(Review Article)

Ecosystem Restoration in Pakistan: a Means of Attaining Social, Economic and Environmental Sustainability

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Abstract:

Ecological restoration, when executed efficiently in a sustainable manner, not only contributes towards the protection of biodiversity but also improves human health and welfare, food and water security, delivers goods, resources, and services, and financial affluence, along with climate change mitigation, resilience, and adaptation. This solutions-based method involves community, scientists, legislators, and stakeholders to overhaul ecological damage and reconstruct an improved association between "people and the nature". When combined with conservation and sustainable practices, ecological restoration is capable enough to change local, regional, and global ecological situations from a state of constant degradation, to the one with constructive improvement. Pakistan has shown great improvements in their efforts to halt the issues of climate change and devastation of natural ecosystem recently, but still the country has to go a long way and achieve the sustainable development, as the country still lies in the rank of first seven countries most effected by the calamities of changing climate.

Introduction:

Ecosystem repair/restoration means supporting the retrieval of natural ecosystems that have been tarnished or battered, as well as conserving the ecosystems that are still undamaged. Healthier ecosystems having affluence of biodiversity serves a great deal of benefits, for example, more productive soils, higher crop yield of timber and fish and larger sinks for greenhouse gases (figure 1).

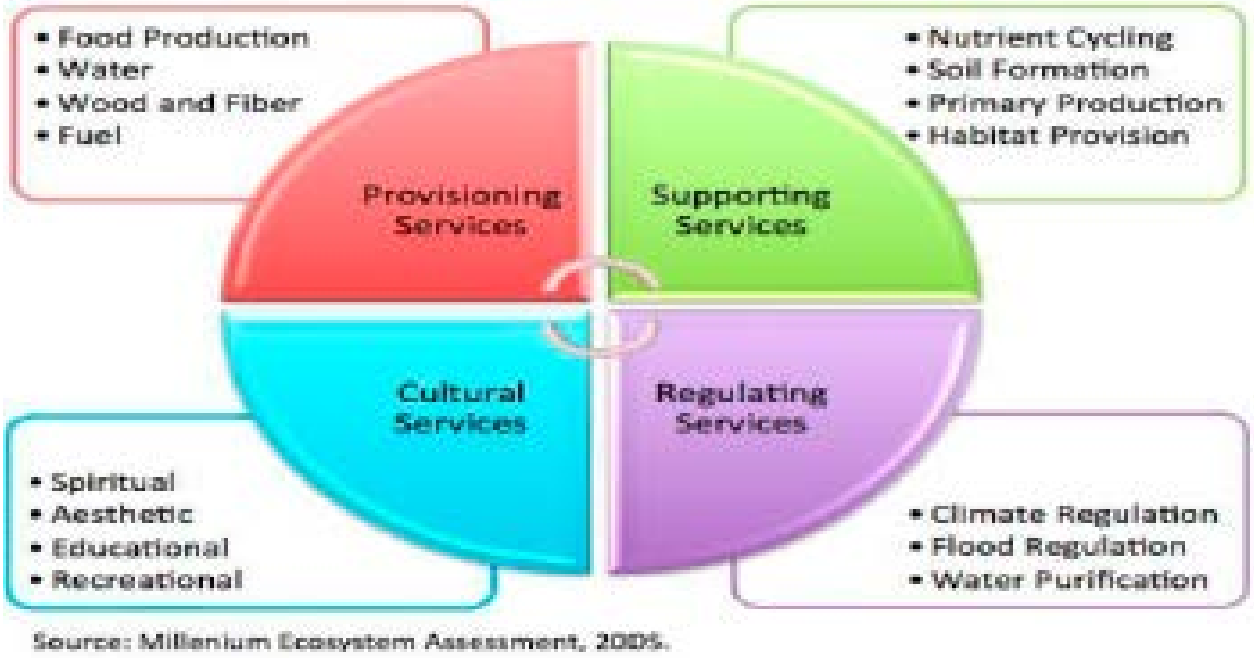

Figure 1: Services of ecosystem

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Ecosystem is the interaction between the environment and the living organisms. The two major tiers of sustainability (society/people + environment) are embodied in the term Ecosystem directly (figure 2).

