

*Review Article***Review on soil degradation and current conservation
practices in India**K. Mohanapriya ^{*1}, A. Mohamudha Jumanahasin ¹¹ Department of Agriculture Engg., Nandha Engineering College, Erode, Tamilnadu, India

Land is the premise for productivity in agricultural activities. Soil erosion is caused by a mixture of deep farming activities, wrong farming practices, rainfall situations and local situations inside the farm location. Soil erosion is a first-rate impediment to agriculture, which can lead to crop failure and environmental degradation. In addition, cuts in agricultural regions pose a threat to the sustainability of agricultural activities. Land erosion is anticipated to arise on 147 million hectares (Mha) of land in India, of which 94 Mha are due to water erosion, 16 Mha because of acid, 14 Mha because of floods, 9 Mha are in lined with topography, 6 Mha because of salt cover, and 7 Mha with the above combinations. On this overview in land conservation, Government of India signed bills such as, (1) to summarize the principle causes of soil erosion in specific agricultural and climatic zones; (2) the extent and cause of the regional decline; and (3) Indian conservation measures and conservation applications. In this paper an extensive attempt has been taken to review soil degradation and current conservation practices in India.

Keywords: Land degradation, Agriculture, Soil erosion, conservation, Programs in India.

1. Introduction

Land is very treasured for environmental financial ruin. Soil erosion is when the soil breaks down and erodes due to the action of water or air. Soil damage because of erosion could have extreme results main to loss of productiveness. Soil erosion takes place international but is the maximum commonplace and most not unusual hassle in arid areas. Soil erosion disrupts agricultural, environmental and environmental sports. Soil erosion reduces soil fertility, reduces moisture retention capability and consequently reduces crop manufacturing.

In addition to losing soil fertility and crop yield, soil erosion will increase environmental pollutants, growing soil volume in rivers and streams, and disrupting aquatic lifestyles, particularly fish. Over the years, soil erosion can affect socio-financial situations through flooding, flooding tanks and disrupting conversation structures. Ground cowl took hundreds of thousands of years to evolve. Soil formation level is sluggish (most effective 1 cm of soil is fashioned every a hundred to four hundred years) and enough soil intensity for fertile land is fashioned in 3000 to 12000 years. Therefore, when the soil is depleted of renewable herbal assets, it's miles absolutely misplaced (Pimentel et al. 1995; Lal 2001). Worldwide, approximately five to 7 Mha of the 22 percentage of land suitable for sustainable agricultural production is misplaced every 12 months because of land degradation, resulting in a chance to international meals protection. the overall place of India is stated to be 329 Mha, decreased by way of about 146.8 Mha for

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numerous motives. Crop and erosion collectively account for 70% of the earth's crust and the last 30% for salts, acids and different factors. India's annual soil loss is anticipated at 5334 million tones and 8.4 million tones of fundamental nutrients are lost (Prasad & Biswas, 2000). Annually, about 480 million lots of the 2052 million heaps of soil added in by these rivers are deposited within the reservoir and lose 1-2% in their very last volume in step with yr (Dhruv Narayan and Rambabu, 1983). Consistent with the national commission for Agriculture, dams in India are three to four times extra muddy than predicted. Of the 329 Mha geographical region, approximately 145 Mha is cultivated and there is no need to bring in extra space for cultivation.

2. Soil degradation in India

A predicted 430 m ha of land inside the world is subject to intense landslides (Borough 1991) and the

erosion impact in Asia is about 18%. In India, Jammu and Kashmir (69.24%) and Himachal Pradesh (50.90%) have the highest percent of land degraded because of snow-blanketed and degraded forests; Nagaland (22.37%), Manipur (59.01%), Mizoram (21.20%) are because of converting cultivation, Sikkim (53.67%) due to deforestation and Rajasthan (29.64%) because of sand location. It shows that the highest percent (4.76%) of the distribution of barren land belongs to the 'scrubbed land' class, especially distributed in the southern states of India, followed by means of 'low consumption woodland land' (3.42%) allotted nationwide).

Of the 583 districts, 19 districts, especially inside the north-eastern states, are allotted in Jammu and Kashmir and Rajasthan, covering greater than 50% of the geographical region below barren land (MoRD and NRSA, 2005).

