

# ECOLOGICAL RESTORATION

A MEANS OF CONSERVING BIODIVERSITY AND SUSTAINING LIVELIHOODS

The Society for Ecological Restoration International (SER) is a non-profit organization infused with the energy of involved member individuals and organizations who are actively engaged in ecologically sensitive repair and management of ecosystems.

Our mission is to promote ecological restoration as a means of sustaining the diversity of life on Earth and reestablishing an ecologically healthy relationship between nature and culture.

Founded in 1987, SER now has members in 37 countries, with 14 chapters world-wide. Recognised by public and private organizations as the source for expertise on restoration science, practice and policy, SER achieves its objectives through cooperation with partner organizations and the work of its global membership.

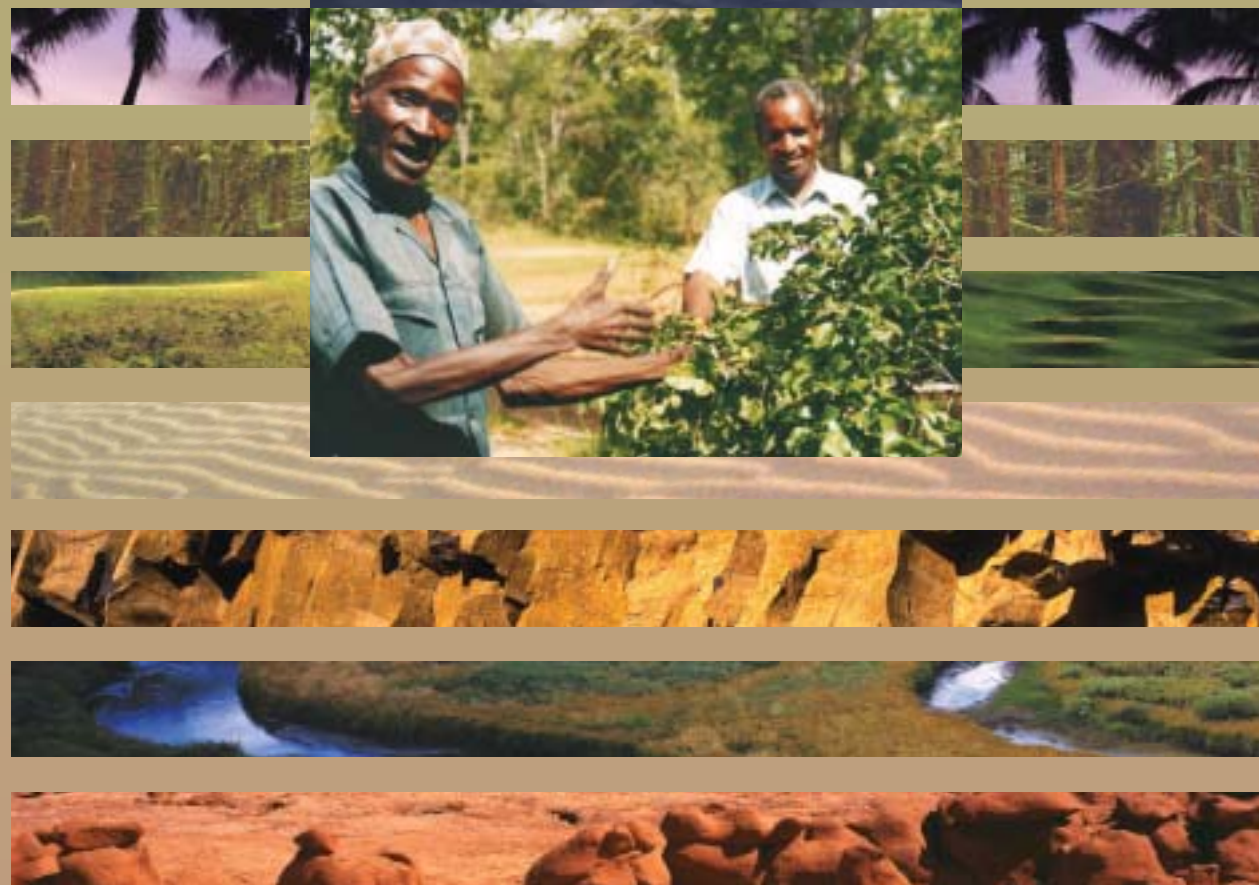
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For more than 50 years this 'Green Web' of partnerships has generated environmental conventions, global standards, scientific knowledge and innovative leadership.

