

Environmental Degradation: Impact and Nature based Solutions on landscape

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ARTICLE ID: 17

Abstract:

Environmental changes are based on factors like urbanization, population and economic growth, increase in energy consumption and agricultural intensification. The degradation has adverse impacts on humans, plants, animals and micro-organisms. To cope up with the critical situation, we need to make optimum use and management of resources, sustainable development, adoption of green concept and above all community participation in all developmental activities. q



Figure: Causes of environmental degradation

Impact on Nature:

Environmental degradation is a result of socio-economical, technological and institutional activities. Degradation occurs when earth's natural resources are depleted. The resources which are affected include water, air and soil. The degradation also impacts our wildlife, plants,



animals and micro-organisms. Our land, water and soil are compromised when people exhaust resources or release harmful chemicals into the air. Deforestation, wasting resources, and pollution all add to the demise of an environmentally-sound and safe planet.

✚ **Soil:** Poverty is a major contributor to environmental degradation. People living in poverty often experience hunger and food insecurity, leading to over-exploitation of natural resources. Deforestation, overgrazing, pollution, and climate change all contribute to environmental degradation and can lead to decreased crop yields and water shortages. These factors can all contribute to poverty, as people are unable to produce enough food to feed their families. It promotes erosion, which removes topsoil and reduces the fertility of the soil. It can also cause an increase in salinity, affecting the ability of plants to absorb water and nutrients. Soil compaction due to environmental degradation reduces the amount of air and water into the soil. Finally, it can lead to a decrease in soil organic matter content, which affects the ability of the soil to retain nutrients and water to support plant growth. Deforestation, overfishing, and other unsustainable practices lead to the destruction of habitats, the release of greenhouse gasses, and the disruption of natural carbon sinks. As habitats are destroyed, fewer plants are available to absorb carbon dioxide from the atmosphere, leading to an increase in atmospheric concentrations of the gas. The destruction of coral reefs and other marine ecosystems also leads to a decrease in the amount of carbon dioxide that is absorbed by the ocean, further contributing to climate change.

✚ **Water:** Water is uniquely vulnerable to pollution. Known as a “universal solvent,” water is able to dissolve more substances than any other liquid on earth. It’s likewise why water is so easily polluted. Toxic substances from farms, towns, and factories readily dissolve into and mix with it, causing water pollution. Not only in the agricultural sector the biggest consumer of global freshwater resources, with farming and livestock production using about 70 percent of the earth’s surface water supplies, but it’s also a serious water polluter. Around the world, agriculture is the leading cause of water degradation. Every time it rains, fertilizers, pesticides, and animal waste from farms and livestock operations wash nutrients and pathogens—such bacteria and



viruses—into our waterways. Nutrient pollution, caused by excess nitrogen and phosphorus in water or air, is the number-one threat to water quality worldwide and can cause algal blooms, a toxic soup of blue-green algae that can be harmful to people and wildlife. The flora and fauna of the rivers experience change and reduction in number due to death by suffocation (Maurya et al., 2019).

- ✚ **Human health:** Areas exposed to toxic air pollutants can cause respiratory problems like pneumonia and asthma. Millions of people are known to have died of due to indirect effects of air pollution. Air pollution Indian cities are among the most polluted in the world. Suspended particulate levels in Delhi are many times higher than recommended by the World Health Organization (WHO). The urban air pollution has grown across India in the last decade are alarming. Some of the most important air pollutants are residual suspended particulate matter (RSPM), suspended particulate matter (SPM), nitrogen dioxides (NO₂), carbon monoxide (CO), lead, sulfur dioxide (SO₂) etc. The main factors of urban air quality deterioration are growing industrialization and increasing vehicular pollution, industrial emissions, automobile exhaust and the burning of fossil fuels kills thousands and lives many more to suffer mainly from respiratory damage, heart and lung diseases. In the countryside, nitrates from animal waste and chemical fertilizers pollute the soil and water, and in the cities, the air is contaminated with lead from vehicle exhaust. The indoor air pollution including cooking and heating with wood, crop residues, animal dung, and low-quality coal produce smoke that contains dangerous particles and gases. When such fuels are using inefficient stoves and poor ventilation, they can cause tuberculosis, other serious respiratory diseases, and blindness.
- ✚ **Loss of Biodiversity:** Biodiversity is important for maintaining balance of the ecosystem in the form of combating pollution, restoring nutrients, protecting water sources and stabilizing climate. The main cause of loss of biodiversity are deforestation, global warming, overpopulation and pollution are few of the major causes for loss of biodiversity. In fact human beings have deeply altered the environment, and have modified the territory, exploiting the species directly, for example by fishing and hunting, changing the biogeochemical cycles and transferring species from one area to another.

