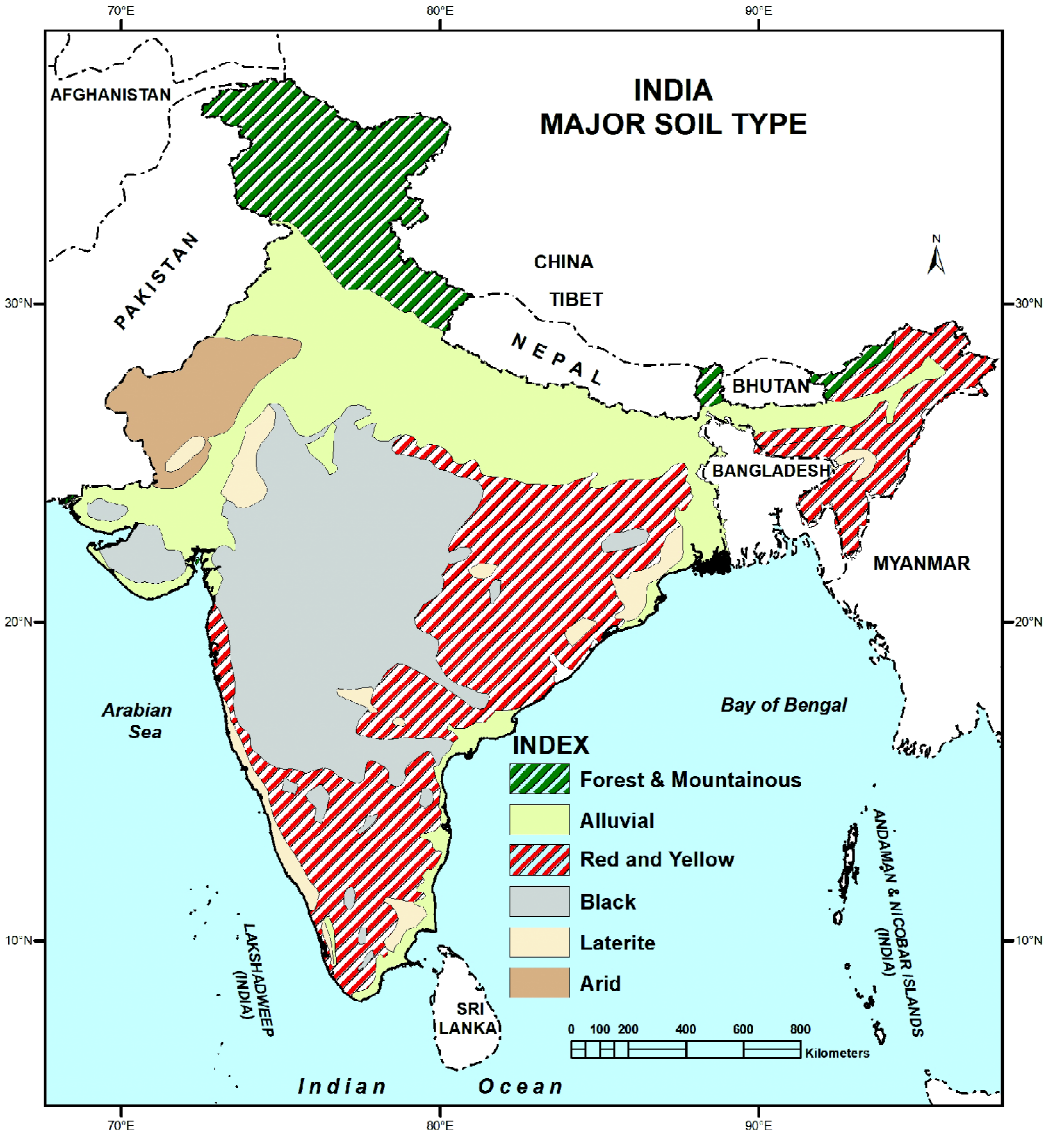

Fig. 14.3 India: Major soil resource

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1. Alluvial Soils

Alluvial soil is the most important soil type of India. It covers the vast valley areas of the Sutlej, Ganga and Brahmaputra and the fringes of the southern peninsula. It is thin near the fringe of the plateau. The alluvial soils occupy 64 million hectares of the most fertile land. The soils vary from sandy loam to clay in texture and are rich in potash but deficient in nitrogen and organic matter. Generally, the colour varies from grey to reddish brown. These soil are formed of deposits of silt and sand brought down by the rivers flowing from the Himalayas and the Great Indian plateau. Being young, the soils lack profile development. Being extremely productive, these soils are most important from the point of view of Indian agriculture. Based on geographical considerations, this soil can be subdivided into two divisions: newer alluvium (khadar) and older alluvium (bangar). Both are different in texture, chemical composition, drainage capacity and fertility. The newer alluvium is a light friable loam with a mixture of sand and silt. It is found in river valleys, the floodplains and deltas. On the other hand, the older alluvium lies on the interfluves. The higher proportion of clay makes the soil sticky and drainage is often poor. Almost all crops are grown on these soils.

