Society for Ecological Restoration International
BRIEFING NOTE

May 2008

Opportunities for Integrating Ecological Restoration & Biological Conservation within the Ecosystem Approach

RATIONALE

The movement to conserve biodiversity is now at a critical junction. How do we maintain the viability and resilience of plant and animal species in the face of unprecedented habitat destruction and accelerated climate change? Outside certain plant and animal groups, *ex-situ* conservation currently has a limited role to play in preserving and safeguarding biodiversity on any significant scale (in terms of amount and coverage of materials available), and is often too narrowly focused on particular groups or even "charismatic" organisms, underplaying the role of different trophic levels, functional groups, and biotic-abiotic feedback interactions (particularly soils and hydrology which are often ignored completely).

At the same time, ecosystems have been fragmented or significantly degraded to the point where they are unable to support many organisms *in-situ*. It is now clear that conservation is no longer sufficient as protected areas continue to decline and habitat loss increases both within and outside these areas. Even many larger reserves do not have sufficient variation in habitat, elevation, or topography to allow for species adaptation to climate change. To properly address the current extinction crisis, we must not only preserve critical (core) habitat but repair and restore the ecological integrity of the surrounding and connected areas (Bennett & Mulongoy 2006), enabling threatened and endangered species to recover and indeed migrate more freely.

Along with climate change and invasive species, both conservation and restoration scientists and practitioners cite the destruction, degradation and fragmentation of habitat as key drivers in the loss of biodiversity and ecosystem services (Turner *et al.* 2007). Even though ecological restoration has an important part to play in mitigating climate change and re-establishing native communities, this SER Briefing Note will address the complementary roles of ecological restoration and biological conservation, and their potential for integration within a unified ecosystem approach.

Conservation Biology & Restoration Ecology

Conservation biology is the science of analyzing and preserving existing biological diversity. Restoration ecology is the science of recovering degraded, damaged or destroyed ecosystems through active human intervention (SER 2004a). Both disciplines are based on fundamental ecological and evolutionary principles. Ecological restoration is the practice of intervention in, and management of, degraded ecosystems undergoing unprecedented rapid changes to re-establish structure and function. Ecological restoration is to restoration ecology what biological conservation is to conservation biology.

Both sciences often agree on the overall goals of increasing ecosystem health and resilience, and acknowledge the distinct and immediate threats to environmental sustainability. Restoration ecology, regarded by some to have emerged as a sub-discipline of conservation biology, can be more correctly traced back to the experimental work of Aldo Leopold beginning in the 1930's (Sarr *et al.* 2004) and much earlier work in Europe. Acknowledging its limitations in true nature creation, ecological restoration can still be a powerful tool in facilitating the inherent recovery mechanisms of ecosystems and their biological constituents.

The main philosophical difference in the applied sciences of conservation and restoration can be framed simply as "conserving what is left" by establishing protected areas with minimal human interface versus "restoring what once was" while acknowledging the human dimension in landscape matrix as well as the pressures on, and alteration of, the biophysical envelope caused by climate change. Other differences in emphasis – targeted or endangered species relative to habitat structure and function, zoological (fauna) versus botanical (flora), short versus long-term objectives, theory and description as opposed to replicable practice – serve to highlight the complementary aspects of these intertwined disciplines (Noss *et al.* 2006).

ECOLOGICAL RESTORATION IN CONSERVATION PLANNING

The loss of suitable habitat has made the work of conservation increasingly difficult in recent years. Article 8(f) of the Convention on Biological Diversity (CBD) states that "each Contracting Party shall, as far as possible and as appropriate…rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies" (CBD 2000). In many cases, the restoration of aquatic and terrestrial ecosystems has become a prerequisite for the long-term preservation and survival of many plant and animal species.

By assisting ecosystems to become more consistent with their historical evolutionary trajectories, an ecosystem approach that successfully integrates restoration and conservation can not only re-establish patterns and processes, but also regain self-regulatory capabilities within the limits of reference conditions, including ecologically appropriate and sustainable cultural practices. Species found in these healthy, restored ecosystems are more likely to be able to adapt to the consequences of climate change than are those occurring in degraded or non-functioning ecosystems.

Many species and habitat types now lack a network of representative reserves, an important principle in conservation (Slosser *et al.* 2005). Habitat restoration that creates expanded ranges, enlarges transitional zones, and increases landscape connectivity can help facilitate the necessary migration of flora and fauna while increasing species resilience to future disturbances caused by climate change and other human-induced changes (Harris *et al.* 2006). Restoration can also further conservation goals by re-establishing native populations fostering a healthy landscape matrix that includes essential improvements in soils and hydrology.

Scientific and applied collaborations among conservation biologists and restoration ecologists as well as other disciplines (e.g. ecological economics, civil engineering, and ethnoecology) must be actively sought and nurtured in order for this approach to effectively secure species continuity and the necessary improvements in ecosystem function and productivity. Many regional conservation plans and management strategies have already implemented ecological restoration and related engineering projects to further conservation and biodiversity goals (see examples below).

THE ECOSYSTEM APPROACH

As the Millennium Ecosystem Assessment makes clear, an ecosystem approach is needed to provide us with a powerful suite of tools for coping with the ever accelerating loss of biodiversity and ecological services. The ecosystem approach, now gaining prominence in the field of conservation biology and other related disciplines (Armsworth *et al.* 2007), emphasizes structure, function, and process -- accenting the manifold provisioning, regulating, and cultural services provided by biologically diverse systems (MEA 2005).