IUCN Commission on Ecosystem Management: [www.iucn.org/themes/cem](http://www.iucn.org/themes/cem)

A call to action by the ecological restoration joint working group of the Society for Ecological Restoration International and the IUCN Commission on Ecosystem Management



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# IMPROVE BIODIVERSITY CONSERVATION IMPROVE HUMAN LIVELIHOODS EMPOWER LOCAL PEOPLE

Many of the world's ecosystems have undergone significant degradation with negative impacts on biological diversity and peoples' livelihoods. There is now a growing realisation that we will not be able to conserve the earth's biological diversity through the protection of critical areas alone. This paper explains what is meant by the term "ecological restoration" and outlines how it can provide enhanced biodiversity outcomes as well as improve human well-being in degraded landscapes. In this way ecological restoration becomes a fundamental element of ecosystem management, although until recently, its potential has not always been fully recognised.

Given that many people now depend on what have become degraded ecosystems to sustain their livelihoods, ecological restoration needs to address four elements. These elements are critical to successful ecosystem management. Ecological restoration should:

This means ecological restoration can be a primary component of conservation and sustainable development programmes throughout the world. What makes ecological restoration uniquely valuable is its inherent capacity to provide people with the opportunity not only to repair ecological damage, but also to improve the human condition. The conservation benefits of restoration are obvious. What is less apparent, but which is at least as important, is that in many instances, ecological restoration has also been able to renew economic opportunities, rejuvenate traditional cultural practices and refocus the aspirations of local communities.

This paper has been produced by a joint working group of the Society for Ecological Restoration International (SER) and the IUCN Commission on Ecosystem Management. The primary motivation for this paper has been to establish a joint rationale for both organizations as to why ecological restoration is a critical tool for biodiversity conservation and sustainable development. Much of this document was derived from the SER International Primer on Ecological Restoration (SER 2002 & 2004). The paper has been also been written to further the Principles of the Ecosystem Approach as endorsed by the Convention on Biological Diversity.



## What is ecological restoration?

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. It is an intentional activity that initiates or accelerates an ecological pathway—or trajectory through time—towards a reference state (see Boxes 1 and 2).

Ecological restoration has as its goal an ecosystem that is resilient and self-sustaining with respect to structure, species composition and function, as well as being integrated into the larger landscape and supporting sustainable livelihoods. Many healthy ecosystems are a product of human endeavors over very long time periods and therefore restoration commonly requires the participation of resource dependant communities. In this respect ecological restoration supports conservation and sustainable development efforts worldwide.

There are two major challenges involved when undertaking ecological restoration. One is how to undertake restoration across large areas comprising a variety of land-uses. The second is how to equitably balance the trade-offs between improving biodiversity conservation and improvements in human well-being.

## Principles of good ecological restoration practice

Ecological restoration is a well-established practice in biodiversity conservation and ecosystem management. We have itemized fourteen principles of good ecological restoration practice based on experience gained over several decades. These principles, and the Attributes of Restoration Progress below, are consistent with both the scope and intent of the Convention on Biological Diversity's Principles for the Ecosystem Approach.



## Principles of good ecological restoration practice include:

### Ecosystems

- Incorporating biological and environmental spatial variation into the design.
- Allowing for linkages within the larger landscape.
- Emphasizing process repair over structural replacement.
- Allowing sufficient time for self-generating processes to resume.
- Treating the causes rather than the symptoms of degradation.
- Include monitoring protocols to allow for adaptive management.

### Human systems

- Ensuring all stakeholders are fully aware of the full range of possible alternatives, opportunities, costs and benefits offered by restoration.
- Empowering all stakeholders, especially disenfranchised resource users.
- Engaging all relevant sectors of society and disciplines, including the displaced and powerless, in planning, implementation and monitoring.
- Involving relevant stakeholders in the definition of boundaries for restoration.
- Considering all forms of historical and current information, including scientific and indigenous and local knowledge, innovations and practices.
- Providing short-term benefits leading to the acceptance of longer-term objectives.
- Providing for the accrual of ecosystem goods and services.



# IT WILL SUPPORT LOCAL SOCIAL AND ECONOMIC ACTIVITIES

## Attributes of restoration progress

A degraded ecosystem can be considered to have been restored when it regains sufficient biotic and abiotic resources to sustain its structure, ecological processes and functions with minimal external assistance or subsidy. It will then demonstrate resilience to normal ranges of environmental stress and disturbance. It will interact with contiguous ecosystems in terms of biotic and abiotic flows and social and economic interactions. It will support, as appropriate, local social and economic activities. Such a state is often difficult to achieve. Nevertheless, significant environmental and social benefits can be realized even in the earliest stages of restoration.

Restoration can take time before all the benefits are evident. The attributes listed below provide a basis for assessing restoration progress. Some are readily measured. Others must be assessed indirectly, including most ecosystem functions, which cannot be ascertained without research efforts that are likely to exceed the capabilities, budgets, and time frames of most restoration projects.

