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Forest Management Outputs: Who Needs Them and Why?

G. H. MANNING (EDITOR)



Proceedings of a Technical Session of the Working Groups on Economics and Policy, Forest Management, and Land Use Planning, 1 October 1979, at the Annual Meeting of the Canadian Institute of Forestry, Jasper Park Lodge, Alberta.

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PREFACE

The 1979 Annual Meeting of the Canadian Institute of Forestry, held October 1-4 in Jasper, Alberta, had as its theme: "Forest Land Management Options in Perspective." As a part of this meeting, the Economics and Policy, Land Use Planning and Forest Management Working Groups held a joint technical session called "Forest Management Outputs -- Who Needs Them and Why?" Fortuitously, this session immediately followed the keynote address, by Dr. K. King, Director General of the International Centre for Research in Agro-Forestry, Nairobi, Kenya, and re-emphasized some of the basic factors such as complexity, uncertainty, choice and accountability, which were to be considered later in the plenary sessions and discussion groups during the remainder of the meeting.

Because the question of multiple-use or, as it is more fashionably known at present, integrated resource management, is of growing concern throughout the Region and the country, the Pacific Forest Research Centre is issuing a proceedings of this technical session. The aim of this proceedings is the same as that of the technical session itself, to make Canadians more aware of the problems and possibilities of integrated resource management.

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RÉSUMÉ

La réunion annuelle 1979 de l'Institut Canadien de Foresterie, tenue à Jasper (Alberta) 1^{er} au 4 Octobre avait comme thème: "Choix de gestion des terres forestières en perspective." Une partie de cette réunion, soit les groupes de travail des Politiques et de l'Economie, la Planification de l'utilisation des terres et la Gestion des forêts, a tenu une séance technique conjointe, nommée: "Extrants de la gestion forestière -- pour qui et pourquoi?" Fortuitement, cette séance suivait immédiatement la présentation - clé donnée par M. K. King, Directeur général du Centre International pour le Recherche Agro-forestière, Nairobi, Kenya, et a remis en relief certains facteurs de base comme la complexité, l'incertitude, le choix et la dépendance qui devaient être plus tard étudiés en séance plénière et en groupes de discussions pendant le reste de la réunion.

Vu que la question d'usage multiple, ou comme on dit maintenant - gestion intégrée des ressources - prend plus d'importance dans toute la Région et partout au pays, le Centre de recherches forestières du Pacifique publie un compte rendu de cette séance technique. Son but est le même que celui de la session elle-même, faire mieux connaître aux Canadiens les problèmes et les possibilités de la gestion intégrée des ressources.

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WORLD WOOD AND PAPER PERSPECTIVES

Paul H. Jones

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Abstract

There is a tendency for forecasts of growth to be high in "good" times and low in "bad" times. In either case, forecasts have usually understated growth of demand. Foresters should look beyond forecasts based on present economic conditions to ascertain the impacts of future demands on the forest resource.

Résumé

Il existe une tendance à prédire que la croissance sera élevée lors de "bonnes" années et faible lors de "mauvaises" années. Dans les deux cas, les prévisions ont habituellement sous-estimé l'ampleur de la demande. Il serait bon que les forestiers voient au-delà des prédictions fondées sur les conditions économiques actuelles pour s'assurer des effets des demandes futures sur les ressources forestières.

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Thank you for inviting me to speak to you today about the market outlook for forest products and about long-term forecasts. Those who have had anything to do with making or analyzing forecasts, short term or long term, of market and market prospects know that the slope of the consumption curve is usually much steeper when it is made during good times and much flatter when it is made during periods of recession. There seems to be a very strong human tendency for expectations to parallel present conditions and circumstances.

What I am trying to suggest is that pre-1974 forecasts of demand for most industrial products, including wood and paper products, were much higher than those being made today, in post-oil crisis times. The western world has not recovered from the "oil" shock, and its consumption of raw materials - and oil - on a per capita basis has declined. All forecasters, be they UN agencies, academics, consultants and now the new breed of forecasters, industry itself, are being less optimistic about the rates of growth that can be expected in wood and paper consumption in the future.

The "Great Alberta Timber Auction" of 1979 is a good example of what is happening in the marketplace for standing trees. Seventeen companies responded to an invitation to submit proposals for the Berland-Fox Creek timber, whose western and southern edges lie only 110 kilometers from Jasper. It is probably the best remaining uncommitted timber area in the world.

Let us look briefly at what companies said they would do with the 1.4 million hectare tract with an annual allowable cut of 1.3 million cubic metres. Remember this reflects what will be, according to each company, needed by the market a few years down the road.

Seven proposals include plans to build one or two sawmills to use the coniferous resources of the area.

Two, in addition to sawmills, propose large bleached kraft pulp mills. One proposes a TMP/newsprint mill. Another proposes a light weight coated paper mill.

One proposes a log house plant; others proposed, in addition to sawmills, veneer and or plywood facilities.

At the present time there is considerable speculation as to which company will be the successful applicant. My information is that a decision may not be made until December. Clearly, the Government has a difficult task. The principal decision-making criteria it is using, as you will appreciate, include total level of investment, value added, level of resource utilization, employment generation, the extent of Canadian ownership and date of commencement of construction and mill start-up.

Naturally, the Government of Alberta will be looking also at the social, environmental and wildlife impacts of all the major proposals.

From a market standpoint we can conclude

from this that the prospects for Canadian exports of kraft pulp, newsprint and lumber are good and that there are other obvious domestic market outlets for light weight coated papers and veneer and plywood.

Next, let us turn to the question of the agencies and how their track records have been in the past. The UN Food and Agriculture Organization, the Stanford Research Institute and the U.S. Forest Service are perhaps the world's pre-eminent forecasters. The earliest Canadian forecasts were made by the Royal Commission for Canada's Economic Prospects in 1957 (Davis *et al.* 1957). Interestingly, the inter-war years were punctuated with experts forecasting imminent timber famines in the U.S. and Canada. In other words, in prewar years, no agency was concerning itself with serious forecasts of demand since information on inventories and output prospects was so poor.

The U.S. Forest Service expected Canada to supply one billion board feet of lumber to the United States in 1975. That year Canada actually supplied nearly six times that volume. In fact, in 1977 Canada supplied more than ten times that volume.

In the past 5 years significant forecasts of forest products prospects in world markets have been made by FAO, the Industry Working Party in co-operation with FAO (UN, FAO 1976), our own Company's forecasts for Ottawa's Industry Trade & Commerce Department (Jones 1974), a forecast by Jaakko Poyry (1975) and, more recently, a new version of the report of the Industry Working Party sponsored by the FAO Advisory Committee of Experts on Pulp and Paper (UN, FAO 1977). Our company is presently doing an update of our study for Industry, Trade and Commerce.

