

Human and Environment: Degradation or Restoration

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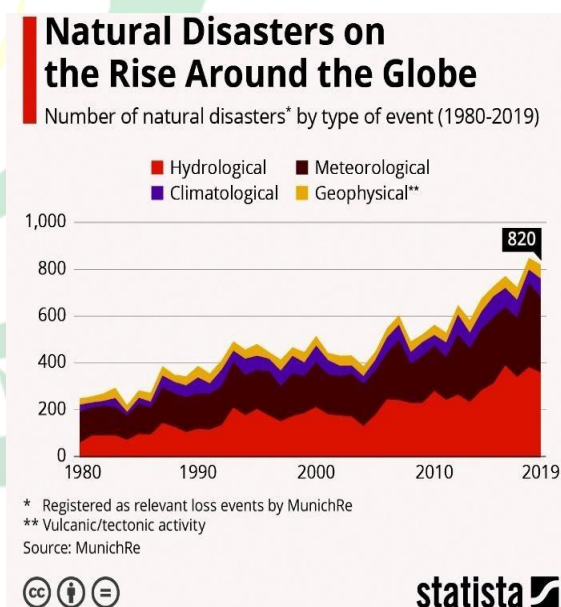
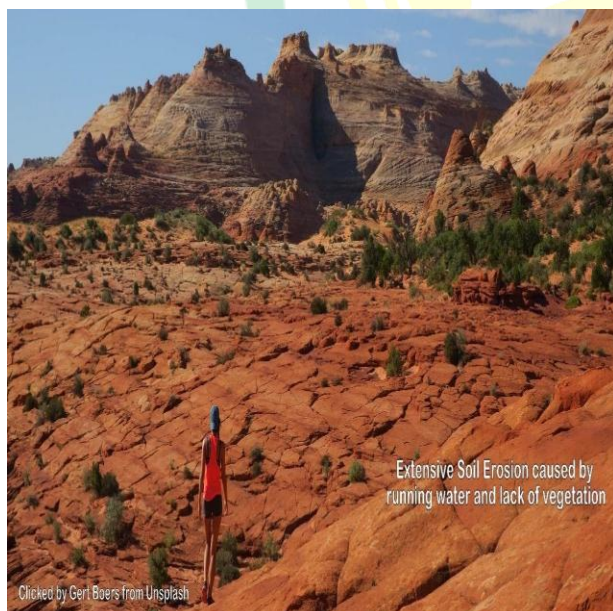
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Introduction

Ever wondered why the incidence of natural disasters are on an increasing trajectory over the past decades? The environmental challenges that we face today share unassailable linkages with the ecological degradation that is currently underway in almost all known ecosystems on this planet. The health and integrity of human life has been severely jeopardized, thus providing a powerful incentive to carefully analyse the urgency of the problem. Societal and cultural shifts have accelerated the environmental decay that was initiated ever since the Industrial Revolution in the 1760s.

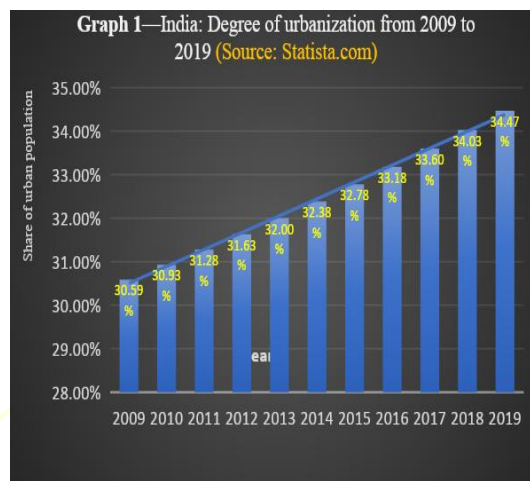
The Pressing Issue of Environmental Degradation



In simpler terms, any changes induced that displaces an ecosystem/environment from its state of dynamic equilibrium can be termed as ecological degradation. A multifarious array of inter-related factors can significantly upset the ecosystem even though they

individually do not pose a threat. The major factors that contribute towards ecological degradation are discussed in brief as under (Chopra et al., 2016).

1. Urbanization: As indicated by the graph (Graph 1) alongside, urbanization in India is on the rise. As speculated by a review in UN population reports, by 2030, approximately 40.76 % of the nation's population will belong to the urban zone. What will it lead to? Such spontaneous expansion of urban areas will bring about a disparity between supply and demand for infrastructural administration, health, water and shelter. The outcome is deteriorating water and air quality, contraction of natural forests, eradication of fragile local ecosystems and a rise in urban poverty.



2. Population Growth: The rapid population growth has antagonistically influenced the natural resources causing the destruction of habitats and biodiversity erosion. The natural ecosystem and the increasing population face the test of sustained improvement without mutual harm. Public health is severely compromised because of the huge population as evident from the current COVID-19 pandemic.