By stressing the importance of ecosystem services, and that losses or a diminution in these services will adversely impact human well-being, this more practical model is increasingly being seen as an important means for motivating conservation and restoration projects, often with the participation of stakeholders not normally engaged (Armsworth *et al.* 2007). Highlighting the interdependence of humans and nature, evident in many indigenous cultures, can only serve to foster community participation in this essential work. In this regard, it is important to note that indigenous peoples are generally regarded as stewards of biodiversity utilizing Traditional Ecological Knowledge (TEK) to protect and restore natural capital (Berkes *et al.* 2000).

In 2000, the CBD adopted the application and implementation of the Ecosystem Approach -- a framework for integrated natural resource management with 12 complementary and interlinked principles as well as 5 points of operational guidance (CBD 2000). Five years earlier, the U.S. Fish and Wildlife Service adopted an ecosystem approach to conservation under the assumption that all species, communities and biological resources are interconnected which was based on a cross-jurisdictional boundaries landscape level ecological model introduced by North American public lands and wildlife agencies in the early 1990s (USFWS 1995). Today, the European Union has several Directives in force or in preparation which have restoration of "good ecological status" for surface waters (Water Framework Directive) and habitats (Habitat Directive and Environmental Liability Directive) at their core.

The IUCN Commission on Ecosystem Management states: "Ecosystem Restoration is thus a key contribution to the application of the Ecosystem Approach, e.g. in informing the negotiation of land use options and in the enhancement of ecological networks." (http://cms.iucn.org/) Collaborative efforts between those working in the fields of restoration and

conservation, specifically utilizing an integrated ecosystem approach, will yield synergies needed to effectively deal with the daunting challenges of protecting biodiversity while simultaneously improving human livelihoods.

The field of ecological economics, and the introduction of new concepts such as natural capital, can also prove useful in this discussion as they point out the difficult tradeoffs between ecological integrity (biodiversity improvement) and human welfare (production enhancement). Specifically, these concepts represent an important contribution to an integrated ecosystem approach which attempts to introduce the proper economic valuation of ecosystem services into the natural resource management decision-making process (Turner *et al*. 2007; Aronson *et al.* 2007).

SOME EXAMPLES OF INTEGRATION

1. The abandonment of large farms and ranches in the western United States offers an excellent opportunity for NGOs and wildlife managers to collaborate on conservation and restoration. Similarly, new opportunities for industry-financed projects and other public-private partnerships are opening up as the need for habitat restoration gains prominence. In the United States, two statewide conservation plans have been built around ecological restoration principles: the New Mexico Forest and Watershed Health Plan (http://www.emnrd.state.nm.us/fd/FWHPlan/FWHPlanMain.htm) and the Statewide Strategy for Restoring Arizona's Forests (http://www.azforests.org/). Ultimate success will depend on avoiding top-down approaches by consulting with all stakeholders (e.g. private landowners, indigenous peoples and government agencies) from the planning stages to implementation and monitoring.

2. The environmental management model of "ecological networks" developed in Europe over the past few decades incorporates both restoration and conservation within a sustainable development framework. This approach grew out of the observation that habitat fragmentation reduces species viability by limiting migration, dispersal and genetic exchange, and is driven by the inextricably linked goals of conservation, restoration and sustainability. The basic components of these ecological networks are core areas, corridors, and buffer zones. As very few wildlife corridors remain intact, this network approach affords restoration and conservation practitioners the opportunity to work together to reconnect fragmented habitats and improve the health of the overall landscape matrix (Bennett & Mulongoy 2006).

3. The recent use of species reintroductions (reintroduction biology) as an ad hoc tool in conservation planning and wildlife management has met with limited success primarily due to a lack of guidance with regard to ecosystem structure, function, and resilience. Once placed within the framework and methodology of restoration ecology, reintroductions will undergo more fruitful experimentation and greatly increase their chances of success. At the same time, restoration ecology can benefit considerably by embracing vital functional components (such as birds and mammals) that have been lacking in some habitat restoration projects (Lipsey & Child 2007).

THE WAY FORWARD

Given the complementary nature of restoration and conservation, an ecosystem approach offers us the most effective toolbox for combating the loss of biodiversity and the ecological services that are so vital to human well-being. The link between biodiversity, ecosystem services, and human livelihoods must continue to be documented in order to inform public and private decision-making. Ultimately, it is the shared passion of both scientists and practitioners -- to preserve and restore species populations and their habitats -- that will contribute to the continuity and enhancement of biodiversity and ecosystem services.

An integrated ecosystem approach is perhaps the only way to tackle the challenges of climate change, habitat loss, and the sustainable use of natural resources. For the reasons stated above, ecological restoration and biological conservation are the logical pillars upon which we can build an innovative approach to maintaining and restoring the ecosystems that we, and all life, depend on. Strategic alliances between non-governmental organizations, like the Society for Ecological Restoration International, the World Conservation Union, and the Society for Conservation Biology, national governments and international bodies, such as the Convention on Biological Diversity, will be critical in moving this approach forward.

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SOCIETY FOR ECOLOGICAL RESTORATION INTERNATIONAL

SER International is a non-profit organization infused with the energy of involved members -- individuals and organizations 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. The SER International Science & Policy Working Group promotes excellence in research and contributes to the policy dialogue on ecological restoration as a conservation tool. The Working Group is composed of:

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