Some of you may have been at the March 1975 CPPA Woodlands Meeting, where I presented our views on the outlook for wood and paper products to 1990. I said at that time that the challenge facing world foresters was to provide the 45 billion cubic feet (1.27 billion cubic metres) which was needed to meet demands between 1975 and 1990, since wood fibre requirements for industrial wood and fuel would climb by that amount in that period. The energy crisis has speeded up the need for fuelwood, especially in developing countries, and slowed the demand for industrial wood, mainly in developed countries. Instead of average annual rates of increase for pulpwood and wood residues for pulping of close

to 5%, we are now looking at rates of around 3% between 1980 and 2000. For saw timber, the rates are relatively unchanged near the 1% to 1.8% range. For panel products, the expected rates of increase per year are between 2.5 and 3.5% per year compounded. This translates into a rate of increase in demand for all industrial wood between 1980 and 2000 of about 1.7 - 2.0% per year.

Fuelwood, on the other hand, which accounts for about 46% of all world forest removals, is growing at a rate of nearly 3% per year - a rate which I consider could result in the very rapid expansion of desert areas and serious famines or other food-population pressures.

One of the most critical points appears to be the rate at which we are approaching the upper limit of world forest growth which, according to FAO, is in the vicinity of 2.7 billion cubic metres, when the demands for industrial wood and fuelwood by the year 2000 will exceed 4 billion cubic metres.

All this suggests that we have to free ourselves for the forestry tasks we face not only in Canada but overseas as well. Certainly, we may expect that the demands for Canadian timber and pulp and paper will be strong in the future.

There is one additional demand I feel I have not adequately covered to this point. This is the potential energy contained in the residues we leave in the forest. When we log an area we may leave behind one third of the forest biomass.

Our Company has just completed a study for the Dept. of Environment of the energy generation prospects from Vancouver Island logging residues (Paul H. Jones & Associates, Ltd., 1979). We found a residue volume generated on the Island of about 4.8 million cubic metres per year. This is enough wood to support additional pulp and paper mills or at least three 60 MW electrical energy generation plants on the Island at costs only marginally higher than costs of producing electricity from coal.

Alberta's huge hardwood reserves may, in fact, be able to contribute in this area. Demands for wood to manufacture food products and from which we could derive silvichemicals should also be included in this general discussion.

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WILDLIFE: MANAGEABLE RESOURCE OR ENVIRONMENTAL ABSOLUTE?

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Abstract

This paper discusses the recent trend to consider wildlife as a component of the natural environment rather than as a distinct resource. The result has given a broader base of support for wildlife protection which draws upon individuals who have a general concern over environmental quality. While this elevated status of wildlife is probably long overdue, the new movement introduces some difficult problems for resource managers. The first and most obvious is the change in priorities among various resource uses. Although this may be unpalatable to some user sectors, it does not impose an obstacle to planning. The goals may have changed but the principles should remain the same. A more serious problem arises from the loss of focus or purpose for wildlife management. It once was possible to ask the question, "Wildlife, who needs it?" and "Why?" and get definitive answers from hunters and naturalists whose needs could be incorporated through integrated resource management. Now the answer is tied in large part to a rather vaguely defined concept of environmental quality.

As managers, we are now faced with a dilemma. On the one hand, basic principles tell us to seek optimum solutions which apply sound manage-

ment techniques to yield the highest level of public benefit. On the other, the wildlife resource is now perceived by many to be an indicator which reflects environment abuse, thereby making any trade-off synonymous with improper resource use. It is not a situation that lends itself to objective resource management.

(The full text of Dr. Addison's paper was not available, hence only the abstract is reproduced here.)

Résumé

Dans cet article, l'auteur discute d'une tendance récente à considérer la faune comme partie de l'environnement naturel plutôt qu'une ressource distincte, avec le résultat qu'un plus vaste appui a été donné à la protection de la faune par les gens qui se préoccupent généralement de la qualité de l'environnement. Alors que ce statut élevé de la faune s'est probablement fait attendre très longtemps, le nouveau mouvement présente certains problèmes difficiles aux gestionnaires des ressources. Le premier et le plus évident constitue le changement de priorités parmi les utilisations diverses des ressources. Bien que cela soit désagréable à certains secteurs d'utilisateurs, ce n'est pas un obstacle à la planification. Les buts ont

peut-être changé mais les principes demeurent. La divergence de vue ou l'objectif de la gestion de la faune représentent un problème bien plus sérieux. Il était jadis possible de demander: "Qui a besoin de la faune?" et "Pourquoi?" et d'obtenir des réponses certaines de la part des chasseurs et des naturalistes dont les besoins pouvaient s'intégrer à la gestion des ressources. Aujourd'hui, la réponse se rattache en grande partie à un concept de qualité de l'environnement plutôt vaguement défini.

En tant que gestionnaires, nous sommes en face d'un dilemme. D'une part, les principes de base nous dictent la recherche de solutions optimales qui appliquent de solides techniques de gestion dans le meilleur intérêt du public. D'autre part, la faune est une ressource que plusieurs perçoivent aujourd'hui comme un indicateur reflétant les abus de l'environnement, ce qui rend tout changement synonyme d'utilisation incorrecte de cette ressource. Voilà une situation qui ne se prête pas à une gestion objective des ressources.

RECREATION AS A FOREST PRODUCT: THE DEMAND, THE MARKET AND FUTURE RESOURCE CONFLICTS

Scott Meis

(Revised from a presentation to the Economics and Policy Working Group Session: Forest Management Outputs - Who Needs Them and Why? Seventy-First Annual Meeting of the Canadian Institute of Forestry, Jasper, Alberta, September 30 - October 4, 1979.)

Abstract

The purpose of this paper is to present, as a basis for discussion, an overview of recreation as a forest product. This overview includes discussions of the nature of the product, its recipients, current and future trends and likely conflicts with other land uses of forested areas. The paper proposes that while recreation is a forestry product, it poses unique management problems. Recreation is harder to define and less well understood than other forestry products. Problems emerging from past and present changes in the demands for recreation activities and opportunities are forcing resource managers to search beyond such tangible recreation products as recreation facilities, services or activities, to understand such intangible products as the multiple experiences and benefits derived by the recreationist. Current thinking and knowledge on the nature of these recreational experiences and benefits are examined. Existing evidence indicates two dimensions of complexity. First, the same activity generates multiple experiences and benefits that vary across different groups of participants. Second, recent evidence indicates that the demands for forestry recreation experiences and benefits are becoming more diversified and more specialized.

The paper also proposes that the emerging knowledge about the demand for and nature of forest recreation highlights special problems for its management as a recreation resource. One problem is that present and future patterns of recreation use of forest areas conflict with previous developments or uses of the resources. In some cases, such contradictions produce either degradation of the resource or the recreation experience. In other cases, such contradictions lead to under-utilization of the resource. A second problem is the resolution of conflicting demands for competing recreational and non-recreational uses of the resource. Conflicting recreational demands plus four non-recreation demands - timber, mining, hydro and urbanization - are seen as particularly problematic. The nature of these conflicts and some emerging means of managing or avoiding them are reviewed briefly.

