



drishti

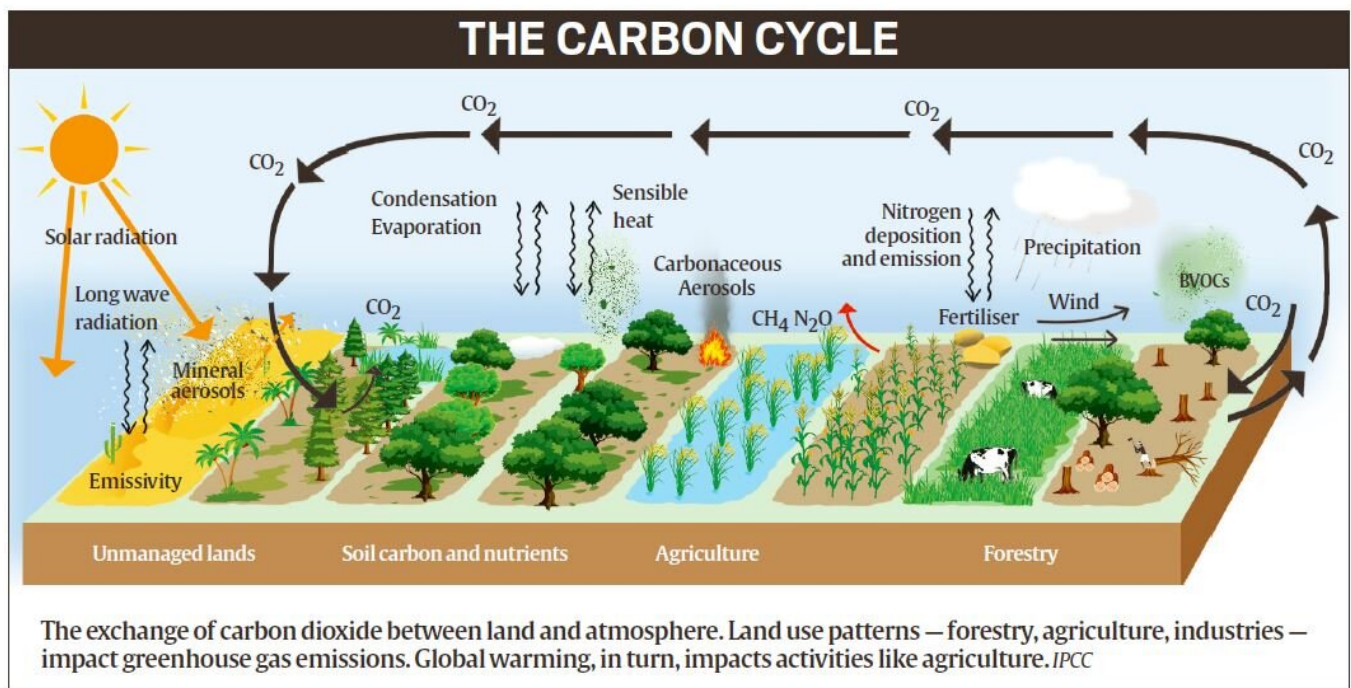
Climate Change and Land: IPCC's Report

drishtiias.com/printpdf/climate-change-and-land-ipcc-report

The Intergovernmental Panel on Climate Change's (IPCC) report on 'Climate Change and Land' reveals the relation between climate change and land use pattern.

- This is the first time that the IPCC, has focused its attention solely on the land sector.
- The report focuses on the contribution of land-related activities to global warming i.e how the different uses of land, like agriculture, industry, forestry, cattle-rearing, and urbanisation, was affecting emission of greenhouse gases.

Key Findings



Climate Change and Land degradation: Land degradation is linked to several climate variables, such as temperature, precipitation, wind, and seasonality.

- **Reduced Photosynthesis:** Extreme heat events can reduce photosynthesis in trees, restrict growth rates of leaves and reduce the growth of the whole tree.
In regions where plants decline, land degradation is expected to occur as vegetation provides a vital safeguard against erosion.
- **Increased Aridity:** global warming will exacerbate heat stress thereby increasing deficits in soil moisture that in turn will increase the rate of drying/ aridity.
- **Rainfall and Flooding:** as a consequence of climate change can also delay planting, increase soil compaction, and cause crop losses.

Land Degradation

IPCC report defines land degradation as a negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity, or value to humans.

However, report states that some aspects of climate change can improve the condition of the land like CO₂ fertilisation, where higher levels of CO₂ in the atmosphere increase plant growth.

How Does the Land contribute to Climate Change: Land acts as both the source as well as a sink of carbon thereby, large scale land-use changes like deforestation or urbanisation, or even a change in cropping pattern, have a direct impact on the overall emissions of greenhouse gases.

