M. A. KHALID, D. S. MALIK, R. A. BALIKAI,
BASEEM TAMINI, K. K. YADAV & P. R. YADAV *Editors*

ENVIRONMENTAL PROBLEMS, PROTECTION AND POLICIES

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This book on "Environmental Problems, Protection and Policies" goes on to highlight the unfavourable conditions created by the human approach to nature. In other words, this book highlights what environmental pollution is! It can be understood how important the issue of environmental pollution is in the situation where even the air we breathe is threatened with pollution. The book contains 30 chapters encompassing different aspects of environmental problems, protection, and policy issues. This book summarizes the Green technologies for sustainable development, Soil pollution, Microplastic pollution in the aerial, soil and marine ecosystem, Plastic pollution, Water pollution, Ozone layer depletion, Biodiversity loss, Air pollution, Marine pollution, Deforestation, Acid rain, Environment degradation and disasters, Human impact on the environment, Pollution and its impact on animal and human health, and Light pollution as the driving force behind loss of biodiversity.

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REPARATION OF ECOSYSTEM IN VIEW OF SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT : The main focus of the sustainable development goals is on the crucial role that science plays in achieving the 17 Sustainable Goals that the global community has agreed to support. It basically means that scientific disciplines and research must define their own ethical standards as they relate to responsibility, problem identification, and research questions. We believe that dismissing these arguments, whether they support or contradict the 2030 agenda, will damage the legitimacy and applicability of science's contribution to sustainable development. Restoring an ecosystem to its pre-distributed state or hastening its recovery is the goal of ecosystem restoration. Human life will be impacted, if we alter the ecosystem's functions or cause its structure to deteriorate. Creating an excessive number of dams on rivers, logging, extreme overgrazing, natural and man-made disasters like floods and forest fires, *etc*. are some common disturbances in ecosystems. We could propose some methods for restoring the ecosystem, such as creating farmland, creating a freshwater body, creating eco-friendly urban areas, creating grasslands, etc. In addition to these, we could grow a wider variety of crops, use natural fertilizers and pest control techniques, etc. These actions can increase the land's carbon content and increase its fertility. So that our nation can easily feed its expanding population without requiring more land. Incorporating these ecosystem restoration techniques will present a chance to regain nature's ability to reduce degradation. This decade is devoted to safeguarding and exposing the world's ecosystems for the benefit of people and the natural world.

Key words : Reparation, deteriorate, disturbances, farmland, ecosystems.

Introduction

In order to increase social-ecological resilience, ecological restoration, which is the process of aiding the recovery of an ecosystem that has been damaged, degraded, or destroyed- aims to restore ecosystem integrity, which includes ecological, socioeconomic, cultural and personal values (Gann *et al*, 2019). The UN Decade on Ecosystem Restoration, which runs from 2021 to 2030 (Nsikani *et al*, 2022) encourages the timely accomplishment of the Sustainable Development Goals (SDGs) by issuing a rallying cry for the preservation and rebirth of ecosystems for the benefit of both people and the natural world as evident from the United Nations Sustainable Development Goals, a commitment of 17 global goals aimed at improving the planet and the quality of human life around the world by the year 2030 (Fig. 1). A review of previous restoration efforts at the national or regional level is required to inform future

Fig. 1 : UN Sustainable Development Goals (Image Courtesy: United Nations).

research, given the need for transdisciplinary studies on ecological restoration that produce social and ecological benefits in the framework of the UN Decade (Edrisi and Abhilash, 2021).

