



**LAND USE PLANNING FOR FOREST HARVESTING AND
ENVIRONMENTAL CONCERNS'**

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Forest Industry Lecturer

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THE FOREST INDUSTRY LECTURES

Forest industry in northwestern Canada is cooperating with Alberta Energy and Natural Resources to provide funds to enrich the Forestry Program of the Faculty of Agriculture and Forestry at the University of Alberta through sponsorship of noteworthy speakers.

The Forest Industry Lecture Series was started during the 1976-77 term as a seminar course. Desmond I. Crossley and Maxwell T. MacLaggan presented the first series of lectures. The contribution of these two noted Canadian foresters is greatly appreciated.

Subsequent speakers in the series have visited for periods of up to a week, with all visits highlighted by a major public address. It has indeed been a pleasure to host such individuals as C. Ross Silversides, W. Gerald Burch, Gustaf Siren, Kenneth F.S. King, F.L.C. Reed, Gene Namkoong, Kenneth A. Armson, John J. Munro, Peder Braathe, Vidar J. Nordin, Juhani Paivanen, Connor Boyd and Peter Rennie. The subjects of their talks are listed at the end of this paper.

This paper contains John Marlow's major public address given on 28 November 1985.

JOHN A. MARLOW



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Born in Edmonton, Alberta in 1932, he was raised in Edmonton and Vancouver. Following high school he spent several years working in the oil and petrochemical industries, and in the military. He graduated from the University of British Columbia in 1964 with a Bachelor of Science in Forestry degree.

He joined MacMillan Bloedel in 1964 upon graduating and held a number of positions including:

- Silviculturist
- Research Coordinator
- Divisional Forester
- Regional Forester
- Manager, Cypre Logging Division
- Manager, Taylor Logging Division
- Manager, Franklin River Logging Division - General Manager, Woodlands Services

We would like to take this opportunity to express our thanks again to the sponsors of this program — we appreciate very much their willing and sustained support:

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INTRODUCTION

I am here to talk about some of the technical aspects of land use planning to show how an effective land use planning team can assist the logger in his planning and everyday operations. This can be done in two ways. First by alerting the logger to specific environmental concerns or problem areas; second by recommending operating techniques that minimize or eliminate logging impacts on non-timber resources. Although the planning principles described may be applicable to other areas, I will deal with procedures we use on the coast of British Columbia. If the procedures seem overly detailed and expensive, remember the coast is an area where "non-timber resource" values are concentrated and create significant operating problems for the forest manager.

Forest harvesting and road building on the B.C. coast are technically difficult and usually expensive because of the mountainous, rocky terrain, the large timber, and the presence of "non-timber resource" values. Non-timber resources include: soils, marine and freshwater fisheries, wildlife and wildlife habitat, recreation, aesthetics and other special interest or historical sites.

Harvesting operations are further complicated by areas of unstable soils and high rainfall.

Harvesting operations must be planned correctly the first time to avoid continuing problems and a compounding of costs.

"INCREMENTS" OF LAND USE PLANNING

There are several non-timber values or "increments" that go into a total land use plan. They can be looked at separately or can be combined. Most often they are combined as they tend to be interactive. Particularly, soils/terrain and fisheries. These increments are:

soils/terrain fisheries wildlife

recreation aesthetics heritage sites

Soils/Terrain

Soils/terrain inventories are a vital part of land use planning and deal basically with terrain mapping and the assignment of stability classes to terrain. This is followed by an assessment of potential harvesting impacts on forest soils and the assessment of potential stream sedimentation from slippage of unstable soils, road building and harvesting (yarding) procedures.

Soils/terrain inventories can be conducted at two levels of intensity depending on the area and operational requirements. A reconnaissance or low-intensity inventory is used when we want a broad look at an area, usually a watershed. It is used to pinpoint problem areas that will require detailed mapping and to give some general guidance to operational planning activities. The inventory itself consists of a photo-interpretation survey of the selected area, followed by limited field checks from existing roads or from a helicopter. The survey data are mapped at a 1:50 000 scale and decisions made on areas requiring detailed inventory.