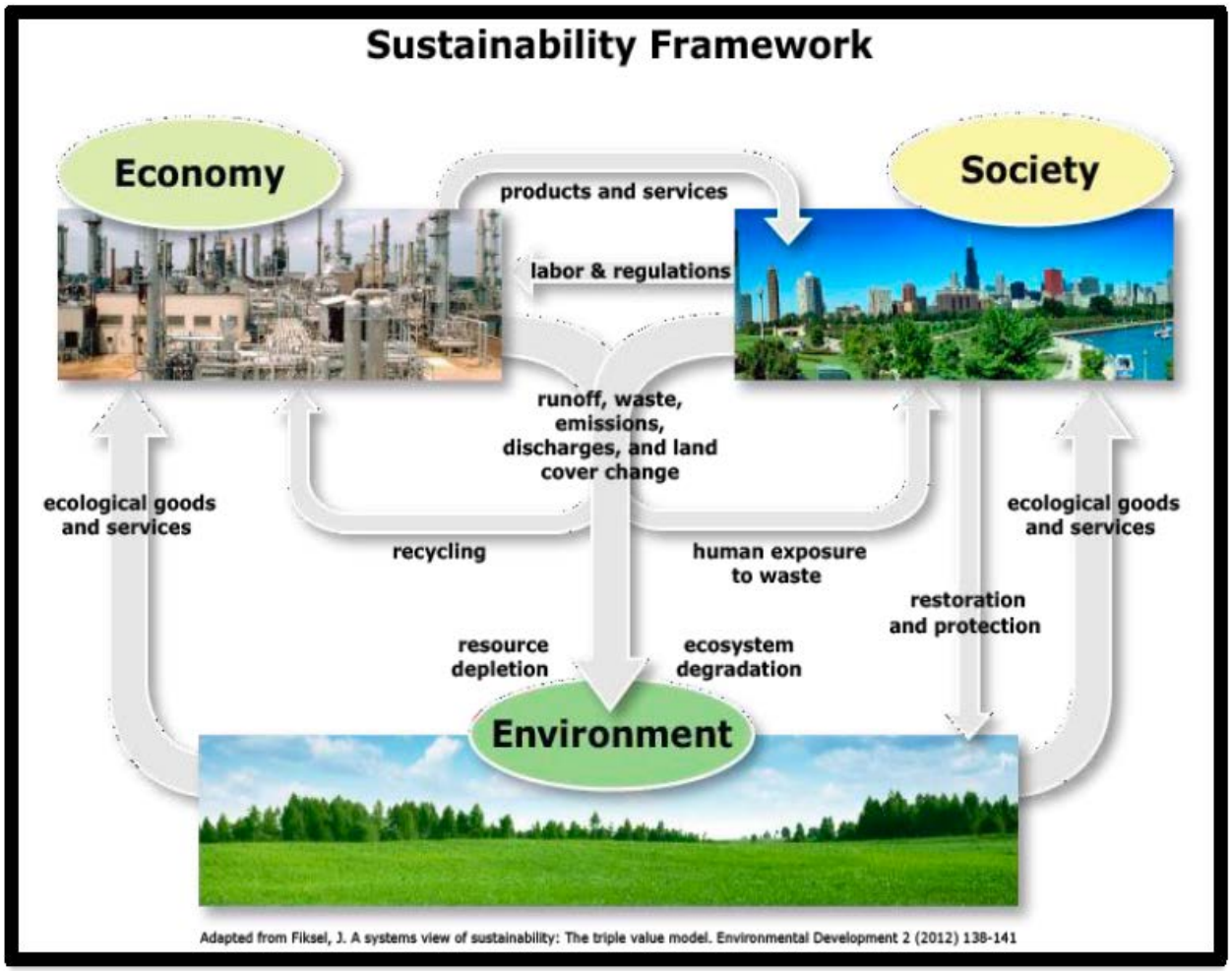

Figure 2: Relationship Between the Three Tiers of Sustainability: Environment, Economy & Society with the Ecosystem.

The two strategies of ecosystem restoration/preservation along with sustainable development need to go hand in hand for us to have socioeconomic growth without destroying the planet earth. Many of the world's habitats have been severely degraded, posing a threat to ecological diversity and people's livelihoods. There is an increasing realisation that protecting critical areas alone would not be enough to preserve the earth's biological diversity. Ecological conservation is a significant component of environmental management, despite the fact that it was previously overlooked (Joern, F., etal., 2021).Many people now depend on degraded habitats to support their livelihoods, that is why ecological restoration must take into account four factors (Khan, N. etal., 2019) which are essential for effective ecosystem management:

1. Increase biodiversity conservation
2. Enhance human well-being
3. Empower local residents
4. Boost ecosystem productivity.