SDG15 (Life on Land) is the main, albeit not exclusive, link between ecological restoration and sustainable development (Singh *et al*, 2022; Yao *et al*, 2021). The SDGs should ideally be achieved in a comprehensive way, but it is clear that there are synergies and trade-offs between the goals (Zhang *et al*, 2021), which need to be considered in the context of ecological restoration. The social-ecological system, the central concept of sustainability science, emphasizes how people and communities, economies, societies, and cultures are all intricately intertwined components of the biosphere on a local and global level (Fu, 2020). Ecological, economic and social processes are often integrated in ecological restoration through the application of the social-ecological systems approach, as in (or in relation to) social-ecological restoration or social-ecological recovery. But as of right now, the social-ecological system lacks a synthetic conceptual framework that integrates adaptive decision-making in ecological restoration and considers co-evolution from the landscape pattern to sustainable development. Because it considers ecological restoration to be an essential part of its so-called ecological civilization, China is addressing the issue nationally (Folke *et al*, 2016). Taking into account China's ecological restoration experience and its social-ecological effects could provide valuable insights for future adaptive restoration initiatives aimed at achieving sustainable development, even though it appears that significant progress has been made in terms of land-system sustainability (Hansen *et al*, 2018). Even though such considerations may have focused on particular regions, such as the Loess Plateau (Bryan *et al*, 2018), there haven't been many evaluations of China's ecological restoration efforts for national sustainable development initiatives up to this point. Using a social-ecological perspective, this review aims to summarize China's efforts in ecological restoration for sustainable development and to propose a scientifically based ecological restoration agenda that promotes greater coexistence between the natural and human worlds in the country.

The relationship between Ecological Restoration and Sustainable Development

Social-ecological systems have strong reciprocal feedback and operate as complex adaptive systems. The term "social-ecological" draws attention to the inter connectedness of humans and the natural world, as well as the arbitrary and artificial boundaries that separate society from the environment (Fu *et al*, 2022). Three systematic, empirically supported steps are needed to achieve sustainable development from ecological restoration: (1) quantifying the reciprocal effects between pattern and process; (2) identifying ecosystem services among various ecosystem functions and acknowledging their corresponding contribution to human well-being; and (3) utilizing adaptations and actions to regulate natural conditions for the promotion of sustainable development (Fu and Wei, 2018). Even though ecological restoration is a prime example of this kind of regulation, not all restoration tactics are conducive to sustainable growth.

The first stage in the co-evolution framework is the ecological restoration of the landscape pattern. A "pattern" is the general term used to describe the spatial arrangement of landscape elements, including their size, type, quantity, and distribution (Fu *et al*, 2019). Provide more useful, process-based recommendations for ecological restoration actions at the landscape scale when combined with ecological processes and landscape patterns rather than just recording the size of a restoration area or counting the number of trees (Fu *et al*, 2011). Aspects such as the dynamics of soil erosion, carbon and hydrological cycle processes, and flow-sediment relationships in response to changes in landscape patterns should be the main focus of monitoring the biophysical effects of restoration initiatives, such as the Grain-for-Green Program in China's Loess Plateau (Fu *et al*, 2017). The second phase of the co-evolution framework focuses on ecological restoration for ecosystem services and human well-being. Landscape elements can be designed to provide ecosystem services that meet human needs and promote well-being while simultaneously maintaining important ecological processes, despite the fact that ecological processes are far too often ignored or improperly managed (Brancalion and Holl, 2020). For instance, significant conversions of farmland to grassland and woodland in China's Loess Plateau enhanced soil conservation and sequestered carbon. Given that ecosystem services and human well-being following ecological restoration are interrelated, understanding the geographically distinct and often cross-scale relationships between these two variables is a research challenge. In many cases, it is also unclear how the supply of ecosystem services relates to satisfying human needs (Fu *et al*, 2013).

Ecological restoration to sustainable development is the final stage in the co-evolution framework (Fig. 2)

Adaptive management advances toward ongoing socioeconomic development and sustainable livelihoods through cycle decision-making. Communities living in damaged landscapes frequently have fewer options due to social and economic reasons such inadequate governance, restricted access to markets and input resources and ignorance about alternative production technologies (Lu *et al*, 2012). Therefore, when coupled with socioeconomic growth and adaptive management, ecological restoration may encourage local investment and generate employment (Wang *et al*, 2022) Moreover, the costs linked to augmenting the delivery of

