

## Ecosystem Degradation and the Need for Restoration: Through the Lens of Environment and Human Health

Bharat Dhiman\*

Department of Communication and Media Technology, J.C. Bose University of Science and Technology, YMCA, Faridabad, Haryana, India

### Abstract

Due to ongoing global development and economic growth, ecosystem degradation has become a crucial issue for the environment and human health. Ecosystems are the basis of life itself! The natural ecosystems in the wilderness provide various products and are regions in which a number of vital ecological processes are present, without which human civilization would not be able to exist.

Ecosystems are, however, frequently disrupted by human actions, which lead to the extinction of species of plants and animals that can live only in the different natural ecosystems. Some species, if eliminated, seriously affect the ecosystem. These are called 'keystone' species. Extinction occurs due to changes in land use. Forests are deforested for timber, wetlands are drained to create more agricultural land, and semi-arid grasslands used as pastures are changed into irrigated fields. Pollution from industry and waste from urban settings can also lead to the extinction of several species.

The reason for the depletion of natural resources is twofold - our rapidly exploding population that needs to sustain itself on resources and the growth of affluent societies, which consume and waste a large proportion of resources and energy. Increasing extraction of resources is at the cost of natural ecosystems, leading to the derangement of their essential functions.

Each of us in our daily lives uses a variety of resources. If tracked back to their source, one finds that the resources were originally obtained from nature and natural ecosystems. Our insensitivity to using resources carefully has produced societies that nature can no longer sustain. Suppose one thinks before wasting resources such as water, reusing and recycling paper, and using less plastic that is non-degradable cumulatively. In that case, this can positively affect the integrity of our natural resource base and conserve the resources that nature provides. This article is about how restoration allows us to improve our relationship with the ecosystems we depend on and how we protect biodiversity for future generations.

**Keywords:** Environment; Ecosystem; Ecosystem Restoration; Ecosystem Degradation; Human Health; Biodiversity

### Introduction

Ecosystem restoration encompasses a wide continuum of activities that contribute to protecting intact ecosystems and repairing degraded ecosystems. Such activities include, for example, enhancing organic carbon in agricultural soils, increasing fish stocks in overfished zones, remediating polluted sites, restoring ecological processes, restoring biodiversity and conserving fauna and flora that can assist in the restoration process.

The scale of these activities can range from a few hundred metres to thousands of kilometres, depending on the societal actors and ecosystems involved. The relationship between humans and nature has been restored, where the area of healthy ecosystems is increasing, and where ecosystem loss, fragmentation and degradation have been ended [1,2].

### Developing goals and objectives for restoration efforts

1) Enhancing global, regional, national and local commitments and actions to prevent halt and reverse the degradation of ecosystems.

2) Increasing our understanding of the multiple benefits of successful ecosystem restoration.

3) Applying this knowledge in our education systems and within all public and private sector decision-making.

### Identifying Barriers to achieving these goals include

1) Public awareness

2) Political Will

3) Legislative & Policy Environments

4) Technical Capacity

5) Finance

6) Scientific Research

**To overcome these barriers, we must work on these pathways:**

### Global Movement

1) Raise awareness of benefits of ecosystem restoration.

2) Increase intent of societies worldwide to invest in restoration.

3) Shift behaviors to reduce ecosystem degradation.

\*Corresponding author: Bharat Dhiman, Department of Communication & Media Technology, J.C. Bose University of Science and Technology, YMCA, Faridabad, Haryana, India, E-mail: biddy88@gmail.com

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- 4) Showcase economic returns from restoration in different ecosystems.
- 5) Support a decentralized global movement focused on restoration.
- 6) Embed restoration into education systems globally.
- 7) Promote a values-based imperative for restoration.
- 8) Develop & implement financing mechanisms for restoration.

### Political Will

- 1) Assist societal leaders to champion ecosystem restoration.
- 2) Amend legislative & policy frameworks to promote restoration.
- 3) Facilitate cross-governmental & cross-sectoral dialogues & collaboration on restoration.
- 4) Redirect fossil fuel, agricultural, forestry & fishing subsidies to conservation & restoration of ecosystems.

### Technical Capacity

- 1) Promote & build capacity across sectors on Designing, implementing, monitoring & sustaining ecosystem restoration initiatives.
- 2) Undertaking long-term scientific research on the implementation & benefits of ecosystem restoration.
- 3) Synthesizing lessons learned from existing ecosystem restoration initiatives.
- 4) Integrating indigenous knowledge & traditional practices into ecosystem restoration initiatives.
- 5) Applying free, prior & informed consent in ecosystem restoration initiatives.