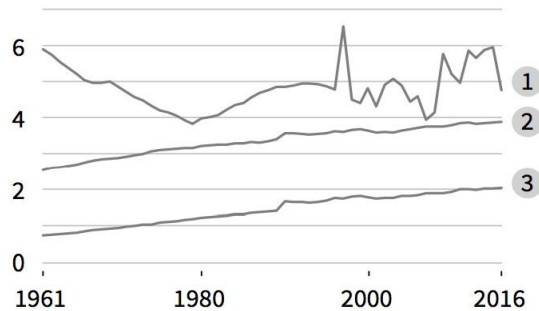
B. GHG emissions

An estimated 23% of total anthropogenic greenhouse gas emissions (2007-2016) derive from Agriculture, Forestry and Other Land Use (AFOLU).

CHANGE in emissions rel. to 1961

- 1 Net CO₂ emissions from FOLU (Gt CO₂/yr)
- 2 CH₄ emissions from Agriculture (Gt CO₂eq/yr)
- 3 N₂O emissions from Agriculture (Gt CO₂eq/yr)

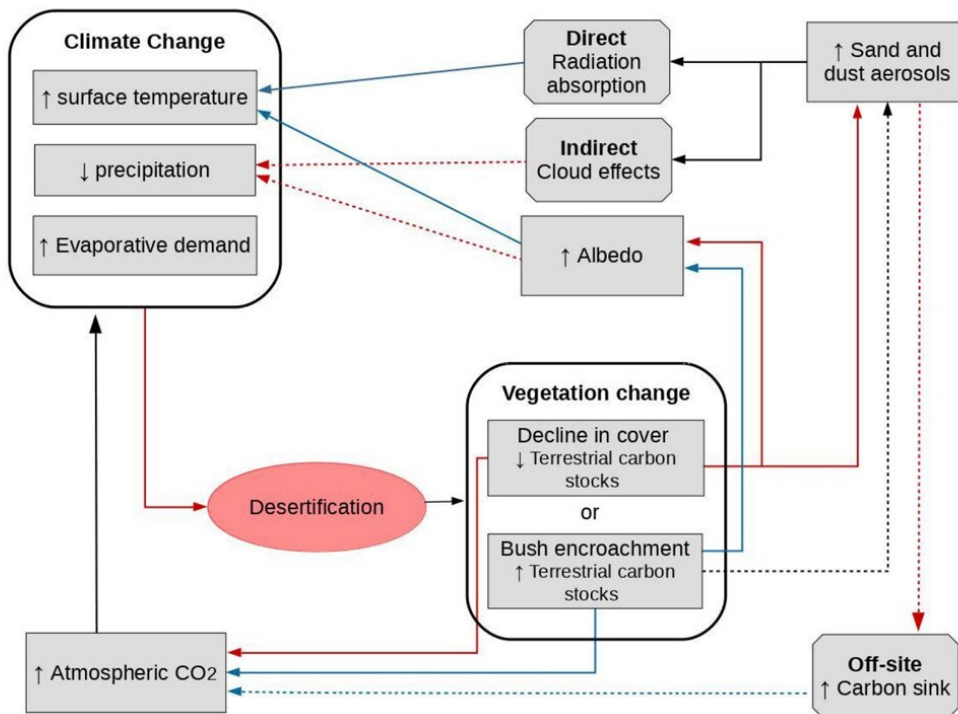
Gt CO₂eq/yr



- **Carbon Source:** Land-based activities such as agriculture and forestry are sources of greenhouse gas emissions hence act as carbon source.
- **Carbon Sink:** Soil, trees and vegetation absorb carbon dioxide, thus act as carbon sinks.

Climate Change and Desertification: The IPCC land report defines desertification as land degradation in arid, semi-arid, and dry sub-humid areas, collectively known as drylands, resulting from many factors, including human activities and climatic variations.

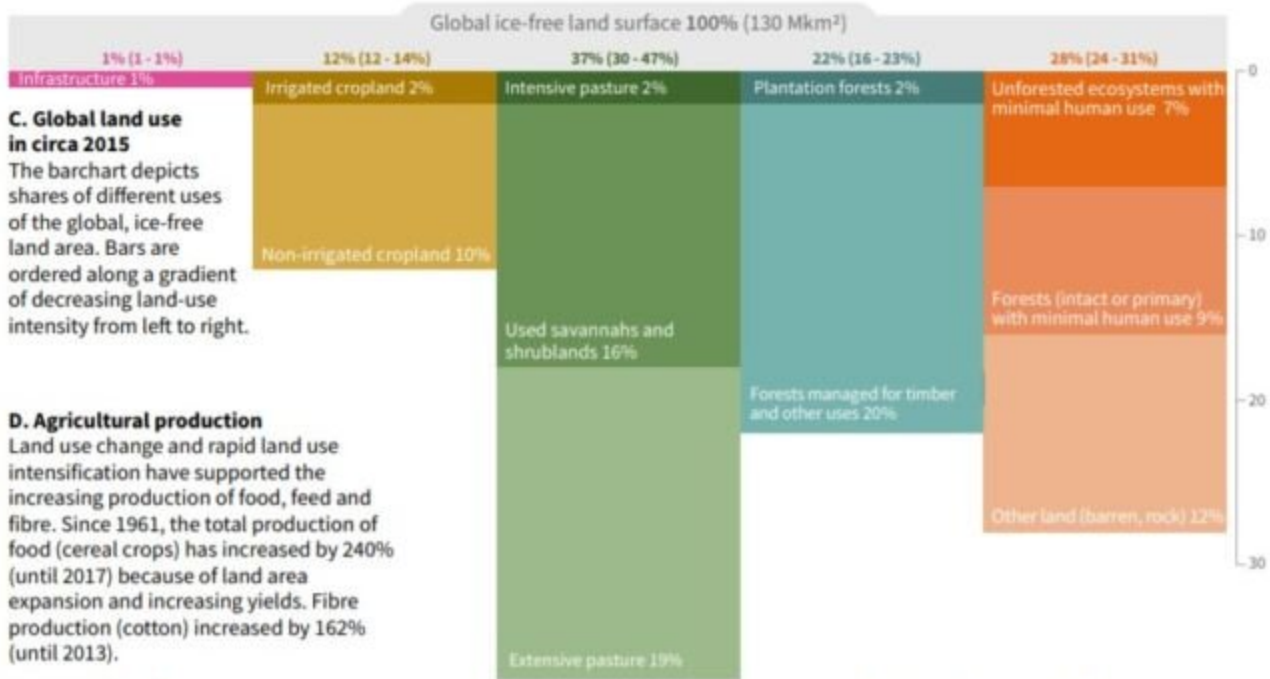
According to report risks from desertification are projected to increase due to climate change.