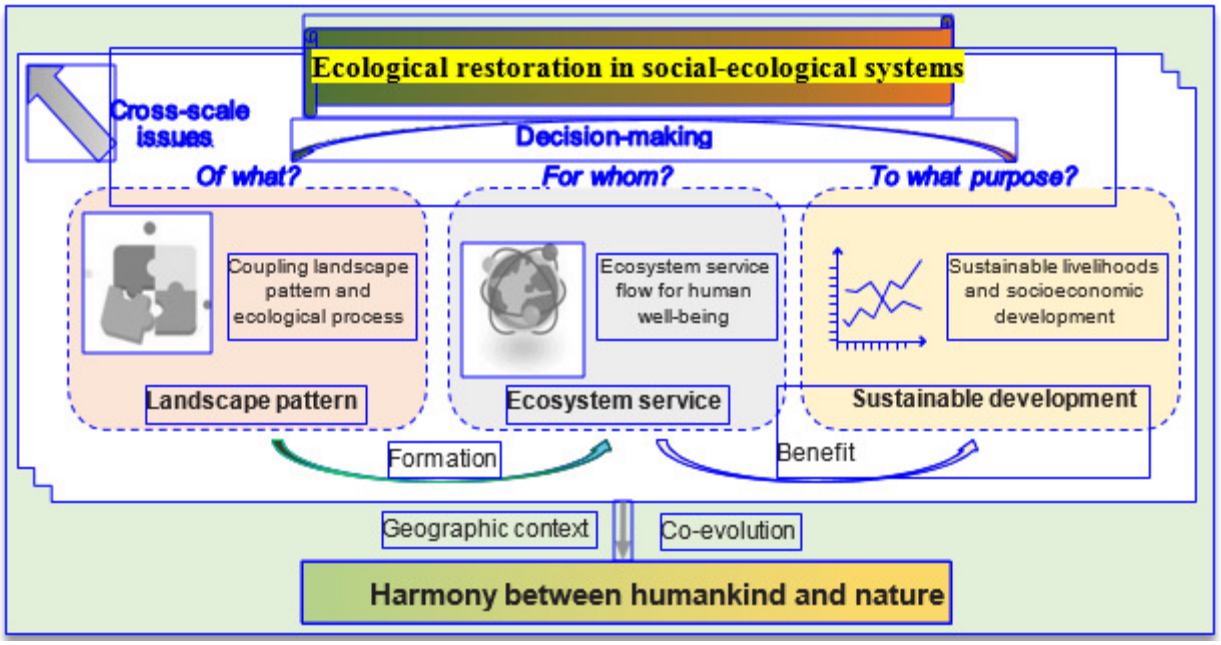

Fig. 2 : Conceptual relationship between ecological restoration and sustainable development (Curtesy: Fu *et al*, 2023).

ecosystem services in an ecological restoration project may be perceived, in part, as a way to guarantee an enduring means of subsistence for the nearby (Cao *et al*, 2021b) place. It is important to emphasize that ecological restoration contributes to sustainable development, in addition to enhancing markets and means of sustenance.

Environmental restoration for sustainable development

Research indicates that sustainable livelihoods, socioeconomic growth, and ecosystem health have win-win synergies at the local level. Finding such win-win solutions for regional government is still a work in progress because benefits and incentives differ across scales. There is no shortage of evidence that at least some ecological projects have improved local livelihoods. The Paddy Land to Dry Land Program was critically evaluated by Zheng *et al*, 2019) in Beijing. They discovered that the program's deployment of a payment system to upstream landholders enhanced household income as well as regulatory services. Similarly, Hou *et al* (2021) concluded that China's Prairie Biological Remuneration Approach progressed both prairie quality and had a noteworthy positive effect on herder salary (Zheng *et al*, 2013). reenacted elective land-use scenarios to recognize win-win results for directing administrations and elastic generation within the Environment Work Preservation Region of Hainan Island (Fan and Li, 2029).

Programs for environmental rebuilding aren't continuously profitable

In spite of the fact that the Movement and Settlement Program within the southern Shaanxi Territory was ruined by considerable short-term costs for lower-income families, which made it incomprehensible for them to take an interest (Zheng *et al*, 2013). On the other hand, after migration, resettled families exchanged from conventional farming and ranger service labor to off-farm exercises that created higher wage, making a win-win situation (Hou *et al*, 2021).

