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Tropical Restoration and Reclamation Strategies: South America, Latin America and India

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It is an unfortunate fact that as human world populations are rising, native ecosystems are quickly diminishing. As human populations increase, so does the need for a wide variety of forest products and land cultivation. While humans play a large role in this diminishment we also have the greatest opportunity to put in place restoration and reclamation strategies to alleviate our impact. Because land degradation is certain to continue, it is our role as humans to put in place strategies that will temper this destruction and ultimately regenerate land for future use.

The following research papers focus on restoration and reclamation strategies in South and Latin America as well as a project in India. The papers cover topics such as decreasing deforestation, recolonization of tropical rainforest species, rehabilitating watersheds and the reintroduction of native tropical birds. Though these papers cover just a few projects in existence, they highlight the needs and obstacles to restoration in these countries.

As typical of many of the poorer countries, there is a constant struggle for what is best for the people and what is best for the environment. For those of us who live in more developed countries, we often take for granted basic needs such as food and shelter. People in less developed nations rely on the land on which they live to provide these necessities. All of the papers discuss the need to develop restoration strategies that incorporate the needs of local populations. Involving local people is challenging but can ultimately result in a 'win-win' situation for all involved. As economic and ecological benefits accrue from restoration, local cooperation is often more forthcoming.

Natural succession proves to be a painstakingly slow process when attempting to restore a natural tropical forest. A "catalyst", such as a tree plantation, has been determined a good means to increase the rate at which land is allowed to return to its natural state (Sorley). The concept behind the tree plantation is to plant exotic species in an area for use as a timber source among other things. Over time, native species are allowed to take over as it has been proven they colonize quite well in the understory of these plantations. The exotics are harvested and the natives are left to continue on the path of natural succession. Natural dispersal processes from wind and animal dispersal and seed germination and growth are facilitated by plantation trees.

Formal projects, such as the Guanacaste Conservation Area project in Costa Rica, provide examples of natural recolonization along with managed restoration (Moline). The two goals of the restoration project are to connect remaining islands of dry tropical forest in the current landscape matrix pasturelands present due to disturbance and to involve the local people to provide a sense of pride and involvement in the restoration. This particular project is a great example of practical technology that takes into consideration locally available resources.

In the Guanacaste project, experimental areas were chosen and managed to minimize disturbances such as fire. As a result of this suppression, wind dispersed seeds and germination at the site which in turn created desired habitat for larger animals who carry fruits into the area and provide additional seed dispersal. The project has been so successful that additional programs that involve bioprospecting and silviculture have been implemented.

Another tropical forest restoration project is described from the Amazon (Sommer). As a result of increasing populations and the need to produce food, much forest destruction is occurring in the Amazon. Land is being used for subsistence farming or as pastureland for cattle to graze. In the past there had been fallow time between land uses which allowed for the regeneration of natural tropical forests. This is no longer the case and the land is tied up in agricultural practices without providing the necessary time for regeneration.

Because the land is being used for subsistence it is necessary to provide government assistance to the people such as nutrient management and alternative cropping systems like agroforestry to deter large amounts of land from going into pasture. In addition, incentive programs for farmers such as developing a rainforest lumber market based on sustainable practices will aid in the regeneration of the forests.

Soil erosion due to deforestation and agricultural practices can cause yet another concern; erosion in the local watersheds. Rehabilitation of a tropical forest watershed was performed in India by installing earthen dams (Sommer). As a result of the dams, erosion decreased and crop yields increased, sending a positive message to the local people who were now willing to work within the guidelines recommended by government foresters. The watershed was improved, as well as the livelihoods of the people.

Native animals are also an important aspect of the ecological system. Unfortunately, acts such as deforestation and predation contribute to the decline of certain species and render them endangered. Two such animals are the Puerto Rican amazon parrot (*Amazona vittata*) and the yellow-shouldered parrot (*Amazona barbadensis*). These animals have both been involved in separate reintroduction programs. The Puerto Rican amazon parrots were raised by non-endangered surrogate bird species and reintroduced into the wild while the yellow-shouldered parrots were raised by humans. Parrots were syringe-fed and raised in cages that resembled their natural habitats prior to being released into the wild. Though different projects, each reintroduction has proven successful.

As evident from the papers in this section, widespread scarcity of tropical forest resources is a significant problem. Restoration and reclamation strategies can alleviate this loss. Endangerment of native animal species will most likely occur. A common theme which is paramount in the success of each of these projects is the education and involvement of the local people to support the restoration efforts.