3. Economic Growth: Ecological degradation to a large extent is a result of market failure of the almost non-existent or poorly functioning eco-friendly goods and services. A lot of economical and eco-friendly innovations are made each year, but they fail to impact the current market. Absence of characterized property rights might be one reason. The pattern of economic growth followed by the developing nations is another major concern. Many countries including India, primarily focus on increasing the industrial level without putting additional efforts on their environmental impacts.

4. Agricultural Intensification: Apart from the direct effects of intensive agriculture on the ecological balance, the very idea of agricultural intensification shakes the stability of the already established biodiversity. Most biodiversity we observe today in agro-ecosystems has been shaped by the agricultural land-use history, giving rise to new ecosystems that fits

perfectly with the agricultural practices. New radical changes introduced in the agro-ecosystems can lead to repercussions like pest resurgences, increment in disease incidence, and droughts.

5. Rise of Poverty: Interestingly, poverty is both the cause and effect of environmental degradation. Income imbalances, a characteristic of poverty, drains regular assets much more than its capacity, thus corrupting the environment. The vicious cycle of poverty and ecological damage can be seen in the context of population growth as well. Although India has managed to lift a major fraction of her population from crippling poverty, there still exists an exponentially large population below the poverty line and in marginal poverty zones.



ENVIRONMENTAL IMPACT

Impact on Human Health

Unfortunately, human health has always been on the receiving end when it comes to the impacts of ecological degradation. Respiratory diseases like pneumonia and asthma have been reportedly on the rise, which has a direct correlation with the increasing ecological degradation. The overall immunity of a population, also known as herd immunity, has considerably weakened over the past century. This could spell the untimely demise of the entire human civilization with even more unfortunate epidemiological incidents like the COVID-19 pandemic. A long-term study conducted on the African population from 1965 to 2015 found a time dependent decline in sperm count by an overall 72.60 %. Environmental degradation was listed as a major cause (Sengupta et al., 2017). Similarly, the overall quality of life has also seen a decline leading to more physiological disorders in later stages of life. Devoid of the touch of nature, human health has suffered at the hands of artificial care which is by no means adequate to provide the complete rejuvenation as needed by the human body.

A Novel Regenerative therapy: Ecological Restoration

One of the fundamental aspects of environmental management is ecological conservation. However, conservation programmes can only aim to preserve the existing ecosystem. There is a growing concern about not being able to conserve earth's biological diversity through safeguarding critical areas alone. To turn back the clock on permanently damaged ecosystems, ecological restoration is employed. Ecological restoration refers to the process of artificially assisting the recovery of an ecosystem that is beyond the scope of simple conservation strategies. Ecological restoration faces two main challenges. One, it is difficult to devise an all-encompassing prototype for a wide area with varied land uses. The second is to strike an equitable balance between ecological restoration and human well-being, as one often comes at the expense of the other. A road map for carrying out successful ecological restoration is shown in the figure alongside (Martin et al., 2017). Ecological restoration is already a well-established discipline and it depends on several principles which are formulated based on the experience of several workers gained over the years. These principles are listed as follows (Gann et al., 2006):

- Incorporating spatial, temporal, and biological variables in the proposed model
- Construction of well-defined linkages for a large tract of land with multiple land-use
- Allotment of adequate time for the self-regeneration processes of nature to take its course
- Pinpointing the causes and treating them, rather than the symptoms
- Regular monitoring protocols to determine the success of the restorative practices, and the extent to which the protocols need to be customised to suit local needs.



ENVIRONMENTAL BENEFITS

There must be a list of benefits that favours any process over the others, and the same can be said about ecological restoration. Ecological restoration is one of the primary reasons why we,



as humans, can still hope to reverse the damage we have done to our ecosystems. Some of its potential benefits through the lens of the environment are discussed below in details:

- 1. Revival of original habitat:** Ecological restoration not only seeks the regeneration of the ecosystem, but also aims to establish the pre-degradation conditions that existed previously. It focuses on the use of native tree species to mimic the original habitat. This is very advantageous as the local plant species are not only highly acclimatized to the local land, but also requires less involvement in terms of fertilizers, irrigation and general maintenance.
- 2. Faster habitat revival:** The speed of a habitat revival is directly proportional to the degree of similarity between the new and the former habitat. Ecological restoration serves to elevate the speed of regeneration by tuning the micro-climate into a conducive environment for natural restoration forces to act faster.
- 3. Retention of natural wildlife:** There is a direct correlation between the restoration of natural ecosystems and the conservation of natural habitat for the wildlife and endangered species. Ecological restoration helps to prevent the loss of natural habitat for the wildlife and prevents further extinction of our precious biodiversity.
- 4. Helps to mitigate climate change:** The result of all our environmental endeavours is to mitigate the effects of global warming and climate change. Be it ecological restoration or conservation, it is of prime importance to directly or indirectly include control of climate change as an objective for all strategies. In the case of restoration, the use of native habitats give rise to high functioning carbon sinks that act as efficient checks on the global carbon footprint and mitigate the climate change.