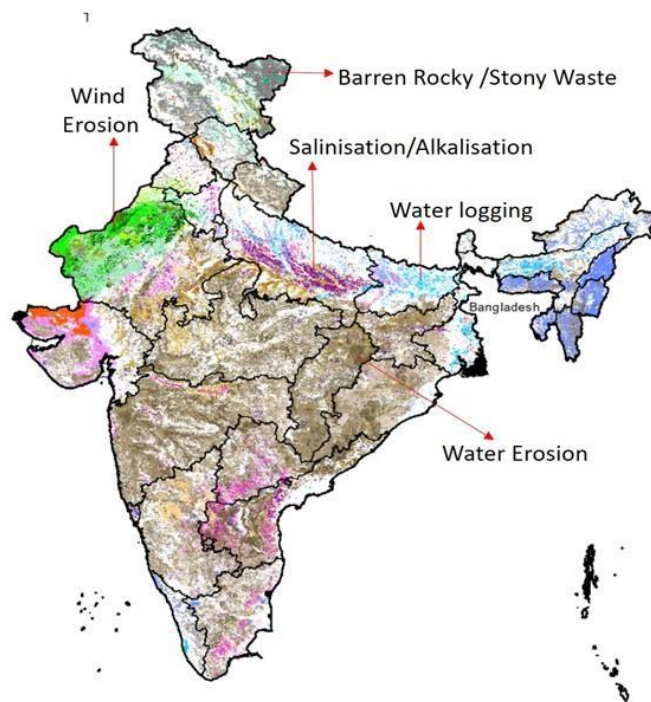


Fig. 1 Land degradation map of India (created using LISS-III data for 2015-16)

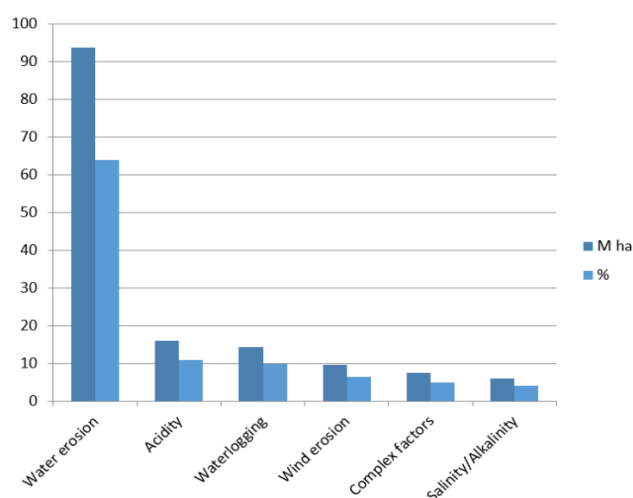
Source: Department of Space, Indian Space Research Organization (generated using LISS-III data for 2015-16)

The volume and extent of land degradation in the USA has been envisioned through several businesses (Table 1). Consistent with the national Bureau of Soil Survey and Land Use making plans, 146.8 hectares of land in India has been reduced. Water and air erosion is a first-rate hassle for land degradation in India, leading to immoderate damage to the soil and subsequent

acidification and water logging. Based totally on a preliminary evaluation of current soil loss records, the common soil erosion rate in 1 year was 16.4 ton ha, resulting in a international loss of 5.3 billion tonnes nationwide about 29% of the depleted soil goes completely into the oceans, whilst 61% is transferred and the last 10% is dumped into dams.

Table 1. Depreciation rate in India as predicted by using numerous institutions

Organizations	Assessment Year	Reference	Degraded Area (Mha)
National Commission on Agriculture	1976	[3]	148.1
Ministry of Agriculture-Soil and Water Conservation Division	1978	[4]	175.0
Department of Environment	1980	[5]	95.0
National Wasteland Development Board	1985	[6]	123.0
Society for Promotion of Wastelands Development	1984	[7]	129.6
National Remote Sensing Agency	1985	[8]	53.3
Ministry of Agriculture	1985	[9]	173.6
Ministry of Agriculture	1994	[10]	107.4
NBSS&LUP	1994	[11]	187.7
NBSS&LUP (revised)	2004	[12]	146.8