The second level is a detailed photo inventory at a scale of 1:20 000 with numerous field checks. These checks are traverses that intersect as many different **photo-identified** "terrain units" as practical. Terrain units are classified on the basis of parent material, shape of the landscape (bench, gully, slope), geomorphic processes (landslides, snow avalanches), soil moisture regime

WHY DO LAND USE PLANNING?

MacMillan-Bloedel has been asked many times why they decided to form a land use planning team. There are several very good reasons:

1. The tree farm licence with tenure system in B.C., which mixes private land and timber with government land and timber into long-term management units, places a high degree of forest management responsibility on the licensee. Protecting "non-timber resource" values is the next step in good forest management, a system which has now evolved into multiple resource management.
2. Declining fish stocks have put great pressure on fisheries agencies to protect fish habitat and in many cases they tend to be over-protective. Perhaps this is an understandable response, but one that can be extremely costly to the forest manager. Having our own fisheries biologists lets MacMillan-Bloedel do an independent determination of the fisheries values, evaluate stipulated protective measures and, possibly, recommend less costly or less restrictive alternatives.
3. More interest in wildlife habitat, particularly winter habitat for deer and elk, has also resulted in protective measures which can be costly to the forest manager. Good management demands that you know the habitat values involved and that you plan your operation with those values in mind. Otherwise you take the chance of building roads into timber that may be deferred from logging for a considerable period of time.
4. Greater interest and pressure by the general public in land use issues make it imperative that the forest manager have available as many facts as possible about the various resource values affected by harvesting. **You** never know what special interest group you may have to face in explaining your harvesting plan.
5. Essentially, it is just good business to know the problem areas and plan accordingly.

Having this team gives us the facts and a sound base from which to plan to answer questions and to evaluate restrictive measures.

Also, the team is available to carry out research in various management techniques that can help reduce blanket restrictions and tailor protective measures to site-specific requirements.

with the soils experts.

Freshwater Fisheries

To inventory freshwater fisheries values an air photo stream reconnaissance is first done to determine the stream's potential for general fish use and to identify habitat that may require a more detailed study.

A detailed inventory also uses air photos to estimate habitat quality and to locate barriers that may limit fish distribution. On the photos streams are divided into "reaches" or units of homogenous characteristics defined by gradient, substrate and channel form. Potential barriers to fish access like falls, chutes and rapids and potential spawning beds and side channel rearing areas are identified and noted.

Photo-interpretations are field checked, concentrating on those areas of significance and value such as areas potentially productive for fish, which in terms of gravel size, stream gradient, and bank stability are evaluated for spawning and rearing. The stream is then sampled for the presence of fish, and any fish found are identified by species.

A report and maps are prepared and sent to the operating division for review where areas most sensitive to road building and harvesting are highlighted and recommendations such as directional falling and/or special yarding techniques are made to minimize impacts.

In order to gain more operating flexibility we often conduct either in-house or cooperative projects with the Federal Department of Fisheries and Oceans and the B.C. Fish and Wildlife Branch into ways to improve or rehabilitate fish habitat or into ways to directly increase fish **productivity**. Some examples of these projects are rearing and release of pink and coho salmon in Haans Creek and pink salmon in Sachs Creek (Queen Charlotte Islands); projects to remove or place large organic debris in creeks and streams to improve habitat; and streamside planting trials of various deciduous tree species that do not compete with conifers.

Marine Fisheries

Involvement with marine habitat and fisheries is more limited and is normally on a site-specific basis. Most often the surveys involve sites for log dumps, dryland sorts or log booming areas and concentrate on how

and soil texture (sandy, silty, etc.) and include such features as alluvial fans, floodplains, rock outcrops, talus slopes, glacial till slopes, etc. On the basis of the terrain unit information and observed conditions we then assign stability classes to the terrain. Stability classes range from Class I to Class V, in an order of increasing instability and are detailed in Appendix I.