As a result, ecosystem regeneration can become a key component of global conservation and sustainable development efforts. The intrinsic potential of ecological restoration to provide people with the opportunity to not only restore ecological damage, but also to improve the human condition, makes it particularly valuable. Restoration has clear conservation benefits. What is less obvious, but equally significant, is that ecological regeneration has also been able to revive economic prospects, revitalise common cultural traditions, and refocus local communities' expectations (Aronson, J etal., 2020).

The United Nations General Assembly declared 2021–2030 as the United Nations Decade on Ecosystem Restoration on March 1, 2019, with Resolution 73/284. The UN Decade Strategy 2021-2030 aims to strike a divine balance between Nature's object and Man's subject. Pakistan, as one of the first seven countries to be affected by the effects of climate change, has a lot riding on this global strategy. With its sister initiative of SDGs, the UN's Ecosystem Restoration Strategy will last a decade, ending in 2030. SDG 14 Life Below Water and SDG 15 Life on Land are explicitly and directly supported by the Strategy. If these two targets are met, it would have an indirect effect on other SDG goals such as climate change (SDG 13), improving the wellbeing of communities in rural and urban areas (SDGs 3, 11), increasing clean water sources (SDG 6), and ensuring healthy food (SDG 2, 12).

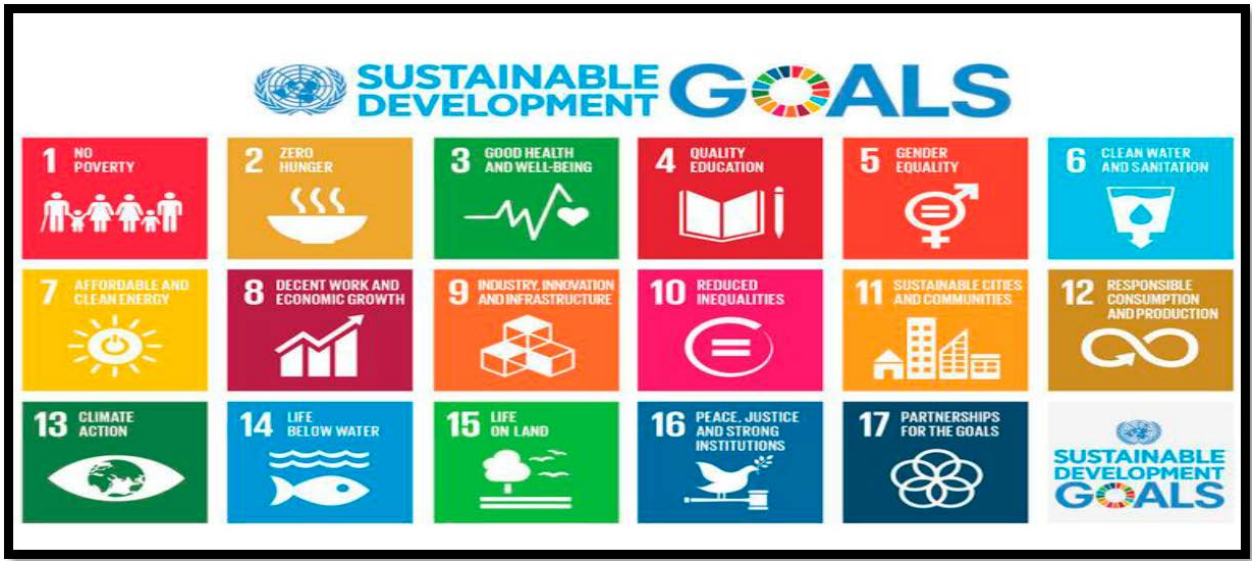

Figure 3: 17 goals of sustainable development (Source: https://sdgs.un.org/goals). Public Awareness and Societal Mindsets, Political Will, and Technical Capacity are all identified

