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The land resources: The application and erosion strategies

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Abstract:

The paper is about land resources and their application in the course of the nature. Agriculture and animals' husbandry are almost land based. Only a limited portion of the earth is suitable for practicing agriculture or for growing trees or for maintaining as pastures and grasslands. Land is one of the most important components of the life support system. Unfortunately, land has been overused and even abused over the centuries. In a predominantly agricultural country like India, land comes first. Due to exploding population, soil is used increasingly which poses threat to its productivity. More land is needed for agriculture and forestry due to increasing population. Moreover, good land is shrinking both in quantity and quality. The only way to raise land resources is by reclamation and developing degraded land or wastelands. Desertification is a process in which the soil loses its productivity as a consequence of degradation or pervasive dryness. The process involves loss of regenerative capacity of soil due to extreme depletion or absence of plant supporting factors. This involves an interplay of climatic, edaphic and biotic factors which may work through time starting with a climatic accident and lead to accentuation of the arid conditions within an already desert terrain and creeping of the desert conditions towards its adjoining areas. The increased pressure of livestock results in overexploitation of resources leading to soil erosion and removal of surface vegetation.

Keywords: Resources,Erosioin,Population,Degradation,Wastelands.

Land is considered the greatest among the natural resources. Land caries the top soil which sustains an immense variety of living beings. Agriculture and animals husbandry are almost land based. Only a limited portion of the earth is suitable for practising agriculture or for growing trees or for maintaining as pastures and grasslands. Therefore, land should be used in a prudent and scientific manner to obtain maximum benefit. The land use pattern (Table below) depends upon the suitability and ecological capabilities depending upon the geological and biological factors. The damage of the land usually results in an irreversible condition. This situation calls for an appropriate land use planning based on suitability and capability adjudged through determination of carrying capacity. The management strategy must involve the prevention of encroachment on forest land, on fertile agricultural lands for non-agricultural purposes.

Table that is shown below is the land use pattern in India

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Land use pattern	Area in mha	Percentage
Net sown area (agricultural land)	140.23	41.88
Area under forests (forest land)	74.84	22.35
Permanent pastures and grazing land	12.47	3.73
Miscellaneous tree-crops and grazing land	3.96	1.18
Non-agricultural uses (settlements, industries, etc.)	17.53	5.24
Barren and unculturable land	21.94	6.55
Culturable wasteland	17.15	5.12
Current fallows and other fallows	23.99	7.17
Area for which no data is available	22.7	6.78
Total	**334.80**	**100.00**

Use and Overexploitation of Land Resources

Land is one of the most important components of the life support system. Unfortunately, land has been overused and even abused over the centuries. In a predominantly agricultural country like India, land comes first. Due to exploding population, soil is used increasingly which poses threat to its productivity. Careless use damages soil that results into reduction in quality and quantity of woodland, grassland, cropland, and soil erosion and degradation of watersheds and catchments, deforestation and desertification. Due to demographic pressures land is under stress due to sprawl in agriculture, industry and urbanization. Cropland is losing fast fertile top soil. Good agricultural land in trans-Yamuna area, from Ghaziabad onwards is going to industrial estates and for urban development. Thus, valuable cropland is lost to agriculture for ever. This is not in national interest. A strategy must be developed to cure post-damage and to save the country from future damage to land. This can be achieved by (i) preparing accurate land use data through remote sensing, (ii) a time-bound nationwide survey program of micro-level land use planning giving short and long term scenarios, (iii) preparing land use classes, (iv) reviewing all existing legislations and updating them and, (v) management plans for land amelioration. This would lead to a dynamic land-use policy.

Land Degradation and its Conservation

More land is needed for agriculture and forestry due to increasing population. Moreover, good land is shrinking both in quantity and quality. The only way to raise land resources is by reclamation and developing degraded land or wastelands. Degraded or wastelands are those which for one reason or the other do not fulfil their life sustaining potential. Increasing misuse of land resources through shortsighted development policies has resulted into wasteland. About half of the land area of the country is lying as wasteland of varying intensity of degradation. These wastelands should be reclaimed and out to some productive use. Thus, the National Wasteland Development Board (NWDB) was established in 1985 to formulate action

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-plans necessary to arrest land degradation and deforestation. Besides this, it also looks for regeneration of degraded forest areas and reclamation of ravines, usar lands, arid tracts, mine spoils etc. The current mission of the NWDB is to check land degradation, bring wastelands into sustainable use, increase biomass availability and restore ecological balance.

Soil and its Formation

Soil is formed as a result of long-term process of complex interactions between climate, topographic and biological factors. The chemical processes of weathering include hydration, hydrolysis, oxidation-reduction, carbonation, etc. The loss of soil, either by natural process or by mismanagement, is harmful not only for agricultural development but to the whole ecosystem, therefore, its conservation has now become a matter of grave concern.

