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Overview of Vol.3, No.1 – Restoration Programs within Parks, Reserves, and Wilderness Areas

Conservation Enhancement; Restoration programs within parks, reserves, and wilderness areas

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Throughout their history, humans have used land for their needs and desires. These uses, such as agriculture, transportation, and shelter construction, limit the spatial area of natural ecosystems. The loss of these natural areas reduces ecosystem services, such as water filtration, and impact animal and plant populations. Indeed, habitat destruction is the primary contributor to the decline of many uncommon species. Undisturbed biological communities are increasingly rare on the modern landscape and are often restricted to protected areas. This section reviews programs that use restoration methods to enhance the conservation value of these remnant communities.

Restorations can serve many functions within relatively undisturbed ecosystems. Restored habitats, if strategically placed, can smooth the sharp boundaries between natural and unnatural habitats and increase habitat homogeneity. These methods can also be used to patch large gaps, or holes, in an otherwise intact community. Sharp community boundaries produce edge effects, such as increased light infiltration, higher evaporation rates and low wind protection, that can create unsuitable conditions for sensitive species.

The Minnesota Chapter of the Nature Conservancy (Clayton) uses restored habitat to buffer and protect high quality areas, which often contain endangered species. In this example, maintaining the quality of the core habitat takes precedence above overall size, as demonstrated by strict propagule source requirements. This restriction may limit the number of individuals introduced in to a particular area. Flood's Mission Mountain Wilderness is another program that uses nearby native materials to patch habitat holes created by visitors. In contrast, the Everglades Program (Bramstedt) and the Minnesota State Park system (Montag) use habitat buffers to primarily increase the extent of functioning habitat.

Resiliency of ecosystem services can be strengthened by restoration apparatuses and techniques, such as water control devices or through reestablishing several different leguminous species. The Everglades Program (Bramstedt) targets the return of ecosystem function, particularly nutrient uptake and water absorption, within the project's goals. In this case, the landscape surrounding the Everglades has dramatically altered the hydrology and water quality of the National Park. Without these services, further restoration attempts would be futile.

The return of function does not necessarily include the restoration of pre-settlement conditions or species composition. In Everglades example, removal of excess phosphorus is facilitated by an engineered cattail (*Typha sp*.) wetland. This activity contrasts with McCrown's review of salt cedar (*Tamarix sp.)* removal efforts for four National Wildlife Refuges. Salt cedar was originally imported to North America from Asia to stabilize riparian ecosystems and slow soil erosion. An uneasy compromise develops in these instances; an exotic species may alleviate an acute

problem, but the species itself may become a problem later in the process of ecosystem recovery. Time will reveal if the engineered cattails will shift from a restoration tool to a menace in the Everglades ecosystem.

If not controlled, exotic species can disrupt natural disturbance regimes, displace native species, and reduce wildlife habitat. All of the restoration programs in this section target invasive species removal as a goal. McCrown's salt cedar example is particularly critical because, unlike most exotics, this species is colonizing undisturbed habitat and changing areas relatively untouched by humans. This species is also tenacious, requiring intensive removal methods, such as root cutting, herbicides, fire, mowing, and flooding. These removal activities are also disruptive to the community and must be conducted with care to prevent further degradation.

Amenity construction and recreational use can also disturb or destroy natural areas. Two programs reviewed in this section target recreational areas to ameliorate damage by visitor activity or enhance the natural quality of the area. Montag's review of Minnesota's State Parks activities are an example of the use of restoration methods to protect the state's unique combination of resources from direct human impact. The Mission Mountain Wilderness area use observation by management and biophysical indicators to trigger restoration (Flood). In both examples visitor behavior can influence the implementation and duration of restoration activities. The Mission Mountain's private contractors, however, use visitor education programs to improve the long-term prognosis of site conditions. Conversely, the Minnesota State Park system could benefit from this type of visitor education.

Fostering a communal attitude towards a particular natural community is a final service provided by these restoration programs. The salt cedar control program demonstrates an effective inter-organization effort. This program includes public agencies, such as the Bureau of Land Management, U.S. Fish and Wildlife Service, several California State offices, and private groups, such as the Nature Conservancy. Likewise, Bramstedt's Everglades example demonstrates funding cooperation among federal, state, and local agencies. The Minnesota Chapter of the Nature Conservancy uses volunteers and works with private landowners to facilitate community protection (Clayton). The private contractors in the Mission Mountain Wilderness demonstrate an effective use of education and manager involvement. The only program that does not fully realize inter-agency participation is the Minnesota State Park system (Montag). The multiple levels of decision-making and prioritization dilute responsibility for decision making and seem to discourage local action.

Monitoring and assessment is a problem for all of the restoration programs. Some projects have defined characteristics to appraise the success of an activity. The Everglades project, for example, will use physical indicators, such as waterfowl colonization and water chemistry, to observe progression to their goals. Other organizations, such as the Minnesota Chapter of the Nature Conservancy, will evaluate on a site-by-site basis (Clayton). Some sites, such as Hole-in-the-Mountain Preserve, may receive intense evaluation by a student, while other areas may receive minimal attention. Passive evaluation, however, appears to be the norm. The Mission Mountain Wilderness relies on field managers and the contractors to revisit restored areas and adjust structures and replenish plants as necessary (Flood). Minnesota State Parks (Montag) and the National Wildlife Refuges (McCrown) also rely on area managers to monitor the success of a

project. This type of evaluation is dangerous because a shift in management or the passage of time may disrupt monitoring activities. The lack of records will prevent evaluation of long-term success.

The restoration of relatively undisturbed habitats can fulfill many goals: buffering high quality habitats from edge effects, increasing the extent of existing habitat, strengthening ecosystem services, exotic removal, enhancement of recreational areas, and cooperative action. The discussed programs use restoration activities to achieve these goals, although the relative priorities and project success varies.

All of the programs in this section have a similar weakness: monitoring and assessment. This step is particularly important for the relatively pristine and public nature of these restorations. Assessment provides an opportunity to learn from restoration failure and improve restoration skills. Although some purists may balk at calling a restored community "natural," restoration programs like those presented in this section, are the only realistic hope of adding area and function to the world’s remaining natural sites.