2. Black Soils (Regur)

The black soils are found mainly in the Deccan lava region covering large parts of Maharashtra, some parts of Gujarat and Madhya Pradesh and small parts of Karnataka, Telangana, Andhra Pradesh and Tamil Nadu. The soils are formed by disintegration of volcanic basaltic lava. The colour of the soil is generally black due to the presence of compounds of aluminium and iron. The soil is locally known as regur which extends roughly to 64 million hectares. It is generally clayey deep and has low permeability and impregnability. But its depth varies from place to place. It is very thick in lowlands but very thin on highlands. The most important characteristics of this soil are its ability to retain moisture even during the dry season. The soils form wide cracks during summer due to moisture loss and swell and become sticky when saturated. Thus, the soil is aerated and oxidised to deep levels which contribute to maintaining its fertility. This continued fertility is favourable in the area of low rainfall for cotton cultivation even without irrigation. Other than cotton, this soil is favourable for the cultivation of crops like sugarcane, wheat, onion and fruits.

3. Red Soils

Red soils cover a large part of the Peninsular upland in Tamil Nadu, Karnataka, Goa, South east Maharashtra, Telangana, Andhra Pradesh, Orissa, Chotanagpur Plateau and Meghalaya Plateau. They encircle the black cotton soil zone. They have developed on the crystalline rocks like granite, gneisses and cover roughly 72 million hectares of the arable land. Iron compounds are abundant making the soil reddish in colour but

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they are deficient in organic matter. The red soils are generally less fertile and are not as important agriculturally as the black and alluvial soils. But the productive capacity can be raised through irrigation and use of fertilisers. This soil is suitable for rice, millet, maize, groundnut, tobacco and fruits.

4. Laterite Soils

The laterite soils are commonly found in areas of high altitude and heavy rainfall in Karnataka, Tamil Nadu, Madhya Pradesh, Jharkhand, Orissa, Assam and Meghalaya extending over 13 million hectares. They generally form under hot and humid climatic conditions.The lateritic soils are particularly found on high flat erosion surfaces in areas of high and seasonal rainfall. Loss of nutrients by accelerated leaching is the most common feature which renders the soil infertile. The pebbly crust is the important feature of laterites which is formed due to alteration of wet and dry periods. As a result of weathering, laterite becomes extremely hard. Thus, their characteristics include complete chemical decomposition of the parent rock, complete leaching of silica, a reddish brown colour given by the oxides of aluminium and iron and lack of humus. The crops which are generally grown are rice, millets, sugarcane on lowland and tropical plantations such as rubber, coffee and tea on uplands.

5. Desert Soils

The desert soils occur in western Rajasthan, Saurashtra, Kachchh, western Haryana and southern Punjab. The occurrence of these soils is related to desert and semi-desert conditions and is defined by the absence of water availability for six months. The soil is sandy to gravelly with poor organic matter, low humus contents, infrequent rainfall, low moisture and long drought season. The soils exhibit poorly developed horizons. Plants are widely spaced. Chemical weathering is limited. The colour of the soil is either red or light brown. Generally, these soils lack the basic requirements for agriculture, but when water is available, a variety of crops like cotton, rice, wheat etc. can be grown with a proper dose of fertilisers.

6. Mountain Soils

The mountain soils are complex and extremely varied. The soils vary from deep alluvium in the river basins and lower slopes to highly immature residual gravel on higher altitudes. Because of complex topographic, geologic, vegetation and climatic conditions, no large areas of homogenous soil groups are found. Areas of steep relief are mostly devoid of soil. Various types of crops are grown in different regions like rice in the valley, orchards on slopes and potatoes in almost all areas.

Notes

C Problems of Soil Resources

Soil erosion is described as the carrying away of soil. It is the theft of the soil by natural elements like water, wind, glaciers and waves. Gravity tends to move soil down slope either very slowly as in soil creep or very rapidly as in landslides. The present shape of land has been carved through thousands of years. Soil erosion has become now one of the major environmental problems and a serious constraint for agricultural production. There are many physical and social factors which determine the extent and severity of soil erosion. The principal physical factors are erosivity of rainfall, erodibility of soil, severity of periodic floods, length and steepness of the slope. The important social factors are deforestation, overgrazing, nature of land use and methods of cultivation.