### How to build a global movement, Political Will and Technical Capacity:

#### Facilitating collaboration

To develop a global movement of organizations and individuals that collaborates to catalyze ecosystem restoration. Importantly, a proportion of the people engaged in protecting ecosystems and restoring them have limited or no internet connectivity, limited access to mobile phone networks and in some areas limited access to radio. It is consequently of critical importance that decade partners and the core team develop systems for effective and appropriate collaboration with such groups of people [3,4].

#### Developing a values-based restoration imperative

Societal decisions that have major repercussions for the well-being of current and future generations are not made solely on scientific and economic grounds. Other factors relating to beliefs, habits and aesthetics are of fundamental importance.

#### Engaging individuals

The local NGOs and businesses as well as hundreds of millions of individuals will help develop and take ownership of the initiatives and ideas. From school children to the elderly can contribute to fulfilling its vision through inter alia teaching, voting, funding, campaigning, raising awareness, collaborating, writing, painting, drawing, speaking, philosophizing, analyzing, planting, seeding or cultivating [5,6].

### Partnering with youth

Young people are agents of change. Youth representatives anticipate the world's youth through participation in decision-making at national and international levels; their influence on social media trends; the running of campaigns; designing online and offline training programmes; their roles as young researchers and young professionals in the restoration oriented workforce; and undertaking on the ground ecosystem restoration initiatives in their local neighborhoods. The social media hashtag #GenerationRestoration will, along with other trending hashtags, be used for encouraging school children and college students to join this global movement.

### Convening cross-sectoral dialogues

A wide range of initiatives, networks and organizations (large and small) have platforms that could host crosssectoral dialogues to catalyze ecosystem restoration. It will encourage partners to initiate such dialogues at local, national and international scales, with a strong focus on lessons learned and methods for up scaling restoration [7].

### Public awareness and societal mindsets

A societal mindset refers to a set of assumptions, views and philosophies that influence how societies organize themselves take decisions and set long-term goals. A wide variety of factors are currently preventing societies from developing mindsets that lead to ecosystem restoration being a central consideration within their long-term development planning [8].

### Awareness of the impacts of degradation:

Most people globally are not aware of the full extent to which many different types of ecosystem degradation are negatively impacting the wealth of their society, their own well-being and their human right to safe, clean, healthy and sustainable ecosystems.

### Awareness of the drivers of degradation and their frequently diffuse nature:

Drivers of degradation in most ecosystems are usually both direct and indirect with both types needing to be addressed to make meaningful progress on protection and restoration of ecosystems.

Direct drivers, include natural events (e.g. earthquakes, volcanic eruptions, extreme weather events, droughts, tropical cyclones and floods), and anthropogenic activities (e.g. changes in land and ocean use, resource extraction, pollution of freshwater resources and oceans, introduction of invasive alien species and emission of greenhouse gases) [9,10].

Indirect drivers include societal values and behaviors such as demographic factors (e.g. human population dynamics), socio-cultural factors (e.g. social beliefs, inequalities, marginalization of certain groups, value systems and consumption patterns), economic factors (e.g. environmental externalities not being priced into goods/services, energy/agricultural subsidies having major unintended negative impacts on ecosystems, and demands from natural resource based-livelihoods), technological factors (e.g. advances in industrial and agricultural technologies) or factors relating to institutions, governance, conflicts and epidemics [11].

### Access to information

Even if messages are tailored appropriately, it is often difficult for marginalized groups such as girls, women and indigenous peoples to

receive the information effectively. Challenges for such groups include a lack of formal schooling (and associated illiteracy) and/or insufficient resources to access information through routes such as newspapers, radio and the internet [12].

### **Absence of ecosystem restoration in education curricula**

Ecosystem restoration is not commonly taught in formal education systems across the world, and consequently most people do not have the nuanced understanding of the underlying principles to form an educated view on its global importance. Additionally, groups who are heavily engaged with and reliant on ecosystem resources – including women, girls and indigenous peoples – often do not have access to knowledge on ecosystem restoration.

This is primarily because of unequal education opportunities and such groups not having access to conventional sources of information (e.g. newspapers, internet). Dissemination of knowledge that depends on writing and reading, for example, does not engage illiterate groups – of which women and girls and indigenous groups make up a large proportion [13].

### **An environmental as opposed to developmental agenda**

Some decision-makers in governments and corporates perceive large-scale ecosystem restoration to be an environmental agenda to conserve biodiversity rather than an investment that will yield numerous social, economic and environmental returns for society. Such decision-makers tend to see the evidence that large-scale ecosystem restoration can yield considerable returns across sectors such as agriculture, water supply and health as being too weak and uncertain for serious consideration. The absence of cost-benefit analyses as part of decision-making processes in many countries places a further constraint on including these broader considerations into policy decisions.

