Evaluation of Soil Degradation as a Factor Affecting Forest Productivity in British Columbia - A Problem Analysis
Phase II & III - Research Needs & Policy Evaluation
FRDA Report 038

Soil degradation is a term used to describe the loss of productivity caused by soil disturbance resulting from forestry practices employed during tree harvest, site preparation or stand tending. The issue is three-fold. First, areas being reforested today (including backlog NSR) may experience soil degradation resulting from harvesting activities and require special rehabilitative measures. Second, treatment of these previously harvested sites by means of mechanical, chemical and prescribed fire techniques may impart degrading effects on the soil. Third, forestry practices currently being employed to harvest the stand and prepare the site for regeneration, may be adding to the area of sites already influenced by soil degradation.

FRDA Report 025 reported on the first phase of this three-part study. Phase II and III are the topic of this report. These phases deal respectively with research needs and strategies, and the adequacy of regulations, staffing levels and education to deal with the identified issues.

Soil degradation is a major concern to forestry managers in B.C. because it can decrease the survival and growth of regenerating stands as well as reduce the success of restocking backlog sites. Impacts such as soil compaction and nutrient reduction due to harvesting and/or silvicultural treatments can result in long-term growth reduction even though the treatments may bring about short-term growth increases. A lack of understanding of the extent and magnitude of issues such as these, and the means of effectively dealing with existing and potential future soil degradation are constraints on management. As a consequence of these cause and effect relationships, forest managers may have to face reductions in long-term sustainable yield and limitations on the use of specific logging methods, silvicultural systems and silvicultural treatments. Research studies, the implementation of realistic site degradation policies and procedures, and improvements in education and training will provide the means of overcoming these constraints.

The report summarizes existing and ongoing research in five tables, organized under the following topics: harvesting technology; site preparation; site rehabilitation; monitoring systems; and technology transfer. The authors conclude from their review of existing research that the majority of effort is being directed toward harvesting and site preparation technology and effects. The majority of work is being conducted in the interior, and the vast majority of work is being conducted by regional and headquarters research staff of the B.C. Ministry of Forests and the Forestry Service. The report notes that it is currently directed at resource planning or economic issues relating to soil degradation.

Research Needs

The authors developed their research topics based on discussion with researchers and operations staff from the provincial and federal agencies and private companies. They organize these topics under six categories, similar to those used for the summary of current research. These categories are: harvesting technology; site preparation; site rehabilitation; monitoring; assessment, and monitoring; planning; and economic. They outline simple yet firm criteria for research studies to ensure their validity and usefulness. They continue by listing seven major initiatives, each of which requires direct action by the Ministry of Forests at either the regional or headquarter’s branch level.

Legislation, Regulations and Policies

Before reviewing provincial legislation relating to soil conservation, the report summarizes pertinent legislation from the United States, especially the Pacific Northwest states, and from other Canadian jurisdictions. In reviewing local legislation and regulations, attention is given to the policy statement contained in the Ministry of Forests’ Silviculture Manual. The authors note that this statement, although comprehensive in its discussion of disturbance related to forest-harvesting, lacks the necessary criteria for implementation.

In outlining legislative and regulatory needs for forest soil protection in British Columbia, the report suggests that few good models exist. The authors suggest that the Forest Act and the Ministry of Forests Act are both appropriate vehicles with which to enact effective legislation. They also point out, however, that research should play an important role in supporting the implementation procedures and identification of standards stemming from this and existing policy and legislation.

Personnel Requirements

The report addresses the personnel question by categorizing it as follows:

1. Development and implementation of policies, regulations, procedures and standards.
2. Training, education, and extension for operational personnel, and for improving awareness of managers and the public.
3. Research needs.
4. Planning, both operational, and for TSA analyses.
5. Monitoring of operational activities.
6. Assessments designed to effectively quantify historical and ongoing forest soil disturbance and degradation.
7. Rehabilitation of degraded forest soils.

It describes the current staffing and proposes a minimum acceptable level. The report also proposes a recommended staffing level and develops a comprehensive program that could be undertaken to effectively deal with soil degradation. This program addresses:

1. policy, regulation, procedures and standards,
2. training, education and extension,
3. research,
4. planning,
5. monitoring,
6. assessment, and
7. rehabilitation.

The 42-page report concludes with a short chapter entitled Education and Training Requirements. The authors outline programs that would be designed for five principal target groups, namely:

1. licensee and contract machine operators,
2. operational personnel in the Ministry of Forests,
3. middle and upper management in the MOF and industry,
4. students from forest technical schools and forestry-related university programs, and
5. general public and politicians.

The report provides a cost estimate to produce the programs and provide the staffing proposed. It also suggests the level of improvement that would be required to offset the program costs.


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