Résumé

Le but du présent article est de présenter comme base de discussion un aperçu des loisirs en tant que produit de la forêt. Cet aperçu comprend des discussions sur la nature du produit, ses bénéficiaires, ses tendances actuelles et futures et ses conflits éven-

tuels avec les autres utilisations des régions boisées.

L'auteur exprime l'avis à savoir que tout en étant un produit forestier, les loisirs posent des problèmes de gestion d'un genre unique. Les loisirs représentent un produit forestier difficile à définir et moins bien compris que les autres produits forestiers. Les problèmes engendrés par les changements passés et actuels quant aux exigences des activités et possibilités récréatives obligent les gestionnaires des ressources à chercher au-delà des produits tangibles de loisirs tels les installations récréatives, les services ou activités, pour comprendre le fait de produits aussi intangibles que les multiples expériences et avantages que les plaisanciers tirent de la forêt. L'auteur étudie la façon de penser et les connaissances actuelles reliées à la nature de ces expériences et bénéfices tirés des loisirs. Deux dimensions de complexité s'avèrent évidentes. D'abord, la même activité donne lieu à des expériences et avantages qui varient selon les divers groupes de participants. Ensuite, il est évident que la demande de loisirs en forêt devient plus diversifiée et donc plus spécialisée.

L'auteur avance aussi que la connaissance émergeant de la demande de loisirs de divers types en forêt met en relief des problèmes particuliers envers les gestionnaires des loisirs. L'un des problèmes réside dans le fait que les modes actuels et futurs de récréation en forêt sont en conflit avec les développements et usages antérieurs des ressources. Dans certains cas, pareilles contradictions sont une source de dégradation de la ressource ou de l'expérience des loisirs. Dans d'autres, ces contradictions conduisent à une sous-utilisation de la ressource. La demande pour les loisirs, qui entre en conflit avec quatre autres demandes hors-loisirs, soit l'exploitation, les mines, l'hydro et l'urbanisation, est considérée particulièrement problématique. L'auteur passe brièvement en revue la nature de ces conflits et quelques moyens pratiques pour les maîtriser ou les éviter.

Introduction

The purpose of these remarks is to present, for this discussion of conflicts between uses of the forest resource, a brief overview of recreation as a forest product. This overview includes discussions of the nature of recreational demands on the forest resource, some relevant current patterns and future trends in those demands and some implications for other service and industrial land uses of forested areas.

Definition of Recreation Demand

As a starting point, some delineation of what we mean by forest recreation activities is warranted. At its most basic level, modern recreation activity is characterized by flows of people moving from their residences to non-residential environments and locations to engage in non-work and non-sustenance activities; in other words, leisure, play and recreation. When we add the forest recreation qualifier, we simply indicate that we are speaking of those flows directed to forested areas.

This kind of forestry use is different from others being discussed today because it emphasizes the social service value of the forest resource rather than their economic uses as potential objective products, such as sawlogs or pulpwood.

One consequence of this difference in the service nature of forest recreation is that it is difficult to describe the demand for the resource in terms of simple conventional economics. Demand in this context is a technical term that refers to the quantity of recreation that would be consumed at different price levels. In practice, however, this is impossible. The concept of recreation is non-unitary. The activity is complex and segmented. Its meaning shifts, depending on the context, and it is open to many different interpretations.

Nevertheless, as a comprehensive term, recreation demand commonly has three distinct facets:

Actual use or participation, which is the visible component of the demand.

Latent or deferred demand, which covers preferences for participation that are not converted into use for various reasons.

Potential demand, which refers to the use which can be expected at some future date on the basis of projection.

Each of these elements needs to be examined if the nature of recreational demand for national and provincial forests and its implications are to be realistically assessed. Given the difficulties inherent in dealing with the second and third facets, however, most studies and analyses simply equate demand with actual use or participation.

Even then, when we are talking of rates of

participation in an aggregate recreation phenomena such as recreational use of Canadian forests, estimates of participation or use are problematic because of the scarcity of specific data on the subject. Few major studies have investigated present patterns of forestry use in and of itself; virtually none, that I know of, have examined future recreation use of forested areas in general. At best, the information available on recreation uses of forested areas is piece-meal. More often than not, inferences must be made from data gathered at different levels of aggregation. These are usually too high, such as in the case of aggregate rates of participation in outdoor recreation activities, or too low, such as in the case of information on the use of specific sites or specific agencies. As a result, it is difficult to interpret with any real certainty, the material available on forestry related recreation.

Patterns of Recreation Use of Forests

Notwithstanding the problems noted above, sufficient information is available, from the numerous studies conducted in Canada and the United States in the past two decades, to clearly establish the general patterns in forest recreation in North America. A review of the existing research yields four such patterns that are relevant to a discussion of the likelihood of future conflicts between recreational and non-recreational uses of the forest: growth, concentration, diversification and specialization.

Growth in Aggregate Recreation Demand

The overall impression gained from the study of forestry related outdoor recreation activities and facilities throughout the 1960s and 70s has been one of growth. While no precise estimate of the growth in overall forestry use is available, approximations indicate that over the last decade, the combined effect of an increasing supply of facilities and a rising demand for recreational opportunities have led to an overall increase in outdoor recreational activity in general of about 7% annually. This figure might not sound high, but it means a doubling in attendance every 10 years (Nuttall 1976: 67). Needless to say, this general growth and use of outdoor recreational facilities has been spread over all types of parks, forests and other facilities from local to national levels of significance.

The growth trend may be traced through many other indicators: the increased construction of recreation facilities; the increased designation of

forested areas for recreational activities; the rising sales of fishing tackle, skis, outboard motors, mobile homes, recreational vehicles and snowmobiles and, above all, the rising number of visits made to national and provincial parks and forests. These latter growth trends in particular are illustrated in the curves and statistics for park attendance shown in Figure 1 and Table 1.

While there have been some regional variations, mass demand began in the 60s. Its course appears to have been marked by a fairly steep initial rate of growth throughout the 60s and into the early 70s. Throughout this period, the annual rate of growth in visits to the national parks has been about 6.9%, while visits to provincial parks have shown a comparable annual increase of about 6.7% (Nuttall 1976: 67).

What can these historic trends tell us about the future? Realistically, not too much. The art of projecting future demands for outdoor recreation is fraught with a multitude of difficulties. Firstly, the concepts underlying the historical statistics are not clearly understood. Secondly, the statistical basis upon which future projections may be made is meager. Finally, unforeseen factors have arisen in recent years (such as high energy prices and spiraling inflation) that are likely to alter the pace of recreational participation in the future.

Nonetheless, resource planners and managers need some projections to work with. Table 1, for example, shows high, medium and low level projections of park attendance given three different sets of underlying assumptions. Projections of park visits vary greatly. Projections of nearly 41 million visits by Canadians to national parks by the year 1986 or about 1.5 visits for each person in the Canadian population, and about 100 million visits to provincial parks or about 3.6 visits per capita are examples of high estimates. The low estimates, on the other hand, are in the order of 22 million visits to the national parks and 56 million visits to provincial parks (Nuttall 1976: 68).