Public Awareness and Societal Mindsets, Political Will, and Technical Capacity are all identified as obstacles to achieve the desired objectives of ecosystem restoration. Creating a participatory environmental restoration movement, promoting political support for the global movement, and catalysing research and development to build up technological capacity for ecosystem restoration are the pathways to overcome these obstacles and make them more likely to change policies on a ‘fast and fair' basis, such as national investment policies, sectoral tax regimes, subsidies, market regulations, and other policies like land tenure and use, in order to mitigate the negative impact of such policies on the environment(Heid, L.D.etal., 2021).Global leaders, decision-makers, governments, marginalised people, thinkers, artists, women, poets, philosophers, singers, media figures, and youth all need to be mobilised to champion restoration. Youth is extremely valuable as role models for change and as people who are well-represented in the media, especially social media. In this regard the UN and the FAO will establish a Digital Hub of Knowledge where big data on ecosystem conservation activities from all over the world will be processed. Similarly, the Strategy to strengthen states' technological capacity to achieve the UN Decade's strategic goals contains a lot of information. It identifies specific research and development programmes as well as other scientific

adoptions that will help to increase capability. Other international agreements, commitments, and protocols will be followed in tandem with this approach. An Advisory Board will provide strategic support to the plan, which will be organised internationally by a Joint Core Team of UNEP and FAO. Different Task Forces will be established to create recommendations on cross-cutting themes to aid countries in implementing the Strategy's various activities (Truman, P.Y. and Mark W.S. 2019). A panel of ideologues from Humans in Nature will develop a value-based imperative to identify, patronise, and enjoy the benefits of ecosystem restoration. A Multi-Partner Trust Fund will be established to support projects focused on the three unique outcomes of the three pathways previously listed. A special task force dedicated to global finance mobilisation will be created. Government subsidy regimes, taxation schemes, national budgets, international financial agencies, multilateral development banks, national development banks, commercial banks, microfinance institutions, impact investments, philanthropic capital, local community investments, landowner commitments can all be used to mobilise finances required for funding of projects.

Pakistan's commitment to ecological restoration till date:

Forests, farmlands, villages, wetlands, and oceans can all be conserved, and conservation efforts can be initiated by almost everyone, from governments and development agencies to industries, neighbourhoods, and individuals. Since the causes of deterioration are numerous and diverse, they can have an effect on various scales. Ecosystem restoration not only protects but also improves the livelihoods of those who depend on them. It also aids in disease control and reduces the risk of natural disasters. Pakistan, like any other region, has long struggled with rising levels of environmental degradation, which costs the national economy billions of rupees each year. However, recently a number of initiatives, worth billions of rupees, to restore ecosystems through nature-based solutions as part of Clean Green Pakistan vision have been taken. Pakistan has shown a strong contribution to global efforts to restore the environment using natural solutions. This form of restoration would also aid in the achievement of many of the United Nations' Sustainable Development Goals (Khan, N. etal., 2019).

Figure 4: change in natural landscape of Balloki in a year due to Billion Tree Tsunami project (Source: https://www.boredpanda.com).

Deforestation, desertification, soil degradation, sea level rise, raging forest fires, depleting fresh water resources, and melting glaciers are among the common human-caused environmental problems that countries around the world, mostly developing countries, are dealing with. Ecosystem conservation projects such as afforestation, rainwater harvesting and groundwater recharge, soil erosion stabilisation, smart agriculture programmes, and the implementation of renewable energy technologies and activities will all help to address these issues (Steven, J.C. 2019). Restoration may take several forms, such as actively planting or removing stresses to allow nature to recover on its own. Between now and 2030, the global community aims to restore 350 million hectares of degraded terrestrial and aquatic ecosystems through nature-based initiatives. In this regard, Pakistan's largest afforestation initiatives, the Billion Tree Tsunami Programme, Protected Areas Initiative, and the Miyawaki technique-based Spring Tree Plantation Campaigns by Pakistan are tremendous achievements (Khan, N. etal., 2019).

Inger Andersen, Executive Director of the United Nations Environment Programme (UNEP), said the Clean and Green Pakistan (CGP) initiative, which was launched in 2018, has gained global attention, and several countries are looking into replicating it to achieve their own environmental sustainability. Following the promising completion and nearly 100% achievement (Table.1) of the billion-tree agenda, Pakistan is now gearing up for the ‘Ten Billion Tree Tsunami' programme, another initiative aimed at combating desertification and water resource depletion in this water-scarce region, as well as achieving pro-poor and equitable growth for all. In one of the world's most ambitious afforestation campaigns, the government aims to extend and rebuild the country's forests over the course of five years with a "10 billion Tree Tsunami." The campaign involves planting trees in urban environments such as schools, universities, public parks, and greenbelts, as well as restoring mangroves and forests.

Table 1: According to the Pakistan Forestry Outlook 2019, the total green area in the country is 4.34 million hectares which makes it 5.01% (Forest Department Pakistan).