The full expression of all of these attributes is not essential to demonstrate that satisfactory progress is being achieved. Instead, it is only necessary for these indicators to demonstrate an appropriate trajectory towards the intended reference ecosystem condition.

## Ecosystems

- The ecosystem contains a characteristic assemblage of the species that occurs in the reference ecosystem and that provide appropriate community structure.
- The ecosystem contains indigenous species to the greatest practicable extent.
- All functional groups necessary for the continued development and/or stability of the ecosystem are represented.
- The physical environment of the ecosystem is capable of sustaining reproducing populations of the species necessary for its continued stability or development along the desired trajectory.
- The ecosystem apparently functions normally for its ecological stage of development, and signs of dysfunction are absent.
- The ecosystem is suitably integrated into a larger ecological matrix or landscape, with which it interacts through abiotic and biotic flows and exchanges.
- Potential threats to the health and integrity of the ecosystem from the surrounding landscape have been eliminated or reduced as much as possible.
- The ecosystem is sufficiently resilient to endure the normal periodic stress events in the local environment that are an integral part of the dynamics of the ecosystem.



- The ecosystem is self-sustaining. It has the potential to persist indefinitely under existing environmental conditions. Aspects of its biodiversity, structure and functioning will change as part of normal ecosystem development, and may fluctuate in response to normal periodic stress and occasional disturbance events of greater consequence. As in any intact ecosystem, the species composition and other attributes of a restored ecosystem may evolve as environmental conditions change.

### Human systems

- Balance exists between ecological processes and human activities such that human activities reinforce ecological health and vice versa.
- The people who are dependent on the ecosystem have a key role in setting priorities and implementation.
- Restoration activities are underpinned by economic mechanisms that equitably distribute the costs incurred and benefits arising at both a local and national level.
- The ecosystem serves as natural capital for environmental goods and services. Indicators may be more specific according to the nature of the restoration goals. For example, one goal may be that the restored ecosystem will provide habitat for rare species or will harbor a diverse gene-pool for selected species. Yet other goals of restoration may be to provide aesthetic amenities or to accommodate activities of social consequence, such as the strengthening of a community through the participation of individuals in a restoration project.

### Challenges and opportunities

The circumstances that we seek to address are often very challenging. The areas of degraded land now present in various parts of the world are large. Some systems are severely degraded and will be costly to repair. Further, many of these degraded systems are still being used by people and many of these people are poor. We may not succeed in fully eradicating the causes of degradation in these circumstances but there is sufficient evidence from a variety of case studies for us to be optimistic. This evidence makes it clear that ecological restoration will be a key element not only of conservation but also for sustainable development worldwide.

Restoration can be large-scale or small scale, it can be carried out by one or a few individuals or via government programmes involving thousands of participants. It can be well resourced or modestly funded, it can involve ecosystems that can be restored quickly or those that will require hundreds of years before ecological recovery can be said to have occurred. In all cases ecological restoration will improve the biological diversity on degraded landscapes, increase the populations and distribution of rare and threatened species, enhance landscape connectivity, increase the availability of environmental goods and services, and contribute to the improvement of human well-being.

*Reference: SER International Primer on Ecological Restoration. [www.ser.org](http://www.ser.org)*





### Box 1: The Reference State

A reference ecosystem is an actual ecosystem or its conceptual model that is used in setting goals and planning a restoration project, and later in its evaluation. In its simplest form the reference ecosystem is an actual site, its written or oral description, or both. In other situations, the reference ecosystem is assembled from multiple sites and from other sources. In parts of the world where there is a lack of an actual reference ecosystem, or in situations where it is unclear which ecosystem over time would serve as an adequate reference, a more conceptual approach is required. It should be noted that the concept of the reference is a dynamic one, and that, typically, the reference represents a point of advanced development that lies somewhere along the intended ecological trajectory of the restored ecosystem (see Box 2).

### Box 2: The Ecological Trajectory

Wherever possible, ecological restoration attempts to return an ecosystem to its historic trajectory. Historic conditions are therefore the ideal starting point for restoration design and planning. The restored ecosystem will not necessarily recover any of its specific former states, since contemporary constraints and conditions may render this impossible. Indeed, the historic trajectory of a severely impacted ecosystem may be difficult or impossible to determine with accuracy. Nevertheless, the general direction and boundaries of that trajectory can be established through a combination of knowledge of the damaged ecosystem's pre-existing structure, composition and functioning, studies on comparable intact ecosystems, information about regional environmental conditions, and analysis of other ecological, cultural and historical reference information. These combined sources allow the historic trajectory or other reference conditions to be charted from baseline ecological data and predictive models, and its emulation in the restoration process should aid in piloting the ecosystem towards improved health and integrity.

### Citation

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