Ravines, gullies and landslides are the most serious and highly visible forms of soil erosion. On the other hand, sheet erosion caused by rains and erosion due to winds are least visible but equally serious as they too take a heavy toll on our precious top soils. Soil erosion by ravines and gullies is widespread in India, It has been estimated that 3.67 million hectares of soil surface is damaged. There are four major areas of ravines and gullies in India. They are (1) Yamuna-Chambal ravine zone, (2) Gujarat ravine zone, (3) The Punjab Siwalik foothills zone and (4) Chhotanagpur zone. There are other areas of substantial ravine erosion in the Mahanadi valley, upper Son valley, upper Narmada and Tapi valleys, Siwalik and Bhabar tract of the western Himalayan foothills and edges of Ganga Khadar in western Uttar Pradesh. The relatively less affected areas are the whole of Deccan south of the Godavari, the Ganga-Brahmaputra plains, east of Varanasi, Kutchchh and western Rajasthan.

Sheet erosion is widespread over sloping deforested terrain, terraced uplands of Peninsular region, Sutlej-Ganga plains, Coastal plains, Western Ghats and NorthEastern hills. The occurrence of landslides is common in earthquake sensitive belts, particularly the Siwaliks. Heavy rainfall and cutting of slopes for roads, buildings and mining activities trigger landslides. Glacial erosion is limited to high Himalayas and sea erosion is confined to coastal areas only. In the last 50 years, the Thar desert has encroached upon 13000 hectares of land in Rajasthan, Gujarat, Haryana and Uttar Pradesh.

Soil erosion and soil exhaustion due to loss of soil nutrients pose serious threats to our efforts of increasing the productivity of soil faster than the population growth. Overgrazing by sheep, goats and other livestock has been partly responsible for soil erosion. Erosion due to these factors has been reported from Jammu & Kashmir, Himachal Pradesh, Rajasthan and Karnataka.

Notes

INTEXT QUESTIONS 14.2

1. What is a soil profile?
2. The soils of India are broadly divided into how many types? Name them.
3. Based on geographical considerations, Alluvial soil can be subdivided into how many divisions? Name them.
4. Why the colour of the 'regur soil' is generally in black colour?

14.4 SOIL CONSERVATION

It takes thousands of years for a single inch of soil to be formed naturally, but it takes only a few years for that single inch to be eroded by human interference. If the soil is wasted or blown away, it is not easy to replenish it. Soil conservation is the prevention of loss of the top most layer of the soil from erosion or prevention of damaged fertility caused by over usage, acidification, salinization or other chemical soil contamination. The most important step of soil conservation is to hold the soil in place. This is possible by improved agricultural practices in different regions. Contour ploughing and terracing are generally practised on the hill slopes of the Himalayas. They are the simplest conservation methods. Rows of trees or shelter belts are planted to protect the fields from wind erosion in desert regions of Rajasthan. Afforestation of the river catchment areas and in steep slopes has been implemented in many parts of India. The important among them are: the Himalayas, the Upper Damodar valley in Jharkhand, the Nilgiri hills in the south etc. It reduces the surface runoff and binds the soil. Ravines are noted for their enormous size and depth with vertical sides. The Central Soil Conservation Board has established 3 research stations: (1) Kota in Rajasthan, (2) Agra in Uttar Pradesh and (3) Valsad in Gujarat to suggest methods of reclamation of ravine lands. Soil fertility loss can be prevented by the application of manures and fertilisers.

Various methods for soil conservation are:

1. Planting more and more trees.
2. Using new farming methods.
3. Reducing rivers flooding.
4. Building small check dams in gullies to slow down water run-off.
5. Digging channels across farm slopes to divert water.
6. Protecting areas likely to be eroded.

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7. Checking deforestation.
8. Contour ploughing terrace farming.
9. Restore wetlands
10. Planting vegetaion cover and forest restoration
11. Planting buffer strips along stream banks
12. Windbreaks
13. Proper waste disposal and management

14.5 SOIL HEALTH CARD

Soil Health Card (SHC) is a printed report of a particular land holding which gives information on 12 soil parameters along with recommendation in dosage of nutrients to be utilised for different crops. On 5th December 2015, the Soil Health Card Scheme was introduced by the Ministry of Agriculture and Farmers' Welfare, Government of India. It is being implemented through the Department of Agriculture of all the State and Union Territory Governments in India. Under the scheme, the card is provided to all farmers of the country at an interval of 3 years.