**Fig. 2 Contribution of land degradation factors in India (Source: NBSS&LUP, 2005)**

2.1. Causes of soil degradation

The reasons of decline are natural and man-made. Natural reasons consist of earthquakes, tsunamis, droughts, floods, landslides, volcanic eruptions, floods, hurricanes and wildfires. Human-triggered land degradation is caused by deforestation and deforestation, illegal farming practices, illegal control of commercial waste, over-grazing, deforestation, over-mining, city sprawl and trade / commercial improvement. improper farming practices encompass cultivation and use of heavy machinery, excessive and excessive use of organic fertilizers, incorrect irrigation and water management strategies, immoderate use of insecticides, insufficient crop residues and / or organic inputs and crop rotation. different most important social causes of land degradation in India are land scarcity, loss of access to land, economic stress on land, land rights, poverty and population increase.

Landslides have grown to be a primary trouble in each the Indian subcontinent and irrigated areas. India is suffering significant losses in the affected regions (table 2). These prices are recorded in phrases of crop yield, land use depth, change in cropping pattern, high input consumption and low profitability. The use of the national far off Sensing agency (NRSA) dataset, the manufacturing deficit in India in 1988–1989 changed into predicted at Rs. 68 billion (Rs) pronounced. additional losses because of desalination, alkalization and dehydration may be as excessive as Rs. anticipated at 8 billion. Recently, a comprehensive have a look at on the effect of water erosion on crop production confirmed that annual crop losses of cereals, oilseeds and pulses due to soil erosion had been ~ US \$ 162 billion [8].

Table 2. Estimates on the annual direct cost of land degradation in India

Parameters	NRSA [19]	ARPU [20]	Sehgal and Abrol [21]
Area affected by soil erosion (M ha)	31.5	58.0	166.1
Area affected by salinisation, alkalisation and water logging (M ha)	3.2	-	21.7
Total area affected by land degradation (M ha)	34.7	58.0	187.7
Cost of soil erosion in lost nutrients (Rs billion)	18.0	33.3	98.3
Cost of soil erosion in lost production (Rs billion)	67.6	124.0	361.0
Cost of salinization, alkalisation and water logging in lost production (Rs billion)	7.6	-	87.6
Total direct cost of land degradation (Rs billion)	75.2	-	448.6

3. Soil degradation types

3.1. Soil erosion

Soil erosion is an herbal method built-in which soil cells are moved by means of air and water and then removed. Desertification is the def While soil erosion takes place built-in, the soil is transferred to almost a built-in length, so there's no damage to the environment integrated. Erosion is built-in the biggest worries built-in the world integrated. Soil erosion impairs soil exceptional and decreases soil production. There are 3 major varieties of soil erosion namely, Wind shear, Water slicing and Gravitational shear.

3.2. Desertification

Desertification is the deforestation of arid, arid, and arid regions for an expansion of motives, including climate exchange and productive ecosystems and human sports main to lack of biodiversity. There may be a want to attempt to prevent this disaster and reverse the adverse system. Sustained maintenance of soil, water and biodiversity is critical to save you harm to the land. India bills for 70% of the entire dry land, which is attributed to desertification, i.e., deforestation because of climatic and anthropogenic situations.

Another 83.69 hectares became wasteland in 2018-19. It turned into 81.48 million hectares in 2003-2005 and 82.64 million hectares in 2011-13. Rajasthan, Maharashtra, Gujarat, Karnataka, Ladakh, Jharkhand, Odisha, Madhya Pradesh and Telangana accounted for about 23.79% of the countrywide TGA inside the area of desertification / land degradation. Because of desertification the following effects will noticed,

- Lack of floor cover
- Destruction of vegetation
- Water reducing
- Wind shear
- weather alternate.

The Causes of desertification are

- Loss of soil cover
- Vegetation degradation
- Water erosion
- Wind erosion
- Climate change

3.3. Violation, deforestation and unnoticed wooded area control

8 Indian territories were devastated due to overgrazing and deforestation, now protecting 20% of barren region areas (source: barren region Atlas of India national far flung Sensing company; NRSA). Immoderate deforestation, out of control firewood and grazing, agricultural encroachments on forest areas, wooded area fires and encroachments have resulted in land loss due to land degradation. 467 million livestock grazes on eleven million hectares of pasture, a median of forty two heads in keeping with hectare in

comparison to the constant price of five animals in step with hectare.

