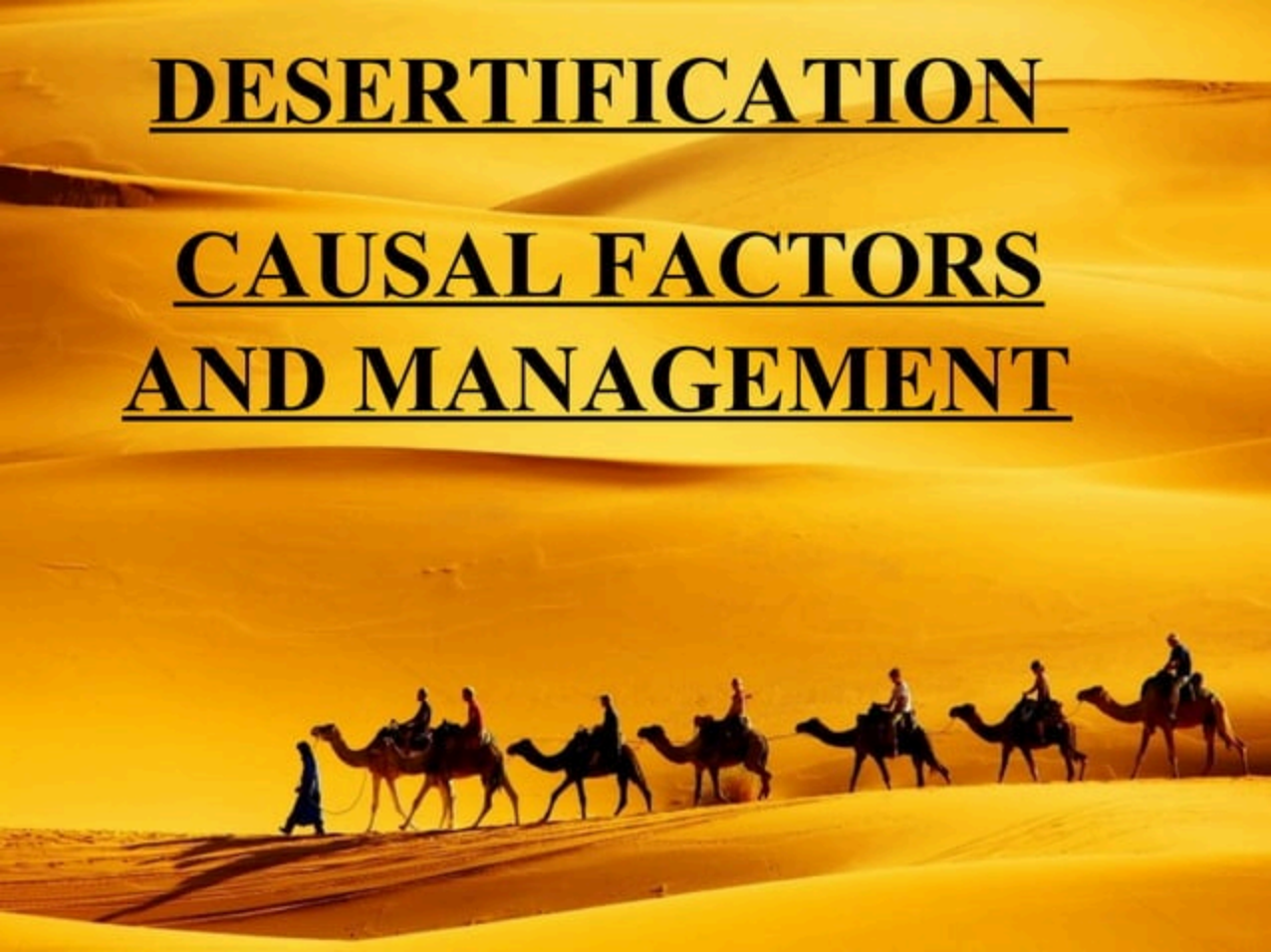
DESERTIFICATION

CAUSAL FACTORS AND MANAGEMENT



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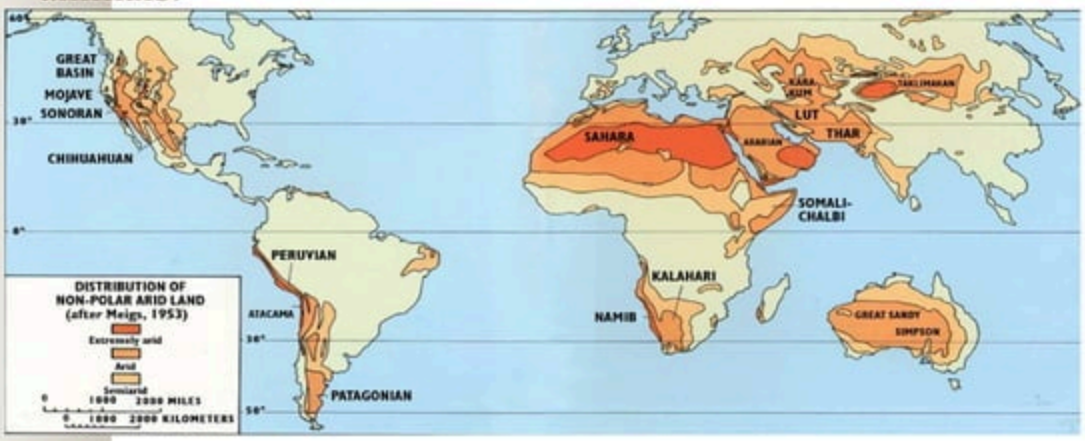
DESERTS

A large, dry, barren region, usually having sandy or rocky soil and little or no vegetation. Water lost to evaporation and transpiration in a **desert** exceeds the amount of precipitation; most **deserts** average less than 25 cm (9.75 inches) of precipitation each year, concentrated in short local bursts.

Deserts of the World

Approximately one-third of the Earth's land surface is desert, arid land with meager rainfall that supports only sparse vegetation and a limited population of people and animals.



Desertification

Desertification is a type of land degradation in which a relatively dry land region becomes increasingly arid, typically losing its bodies of water as well as vegetation and wildlife. It is caused by a variety of factors.Desertification is a significant global ecological andenvironmental problem

(**ARID**: Lacking moisture,especially having insufficient rainfall to support trees or woody plants)

CATEGORIES OF DESERTIFICATION

