NATURAL PROCESSES FOR THE RESTORATION OF DRASTICALLY DISTURBED SITES

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Natural processes have been restoring natural disturbances for millions of years (Polster 2009). Understanding how these processes operate provides us with the opportunity to mimic these processes when we restore disturbances we create. Photographs 1 and 2 show the Frank Slide in the Crowsnest Pass area on the British Columbia – Alberta border. The slide came down in 1903, burying the town of Frank, Alberta, killing the 70 to 90 people who were in the town asleep. Since that time, natural processes have operated to restore over 82 million tonnes of rock that came down. By looking closely at how the vegetation (primarily Balsam Poplar in this case) is establishing on the slide debris (Polster and Bell 1980), techniques for restoration of mining wastes can be developed.

Photograph 1 & 2. The Frank Slide came down in 1903, burying the town of Frank, Alberta. The collection of organic materials in the interstitial spaces between the rocks creates a substrate that will support the growth of vegetation.

The processes differ for different ecosystems so for instance, on soil like sites, pioneering species establish quickly where there are suitable conditions. Identifying the filters (constraints) that might prevent establishment (e.g. compaction, lack of micro-sites, erosion, etc.) is the first step in the restoration of degraded sites. Creation of habitat where pioneering species can establish is often the most effective way of restoring sites (Photographs 3 and 4). By allowing natural processes to restore the damaged site, there is no question of selecting the right species for planting or even the locations where they should be planted. Of course the costs are significantly

less than traditional reclamation techniques. Making the ground rough and loose costs about $700/ha while scattering woody debris often provides an opportunity to get rid of a waste material that would otherwise have to be disposed of. All of the work of planting and erosion control is eliminated and you get the right plants in the right spots.

Photograph 3 & 4. This former dam penstock site (left 2013) was made rough and loose and woody debris was scattered and within two years it was covered with alder (right 2015). In addition to the alder, there are now over 80 other species, including conifers that have established on the disturbed areas.

Soil bioengineering (Photographs 5 & 6), the use of plant materials to provide some engineering function (retaining walls, drains, soil reinforcement, etc.). Soil bioengineering systems (Polster 1997) use pioneering species like Willows, Balsam Poplar and Red-osier Dogwood that have the ability to root from dormant cuttings. These pioneering species set the stage for the subsequent successional development so the final outcome will be a conifer forest.

Photograph 5 & 6. This 70^{o} sand slope below the Anthropology Museum at the University of British Columbia was treated with soil bioengineering in 1989 (left). By January 21, 2016, the slope was well on the way to becoming a forest again with Red Alder, Western Hemlock, Swordferns and Salmonberry as well as other forest species.

Natural processes, including soil bioengineering (uses pioneering species) can be used to solve the toughest restoration problems. Looking at the way natural systems have addressed a lack of vegetation on naturally disturbed sites (volcanos, glaciers, landslides, floods, etc.) we can develop systems for restoration of our disturbances.

LITERATURE CITED

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