In dry areas high congestion can result in encroachments, which reduce water availability and accelerate soil float and erosion. Soil loss because of over-grazing is 5 to forty one times better than regular inside the mesoscale area and 3 to 18 times better than the macro scale. Sloping planting styles in the Nineties brought about deforestation and land degradation. The natural cowl of native timber and shrubs is the primary motive of declining air and water erosion. At the same time as 0.47 hectares is needed to meet the simple needs, the in step with capita woodland vicinity in step with us of a is only 0.08 hectares, which places significant stress on the woodland areas.

3.4. Agricultural activities leading to groundwater depletion in India

- Low fertility and inequality
- Large agriculture and use of heavy equipment
- Roasting vegetable residues and taking away waste organisms
- Flawed irrigation and water control
- Flawed crop variant
- Immoderate pesticide use and soil pollution

4. Soil conservation

Soil conservation is the potential to prevent immoderate soil layer erosion or lack of fertility because of overuse, acid reflux disorder, salt in water or other chemical contaminants inside the soil. Soil conservation is the paintings finished at the floor to triumph over the trouble of what kind of soil erosion, which was mentioned in a preceding examine. In a broader experience, conservation sports control soil erosion in a variety of methods. the principle goal of soil conservation is to estimate non-stop soil erosion and preserve agricultural productiveness.

4.1. Objective of Soil Conservation

Primary requirements for soil conservation nonetheless exist to develop and maintain agricultural production in step with current agro-socio-economic methods inside the location. But the specific goals of soil conservation are as follows:

- Strengthening production from natural assets to satisfy the fundamental needs of food, shelter and garb for developing humans.
- Topsoil conservation to reduce soil fertility and water retention capability, thereby retaining productivity.
- Check the formation of ditches and drains in the subject because of soil erosion, which could have a bad effect on manufacturing.
- Growth groundwater charging even as retaining soil moisture retention capability.
- To hold effective land and save you cultivable land erosion.
- Lowering mining activities because of soil erosion in rivers, lakes and ponds.
- Protecting water facilities from non-environmental pollution.
- Lowering the risk of floods affecting the livelihoods of humans, animals and plant life.
- Controlling surroundings degradation due to soil damage, disrupting the nutrient cycle, leading to loss of soil fertility, extinction of flora and animals and soil erosion. This subsequently caused biodiversity and human struggling.
- Facilitate ecosystems that affect crop boom and deforestation.

5. Soil Preservation methods in India

The salient mitigation strategies for reversing land degradation in India and their applicability in principal agro-climates are given in Table 3.

5.1. Gullied or ravenous land

The key to development of gullied and or ravenous land lies in the management of runoff. Prevention of sheet or rill erosion on the tablelands and in transition zones is the first step to control the further increment of gullied/ravenous lands. Preventing damage from river back flow, promoting afforestation and grass land development with involvement of local peoples and government departments and encourage the farmers to go for suitable horticultural plantation in the susceptible regions are the other feasible measures for rehabilitation of gullied / ravenous land.

Wherever vegetative measures are not feasible or economical appropriate engineering / mechanical

measures have to be adopted or both the measures can be combined suitably.

Table 3. Primary land degradation mitigation strategies in the agro-climatic zones of India

