CASCADE CREEK RESTORATION

(A SLIDE PRESENTATION)

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INTRODUCTION

This is essentially a visual tour of a small 25 km^2 watershed, last glaciated some 10,000 years ago, as seen from the perspective of an engineer charged with the responsibility for bringing about a reasonable degree of protection for residents of the alluvial fan traversed by the lower reaches of Cascade Creek. The principle focus is on aspects which impact significantly on the residential area.

LOCATION

Cascade Creek is situated at the northerly end of the agricultural Hatzic Valley, some 70 km east of Vancouver, B.C., and ranges in elevation from 1360 m down to 100 m GSC where it discharges into Slave Lake. The watershed is comprised of two characteristically different areas; the Upper Watershed and the Lower Watershed.

RECENT HISTORY

Between 1950, when logging of the Upper Watershed commenced, and 1983, some 56% of this area was logged, in addition to which a wide transmission line R/W was cleared and an extensive network of logging and hydro access roads constructed. During clearing of the Hydro R/W in 1974, a slash burning operation got out of control and burnt a further 13% of the Upper Watershed. These various activities together have resulted in effective clearing of about 75% of the area.

Problems in the watershed first became significant in 1977 (Nov. 1) following moderately heavy rains (76 mm/24 hr. at Aggasiz); but during a period when the Nov.-Jan. total precipitation was 55% higher than the 57-year average. The total runoff for the adjacent Norrish Creek was also 55% above its 21-year average during this period.

Many instances of mass wasting, debris torrents and surface scour in the upper areas resulted in massive deposition of gravel and wood debris in the mainstem channel, causing severe damage in the lower, inhabited reach where the channel, choked with gravel at various locations, overflowed its shallow banks.

Subsequent storms during 1982 (Dec.), 1983 (Jan.) and particularly 1984 (Jan.) when 114 mm of precipitation fell in 24 hours at Aggasiz, resulted in recurrences of these problems to varying degrees.

CONSEQUENCES - Upper Watershed

At the higher elevations mass wasting was prevalent throughout much of the area, a direct consequence of the loss of vegetative cover and of access road construction; in one area alone some 12 failures were evident. The width of these erosion scars increases as they progress upslope. This process resulted in extensive outwash deposition at the valley bottom and

downstream bedload movement.

The failure of several towers supporting a high-voltage hydro transmission line across this very steep terrain may also be attributed to disturbance of the soil mantle and loss of the protective vegetation.

CONSEQUENCES - Lower Watershed

In the Lower Watershed the most dramatic and damaging effects were flood flows across the alluvial fan area and infilling of the creek channel with deposited bedload material ranging in gradation from huge boulders near the apex of the fan, below Cascade Creek Falls, to fine sands nearer Stave Lake. This infilling, in addition to increasing the propensity for flooding and channel avulsion, also destroyed any fish spawn and damaged habitat areas.

Property damage included: water damage to buildings and contents, loss of small livestock, damage to access roads and damage to fields by surface scouring, and by the deposition of gravel and floating debris.

REMEDIAL OPTIONS - Upper Watershed

Remedial options in the steep-walled Upper Watershed were generally limited to hydroseeding of road cuts and slide areas using truck-mounted equipment, where possible, or helicopters, but putting redundant access roads "to bed" by regrading the slopes at critical locations, removing drainage culverts and initiating revegetation were preferred, where practical.

Good coverage of exposed mineral soils was generally obtained within two months of seeding.

REMEDIAL OPTIONS - Lower Watershed

On the alluvial fan there were essentially four options for alleviating the flood hazard:

1. periodic channel clearing, either by temporary reshaping using bulldozers, or else by totally removing the deposited material;

2. protection of all or part of the area by dykes, either close to the creek banks, or, preferably, set back from the banks so as to leave a wider floodway and to benefit from the natural protection afforded to the dykes by the intervening trees and vegetation;

3. floodproofing of the existing buildings which would have been very expensive;

4. purchase of affected properties, which would have been even more expensive.

The solution which was ultimately adopted was to build a setback dyke, to provide long-term protection for most of the

area, and to rely on channel excavation, together with a lower standard of dyking, for protection of uninhabited grazing land. Elsewhere, remedial action was limited to the removal and burning of logjams and other forest debris. The existing road bridge was also replaced by a longer one having significant clearance, thus providing adequate capacity for debris-laden flood flows.

CONCLUSION

The lesson to be learned from past experiences in this watershed is that, if detrimental environmental and social consequences are to be avoided, logging and other construction activity in steep West Coast watersheds must be carefully planned and executed so as to minimize disturbance of side slopes, the natural drainage patterns, and the vegetative cover.