The field information is then used to correct the original photo-interpretations and draft 1:20 000 scale maps showing the various terrain units and the interpreted terrain stability classes. A written report is produced and both maps and reports are then reviewed with the logging division to ensure that the operating personnel are fully aware of any problems the terrain presents to harvesting. Some of the more common problems are road building and harvesting on unstable slopes, the potential for the windthrow of timber, the potential for the sedimentation of fish streams from poorly placed roads or harvest openings, and the impact of the proposed harvesting method on soil productivity.

In addition to identifying problem areas the planning team may recommend specific construction or harvesting procedures that eliminate or minimize impact. For example, erosion control can often be accomplished by the use of sedimentation basins, the outsloping of roads or by hydroseeding. Also, operations can be keyed into cost saving measures such as the location of gravel deposits, options to locate road in softer rock or the chance to reduce the amount of ballast if the road is located on drier areas where soils have higher weight-bearing strength.

In addition to detailed terrain maps, specific stability surveys called sensitive-site mapping are conducted to identify and map **highly** unstable terrain areas (Stability Classes IV and V). These surveys are used to avoid severe problem areas and for adjusting the annual cut by removal of areas that cannot be harvested by current technology.

To date, between 600 000 and 700 000 ha have been inventoried for soils and terrain in our management units.

Fisheries

Marine and freshwater fisheries are the second increment involved in producing a total land use plan. Since sedimentation and landslides present the most serious threat to fish and fish habitat, the fisheries biologists work closely

Basically, the east coast of Vancouver Island has been fully inventoried for deer and elk winter range so I will not recount the details of how the inventories were conducted. The main job now is to confirm the relative value of each habitat area and, in our case, locate and suggest other less timber-valuable areas for deferral. As part of this program we are engaged in our own and cooperative research to determine when older immature timber might become suitable for winter range and in developing silvicultural practices that can assist in providing suitable spring forage. Just recently we received a grant from the B.C. Habitat Conservation Fund to space an area of young trees adjacent to winter range in order to test this method of enhancing spring forage production and thus release other areas of mature timber for harvesting.

I

At present in MacMillan-Bloedel's four divisions on northeast Vancouver Island there are 89 separate winter ranges for deer and elk encompassing an area of 8 646 hectares, much of it containing high value mature timber. In total 300 000 ha have been inventoried for wildlife in our various management units.

Recreation

Recreation is another increment of land use, and is probably the one non-timber value most readily identified with by the general public.

The inventory system used is the B.C. Ministry of Forests' reconnaissance level inventory that identifies special recreation features and grades them on quality, uniqueness and availability, and on their suitability for various recreation activities such as sport fishing, boating and hiking.

Management classes of: 0 - high value, management for recreation; 1 - medium value, some management required; 2 - low value, no special management required, are assigned to the units which are then mapped and reviewed with the operating personnel.

Often additional analysis for visual quality is done and this can result in recommendations for operations to employ various landscape practices which preserve the aesthetic quality of the recreation feature as well as the feature itself. Also, aesthetics may be identified as a value by itself without any specific recreation feature being involved.

these uses may impact valuable marine habitat or areas suitable for mariculture or marine recreation.

Much of the time only limited marine resource data are available, so our underwater surveys identify in detail the flora and fauna present and evaluate or confirm habitat quality and pinpoint areas of high value. On the basis of the values found, recommendations are made to minimize or eliminate operational impacts. These may include suggestions such as the use of special equipment to prevent damage to habitat, a change of site for the installation (normally to deeper water) to prevent the grounding of logs and damage to delicate habitat like eelgrass, or a change in the actual design of shoreline structures that will minimize encroachment on the critical habitat.

To date 500 000 ha have been inventoried for fisheries in our forest management units.