Mitigation Technologies	Hilly Areas	Indo-Gangetic Plains	Dryland and Desert Areas	Southern Peninsular India	Central India	Coastal Areas
Soil Erosion Control	✓	✓	✓	✓	✓	✓
Water Harvesting, Terracing and Other Engineering Structures	✓	✓	✓	✓	✓	✓
Landslide and Mine spoil Rehabilitation and Riverbank Erosion Control	✓	✓	✓	✓	✓	✓
Intercropping and Contour Farming	✓	✓	✓	✓	✓	✓
Subsoiling					✓	
Watershed Approach	✓	✓	✓	✓	✓	✓
Participatory Resource Conservation and Management	✓	✓	✓	✓	✓	✓
Integrated Nutrient Management and Organic Manuring	✓	✓	✓	✓	✓	✓
Reclamation of Acid and Salt Affected Soils and Drainage (Desalinization)	✓	✓	✓	✓	✓	✓
Remediation of as contamination		✓				✓
Water Management and Pollution Control	✓	✓	✓	✓	✓	✓
Irrigation Management for Improving Input Use Efficiency	✓	✓	✓	✓	✓	✓
Judicious Use of Distillery Effluent	✓	✓	✓	✓	✓	✓
Reforestation, Grassland and Horticulture Development	✓	✓	✓	✓	✓	✓
Vegetative Barriers and Using Natural Geotextiles, Mulching and Diversified Cropping	✓	✓	✓	✓	✓	✓
Agroforestry	✓	✓	✓	✓	✓	✓
Conservation Agriculture (CA)	✓	✓	✓	✓	✓	✓
Intensive Cropping and Integrated Farming Systems (IFS)	✓	✓	✓	✓	✓	✓
Disaster (Tsunami) Management						✓

Combined use of engineering measures like trench-cum-bund and vegetative barrier of Vetiveria

zizanioides and sambuta (*Saccharum Spp*) reduced runoff and soil losses to half of that observed in control plots and thereby increased test crop (finger millet) yield by 18–33%.

5.2. *Land with or without scrub*

Sylvester is suggested for boom in regions with low rock / rock and gravel soils and very low and inaccessible shrubs and grasses as well as shallow difficult soils with low productiveness. While depleted land is converted to everlasting land use which includes woodland cover it reasons minimal soil disturbance and increases soil natural carbon sequestration, decreasing the danger of soil erosion.

Advanced soil and water conservation measures, inclusive of rainwater harvesting practices in addition to vegetative limitations, are vital stipulations for organizing such production structures.

5.3. *Water logging and salinization*

Water retention is a chief hassle in soils with low drainage ability. Waterlogged areas may be controlled efficaciously with the aid of adopting green water application era and contemporary irrigation machine, intercropping with included nutrient management and adopting crop rotation.

Apart from this, vertical drain, sub surface drain, bio drain and canal lining assist to eliminate excess water from those areas.

5.4. *Degraded forest land*

In part depleted woodland regions may be stepped forward by way of filling in, replanting and transplanting fields with appropriate plant species the usage of soil and water conservation measures inclusive of trenching and contour furrowing. Such degraded wooded area areas should be properly included by way of fencing in order that existing seeds germinate and woodland land condition improves. Soil vegetation must be enriched by developing suitable shrubs and grass species inside the contour groves.

Fodder in those areas must be restrained and appropriately regulated with the participation of the area people. Regular monitoring of developmental activities should be ensured and timely action should be taken to prevent degradation and development of

good forest cover. Joint Forest Management is one of the excellent systems which aids in the regeneration of degraded forests with the help of the nearby villagers who are dependent on the forest for their livelihood. Co-operation from nearby villages should also be taken to ensure social protection of these forest areas.

5.5. *Degraded pasture / grazing lands*

The depleted grasslands were specially allotted within the states of Rajasthan, Haryana and so on. And at gift almost all the grasslands, specially the village mango, are in bad circumstance. Lack of land cover has an effect at the infiltration fee, main to low moisture garage within the soil profile. Rehabilitation of these lands is a concern and can be performed with the cooperation and lively participation of the local community.

Depleted plants can be restored by offering adequate soil and moisture conservation measures and safety. The inclusion of fodder bushes and grass / legumes within the meadows decreased the go with the flow with the aid of 10.2% in comparison to 40.5%, in which soil and water conservation measures have been not in location and multiplied biomass production potential inside the meadows. This approach need to be environmentally suitable and appropriate to local humans.

5.6. *Shifting cultivation*

Shift farming is a common farming approach inside the hilly areas of India and is extensively practiced inside the northeastern states of Orissa and the Japanese Ghats with an area of approximately 4.35 million hectares of forest. Initially the fallow period followed in shifting cultivation is more than 30 years, but now the pressure on agricultural land has increased significantly due to burgeoning population and the fallow period has reduced to 2- 3 years.