Significant features of Soil Health Card Scheme are:

- The Government issues individual soil cards to farmers once every 3 years.
- Cards carry crop-wise recommendations of nutrients and fertilisers in the respective individual farms. These recommendations aim at improving productivity through judicious use of inputs.
- To deliver the recommendations Soil samples are collected and tested in various soil testing labs across the country. After testing, various experts analyse the strength and weaknesses of the soil and suggest measures to deal with it. The result and suggestion are displayed in the cards.
- The soil samples are tested for 12 parameters. They are pH, Electrical Conductivity (EC), Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Zinc (Zn), Boron (B), Iron (Fe), Manganese (Mn), Copper (Cu) of farm holdings.

The benefits of Soil Health Cards are:

- It decreases 8 to 10 per cent use of chemical fertilisers
- It increases productivity by 5 to 6 per cent.
- It creates job for the agrarian youths in terms of laboratory establishment to undertake soil testing
- It curbs the overuse of urea which leads to the deficiency of many soil nutrients.
- It gives crop wise guidance to farmers.

The card displays farmer's detail, soil sample detail, soil test results and general recommendations. The sample of the Soil Health Card is given below.

Department of Agriculture & Cooperation
Ministry of Agriculture & Farmers Welfare
Government of India

Directorate of Agriculture
Government of Goa

SOIL HEALTH CARD

Soil Health Card No. : _____
Name of Farmer : _____
Validity : From_____ To_____

SOIL HEALTH CARD

Farmer's Details	
Name	
Address	
Village	
Sub-District	
District	
PIN	
Aadhaar Number	
Mobile Number	

Soil Sample Details		
Soil Sample Number		
Sample Collected on		
Survey No.		
Khasra No. / Dag No.		
Farm Size		
Geo Position (GPS)	Latitude:	Longitude:
Irrigated / Rainfed		

Name of Laboratory : _____

SOIL TEST RESULTS

S. No.	Parameter	Test Value	Unit	Rating
1	pH			
2	EC			
3	Organic Carbon (OC)			
4	Available Nitrogen (N)			
5	Available Phosphorus (P)			
6	Available Potassium (K)			
7	Available Sulphur (S)			
8	Available Zinc (Zn)			
9	Available Boron (B)			
10	Available Iron (Fe)			
11	Available Manganese (Mn)			
12	Available Copper (Cu)			

Secondary & Micro Nutrients Recommendations

Sl. No.	Parameter	Recommendations for Soil Applications
1	Sulphur (S)	
2	Zinc (Zn)	
3	Boron (B)	
4	Iron (Fe)	
5	Manganese (Mn)	
6	Copper (Cu)	

General Recommendations

1	Organic Manure	
2	Biofertiliser	
3	Lime / Gypsum	

International Year of Soils 2015

Healthy Soils for a Healthy Life

Fertilizer Recommendations for Reference Yield (with Organic Manure)

Sl. No.	Crop & Variety	Reference Yield	Fertilizer Combination-1 for N P K		Fertilizer Combination-2 for N P K	
1	Paddy (Dhaan)					
2						
3						
4						
5						
6						