POSITIVE IMPACT ON HUMAN HEALTH

Emerging infectious diseases (EIDs) can serve as a potential area of research due to its suspected links with human health and ecological restoration. EIDs has recently increased in their intensity, incidence and distribution with examples including the SARS (Severe Acute Respiratory Syndrome), HIV (Human Immunodeficiency Virus), DHF (Dengue Hemorrhagic Fever) and Lyme disease. These diseases incur a crippling burden on the public healthcare

infrastructure (Fonkwo, 2008). It is of no coincidence that,developing countries like India, which have the severe problem of population growth, biodiversity loss andagricultural intensification, also has a higher incidence of EIDs. The Following table demonstrates the effects of various restoration activities on major insect vectors in tropical regions:

Vector	Restoration	Impact
Ticks (<i>Ixodes scapularis</i>)	Removal of weed species	Reduction in Lyme disease risk by 98%
Ticks (<i>Ixodes dammini</i>)	Suitable tree species used for reforestation programmes	Lyme disease incidence is lowered
Ticks (<i>Ixodes ricinus</i>)	Reclamation of peatland ecosystems	Tick population plummeted
Mosquitoes	Modification of habitat	Increase in larvae mortality rates
	Drainage of salt marshy land to its natural states	Reduction in adult mosquito numbers

Ecological health should be a part of public health service. Unfortunately, there is a dearth for quantitative research data on the link between ecological restoration and human health. As ecosystem health directly affect human health, its restoration should be treated as a medical service (Reaser et al., 2021). A growing interest in one nature one health shows that scientists and policy makers recognize that importance of ecosystem and human beings as co-regulators, with the human society as the prime benefactor of this relationship.

INDIVIDUALIZED VIEWPOINT

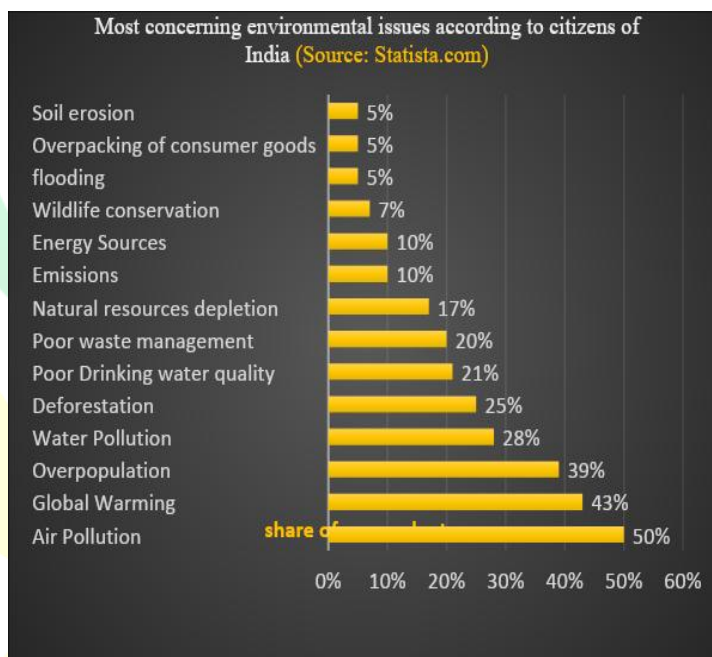
As far as ecological degradation is concerned, there is a growing misconception regarding the causes and effects among the general population. This is usually complimented with a general distaste for industrial developments and modernization, which do not directly cause the negative effects of ecological degradation. People tend to confuse between results, correlation and causality. Climate change, wildlife extinction, loss of biodiversity are all results of ecological and environmental degradation. Similarly, air pollution, water degradation and soil erosion are all directly correlated to environmental degradation but are not its causes. It is explained in a case study below.

Graphical analysis: A case study

The following graph shows an interesting finding from a study conducted on the citizens of India. It focused on what are the causes of environmental degradation that were identified by the general public. The highest percentage of votes were received by Air pollution and Soil erosion scored the lowest.

What interesting thing does this identify?

People are not aware about the exact causes of the environmental pollution. The entire list consists of either the results or a form of environmental degradation. None of them were a cause. There were five main causes of environmental degradation as discussed earlier: urbanization, population growth, economic growth, agricultural intensification and poverty. None in the list were even



remotely related to these causes but were a by-product of such problems. This lack of comprehension and public awareness in this form is a huge missing piece that thwarts the colossal efforts to carry our ecological restoration and conservation.

Conclusion

Ecological degradation is a real problem, whose complex nature often neutralizes all efforts to completely eradicate it. Further research in this discipline is required to understand the complex relationship between the abiotic, biotic and socio-economic factors that lead to such a disaster. As much as the prospective benefits of ecological restoration appear to be perfect, it is not without its shortcomings. It should only be used as the last resort since our lack of discernment about the detailed intricacies of our ecosystem is still unknown. No circumstances should justify its misuse to replace natural habitat or as a remedial measure after intentional destruction of habitat. Philosophical debates in the scientific



community whether humanbeings can actually recreate “nature” are clear indications of restorative ecology being a juvenile field, which requires ample research, implementations and further real-life examples to become one of our primetools to help preserve our biodiversity for a sustainable future.

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