Sr. No	Name of Scheme	Activity	Target	Achievement	% age
1	Ten Billion Tree Tsunami Project	Afforestation along Canalside Plantation	947.00 Av. Miles	947.00 Av. Miles	100%
2		Afforestation compact plantation through canal water.	340.50 Acres	340.50 Acres	100%
3		Afforestation Chak Plantation through Peter Engines (Flow Irrigation)	486 Acres	486 Acres	100%
4		Raising of Potted Nursery	25.46 Lacs	25.46 Lacs	100%
5		Raising of Bed Nursery	23.00 Acres	23.00 Acres	100%

Pakistan has established the Eco-System Restoration Fund to support nature-based climate change solutions, easing the transition to environmentally-resilient initiatives such as afforestation and biodiversity conservation. Under 10 billion Tree Tsunami, for the first-time olive production in Pakistan is underway which is estimated to even surpass Spain in the production globally if completed successfully.

Chinji National Park in district Chakwal Salt Range and Tilla Joggian National Parks, Himalaya and Nanga Parbat National Parks have also been inaugurated by Prime Minister under the Protected Area Initiative. Monroe Trail in the Himalayan moist Forest Balakot has been revived for nature lovers by Ministry of Climate Change under 10 billion Tree Tsunami. Billion Tree Honey Project is expected to increase exports worth of 40 billion annually. In addition, 15 model protected areas are being created across the country to preserve over 7,300 square kilometers of land, resulting in the creation of over 5,500 green jobs.

What Pakistan can do further: a way forward:

1. Pakistan must provide an institutional framework to carry out the United Nations' strategic objectives. The topic of environment and climate change has devolved to the point that a synergized solution, as requested by the subject of environment and climate change, is seriously jeopardised. The institutions have oscillated poles apart from the core as a result of devolution, and this disbranching has already resulted in significant differences in policy and institutional covenants.
2. The environment and climate change are viewed by stereotypical public sector institutes with vastly inadequate technical and technological capabilities. Despite the fact that the National Climate Change Policy of 2012 still gives the center the authority to unite the provinces, little to no action has been taken by the center in this regard. The Pakistan Climate Change Authority, Climate Change Council, and Climate Change Fund were all promised in the 2017 Climate Change Act, but they have yet to be fully implemented. A National Plan for Ecosystem Restoration and subnational plans at every provincial level focused on the UN Decade Strategy must be hatched quickly to demonstrate responsiveness.
3. Public private partnership needs to be promoted to cater the financial constraints faced by the country to kickstart the required pace of restoration. Technical and technological capabilities of public sector institutes, research, and development along with political will need further work.
4. Also, the subject of environmental studies and basics of ecosystem restoration should be added in national curriculum so that the new generation understands the perils of degrading environment.
5. Public awareness to change societal mindset towards the use of natural resource exploitation is also crucial for responsible resource consumption.
6. The deployment of low carbon emitting and polluting freight fleets, and the promotion of renewable resources (biofuels) will assist Pakistan in conserving its biodiversity through resource management and ecosystem restoration by involving the private sector.
7. Pakistan must also follow policies that ensure the protection of human settlements and include hazardous waste management, such as healthy and sustainable agricultural and rural growth to improve farmers' roles. There is also a pressing need to mobilise labour unions, in order to ensure that environmentally sound equipment is transferred.
8. Biological/Green corridors can be built alongside economic corridors (such as in case of CPEC) to create coherence between socioeconomic growth and the environmental sustainability. Pakistan can learn from the precedents of such projects from around the world such as the projects under the Asian Development Bank such as Biodiversity Conservation Corridor Initiative (BCI) and the Core Environment Program (CEP)successful in preserving environmental quality and conservation (Ramsha, M. and Umer, K. 2019).

