



## Overview of Vol.4, No.7 - Global

### Restoration and Reclamation Efforts that Span the Globe

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The relationship between mankind and the environment has gone through several stages of change, beginning with the early primitive time when humans and nature lived in a symbiotic relationship. During this early stage of development the level of technology needed to exploit the raw material of the earth was low and nature was a force over which humans had little control. This period was followed by increasing mastery over nature as technology improved leading up to the "Green Revolution" and the "Industrial Age." This set the stage for the rapid technological development and the need to exploit more of the earth's natural resources to satisfy a growing population world- wide. The environment became both a source tapped to produce goods and services for consumption as well as a sink for the disposal of waste. The initial reaction to environmental damage was a reactive approach and increasing clean-up efforts.

With this new industrial age, exploitation of minerals caused alteration of the physical landscape, destruction of natural habitats, biodiversity, soil degradation, air, and water pollution. As ecosystems became drastically altered, the need was no longer one of clean-up, but also restoration of the landscape in an effort to return ecosystems to a state where they could be self-sustaining in the long run. Papers in this section examine international efforts at habitat restoration, in particular, wetland restoration and techniques used in the restoration following mining.

The 1992 Earth Summit in Rio de Janeiro, Brazil, hosted by the United Nations Conference on Environment and Development (UNCED), ushered in a new era in world cooperation against environmental degradation. Sustainable development became the main theme and most importantly, the recognition that this required a global effort. It has been estimated that due to the direct impact of land-use, approximately 43% of the earth's terrestrial surface now have a reduced capacity to supply benefits to the world population (Daily 1995).

The paper by Fairchild reports on an international approach to wetland restoration by a non-profit organization known as the Wetland International (WI). Wetland functions vary from coastline protection to those including inland flood protection, sediment trapping, wildlife habitat, and water quality improvement. Fairchild made the point that these areas are being destroyed due to population growth and technological advances. Wetland International has established regional offices providing both scientific and educational information along with demonstration projects. Data gathered on wetland restoration from these projects are then made available to the international community. This dissemination of information is done via the internet, publications in various languages, e-mail, and conferences and represents the importance of global cooperation..

The other three papers in this section focused on restoration following mining activities. Mining of heavy metals endangers our environment because they can be toxic even in trace

concentration. This problem is affecting many countries and has become a cause for global concern. Fahrenholz discussed the use of bioremediation for restoration of sites contaminated by heavy metals. Bioremediation has the advantage of being a cheaper option of treating heavy metal contamination than removing and transporting the contaminated soil to a toxic waste dump. Another advantage is that by using bioremediation there is a reduction in the level of exposure of these toxic substances to humans and the environment. This method of treating sites contaminated by heavy metals was also discussed by Haselhorst who focused was on the munitions sites contaminated by 2,4,6-Trinitrotolene (TNT).

During World War II the production of TNT greatly increased as munitions plants mass-produced ammunition and explosives to supply their fighting forces. During this period waste disposal was an after thought and as a result, wastes were disposed of simply by burying at their easiest convenient with no consideration of the possible pollution effects. These past actions have now resulted in massive clean-up efforts in many countries of sites, sometimes miles downstream from where these munitions site were located as the contaminant leached into the ground water. In the United States, some of these sites have become Supervened Sites targeted by the Environmental Protection Agency (EPA) for clean-up. This is a prime example of the actions of the past coming back and impacting present generations, a trend that sustainable development is hoping to halt.

Methods of bioremediation discussed by Haselhorst include composting, bioslurry, and phytoremediation. The choice of technique used to clean-up munition sites is dependent on the extent of TNT contamination and includes either in-situ (on site treatment) or ex-situ (off site treatment). Based on the research Haselhorst did, bioslurry is more likely used when there is a threat of leaching into the ground water, composting used where complete eradication of all the degrade products is not necessary, and phytoremediation used where the level of contamination is low.

The final paper in this section examined the advantages and disadvantages of using soil stockpiling as a restoration technique following mining or construction activities. While the advantages are often highlighted, Strohmayer outlined approximately nine disadvantages of using this technique, but also made the point that stockpiling is still better than trying to re-establish plants on soils where the A and B horizon was removed.

In conclusion, this section outlined some of the global issues facing restoration ecologist and scientist in the area of waste management, clean-up, and reclamation. With an increasing consciousness of the need for environmental stewardship and the growing population pressure on the land, research are being done to treat and reclaim areas so that they can be made productive following mining activities. The papers in this section presented techniques using bio-engineering options and international cooperation in addressing the problems of restoration and are examples of some of the work being done in the field.

## **Reference**

Daily, C.G. *Restoring value to the world's degraded lands*. In Restoration Ecology and Sustainable Development. 1997. Urbanska, K.M., Webb, N.R., and Edwards, P.J.(eds.). Cambridge University Press.