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Cost Effectiveness of Ecological Restoration Demonstrated

Research recently published in the Proceedings of the National Academy of Sciences (PNAS) provides new evidence that ecological restoration can provide a cost effective response to environmental degradation.

The research focused on the dryland forests of Latin America, and examined the cost effectiveness of ecological restoration techniques such as tree planting and forest regeneration. This was achieved using a novel research approach, which involved mapping the value of different benefits provided by these forests. The research was conducted by a team of ecologists from the UK, Mexico, Chile and Argentina, headed by Professor Adrian Newton of Bournemouth University, UK.

Worldwide, billions of dollars are now being spent annually on different approaches to ecological restoration, which aims to reverse the process of environmental degradation. However, very little evidence is available regarding whether such interventions are cost effective. The problem of environmental degradation is most intense in arid and semi-arid areas, which together cover nearly 30% of the earth's surface and comprises half the surface area of the world's developing countries.

Despite their aridity, dryland areas are of global importance for biodiversity, being the centres of origin for many agricultural crops and other economically important species. Rural communities in dryland areas are often highly dependent on forest resources to support their livelihoods, particularly fuelwood and fodder. However, in many areas dryland forests have been subjected to unsustainable land use practices, including expansion of rangeland for livestock, overharvesting (particularly for fuelwood), conversion to agriculture and rapid growth of urban settlements. These processes have resulted in the widespread degradation of dryland ecosystems, which has resulted in negative impacts on biodiversity, soil fertility and water availability, and on the livelihoods of local people.

Environmental degradation presents a major challenge to policy initiatives aiming to support sustainable development. Restoration of dryland forest ecosystems can potentially offer a solution to this problem. With this in mind, the team of academics led by Jenny Birch, analysed six different study areas across, Latin America. As she explains: "Values were analyzed through interviews with local people and other stakeholders and by reference to the scientific literature. Research focused on valuing the benefits provided by forests to people, including carbon sequestration, timber, non-timber products (such as medicines and honey), and tourism. The costs of forest restoration were also estimated, including loss of livestock production, cost of fencing, fire suppression and tree establishment."

Three different restoration approaches were examined, which were compared using a simulation model of forest landscapes. This enables the potential future impact of restoration approaches on the provision of benefits to people to be compared.

The results showed that ecological restoration of dry forests is most likely to be cost effective if 'passive' approaches are adopted, which support the natural process of forest recovery. 'Active' restoration approaches, involving tree planting, are less likely to be cost effective, because of the high costs associated with new tree establishment. However, in each of the study landscapes, some locations were identified where even this approach is likely to be cost effective.

Professor Adrian Newton, who coordinated the research project, explains the potential impact of the study. "At the recent meeting of the Convention of Biological Diversity in Nagoya, Japan, countries of the world committed to a new target to restore 15% of degraded ecosystems worldwide by 2020. Our research demonstrates that in dryland areas, where it is most needed; investment in ecological restoration can provide a net increase in the value of ecosystems to people. Hopefully, our research will encourage decision-makers to support restoration efforts, so that the global restoration target is achieved."