### **Enabling environment:**

The enabling environment category includes capacity for society to develop appropriate: political commitment and visions; policy, legal and economic frameworks; national public-sector budget allocations and processes; governance structures; incentives; and social norms.

The organizational category includes the capacity of a wide range of public as well as private organizations pertaining to management (functions, structures and relationships), operations (processes, systems, procedures, incentives and values), human and financial resources (policies, deployment and performance), knowledge and infrastructure.

Lastly, individual capacity refers to people with the necessary knowledge, mindsets, technical skills and managerial skills. Marginalized groups such as women, youth and indigenous peoples are often lacking this capacity because of unequal opportunities in terms of access to education and information.

### **Capacity for initiating ecosystem restoration**

The capacities of the enabling environment, organizations and individuals are strongly dependent on the availability of knowledge with regards to designing, implementing and sustaining large-scale ecosystem restoration initiatives.

### **Role of Scientists and technology experts**

#### **Quantify the socio-economic and biophysical impacts of degradation**

This includes developing an understanding of the links between the

health of ecosystems and the supply of goods/services to communities in rural as well as urban environments; how social behaviors affect ecosystem use; how marginalized groups such as women, girls and indigenous peoples are affected by degradation and how their limited access to education affects their natural resource use; and how tenure systems affect natural resource use.

Develop ecosystem-specific protocols of ecosystem restoration that detail how local fauna and flora will play a role in the ecosystem restoration process. This includes: analyzing successes and failures of past restoration efforts; using the appropriate genetic diversity of fauna and flora; setting appropriate goals for restoration; monitoring and evaluation restoration initiatives; conducting long-term research to hone restoration protocols; and managing future climate change impacts [14].

Integrate science, indigenous knowledge and traditional practices within restoration initiatives effectively. Engage with technology companies to develop platforms and applications that will catalyze large-scale ecosystem restoration. Integrate consistent standards of ecosystem restoration across existing ecosystem restoration initiatives [15].

### **The scientific platform**

The applied science of restoration ecology is a relatively new academic discipline that advances by analyzing datasets collected over decades from plot-scale ecosystem restoration experiments. The long-term nature of the research, the paucity of large-scale ecosystem restoration experiments, and the inherent complexity of ecosystems means that knowledge on how to undertake large-scale ecosystem restoration is generated slowly.

The science is further disadvantaged by being relatively poorly funded, with minimal investment into research and development taking place to hone methods of large-scale ecosystem restoration and to maximize the benefits for society in the long-term. As a result of the above factors there are often gaps in technical knowledge that constrain the upscaling of ecosystem restoration globally [16-18].

### **The context-specific nature of ecosystem restoration**

Knowledge gaps are particularly apparent at a local level with regards to how to design, implement and sustain large-scale ecosystem restoration over time. This is because the approach to ecosystem restoration needs to be tailor-made to fit the unique socio-economic and biophysical conditions of any particular ecosystem [19].

Generic protocols and approaches provide useful templates for ecosystem restoration practitioners, but experts from across numerous disciplines are invariably required to provide highly specific technical knowledge for the local context [20-23].

### **Countering extreme degradation**

In certain environments, the state of degradation is so extreme that restoration options are greatly constrained. Examples of such environments include highly polluted sites, mine sites where topsoil has been lost, and landscapes where extinctions of flora and/or fauna occurred [24].

### **Promotion through a wide range of Multimedia channels**

1) Develop and circulate TV shows, radio shows, newspaper articles, magazine articles, films, webinars, video games and videos on ecosystem restoration benefits.

2) Publicize the Decade using social media channels, including Instagram, Twitter and popular YouTubers.

3) Host dialogues on a wide range of topics related to ecosystem restoration by using online platforms, webinars, and communities of practice, TV and local radio stations. Communication should be in as many languages as possible.

4) Hold competitions, through for example the X Prize Foundation, to catalyze advances in monitoring ecosystem restoration success.

5) Partner with media organization and social media actors. This would be undertaken in an organic, iterative manner to ensure alignment with what audiences expect from social media personalities. Partner with artists who can promote through inter alia sculptures, paintings, drawings and films.

6) Partner with advertising and marketing agencies, as well as global news outlets.

## Conclusion

People, plants, and animals depend on healthy ecosystems. Ecologist Aldo Leopold states, "We abuse the land because we regard it as a commodity. When we see land as a community, we belong to, and we may begin to use it with love and respect." Restoration allows us to improve our relationship with the ecosystems we depend on and become a constructive part of the communities that create our region's natural environment.

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