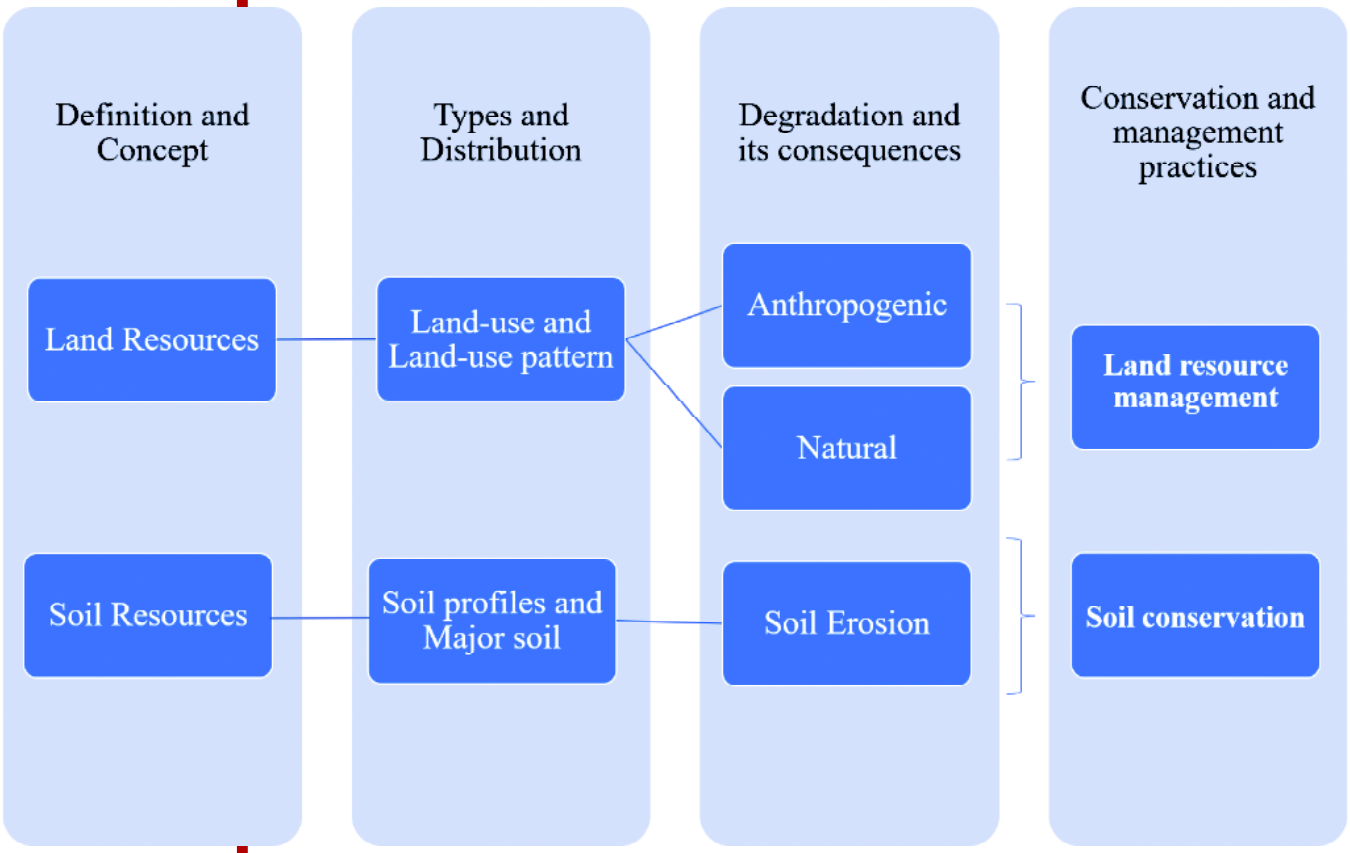
Fig. 14.4 Soil Health Card

Notes

INTEXT QUESTIONS 14.3

1. What is the soil Health Card (SHC)?
2. What are the measures to conserve soils?
3. In which year SHC was introduced?

WHAT YOU HAVE LEARNT



TERMINAL QUESTIONS

1. What are the significant features of land utilisation in India?
2. Give a brief description of various types of land use in India.
3. Write two main characteristics of each soil type of India.
4. Describe various measures undertaken for conservation of soils.

Notes

5. Differentiate between:

   (a) Laterite soil and red soil

   (b) Soil erosion and soil conservation

   (c) New alluvium and old alluvium

6. Locate and label the following on an outline map of India:

   (i) Alluvial soil.

   (ii) Laterite soil.

   (iv) Desert soil.

ANSWERS TO INTEXT QUESTIONS

14.1

1. Forest land, Net sown area, Land not available for cultivation, Fallow land, Other cultivable land excluding fallow land (any 3)
2. Current Fallow
3. Rapid urbanisation, deforestation, overgrazing, faulty irrigation practices, urban sprawl, pollution from industries, quarrying and mining activities.

14.2

1. A soil profile is a vertical cross-section of the soil, made up of many layers running parallel to the surface.
2. Six (6); Forest and mountainous soil, alluvial soil, laterite soil, black soil, red soil and desert or arid soil.
3. Two divisions, named Bangar (older alluvium) and Khadar (newer alluvium).
4. Due to presence of Aluminium and Iron.

14.3

1. Soil Health Card (SHC) is a Government of India's scheme promoted by the Department of Agriculture & Cooperation under the Ministry of Agriculture and Farmers' Welfare. It is being implemented through the Department of Agriculture of all the State and Union Territory Governments in India.

Notes

2. i. Planting more trees

   ii. Using new farming method

   iii. Reduce river flooding

   iv. Checking deforestation (Any 3)

3. 2015