In general, current research seems to indicate that low growth estimates are the most likely for national aggregate indicators of recreation activity. For example, the growth rates in national and provincial park attendance show a deceleration or tapering off of growth since 1975 (Canada, Parks Canada 1979). Furthermore, the national figures mark absolute declines in participation in some

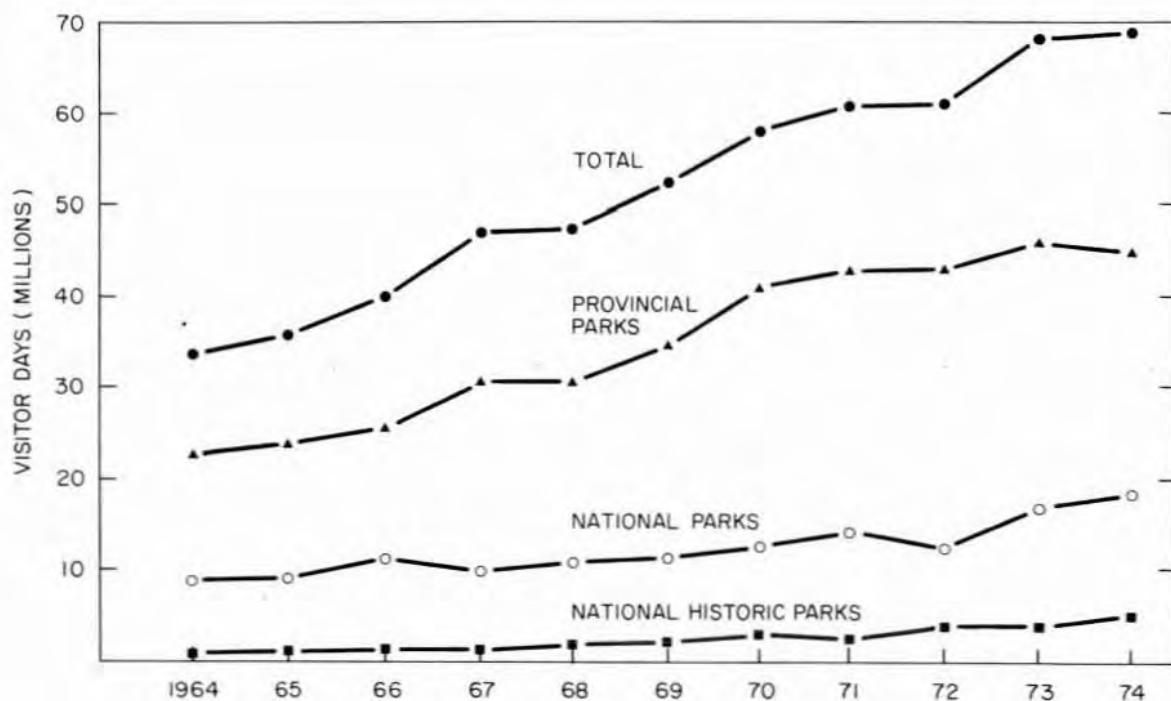


Figure 1. Visitor Days, Provincial Parks, National Parks, National Historic Sites
1964-1974

Source:

Park and Recreation Futures in Canada: Issues and Options, 1976, p. 66.

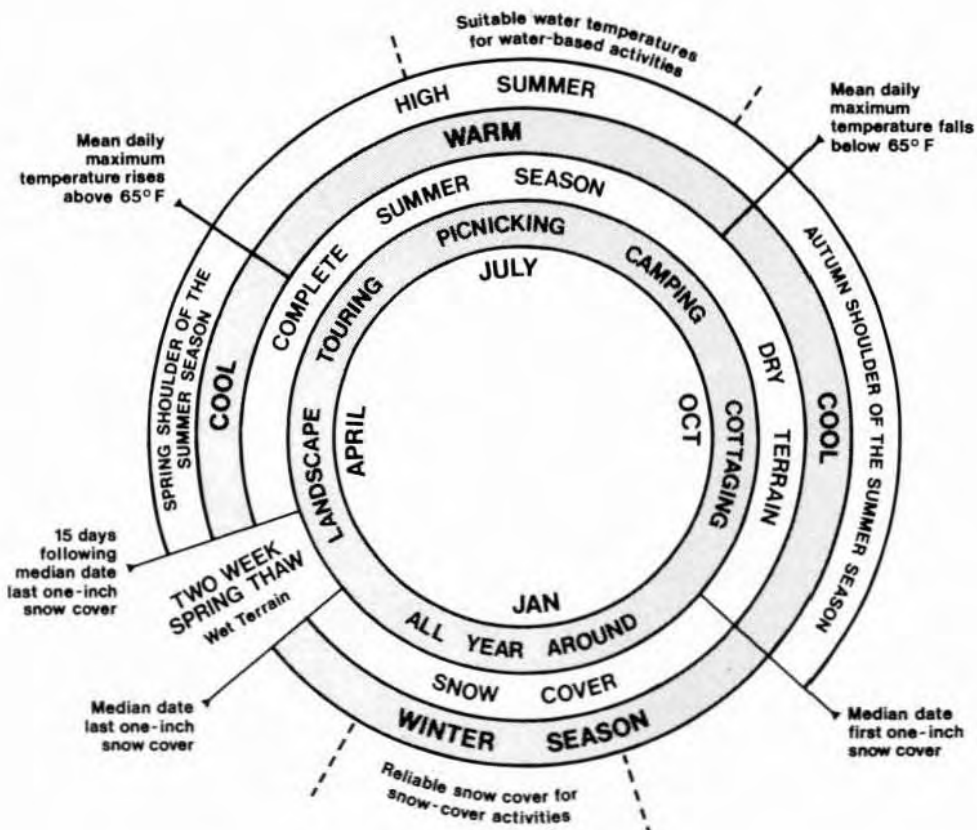


Figure 2. Seasonal Recreation Patterns at Any Typical Ontario Location

Source:

R. B. Crowe, The Recreational Climate of Ontario in Recreational Land Use in Southern Ontario, edited by G. Wall, 1979, p. 22.

specific parks and regions. Thus, these recent changes in the pattern of growth in park related recreation activities seem to indicate that the future growth in forest related recreation should taper off to a level equivalent to the average annual increase in the general population.

Concentration in the Forms of Forest Recreation Activity

Traditionally, forest recreation was centered around the three relatively broad activities of camping, hunting and fishing. Tables 2, 3 and 4 show the relative national rates of participation in camping and those other activities particularly relevant to the national parks mandate. They illustrate the fact that at present recreation demand is still concentrated in the five most popular outdoor recreation activities at the national level: driving for pleasure, picnics and cook-outs, walking or hiking for pleasure, sight-seeing from vehicles and swimming. In interpreting these national participation figures, however, one must always keep in mind that, in Canada, there is also considerable regional variation in these participation rates. Camping, hunting and fishing, in particular, are much more popular in the less urban regions of the country.