The quick comply with-up period between the 2 cultivars is not enough for the natural approaches of replica of the disturbed atmosphere main to declining soil fertility and land degradation. The land degraded by shifting cultivation has to be rehabilitated by adopting silvipasture, silviculture and agri-horticulture system. In eastern ghats of Odisha, shifting cultivation ravaged hills could be successfully rehabilitated with production-cum conservation based agroforestry

systems consisting of Guava / cashew + *Stylosanthes hamata* + Trench system.

5.7. Control measures

In the Kashmir Valley, the trouble of soil erosion has caused very huge scale land erosion. The problem of soil erosion is in particular characterized with the aid of declining steep mountain slopes, landslides, landslides and mountain watersheds, trendy degradation of forests and shortage of control of agricultural practices. Soil care methods:

- Plants enlargement and protected afforestation
- Controlled feeding
- Flood control
- Prohibition of shifting cultivation
- Fair land use
- Preserving soil fertility
- Land acquisition, barren land recuperation
- Status quo of soil studies institute and training for soil scientists and
- Effective organizations for soil management.

6. Soil Conservation Programs in India

Because of increasing population strain, indiscriminate clearing of wooded area areas to meet the demand for meals, fiber, gas, wooden and fodder has caused massive soil harm in lots of components of the United States of America. Human activities along with urbanization, street production, mining, and many others. have exacerbated the trouble. Within the early days the problem became neighborhood but now it's far exacerbated by the growing plunder of natural assets. But, seeing that pre-independence, diverse government schemes have been applied for the safety of land, water and vegetation.

6.1. The Pre-Independence Era

In 1882, Inspector widespread of Forests Sir Dietrich Brandes commented at the opportunity of soil erosion within the pre-independence Nilgiris district of the Madras Nilgiris district and the need to combat it. It's far counseled that vegetation be planted within the center of the cultivation at the slopes. Defensive the land from the hazard of 'cho' (mountain streams) also attracted early interest and the first regulation to prevent soil erosion was handed in 1900 because the Land Conservation Act in Punjab. It supplied measures

inclusive of watt cart (ridge creation), contour trenching, gully plugging, terracing, and tree planting to prevent chaos destruction. Soil conservation studies in India started in 1933-35 when the then Imperial (now Indian) Council of Agricultural research mounted its nearby facilities for research on dry farming in Solapur (Maharashtra), Bijapur, Raichur, Bellary (Karnataka) and Rohtak. Decided to installation. (Haryana). Important measures encouraged through the research facilities are cultivation of kharif vegetation in ridges, inexperienced manures, shallow soils and prevention of rainwater infiltration into deep black soils.

Soil conservation received actual impetus within the Forties whilst a unique soil conservation unit becomes set up at the department of Agriculture in Maharashtra and a large scale contour bunding program became brought following medical guidelines and specs went. Subject bunding became additionally practiced within the Deccan Plateau inside the Thirties and '40s as a part of drought relief efforts. Soil conservation isn't always restricted to contour bunding however additionally consist of nala bunds (loose stone test dams) and percolation dams for water series.

In 1919 the state of Gwalior appointed a commission to check out ways and approach to enhance the manufacturing of economic flowers in these regions and to prevent similarly growth of the valleys. Within the 1930s, valley healing techniques were applied in the Chambal Valley within the country of Gwalior. In 1953, the Board of Agriculture proposed a scientific surveillance of Indian soil to assess the damage resulting from erosion.

The Bombay Land Reforms Act of 1942 established land reform boards in every division for the protection, development and manages of agricultural, woodland and pasture lands. In 1945, the imperative authorities used the offerings of Dr. Donald V. Schuhart of the Soil Conservation carrier of the USDA to record on soil erosion problems in India and to suggest preventive measures. A high-powered seven-member team visited the USA in May 1947 and submitted a record to the government of India at the specific conditions of Indian agriculture for a detailed observe of soil conservation practices. The crew suggested that the planning unit should be a village or group of villages or a watershed.

6.2. *The duration after independence*

In September 1953, an assembly of the Ministers of country for Agriculture and Cooperation turned into held in New Delhi. The convention cited that existing agency on the kingdom stage must hand over the duty of preparing soil conservation applications to the nation improvement committees.