Light Desertification: In this type of desertification, a very slight damage occurs in vegetation cover and soil. This damage does not affect the biological capacity of the environment and can be neglected .

Moderate desertification: A medium degree of damage of vegetation cover occurs and formation of small sand dunes and salinization of the soil which reduces production by 10-25%.

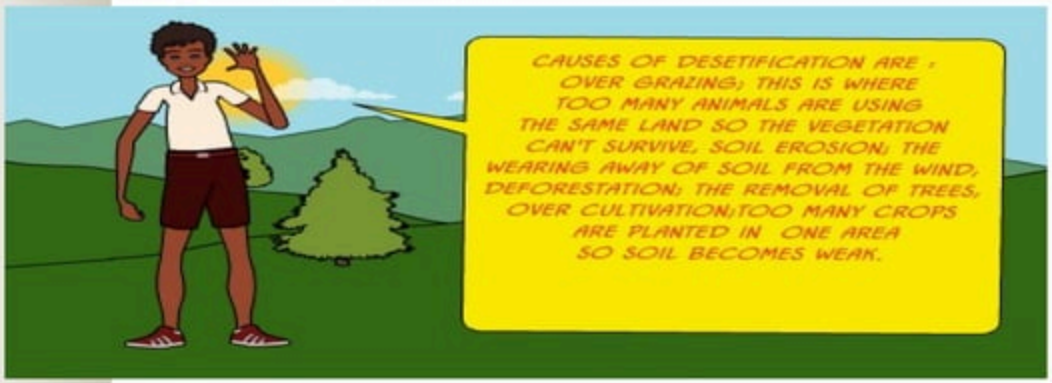
Severe Desertification: In this type, spreading of weeds and unwanted shrubs in the pasture at the expense of desirable and wanted species occurs as well as increasing of the erosion activity which affects the vegetation cover and reduces production up to 50%.

Very severe desertification: In this type of desertification, composition of active naked great sand dunes occurs and formation of many grooves and valleys and the salinization of the soil which leads to soil degradation.It is the most serious type of desertification.

Causes of Desertification

- There are 4 main factors in desertification
- Drought
- Over grazing
- Over cultivation
- Trees used for fuel and shelter



- **Drought** –
  - A long period without rainfall.
  - Causes crops to die.
  - Lack of food.
  - May have to move to find food.