Concentration in the Timing of Forest Recreation Activities

Forest recreation activities are also subject to recurring and well-known temporal concentration patterns. The strong seasonal, daily and hourly fluctuations which occur are not only considerable in their own right, but compound each other in a cumulative way. At certain periods and places, very high levels of use are recorded; at other times and locations, it remains light or non-existent. The broad seasonal pattern of recreation use which is observable through most of Canada is illustrated in Figures 2 and 3 dealing with the case of Ontario. Even though the particular recreation seasonal pattern shown in Figures 2 and 3 was developed for southern Ontario, this seasonal framework has general applicability for recreational studies throughout most of Canada. Thus, the timing of each particular recreation activity is characterized by a successive set of recurring peaks in which the round of seasons is the fundamental factor. Most visits are crowded into the summer months and use decreases significantly in other seasons.

This seasonal concentration of forest recreation activity has been illustrated in one particular study of the recreation time budget of informal visitors to the Canmore Corridor area of Alberta. From a summer high, the frequency of visitors declines from about one-third in the fall to reach a winter low when use levels are down by 250% compared to the park season. The resurgence of activity takes place in the spring, although this is still roughly below the level reached in the fall (Crowe 1979: 21).

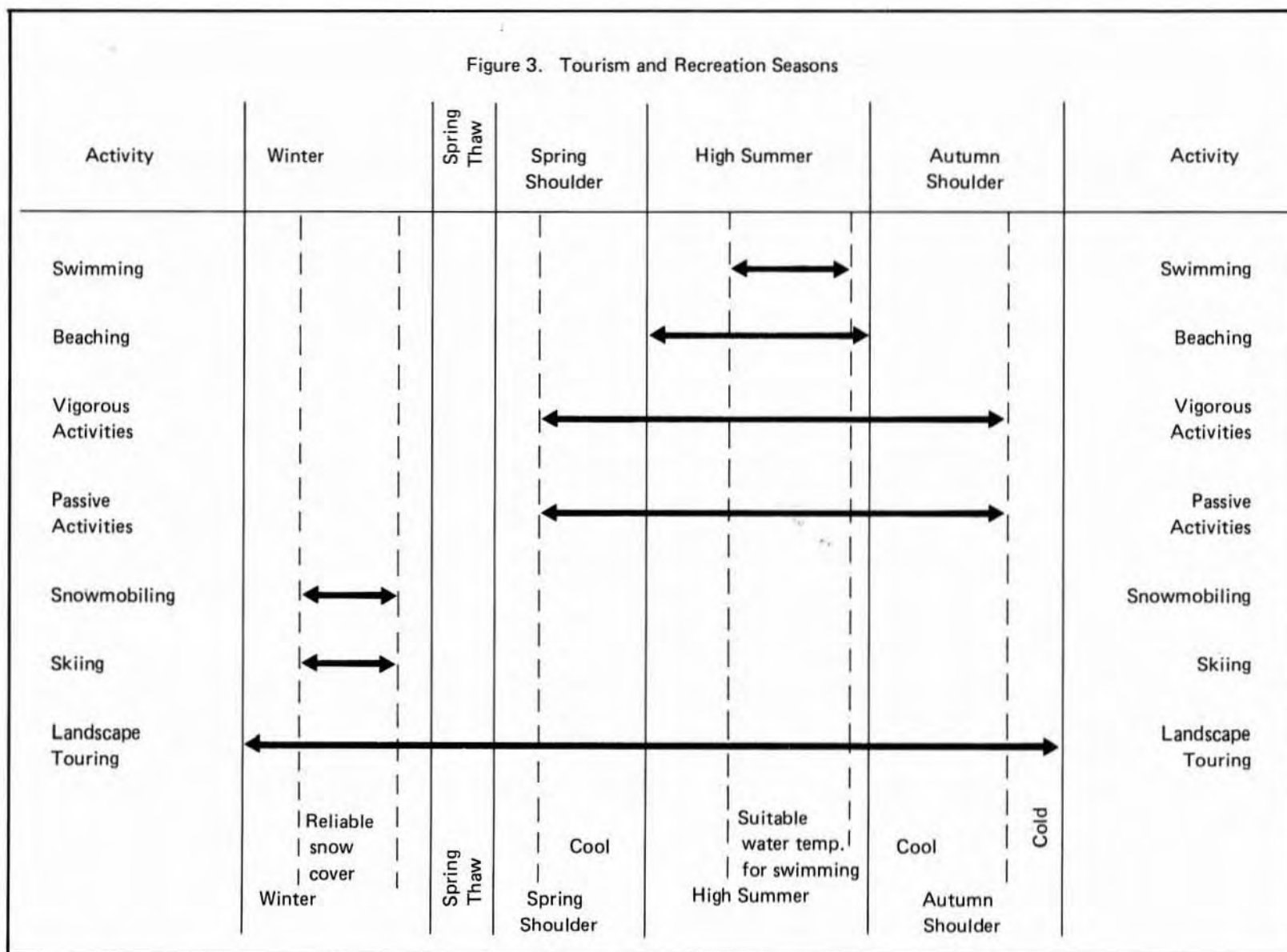
Within this cyclical framework, regular monthly fluctuations in activity occur. A typical graph of recreation use will also show sharp weekend peaks, which become especially evident on holiday weekends (Sadler 1978: 24). Finally, there is an often overlooked but visible concentration of use during certain hours of the day.

Concentration in the Location of Forest Recreation Activities

Forest recreation activity is also unevenly distributed in space. On a general scale, use levels are related to distance from the main population centers, and are light and localized in northern forests and more dense and generalized in southern forests closer to the large population centers. On a finer scale, recreation use is concentrated around access routes and focussed on facilities and services within a given forest. For example, although the Boundary Waters Canoe Area (BWCA) receives more visitors than any other designated wilderness area in the United States, about 70% of its use is funnelled through only seven of the area's seventy entry points, and a full third of its visitors entered through two of the seventy entry points (Lime 1976: 4).

Market Diversification in Forest Recreation Activities

In the last decade, since people have become more familiar with recreation as a mass experience, there has also been a trend toward market diversification (Campbell 1976: 84). Research has shown that as people become exposed to new recreational possibilities, as demonstrated most vigorously in the mass media, they select more diverse and specialized forms of recreational activities in which to participate. Tables 3 and 4 contain figures illustrating these



Source:

R. B. Crowe, The Recreational Climate of Ontario, in Recreational Land Use in Southern Ontario, edited by G. Wall, 1979, p. 21.

trends. In recent years, participation in such activities as skiing, snowmobiling, photography, nature study and cross-country skiing has become more widespread. The case of cross-country skiing is particularly noteworthy. The high expected growth rate in cross-country skiing of 12% per annum shown in Table 4, would eventually result in a major change in a past pattern of use of our forested areas to include extensive and substantial dispersed winter use.