   Similarly, programmes like the Core Environment Program and Biodiversity Conservation Initiative (CEP, BCI) designed by other societies to create capacity through coherence between growth and the environment (e.g., tourism, climate change, institutional support, and an integrated spatial and strategic approach) continue to be successful in resolving environmental degradation issues (ADB, 2011) and are still viable for establishing green corridors (SADC, 1997). Similarly, a Biological Conservation Complex modelled after Bhutan's model will help to protect national parks and wildlife sanctuaries across Pakistan (MoA, 2004). Furthermore, the Mesoamerican Biological Corridor (MBC), which protects biodiversity sites while also promoting socioeconomic development (Miller, Chang, & Johnson, 2001), could aid Pakistan in reducing natural resource exploitation and poverty. Projects such as the Nicaragua Atlantic Biological Corridor Project (1997–2005), the Honduras Biodiversity in Priority Areas Project (1997–2005), and the Panama Atlantic Mesoamerican Biological Corridor Project (1998–2005), Costa Rica's Ecomarkets Project (2000–06) and Mexico's Mesoamerican Biological Corridor Project (2000–09) all sponsored by the World Bank in this regard and showed promise in terms of strengthening regulations to mitigate the negative effects of growth (Brown et al., 2014). All of these projects have the potential to be successful models for Pakistan, as they allow for both industrial expansion and biodiversity

conservation, and they are focused on internationally recognised green growth initiatives. Such projects if implemented successfully have the ability to mitigate Pakistan's negative and irreversible long-term environmental impacts.

9. Lastly, continuous evaluation of ongoing and previously achieved restoration projects along with monitoring of climate variability factors need to be done to devise the future plans so that country could deliver efficiently and productively on the agenda of restored ecosystem by the year 2030 (Abhilash. P.C. 2021).

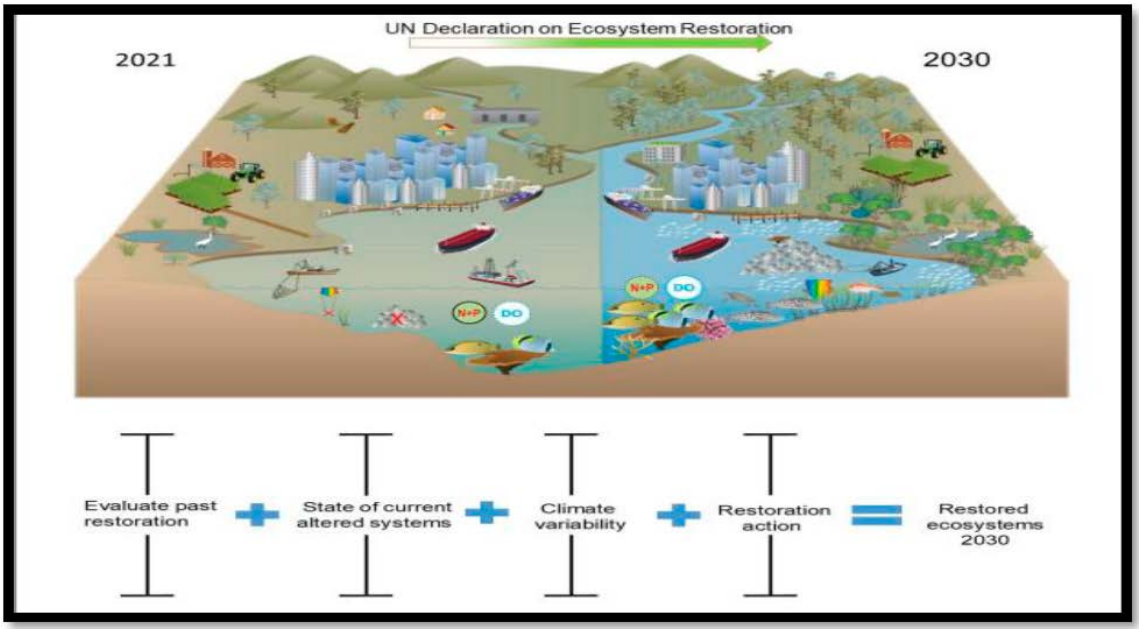

Figure 5: The elements required continuous monitoring to attain the restoration successfully by the end of this decade.

Conclusion:

In previous years, the earth faced several disasters due to changing climate, and the conservation of nature is crucial for our planet's and humanity's existence in the modern world. The United Nations Decade on Habitat Conservation aims to accelerate the restoration of endangered habitats in order to combat climate change, avoid the extinction of millions of animals, and improve food security. According to UN Environment Programme projections, such ecosystem conservation activities could produce $9 trillion in ecosystem services and remove 13 to 26 gigatons of greenhouse gases from the atmosphere. The economic benefits of such interventions exceed ten times the cost of investment, whereas inaction is at least three times more costly than ecosystem restoration. To become a nation who is sustainable and responsible towards environment, it is imperative for us to look for solutions of environmental issues that are economical, ecologically sound and are capable to improve the overall quality of life.

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