- **Overgrazing** –
  - Too many animals grazing on the land.
  - Animals eat all the vegetation.
  - Vegetation fails to grow.
  - Soil is exposed to rain and wind.
  - Soil is washed or blown away.

Overcultivation

- Many crops being grown on the land year after year.
- No rotation of crops.
- Crops take all the nutrients from the soil.
- The soil becomes infertile and nothing can grow.
- Because there are no crops to protect the soil the soil is again easily eroded by the wind and rain.

REMOVAL OF TREES FOR FUEL AND SHELTER

- There are few trees in the desert and their roots hold the soil together.
- When the trees are removed for firewood or to build shelter the roots die and the soil becomes loose.
- Yet again this means the soil can be easily blown or washed away.

COUNTER MEASURES &PREVENTION FOR DESERTIFICATION

Desertification is recognized as a major threat to biodiversity. Some countries have developed Biodiversity Action Plans to counter its effects, particularly in relation to the protection of endangered flora and fauna.The culture of prevention requires a change in governments' and peoples' attitudes through improved incentives.

- REFORESTATION.
- FIXATION OF SOIL.
- CONTOUR TRENCHING.
- FARMER-MANAGED NATURAL REGENERATION.
- MANAGED GRAZING.

REFORESTATION

•**Reforestation** is the natural or intentional restocking of existing forests and woodlands that have been depleted, usually through deforestation.Reforestation can be used to improve the quality of human life by soaking up pollution and dust from the air, rebuild natural habitats and ecosystems, mitigate global warming since forests facilitate biosequestration of atmospheric carbon dioxide, and harvest for resources.

•The term *reforestation* is similar to afforestation, the process of restoring and recreating areas of woodlands or forests that may have existed long ago but were deforested or otherwise removed at some point in the past

•Reforestation of large areas can be done through the use of measuring rope (for accurate plant spacing) and dibbers, (or wheeled augers for planting the larger trees) for making the hole in which a seedling or plant can be inserted. Indigenous soil inoculants (e.g., Laccaria bicolor) can optionally be used to increase survival rates in hardy environments

FIXATION OF SOIL

•Fixating the soil is often done through the use of shelter belts, woodlots and windbreaks. Windbreaks are made from trees and bushes and are used to reduce soil erosion and evapotranspiration.

•Some soils (for example, clay), due to lack of water can become consolidated rather than porous (as in the case of sandy soils). Some techniques as tillage are then used to still allow the planting of crops .

•Enriching of the soil and restoration of its fertility is often done by plants. The Leguminous plants which extract nitrogen from the air and fixes it in the soil, and food crops/trees as grains, barley, beans and dates are the most important. Sand fences can also be used to control drifting of soil and sand erosion

SHELTER BELTS

TILLAGE

CONTOUR TRENCHING

•**Contour trenching** is an agricultural technique that can be easily applied in arid subareas to allow for water and soil conservation and to increase agricultural production.

•This involves the digging of 150m long, 1m deep trenches in the soil. The trenches are made parallel to the height lines of the landscape, preventing the water from flowing within the trenches and causing erosion. Stone walls are placed around the trenches to prevent the trenches from closing up again.

FARMER-MANAGED NATURAL REGENERATION

- Technique that has produced successful results for desert reclamation.

- Its a simple and low-cost method has enabled farmers to regenerate some 30,000 square kilometers. The process involves enabling native sprouting tree growth through selective pruning of shrub shoots.

- The residue from pruned trees can be used to provide mulching for fields thus increasing soil water retention and reducing evaporation.

MANAGED GRAZING

- A method proposed to restore grasslands by using fences with many small paddocks and moving herds from one paddock to another after a day or two in order to mimick natural grazers and allowing the grass to grow optimally.

RESEARCH PAPERS RELATED TO DESERTIFICATION

* **The African Sahel 25 years after the great drought: assessing progress and moving towards new agendas and approaches.**

Simon Batterbury ,Andrew Warren

Development Studies Institute, London School of Economics, Houghton Street, London, UK

Department of Geography, University College London, 26, Bedford Way, London, UK

*__Why Large-Scale Afforestation Efforts in China Have Failed To Solve the Desertification problem.__

Shixiong Cao ,China Agricultural University

* **The African Sahel 25 years after the great drought: assessing progress and moving towards new agendas and approaches.**

The Sahel is a semi-arid to arid area of scrubland and desert stretching mainly across the countries of Ethiopia, Eritrea, Djibouti, Northern Nigeria and Somalia. Desertification in the Sahel is progressing at a disturbing rate affecting 2,500 hectares each year.