Specialization in Forest Recreation Activities

In addition to overall market diversification, it has been demonstrated that a recreational cycle exists such that as people participate in a particular activity, they progress through different stages of activity specialization. First the activity becomes an established behavior. Then the recreationist becomes competent in the activity. At this stage, the recreationist attempts to validate that competence with increased participation and attention to the number of successes obtained and, later, by seeking out recreational settings providing greater and greater challenges. Finally, after mastering the general form of the activity, the recreationist becomes susceptible to adjunct types of specialization with the general activity (Hobson 1979: 45).

Thus, the outdoor recreation market is becoming more and more characterized by a large number of specialized market segments. This is particularly important for management because as people become more specialized they set more and more demanding criteria for what they consider to be a successful recreational experience. It thus becomes increasingly difficult for the supplier to provide an adequate recreational environment for that experience.

As an illustration of this tendency, think for a moment of the case of camping. In the 1930s, 40s and early 50s, camping was a largely undifferentiated activity that was mainly provided to afford access to a park-related natural experience. However, with the development of the activity throughout the 60s and 70s, it has become differentiated into a number of diverse specialized experiences which different groups are seeking.

1. The group/organization campground experience.
2. The sports-skill development, campground experience.
3. The campground resort experience.

4. The environmental backpacking camping experience.
5. The highway-overnight rest stop camping experience.
6. The winter recreation camping experience.
7. The senior citizen, shoulder season, camper vehicle, camping experience.
8. The urban vacation, cheap accommodation camping experience.
9. The fishing campground experience.

Although it is not possible to identify the growth and decline in each of these sub-markets, data available in B.C. and the United States provide some verification of the movement away from tenting to more comfortable, more mobile, forms of camping equipment (Campbell 1976: 84).

When camping was simple and undifferentiated, people chose their experience quite happily from a small array of standard offerings and there was relatively little risk involved in the investment and provision of such recreational environments over time and space. However, with the highly segmented market of today with geographical differences in the rate of specialization, the campground manager's problem of matching facilities to the markets becomes particularly difficult and uncertain. Furthermore, the camper has now developed a very specified set of conditions that must be met to achieve full satisfaction of his recreation experience. With his heightened sensitivity and specialized taste, the camping recreationist has become increasingly difficult to please, and it becomes increasingly likely his values will be in conflict with other types of campers or with other users of the same resource.

Anticipated Conflicts and Their Mitigation

At this point in the paper, I was asked for my comments on some impending conflicts that I see as emerging between recreation activities and other uses of the forest resource. What followed from my first attempt at addressing this issue was a list of very specific site conflicts. Generally, these conflicts arose from the interaction of the four predominant patterns described above; that is, the relative concentration of recreation uses in timing and location tend to magnify the visitor pressures generated by the rapid expansion, diversification and specialization of activity in forested areas. As a general rule, most areas and facilities which are relatively accessible

from urban centers are taxed during the summer. In particular, there is sustained pressure in those areas adjacent to or accessible from main transportation arteries. On weekends, this may pose serious problems of congestion and overcrowding when such concentrations of use can exceed both the biological carrying capacities of the resource areas and the social carrying capacities associated with each activity at a given facility. Given the implication of the twin trends of diversification and specialization, the most likely prospect for the future is substantial increases in recreation conflicts in almost all areas that are accessible to expanding urban populations.

In addition to increasing site specific conflicts, a review of pressures and fears within Parks Canada and other federal and provincial agencies concerned with recreation indicated the likely re-emergence of the major and fundamental underlying conflict between economic uses, such as the timber industry, and non-economic uses, such as recreation, providing gene pools, offering areas for scientific study and protecting biological diversity.

From my point of view, inside a federal agency responsible for recreation and preservation objectives, this fundamental conflict appears increasingly likely for the following reasons:

1. Lack of Money:

In recent years, with the exception perhaps of the three western provinces, most federal and provincial governments are experiencing severe financial constraints or cutbacks. One result has been that recreation programs in particular have generally suffered severely. Money previously budgeted for land acquisition and development has been severely cut and, in some cases, has completely disappeared. Employees working on contract have not had contracts renewed. Indeterminate personnel have been cut and moved laterally out of recreation programs or out of the Civil Service altogether. Services provided to the public have been cut back (Priddle 1979: 365).

2. Inability to Substantiate Quantitatively Non-Economic Benefits

The research community has been largely unsuccessful in establishing defensible quantitative values for conservation and recreational benefits. Thus, the absence of any comparable concrete evidence substantiating the benefits of non-economic uses has aggravated the previous problem of scarce

funds. Decision making power in public agencies is shifting from planning functions to audit evaluation and control functions. The new decision makers or the new criteria see recreation as a frill, something that can be conveniently cut in times of economic constraint with no obvious serious consequences (Priddle 1979: 365).

3. Recreational Market Diversification and Specialization

As mentioned earlier, the nature of the recreational public has become increasingly differentiated into highly specialized groups that are increasingly demanding and hard to satisfy. This makes it increasingly difficult to mount and deliver successful recreation programs that appeal to broad segments of the public.

4. Shrinking Economic Base of Recreational Pressure Groups

In times of inflation and economic uncertainty, public concern for their recreation and non-economic needs lessens and pressure groups defending those needs have increasing difficulty in raising the funds necessary to sustain that public voice (Priddle 1979: 365).

5. Highly Differentiated Nature of Public Recreation Interests

The increased specialization differentiation of the public's recreation interests discussed above also makes it increasingly difficult to represent those interests through large and powerful environmental action groups such as the National Provincial Parks Association of Canada.

For these reasons, I foresee a future in which the largely unrepresented and highly specified recreational elites will find themselves increasingly in conflict with and isolated from political and economic systems concerned primarily with preserving and defending the eroding economic wellbeing of the country. The conflict becomes more salient today because forest industry economists forecast the depletion of accessible and economic timber for use in pulpwood and logging operations in the near future. This heightens the competition for, and the significance of, remaining accessible forested areas. Nevertheless, since primary resource extraction from forested areas has traditionally been one of Canada's principal means of building and maintaining its

economic wellbeing, I foresee that the economic uses of forested areas are likely to have increasing precedence in most public agency decisions concerning those resource areas.

One benefit of the emerging conflict between resource uses is that it forces us, as planners and managers of the resource, to tighten up our thinking about the nature of our respective conflicting uses. For example, it forces us to eliminate the reductionism still present in much of our thinking and manage-

ment practices relating to multiple use (Priddle 1979: 367). It also forces us to be much more specific than in the past about the nature of the demands for the resource. In the long run, I believe that the only means of mitigating such conflicts will be through research, though, and the development of knowledge and techniques relating to first, the precise specification of the different demands on the resource, and second, means of planning and programming optimal resource allocations to conflicting uses.