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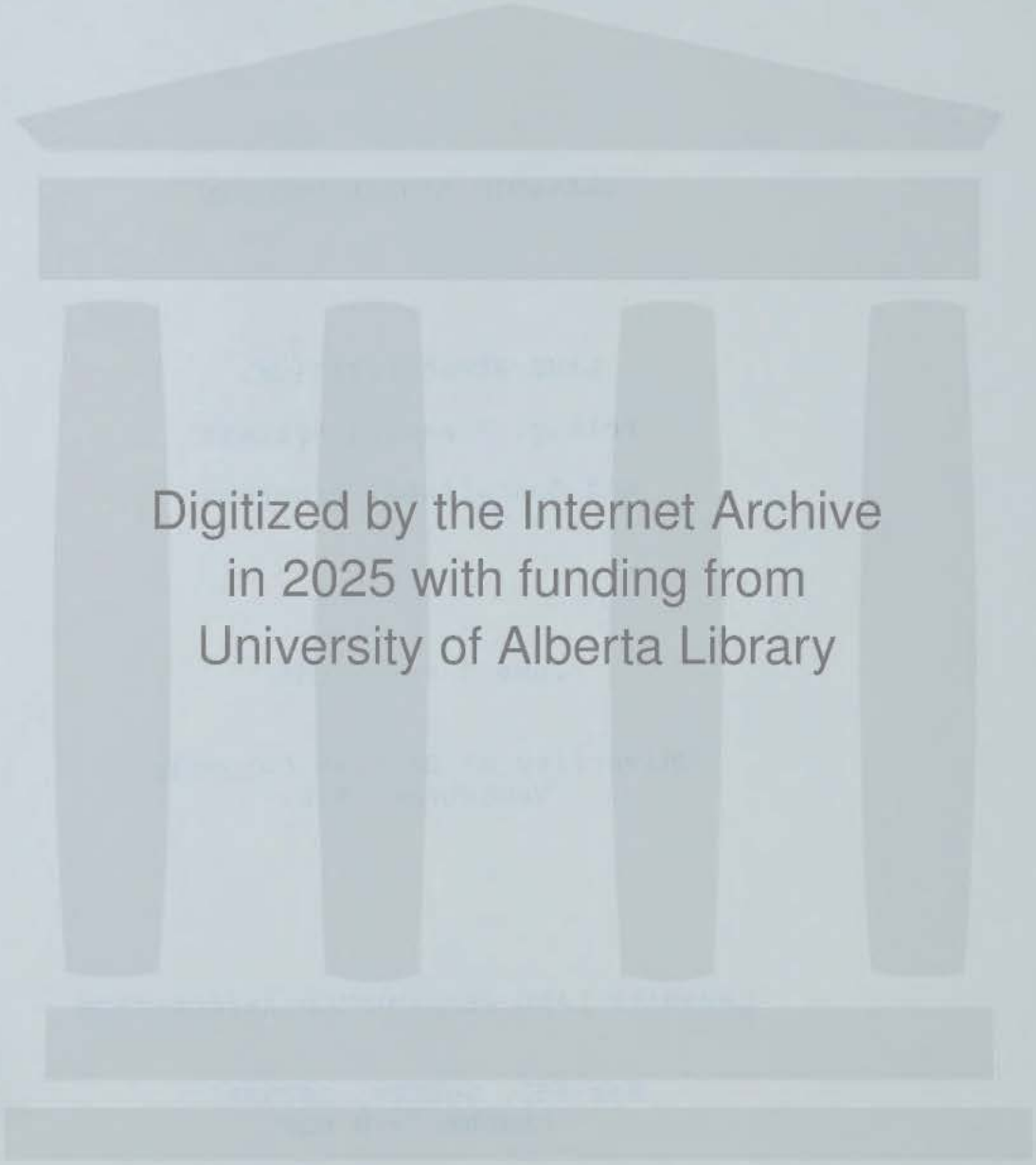

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FOREWORD

The British Columbia Chapter of the Canadian Land Reclamation Association was formed in 1985 to provide a local public forum for the exchange of information and experience in land rehabilitation. Comprised of professionals from a wide range of backgrounds and interests, this organization pulled together quickly to host the 1986 Annual Meeting. The diverse membership in the B.C. Chapter was realized in a program that expanded the scope of the conference to include many fields that have not been represented in past programs. The quality of presentations and range of topics kept audience participation at a spirited level. It is our hope that we have initiated a trend to widen the scope of the annual meetings so as to not focus on traditional mining or energy development issues.

I wish to thank all speakers and attendees for making this first formal function of the B.C. Chapter a success. The enthusiastic support of chapter members in the planning and administration of the conference demonstrated a strong desire for a quality meeting. This drive bodes well for the future of our chapter.

A great deal of effort went into the publication of the proceedings of the 1986 Annual Meeting. Care was taken to accurately reproducce all papers, however minor errors may have escaped the review process. We hope that this will not detract from the information presented by the authors.

May the CLRA and all local chapters continue to grow and function as a focal point for land rehabilitation.