The decline in vegetation can leave the soil more at risk of erosion, increasing the likelihood of sand and dust storms that in turn would tend to decrease precipitation in the local climate, thus further reinforcing desertification.

Impacts of Climate Change-driven Land Degradation:

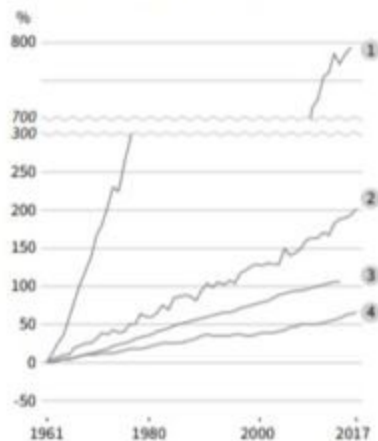
Poverty: Report states that climate change is frequently noted as a risk multiplier for both land degradation and poverty.



D. Agricultural production
Land use change and rapid land use intensification have supported the increasing production of food, feed and fibre. Since 1961, the total production of food (cereal crops) has increased by 240% (until 2017) because of land area expansion and increasing yields. Fibre production (cotton) increased by 162% (until 2013).

CHANGE in % rel. to 1961

- ① Inorganic N fertiliser use
- ② Cereal yields
- ③ Irrigation water volume
- ④ Total number of ruminant livestock

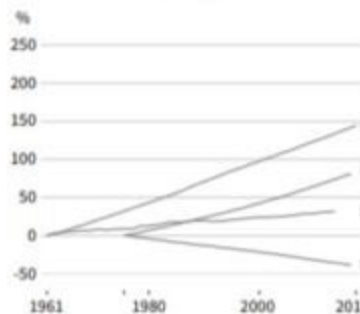


E. Food demand

Increases in production are linked to consumption changes.

CHANGE in % rel. to 1961 and 1975

- ① Population
- ② Prevalence of overweight + obese
- ③ Total calories per capita
- ④ Prevalence of underweight

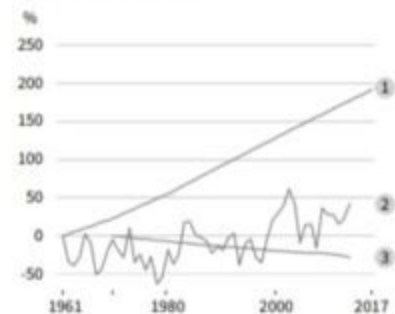


F. Desertification and land degradation

Land-use change, land-use intensification and climate change have contributed to desertification and land degradation.

CHANGE in % rel. to 1961 and 1970

- ① Population in areas experiencing desertification
- ② Dryland areas in drought annually
- ③ Inland wetland extent



Migration: Climate-related land degradation and migration are directly linked to each other.

When people are pushed into poverty or have their livelihoods stripped as a result of changes in their environment, one adaptation option is to move to another area and this can be internally or across borders.

Climate Change and Food Security: Climate change is affecting food security through increasing temperatures, changing precipitation patterns, and greater frequency of some extreme events.

- **Agricultural Production:** Increasing temperatures are affecting agricultural productivity in higher latitudes, raising yields of some crops (maize, cotton, wheat, sugar beets), while yields of others (maize, wheat, barley) are declining in lower-latitude regions.
- **Nutritional Quality:** Increased atmospheric CO₂ levels can lower the nutritional quality of crops.
- **Livestock Production:** Future climate change could affect livestock production. An increase in desertification and heatwaves could have a direct impact on animal morbidity, mortality and distress that in turn could adversely affect the food security.
- **Higher Prices:** Report states that cereal prices could increase by 1-29% by 2050 as a result of climate change, leading to higher food prices and increased risk of food insecurity and hunger

Source: IE