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Table 1. Estimated Visits to Canadian Parks - 1964, 1974, and Projections for 1986

(Thousands)

Year		Provincial Parks	National Parks	National Historic sites	Total
1964		23,590	9,170	1,445	34,205
1974		45,977	18,290	5,185	69,452
	L	56,437	22,299	6,332	85,068
1986	M	78,371	31,516	14,166	124,053
	H	100,305	40,732	22,000	163,037

Source:

Park and Recreation Futures in Canada: Issues and Options, 1976, p. 69.

Table 2. Growth in the Participation in Outdoor Recreation

Activity	1 Increase in number of participants 1975-1985	2 Percentage increase 1975-1985	3 Rank order of percentage increase 1975-1985	4 Projected number of participants 1985	5 Rank order of projected number of participants 1985
Driving for pleasure	2,100,000	17	6	14,200,000	1
Swimming	1,900,000	16	7	14,000,000	2
Picnicking	1,700,000	16	7	12,600,000	3
Driving for sightseeing	1,600,000	22	4	8,800,000	5
Visiting historic sites	1,400,000	19.4	5	8,600,000	6
Hiking/walking	1,300,000	15	9	9,900,000	4
Cross-country skiing	1,200,000	120	1	2,200,000	11
Bicycling	1,000,000	13	10	8,600,000	6
Tent camping	500,000	12	11	4,700,000	8
Trailer camping	500,000	24	2	2,600,000	10
Snowmobiling	400,000	10	12	4,400,000	9
Camping using pick-up truck	170,000	23	3	900,000	12

Source:

Discussion Paper on the Use and Implications of the Report "Projections of Participation in Outdoor Recreation". Socio-Economic Research Division. N.D.

Table 3. Projected Growth in Numbers of Participants 10 Years of Age and Over in Selected Activities
(Millions)

Year	Historic park visitation	Bicycling	Snowmobiling	Cross-country skiing	Driving for pleasure	Driving for sightseeing	Tent camping	Trailer camping	Pick-up camper	Hiking and walking	Swimming	Picnicking
1972	6.6	7.1	3.7	.5	11.2	6.6	3.9	1.9	0.63	7.7	11.6	10.4
1975	7.2	7.6	4.0	1.0	12.1	7.2	4.2	2.1	0.73	8.6	12.1	10.9
1980	8.0	8.2	4.2	2.0	13.2	8.1	4.5	2.4	0.81	9.3	13.0	11.7
1985	8.6	8.6	4.4	2.2	14.2	8.8	4.7	2.6	0.90	9.9	14.0	12.6
*	2.1%	1.5%	1.4%	12.0%	1.8%	2.3%	1.6%	2.6%	2.6%	1.9%	1.5%	1.5%
Comments	Supply an important factor in future growth	Rapid growth rate 1969-1974 unlikely to continue to 1980	Rapid growth rate 1969-1972 slowing	Growth rate subject to saturation in market in future years	Market approaching saturation - energy a continuing factor	More people willing to drive with specific destination in mind	Appeals to the under 29 who will decline in proportion by 1985	Appeals to 30-39 age group who will increase in proportion by 1985	Appeals to 30-39 age group who will increase in proportion by 1985	Participation in hiking - greatest by urban, young and affluent	Activity saturated - main growth due to population increase	Activity saturated - main growth due to population increase

* These percentages are the average yearly compounded growth rates from 1972-1985. The participation rates for all activities except cross-country skiing are based on economic projections. For cross-country skiing the projections are a time series estimate.

Source:
Projections of Participation in Outdoor Recreation, SERD 76-1 Socio-Economic Research Division, Parks Canada, July 1976, p. iii.

Table 4. Participation Rates of Canadians in Selected Outdoor Recreation Activities
1967 - 1976

(Number of participants per thousand population 18 years and over)

Activity	1967	1969	1972	1976
Swimming, non-pool	—	—	—	420
Tent camping	132	122	188	192
Trailer camping	64	56	98	120
Camping with pick-up camper	—	22	37	85
Canoeing	48	80	95	141
Visiting historic sites	155	366	351	430
Driving for pleasure	—	668	633	658
Sightseeing from vehicle	—	—	365	491
Cross-country skiing	—	—	19	103
Picnics or cookouts away from home	398	540	524	567
Walking or hiking for pleasure	130	374	379	541
Bicycling	—	125	188	284
Wilderness tripping	—	—	—	168
Canals: sightseeing in a commercial boat	—	—	21	45
Canals: boating in a private craft	—	—	56	93
Canals: non-boating activities	—	—	78	116
Visiting National Parks	127	—	223	290

Source:

Longitudinal Data on the Participation of Canadians in Outdoor Recreation
Activities 1967-1976, SERD 77-15. Socio-Economic Research Division,
Parks Canada, p. 4.

FUTURE WATER DEMANDS IN WESTERN CANADA

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Abstract

This paper presents a discussion of water demand and water use concepts. Aspects of water use competition and complementarity are explored in quantitative and qualitative terms. Data are presented for western Canada, showing gross withdrawal and net consumptive uses of water. Factors affecting water requirements in various categories are analyzed. The implications of changing water usage for individual watersheds and alternative forest outputs are considered.

Résumé

Dans cet article, les auteurs dissertent sur les concepts de demande et d'utilisation des eaux. C'est en termes quantitatifs et qualitatifs que sont étudiés les aspects compétition et complémentarité et de l'utilisation des eaux. Les auteurs analysent les facteurs qui influent sur les demandes en eau et diverses catégories d'utilisation des eaux; ils emploient des données provenant de l'Alberta pour illustrer la nature des changements intervenus dans la demande dans l'ouest du Canada. Les implications de ces changements pour les différents bassins-versants et autres productions de la forêt sont étudiées.

Introduction

Predicting the direction of change in water demand is relatively easy. Predicting the relative magnitude of change is more difficult, and predicting the quantity demanded is the most difficult of all. Quantitative prediction raises a number of methodological questions. Ciriacy-Wantrup (1961) pointed out that neither the validity of the theory nor the adequacy of the model is enough to ensure accurate predictions. The purposes of this paper are to explore some of the concepts and methods of water use projection and to consider their application to western Canada.

Meaning of Water Demand

The term "water demand" has different meanings to people in different disciplines. The economic concept of demand involves price-quantity relationships - how much users would be willing to purchase at various prices. Some people use the terms "water requirements" and "water demands" in the same sense. In discussions of water requirements, the role of price usually is ignored or, at least, not made explicit. Most estimates of future water use are based on projections of population, economic growth and fixed water use coefficients (which assume constant price relationships). Such estimates are more properly called water needs or requirements than water demands.

Kelso (1967) described a set of attitudes which he called the "water-is-different syndrome." This philosophy holds that water is not like other natural resources and that it should be treated differently. It should not be owned, bought, sold or used like other resources. Public ownership and control of water is the norm; private ownership is restricted and discouraged. Since water is "different," its development, diversion and allocation cannot be left to the market. Instead, an entirely different set of institutions is needed to regulate the use of water. Water is allocated by administration, licensing, quota regulation, environmental control and judicial action, rather than the market which controls the allocation of most other resources.