In arrange to realize a win-win circumstance, Cao *et al* (2021a) proposed a salary limit connected to the destitution trap (Wang *et al*, 2022). In case their earnings rise over a particular least sum, feasible jobs may be elevated. Additionally, a few nearby information recommends that financial advancement and biological system wellbeing are commonly strengthening. Biological system corruption downstream was altogether diminished after a water preoccupation extend was put into put within the Heihe Waterway Bowl, keeping up biological wellbeing and financial development (Li *et al*, 2015). The Three-North Shields Timberland Framework Venture, the Common Woodland Preservation Program, and the Grain-for-Green Program were assessed by Cao *et al* (2021b) to have returned on speculation of 29.3%, 328.9% and 77.0%, separately (Li *et al*, 2018). I

Future Research Needs

An in-depth, logical understanding of the human-nature relationship in different geological settings may be a prerequisite for supporting policy-making on biological reclamation for feasible improvement, particularly given China's tremendous earthly zone, diversity of biological system sorts, and wide varieties within the levels of provincial improvement. In this way, this paper highlights four geographic investigate points of view for integrator environmental security and reclamation: Deciding the nature of coupling forms among imperative components, recognizing biological system benefit streams, evaluating the benefits to society and environment and helping with versatile administration for feasible advancement within the locale.

Identification of ecosystem service flows

In China, biological system services' responses to biological reclamation have concentrated on how the scene alteration has influenced them. Human well-being is still not adequately considered, in spite of the fact that. Biological system benefit stream isn't a novel concept in and of itself (Cao *et al*, 2021b) in spite of the fact that considers on environmental rebuilding has barely ever taken spatially explicit streams into consideration. Therefore, determining the specifics of biological system benefit streams may be a vital inquiry about the goal in arrange to find out the genuine effect of reclamation ventures on human well-being. Taking under consideration geological joins and developments, we propose two boundaries. Distinguishing environment benefit streams from the angle of social-ecological systems is vital to begin with. This involves measuring fabric streams, just like the extraction and transportation of sand for development materials, or dispersal-related streams, like creature movement and pollination (Cui *et al*, 2021). It too should evaluate the conceivable stream of environment administrations to family units (Bagstad *et al*, 2014). The distinguishing proof of conceivable trade-offs between environment administrations at different spatial scales- from neighborhood to national- as well as between brief and long worldly scales-based on environment benefit flows- represents the second frontier. Environment benefit supply and request can be connected to make cross-regional coordinating of longer-range benefits and inside coordinating of proximal benefits, depending on the spatial scale.

Appraisal of social-ecological preferences

Social-ecological preferences must be surveyed in a comprehensive territorial setting. The kind of intensive assessment of rebuilding endeavors on biological system well-being and financial maintainability that a social-ecological point of view requires may be avoided in case, as may be the case, reclamation scientists and social researchers stay exclusively inside their possess investigate field (Xu and Peng, 2022). It is prescribed to create an orderly demonstrate that consolidates all the elemental components of a social-ecological framework. This way, any modification in a particular calculation will uncover the comparing reactions of the ecological and social benefits within the reclamation program. There are two boundaries in assessing any benefits that are particular to a given geographic setting, aside from the ordinary troubles in getting information and the complexity of coding in show advancement. The primary is the context-specific parameter run the show, which includes parameters at the community level in family information as well as scene level in topographical highlights (Robinson *et al*, 2019). Clarifying the essential and auxiliary connections of benefits is the moment of wilderness. In arrange to meet nearby and worldwide requests for current and future social-ecological benefits, biologists and social researchers included in demonstrate improvement ought to concentrate on making strides past biological system administrations (Yin and Zhao, 2012) They ought to moreover continuously move forward the standard explanatory handle for multi-objective environmental reclamation, keeping in intellect the significance of satisfactory communication with specialists and policymakers.

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