Soil Erosion

The main types of soil erosion are: (i) Normal or natural erosion, (ii) Fluvial or water erosion, (iii) Aeolian or wind erosion, and (iv) Accelerated soil erosion by human actions. Actually, normal soil erosion is a continuous process but when it occurs on a large scale due to water and wind erosion, it not only degrades the environment but is also responsible for the expansion of wasteland due to gullies an ravines, as has been in case of the Chambal region of Central India. Soil erosion due to wind is a common phenomenon in arid and semi-arid regions and is often a cause of desertification or desert expansion. The process of soil erosion is always accelerated by man either by overgrazing, faulty land use practices or by deforestation. The following are the general impacts:

i. Formation of gullies and ravines and the whole region becomes an undulating area not suitable for human activities.
ii. Washout of the upper layer of the soil, especially along hillside slopes.
iii. Uprooting of plants due to soil cutting, thus responsible for deforestation.
iv. Loss of soil fertility.
v. Loss of pastures.
vi. Expansion of deserts, and
vii. Increase in frequency of droughts and floods.

In fact, too much soil erosion is one of the causes of eco-imbalance. In India, the problem of soil erosion can be seen in Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Bihar, Assam, Arunachal Pradesh, Sikkim as well as in areas of Rajasthan and Madhya Pradesh. It has been estimated that in India about 53% of the area suffers from the problem of soil erosion.

Soil Conservation

It can be checked by adopting the following measures:

i. Biological methods – strip cropping, crop rotation, application of manure, shelter belt and vegetation cover.
ii. Mechanical methods – contouring, terracing, control of gully through retention of run-off, diversion of run-off and new structures.

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iii. By maintaining soil fertility through proper soil management system.

Important techniques of soil conservation

1. Forming in counter way: Across the slope forming is done like plouging,sewing nd croping etc .
2. Cropping in strip:
3. With a decided slope,erosion of the stripe is done deterrent.
4. Terracing:

Minimum erosion is done due to less water erosion.

5. If a gully is small it may be ploughed in and then seeded to quick growing Crop like barley, maize, jowar and wheat in order to check dams of manure and straw constructed at 5 meter intervals which may be effective.
6. Shelter Belts: These are the 'green belts' of trees which help to break the force of strong winds and thus prevent or cut to a minimum the blowing away of the loose top-soil.

Landslides

Landslide is another event which may cause disruption in the general ecosystem. Landslide is a natural hazard and is defined as any any downward movement of mass of regolith or bedrock under the influence of gravity. It is a rapid sliding of large rock masses beginning their descent as unit of blocks, without internal flowage. In India, landslides often occur in the hilly states like Jammu and Kashmir, Himachal Pradesh, Uttaranchal and north-eastern states. These are common on hills and mountains where a piece of hilly mountain slides its way downwards eroding the soil on its way. The environmental hazard of landslides is extremely high for towns located on the floors of glacial troughs and at heads of fiords. During construction of roads, mining and other activities.The blockage of roads by landslides is a common phenomenon but sometimes it also blocks the course of the small rivers, thus, causing much damage. The main factors responsible for landslides are:

i. Naturally factors such as heavy and prolonged rainfall, wind, temperature, humidity, steep slopes, soil structure and texture, organic matter content, earthquakes, etc.
ii. Anthropogenic factors such as removal of vegetation of the slope, deep excavations on slopes for buildings, roads, canals, and mining without proper disposal of debris and reinforcement of slopes, etc.

Desertification

Desertification is a process in which the soil loses its productivity as a consequence of degradation or pervasive dryness. The process involves loss of regenerative capacity of soil due to extreme depletion or absence of plant supporting factors. Desertification is a complex process affecting more than six hundred million people and approximately one-third of the earth's land surface. It is a systematic phenomenon involving deterioration of the ecosystem due to change in the pressure of human adaptation or use system. It is a process through which fertile

land is converted into infertile land. This involves an interplay of climatic, edaphic and biotic factors which may work through time starting with a climatic accident and lead to accentuation of the arid conditions within an already desert terrain and creeping of the desert conditions towards its adjoining areas.

Desertification is one of the major global environmental and socio-economic problems that have attracted the attention of the environmentalists, planner, policy makers, politicians, common people and NGOs. In India, the arid zone of 20,000 sq km of hot desert located in parts of Rajasthan (62%), Gujarat (19%), Punjab and Haryana (9%), and Andhra Pradesh and Karnataka (10%).

In these regions as well as in other rid regions of the world, due to the high pressure on grazing lands and overexploitation of resources, degradation of environment is evident in the form of salinity hazard, seepage and water-logging problems in irrigated areas of the desert. The increased pressure of livestock results in overexploitation of resources leading to soil erosion and removal of surface vegetation.

In order to control desertification the following steps should be taken:

i. Ban on cutting of desert vegetation.
ii. Plantation of ecologically suitable plans in affected areas.
iii. Development of pasturelands to release pressure from susceptible areas.
iv. Control overgrazing in decertified area.
v. Stabilization of sand dunes.
vi. Proper use of available groundwater resources.
vii. Management of land use and farming practices.
viii. National watershed programme should be intensified, and
ix. Public awareness should be generated.

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