✚ **Depletion of ozone layer:** Ozone layer is responsible for protecting earth from harmful ultraviolet rays. The most important reason for ozone layer depletion is the production and emission of chlorofluorocarbons (CFCs) and leads to almost 80 percent of the total ozone layer depletion. There are many other substances that lead to ozone layer depletion such as hydro chlorofluorocarbons (HCFCs) and volatile organic compounds (VOCs). Such substances are found in vehicular emissions, by-products of industrial processes, aerosols and refrigerants. All these ozone depleting substances remain stable in the lower atmospheric region, but as they reach the stratosphere, they get exposed to the ultra violet rays. This leads to their breakdown and releasing of free chlorine atoms which reacts with the ozone gas, thus leading to the depletion of the ozone layer (Buhaug et al., 2010). Global warming is another result of environmental degradation.

Nature based solutions to environmental degradation:



Figure 2: Nature based solutions of environmental degradation

Challenges like poverty, soil erosion, and climate change are both causes and effects of environmental deprivation. This means that when one of these problems grows out of control, it sets off the other problems, and they all grow more severe together. The practice works to rebuild soil fertility, increase biodiversity, and reduce the use of synthetic fertilizers and pesticides. Regenerative farming also works to improve water retention and reduce water runoff, which can help to reduce soil erosion and improve water quality. Through the use of cover crops, crop rotation, and other practices, regenerative farming helps to improve soil structure, increase organic matter,



and promote healthy microbial activity in the soil. In addition, regenerative farming also works to restore biodiversity by increasing the number of beneficial insects, birds, and other wildlife. This helps to create a more balanced ecosystem that can better resist pests and diseases. By reducing the use of synthetic fertilizers and pesticides, regenerative farming also helps to protect waterways from contamination and increases crop yield by a good deal.

Another important nature-based solution is the Agroforestry system, is a multiple land-use system in which agricultural crops and woody perennials are grown on the same land management unit (Santiago-Freijanes et al 2021). Agroforestry practices encompass an entire spectrum of land use systems in which woody perennials are deliberately combined with agricultural crops and/or animals in some spatial or temporal arrangement. Agro-forestry practices have been known to have the capability of reducing emissions from deforestation and forest degradation; it promotes sustainable forest management as well as the conservation and sustainability of the environment. Agroforestry systems can sequester carbon dioxide from the atmosphere, as trees and other perennial plants absorb and store carbon in their wood, leaves, and roots. This can help to mitigate the impacts of climate change, as increased atmospheric CO₂ is a major contributor to global warming. Improved soil health by providing cover, adding organic matter, and increasing soil water-holding capacity is possible through agroforestry systems. This can lead to increased crop yields and reduce the need for chemical fertilizers and pesticides. This system supports biodiversity and maintain ecosystem functions by providing habitat for a wide range of species, including birds, insects, and mammals. Regulation of water flow and erosion reduction is possible, as trees and other vegetation intercept and slow the movement of water. Moreover, farmers are provided with a range of products, including timber, fuelwood, non-timber forest products, and food that help to diversify their income streams and increase food security. It is therefore imperative to employ, agroforestry, a land use system which encourage increase productivity as well as environmental stability.

Conclusion:

These human disturbances and unsustainable use of natural ecosystem which posed a lot threat to local biodiversity; leading to environmental degradation need to be addressed.



When the nature-based solutions are applied holistically, they can turn cycles of poverty into cycles of abundance. Regenerative farming is an agricultural practice that focuses on restoring the health of the soil and reversing environmental damage. Agroforestry provides numerous provisioning, regulating, cultural and supporting ecosystem services and environmental benefits while promoting eco-intensification based on a more efficient use of the resources.

References:

- Buhaug, H., Gleditsch, N.P. and Theisen, O.M. (2010). Implications of climate change for armed conflict. *Social dimensions of climate change: Equity and vulnerability in a warming world*, pp. 75-101.
- Maurya, P.K., Malik, D.S. and Sharma, A. (2019). Impacts of pesticide application on aquatic environments and fish diversity. *Contaminants in Agriculture and Environment: Health Risks and Remediation*, pp. 112-127:
- Santiago-Freijanes JJ, Mosquera-Losada M, Rois-Díaz M, Ferreiro-Dominguez N, Pantera A, Aldrey JA, Rigueiro-Rodríguez A (2021) Global and European policies to foster agricultural sustainability: agroforestry. *Agroforest Syst.*
<https://doi.org/10.1007/s10457-018-0215-9>.
- Yadav, K.K., Kumar, S., Pham, Q.B., Gupta, N., Rezanian, S., Kamyab, H. and Talaiekhosani, A. (2019). Fluoride contamination, health problems and remediation methods in Asian groundwater: A comprehensive review. *Ecotoxicology and Environmental Safety*, 182: 109362.