It additionally suggested that any state issue associated with soil conservation need to be brought to the eye of the critical Soil Conservation Board. The significant Soil Conservation Board turned into set up in 1953 by using the vital government inside the Ministry of meals and Agriculture. The state of Maharashtra has taken the lead on soil erosion troubles and conservation measures on cultivable land. it's miles found out that the closing intention of soil conservation isn't always best to control erosion however also to keep soil productivity.

6.3. *First Five Year Plan (1951-56)*

The first 5 year Plan (1951-56) targeted on soil and moisture conservation. If you want to growing a studies base for soil conservation, a Soil Conservation department and a barren region wooded area studies middle were set up at Jodhpur underneath the manipulate of the forest research Institute in Dehradun. As a end result, the significant Soil Conservation Board has set up nine soil conservation studies, demonstration and training centers at Dehradun, Chandigarh, Bellary, Ooty (now Udagamand), Kota, Vasad, Agra, Chhatra (Nepal) and Jodhpur. Five year Plan and preliminary second 5 year Plan.

6.4. *Second Five Year Plan (1956-61)*

Underneath this plan, the desert forest and Soil Conservation center at Jodhpur was evolved in 1959 because the vital arid quarter studies Institute (CAZRI) in collaboration with UNESCO. A center has been installation in Chatra, Nepal to investigate the soil conservation troubles of the Kosi River Valley undertaking. The All India Soil and Land Use Survey enterprise was mounted on the primary degree.

6.5. *Third Five Year Plan (1961-66)*

A middle at Ibrahimpatnam (Hyderabad) inside the semi-arid crimson soil vicinity become mounted in 1962 in the 3rd 5 yr Plan. The authorities of India has reorganized the Soil Conservation division of the

Ministry of Agriculture and re-appointed and appointed a Senior Director. Consultant liable for coordinating soil and water conservation development. Following the reorganization of agricultural studies and schooling in India, all the soil conservation research, demonstration and training centers of the government of India besides Chatra (Nepal) were transferred to the Indian Council of Agricultural research (ICAR) on 1 October 1967.

6.6. *Fourth Five Year Plan (1969-74)*

Beneath this scheme, All India Soil and Land Use Survey have organized a detailed analysis of numerous watersheds in the us. The concept of integrated Watershed management has been successfully delivered at the sector stage in various components of the USA.

6.7. *Fifth Five Year Plan (1974-79)*

Beneath this scheme, the authorities of India has introduced several Centrally backed Programmers, Drought Prevention location (DPAP), Flood Prevention area (FPAP), Rural improvement program (RDP) and wilderness improvement software (DDP). The various DPAP and DDP, the point of interest became on planting bushes in depleted land and drilling tube wells to extract groundwater.

6.8. *Sixth Five Year Plan (1980-85)*

On this plan length, greater emphasis turned into given at the remedy of small watersheds various in size as much as 2000 hectare. an in depth programme for incorporated control of approximately two hundred sub-watersheds of 8 flood susceptible catchments of Ganga River basin turned into undertaken throughout this plan.

6.9. *Seventh Five Year Plan (1985-90)*

In this plan, DDP is positioned inside the warm and cold desert areas and mass deforestation practices are adopted following an included watershed control approach. Primarily based on the experience gained in numerous schemes, the countrywide Watershed improvement program (NWDPPRA) has been released within the seventh Plan inside the decided on 99 districts of the United States below the seventh Plan. NWDPPRA has been carried out in approximately 2550 watersheds in 357 districts in 25 states and union territories, viz.: Andaman and Nicobar Islands and

Dadra and Nagar Haveli. The watershed method has the benefit of providing twin desires of restoring ecological stability and the socio-financial properly-being of the watershed community.

6.10. Eighth Five Year Plan (1990-95)

At some stage in this era, the Ministry of Agriculture, Ministry of Agriculture and Co-operation, New Delhi prepared pointers for the implementation of NWDPR and posted it within the shape of a report normally called WARASA (Watershed area Rain fed Agricultural machine approach). Outstanding figures inside the Ministry of Rural development have additionally added in trendy suggestions for the implementation of the DPAP, DDP and the incorporated desert improvement program (IWDP) to preserve uniformity in goals, techniques and value constraints for diverse watershed development initiatives inside the United States of America.