Wildlife

The third planning increment is wildlife, or more specifically the identification of critical wildlife habitat rather than the counting of animals. Inventory work is concentrated on key wildlife species most affected by forest harvesting, such as deer and elk. This work is done in close cooperation with the B.C. Fish and Wildlife Branch, and most often involves the exchange of data, discussions on habitat requirements and decision making on which critical habitat areas are to be protected from harvesting. We are particularly interested in the size of the habitat areas and in the length of time habitat is expected to be deferred from harvest as very often large timber values involved.

Columbian blacktailed deer, a subspecies of mule deer, has habitat requirements that can be very expensive in terms of timber deferred from harvest. Their critical habitat is winter range and it is expensive because it normally requires relatively low-elevation, high-value mature timber. Ideal winter range also requires adjacent open areas for spring forage.

Roosevelt elk is the other species whose habitat can be of concern to harvesting. Even though this animal does not require as much mature timber as deer, because they winter in valley bottoms and in immature stands, the deferral of timber for their winter range is still significant.

LAND USE PLANNING

Now that I have described the "increments" of land use planning let us discuss briefly how they are used in the formal planning process for forest management. The non-timber resource data maps and reports are used to prepare three specific forest management planning documents. These are:

1. The management and working plan which is a document that is written every five years for each forest management unit (TFL, TF) and is a commitment by the licensee (company) to manage to an agreed standard. The plan outlines, along with other aspects such as cut levels, how the licensee proposes in general to protect non-timber resources.
2. The five-year development plan outlines areas planned for harvest in the next five years and deals specifically with the non-timber resources in each harvesting area. In the case of this plan, the logger will use much of the non-timber inventory data to help lay-out the roads and select areas for harvest thus avoiding, where possible, areas that contain soils sensitive to logging and areas of high non-timber values.
3. Third is the cutting permit application which covers the next two years of logging and specifies exactly how harvesting will be conducted in each of the specific openings and defines in detail the measures that will be taken to protect non-timber values.

All three of these plans are reviewed by various government agencies in varying degrees of detail. In some cases, special interest groups and the general public also enter the review process. The system is designed to ensure that all possible input on non-timber resources has been utilized and that the agreed upon protective measures are in place and will be employed in the harvesting operation. In other words, there are many checks in the system to ensure that non-timber values are not overlooked and possibly lost.

The total cost of all the environmentally related activities of inventory, special studies, plan reviews, etc., conducted by MacMillan-Bloedel over the past ten years has been close to \$5.7 million. About \$1.0 million of this was recovered from government.

To date 700 000 ha have been inventoried for recreation in our management units on the coast.

Heritage Sites

Heritage sites are the last planning increment I will deal with today. While heritage sites are not normally too affected by logging we do occasionally operate in areas where native or historic values are involved and the B.C. Heritage Conservation Branch can request that we inventory these values and report them to the Branch.

Very seldom are native artifacts as obvious as a totem pole. Most often the items of concern are beach-related features like middens and burial sites or tree-related features such as old bark stripping of cedar that was used for weaving clothing, planks split from standing trees or canoe blanks, etc.

Areas that contain significant historic native activity are usually easy to identify and are routinely reported to the Heritage Conservation Branch.

Occasionally an area, like Meares Island, may require a full inventory of heritage sites. In this case inventory transects were run from the beach to the property boundary and the features found were recorded by location, frequency and age.

This concludes the inventory portion of my talk. It is worthwhile to note that since 1975 we have inventoried, for all increments, nearly 1.5 million hectares (includes overlap) of forest land. Total cost for these inventories was close to \$1.0 million dollars. MacMillan-Bloedel paid approximately 45 percent of this cost, while government, usually the B.C. Ministry of Forests, paid the remainder.