The reasons for desertification in the Sahel are:

- **Human** - Large population increases in recent years – has lead to **overgrazing** of the land to meet higher food requirement. The increased energy requirements have lead to **deforestation** as more firewood has been needed.

Environmentally unsound policies that do not forbid or actively encourage activities that may lead to desertification.

Lack of education in agricultural policies and techniques has lead to stripping the land of minerals and humus which has not been replaced.

Poor irrigation practices raise salinity, and sometimes dry the rivers that feed large lakes: the Aral Sea and Lake Chad have shrunk dramatically in this way.

•**Environmental or physical factors** - Long periods of drought and short periods of torrential rain experienced by the Sahel region, and some climatic change

APPROACHES FOLLWED BY THEM:

* **Contour stone bunds** trap organic material such as leaves, whilst allowing water to trickle through. This distributes water evenly over fields when it rains, and the trapped organic material can be raked across the fields, eventually turning to humus and so improving the quality of the soil. 10,000 people in more than 500 villages in Mali have been taught this technique, in these villages, collectively, contour stone bunds have been used on more than 10,000 hectares of l

Education

UNDP United Nations Dry lands Project - Sahel

Barriers to stop wind erosion of soil

Sustainable planting and irrigation techniques

*Digues Filtrantes

- Permeable rock dams (digues filtrantes). The structures are typically long, low dams of loose stone constructed in gullies and across valleys. Because they lack a spillway, the dams force flood water to spread over their length, which strongly reduces its erosive force. They also force water to infiltrate: this results in large quantities of sediment being deposited, often filling up gullies within two years – which in turn creates favourable conditions for growing crops where nothing could be grown before.

*GREAT GREEN WALL

- The Great Green Wall is a project developed by the African Union to face desertification in South Sahara.
- It is the largest environmental transformation in Africa and the green belt of trees expands out 7,775km long and 15km thick.
- The trees' shade and bulk help offer crops relief from the overwhelming heat and gusting winds.
- Spans out across 11 countries of Africa.

*Why Large-Scale Afforestation Efforts in China Have Failed To Solve the Desertification problem.

The main areas of desertification in China are currently located in northwestern parts of the country, including the Inner Mongolia and Ningxia autonomous regions, Shaanxi, Qinghai, and Xinjian provinces, and other nearby areas.

The **climate of northwestern China appears to be unsuitable for afforestation owing to the low rainfall**. Historically, the forested areas of China have been distributed to the east of the 500 mm precipitation isoline, which comprises China's humid or semihumid regions.

In contrast, **northwestern China has a semiarid or arid climate, with only 50-500 mm of annual precipitation** as a result, the natural vegetation is grassland or desert.

Previous attempts to solve the desertification problem by means of afforestation have failed several times in northwestern China.

At the beginning of the 1980s, large-scale afforestation carried out in northwestern China by the central government failed completely. Simultaneously, an FAO afforestation project implemented in Hai-Yuan county Qinghai Province and China's government's afforestation project implemented in Inner Mongolia autonomous regions, **where the annual precipitation averages less than 400 mm also failed.**

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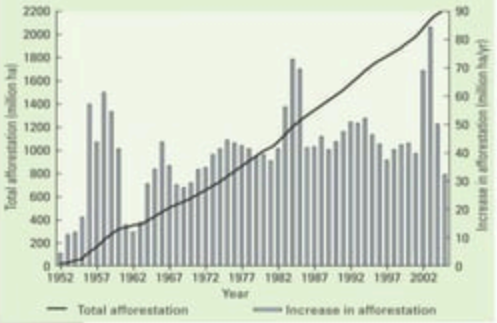
Although it is likely that some afforestation in northwestern China has been successful in areas with access to more water than the regional average, there seems to be little evidence that trees are capable of surviving in areas with less than 500 mm of precipitation; there is no historical evidence that trees were ever capable of surviving under these conditions

FIGURE 1

Total area of afforestation in China from 1952 to 2005

Data from Ref. 8.



Although the area of afforestation is increasing rapidly, the area of degraded land has continued to expand and the severity of desertification has continued to intensify throughout the country

THANK YOU.....

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