6.11. Ninth Five Year Plan (1997-02)

Inside the 7th five 12 months Plan, a Centrally backed Scheme for Alkaline Soil improvement turned into launched inside the states of Haryana, Punjab and Uttar Pradesh. It continued within the 8th five yr Plan and changed into prolonged to the states of Gujarat, Madhya Pradesh and Rajasthan. In 2000-01, it turned into prolonged to all other states with alkaline soil troubles. The goal of the scheme is to enhance the physical situations and productivity situations of alkaline soils to restore most efficient crop manufacturing. Assured agricultural development works include irrigation water, land leveling, dams and farming, community drainage system, utility of soil adjustments, natural manure and many others. In Plan IX, a place of 0.97 lakh hectares, in most cases in isolated patches. Rs. 14.99 crores (part of government of India). thru Plan IX (1997-02), an area of 426 lakh hectares become included through the All India Soil and Land Use Survey underneath precedence Description Survey (PDS) and 13.1 lakh hectares below detailed Soil Survey (DSS).

6.12. Tenth Five Year Plan (2002-07)

The tenth 5, 12 months Plan (2002-2007) focuses on rainwater harvesting, groundwater recharge sports and groundwater exploitation, watershed improvement, and natural aid control thru the remedy of waterlogged

areas. The government of India has absolutely funded the Western Ghats development program (WGDP), a place tormented by erosion and water problems. This system additionally directed the kingdom governments to adopt a complete watershed approach to implement activities like soil conservation, agriculture, horticulture, afforestation, electricity and fodder development, minor irrigation, animal husbandry and so forth. diverse soil conservation measures (engineering and agriculture), construction, check dams, gully plugging, blended species plantation and contour ditches have been undertaken within the touchy western ghats of Sattari, Canacona and Sangam taluks.

6.13. Eleventh Five Year Plan (2007-12)

Watershed improvement tasks aimed at retaining soil and water had been funded thru numerous schemes in the rain fed areas, including country wide Watershed improvement projects (NWDPR), River Valley initiatives (RVP), and the integrated desolate tract improvement software (WDP) (IWDP). The point of interest is on increasing the provision of water assets as well as their green use. duty for making sure good enough water availability for agricultural use is split between the Ministry of Water resources (MoWR), that is accountable for main, intermediate and minor irrigation, and the branch of Land sources, which is accountable for watershed management. The branch of Agriculture is liable for addressing rural development and water conservation issues and dealing with water use performance under the Mahatma Gandhi Rural Employment assure Act (MGNREGA).

7. Future thrust areas

The potential for water sources in India is expected at 187 million hectares, of which 60 million hectares and one hundred ten million hectares of floor and groundwater resources have a usable water aid potential of fifty million hectares. The Indian location may be very prone to climate exchange and if rainfall decreases and floor water drift decreases, call for water from groundwater will growth, whilst discharges somewhere else will decrease. As a riverside united states, 316 million hectares are fed by way of predominant rivers and their tributaries. The main area of the us is at risk of water induced soil erosion and is consequently excessive in the us Therefore it's far

necessary to periodically keep away from the danger of soil damage of rivers and streams. Consequently, a lot of attempts are needed to manipulate land erosion and make use of the capability of water resources and to conquer drought and floods within the United States of America. Identified studies areas for the destiny are prioritized and classified as follows,

- Policy implications
- Inventories on soil degradation
- Soil conservation
- Climate change impact

8. Conclusion

With a geographical region of 329 M ha in India, it's far expected that approximately 45% of the land (146.8 MHz) is depleted. The urgently wishes to undertake appropriate mitigation strategies to repair such degraded lands for sustainable production. Erosion control engineering methods are the only ways to build bodily systems that incorporate water and control the go with the flow velocity. Accordingly preventing soil erosion diverse structures constructed to manipulate the speed of flowing water consist of test dams, preserving walls, embankments, and so forth for the reason that our Indian location may be very vulnerable to weather change, declining rainfall will lessen floor water glide and boom demand for groundwater. Developing appropriate policy, far off sensing and GIS-based totally mapping of land erosion, studies at the effect of climate trade on soil sources, soil mitigation and moisture conservation, and future challenges for soil conservation scientists and coverage makers.

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