CONCLUSIONS

I certainly do not wish to finish on a "down" note. There have been some really significant gains in improving the land use planning process over the past few years. Exposure to our inventory work has made harvesting personnel very familiar with non-timber resource values and they have responded by devising many operating procedures that minimize or eliminate the impact of harvesting on non-timber resources. Government agencies have got used to the idea of industry employing their own experts in the non-timber resource fields and where in the beginning they were very suspicious of our motives they have come to recognize the professionalism of our staff and the interaction between us is now much more positive and productive. The real key to an effective land-use planning process is good non-timber resource data and more, good data are available with each passing year. Also, I think that we have all come a little closer to appreciating the other fellow's point of view or in any case we realize that he and the public will not just go away.

PROBLEMS WITH LAND USE PLANNING

If at this point you think the system outlined works perfectly - I have misled you. The system does a fairly effective job of protecting non-timber values but it is extremely inefficient and expensive both for government(s) and industry. I have heard it labeled "adversarial management" and perhaps that is an apt description for the process. Very seldom is there instant agreement on values between government ministries, let alone between ministries and industry. Perhaps this is understandable when you realize that each agency has its own objective and that "objective" rarely coincides with the objectives of the other user(s). In other words, most users are single resource oriented. In addition to government and industry there are special interest groups and the general public who may have even different ideas about how the various values should be protected or preserved and often their opinions are based or "created" on emotion rather than fact.

Probably the greatest flaw in the process is that there is no overall planning authority that can assess these conflicting interests by cost:benefit analysis or other criteria and reach a timely and economically sound decision. In most cases the process is far too slow, which is extremely costly, or it can end in legal battles where only the lawyers benefit.

Another complication to the efficient solving of forest land use problems is that the general public is rarely given the information necessary to really understand the issue at stake. In spite of the forest industry's size and importance it does not do an adequate job of telling the real story about forest land management. All the public usually gets is media opinion or coverage concentrating on dramatic side issues which are nearly always misleading.

Minor slumping is expected along road cuts on roads crossing areas with slopes greater than 30°, especially for one to two years following construction.

Stability Class IV

Expected to contain areas where there is a moderate to high likelihood of slope failures following road construction. Wet period construction will significantly increase the potential for failures. Terrain failures can occur if sidecasting is allowed on units exhibiting significant soil creep.

- There is a low to moderate likelihood of failure in clearcut areas.

A field inspection of these zones should be made by a soils specialist prior to any proposed development in order to assess in detail the stability of the affected area.

Stability Class IVc

- There is a low to moderate likelihood of failure in clearcut areas.

Road failures are unlikely.

A field inspection of these areas should be made by a soils specialist prior to any proposed development in order to assess, in detail, the stability of the affected area.

Stability Class V

There is a moderate to high likelihood that slope failures will follow conventional clearcutting or road construction.

APPENDIX I

TERRAIN STABILITY CLASSES

1.0 INTRODUCTION

Terrain stability classes are derived from data on surficial material, landform, geomorphic process, slope angle, texture, length of slope, soil moisture regime, landscape position, vegetation and bedrock properties. Based on the relative importance of each of these factors, stability classes are assigned.

2.0 TERRAIN STABILITY CLASSES Stability Class I

— No significant stability problems exist. Stability Class II

— No significant stability problems exist.

Normal road construction and logging practices will not significantly decrease the terrain stability.

Periodic maintenance involving ditch cleaning is expected due to sloughing along road cuts.

Stability Class III

— Minor stability problems can develop.

Clearcutting should not significantly reduce the terrain stability; there is a low likelihood of post-logging failure.

5.0 CUTTING PERMITS

— fully engineered

identifies specific road locations

identifies cutting boundaries

specifies how operations will be conducted to protect non-timber resources

A field inspection of these zones should be made by a soils specialist prior to any proposed development in order to assess in detail the stability of the affected area.

3.0 MANAGEMENT AND WORKING PLANS

- management objectives and strategies

rate of harvest (AAC)

forest protection

silvicultural practices

research

protection of non-timber resources

contracting practices

4.0 FIVE-YEAR DEVELOPMENT PLANS

- areas planned for harvest in the next five years

detailed engineering for years 1 and 2

projections for years 3 through 5

potential problems with non-timber resources

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