Water is a unique substance in many respects, but many of the differences attributed to it are mythical distinctions. The distinctive attributes of water, real and false, have led to the present set of institutions and policies which control the use of water. Because the market plays an insignificant role in water development and allocation, new demands may remain unsatisfied or they may be served by expensive new developments, while old and inefficient uses retain their original allocations. The institutional ar-

rangements that were made to meet the earlier demands and to provide a security of usage now serve to deny new demands while perpetuating misuse.

Since water is regulated by governments in such a manner that market forces are unable to operate, water requirements are used more than market demands in government decision making. The following discussion concerns water requirements and uses.

Forms of Water Use

Due to its recurring flow characteristics, water may serve a variety of purposes - some simultaneously, some sequentially and some alternatively. These purposes may be grouped into site, flow and withdrawal or consumptive uses.

Site uses. - Any use which does not require withdrawal or movement of water is a site use. Such uses include fish and wildlife habitat, boating, fishing, swimming and enjoyment of scenic amenities. The usual requirements for site uses are only that certain minimal levels of water quantity and quality be maintained. Generally, a fairly high quality is required for most site uses, particularly for fish and wildlife. Since site uses do not consume any water, replacement is necessary only for evaporation and runoff.

Flow uses. - A flow use utilizes the natural movement of water in a watercourse. Two of the major flow uses are hydroelectric power generation and navigation. The former requires large flows and substantial drops in elevation, whereas the latter finds gentler flows and more gradual drops congenial. Thus, the two uses are neither complementary nor competitive. A third major flow use is sewage dilution.

Withdrawal uses. - The gross amount of water diverted from the source is called "withdrawal"; the net amount used is called "consumption", and the difference is called "return flow." Evaporation, seepage, discharge into another water system and unaccounted for losses may be included in consumption or return flow, depending on the circumstances and the purpose of the calculation. Return flows may differ from withdrawals in place, time and quality. The degree of competition among alternative uses depends largely on the circumstances of withdrawal and return flow. At one extreme, if all users withdraw at one point and all returns are downstream, the withdrawals are fully competitive. At the other extreme, if the users are distributed along a stream so that each

is able to use the return flows of upstream users, only the net amounts used should be considered competitive use.

Competition among forms of use. - Competition and complementarity among forms of use can occur in a variety of ways. The Bow River in southern Alberta provides an example of complex interaction among many uses. The Bow arises in the Banff National Park, flows east through Calgary, and joins the Oldman River west of Medicine Hat to form the South Saskatchewan River. There are several hydroelectric installations along the upper reaches of the river above Calgary, and the reservoirs can be operated to change downstream flows on short and long period bases. At Calgary, municipal and industrial sewage is discharged into the river. At the Bassano dam southeast of Calgary, water is diverted to the Eastern Irrigation District. A large amount of water is stored in Lake Newell near Brooks. The reservoir acts as a buffer stock to supply irrigation and other local uses at such times as they may exceed the current flow of the river. In addition to irrigation, Lake Newell supplies water for domestic and municipal use in the surrounding area.

Kinbrook Island Provincial Park is located on the east side of Lake Newell. Site uses on and near Lake Newell include fishing, boating, swimming, camping, picnicking and other forms of recreation. These uses require that the reservoir be maintained above some minimum level and that a high water quality be maintained. The former sets a limit on how much water can be withdrawn for consumptive uses, and the latter sets a limit on the quantity and type of sewage added at Calgary.

A conflict between flow uses and other uses may develop in the near future. The power company needs to release water throughout the year. Consequently, some water should be stored in the summer and fall to run the generators during the winter when very little water is entering the river. Likewise, the City of Calgary needs a sufficient flow at all times for sewage dilution and movement. Water for irrigation, the largest consumptive use, is needed in the spring and early summer. Water-based recreation on Lake Newell is a summer-time activity. Thus, competition may develop over the timing of flows even though there is more than enough water to supply all needs on an annual basis. One solution to this problem is to increase the amount of downstream storage, but it can be fairly expensive.

Water Use Projections

Water use changes may be due to supply factors, demand factors, or a combination of the two. In the absence of a market for water where prices are allowed to respond to demand and supply, water use figures are difficult to interpret. The following water use projections are based on the assumptions that factors affecting use will change only slowly and water supply prices will increase only slightly.

Municipal water use. - Withdrawals of water for municipal purposes were about 762 million cubic metres for the four western provinces in 1974 (Table 1). Daily per capita use averaged 496 litres (109 gallons), but it ranged from 358 litres (79 gallons) in Manitoba to 573 litres (126 gallons) in British Columbia (Fisheries and Environment Canada 1976). Net water consumption in Alberta amounts to about 20% of total withdrawals. If this ratio is applicable to the other western provinces, total consumption amounted to about 152 million cubic metres in 1974.

Municipal water withdrawals included urban residential use (55%), commercial use (27%) and public use (18%). Residential use includes water for drinking, cooking, sanitation, lawn and garden irrigation, and miscellaneous purposes such as washing the family car. Commercial users include stores, offices and some light industry. Public uses include government buildings, schools, hospitals, street cleaning and fire fighting.

Population shifts into the region and from rural to urban areas will affect average and total consumption. Statistics Canada (1974) made a series of population projections for each province and territory. The compound growth rate for the western provinces for the period 1972 to 2001 ranged from 1.72% for the highest projection to 1.05% for the lowest. The projections were heavily influenced by the interprovincial migration patterns of the 1960s. The patterns changed somewhat during the 1970s in response to changes in world energy and grain markets. A population growth rate nearer to 2% would seem appropriate for western Canada as a whole, and a somewhat higher figure may be expected for urban growth. Population growth will affect commercial and public uses as well as residential use. Municipal water use may be expected to grow from 2% to 2.5% per year.

Rural residential water use. - Water use in rural households amounted to 101 million cubic metres in

1974 (Table 1). Since most rural residences use septic tanks with tile drain fields, the return flows are negligible and net consumption is substantially the same as withdrawals. Rural residential water use probably will not change much in the foreseeable future. Increases in water use per person are likely to be roughly offset by decreases in rural population.

Manufacturing water use. - Manufacturing is one of the major water users, with total withdrawals of 2 018 million cubic metres in 1974 (Table 1). Manufacturers reuse water to a large extent. For example, the pulp and paper industry recirculates water three times and the petroleum refining industry recirculates it five times before returning it to its source. The total use of water in manufacturing is more than twice as great as withdrawals. On the other hand, net consumption is very small, amounting to only 116 million cubic metres for western Canada in 1974. As the costs of pumping water and treating effluent continue to rise, manufacturers seem likely to find new ways to conserve water. Water use per unit of output may decline substantially as technology changes. The pulp and paper industry is an especially heavy water user; it used 35% of the total water intake by primary manufacturers in 1972. Other large water users in the West include petroleum refining, chemicals, food and beverage processing and concrete products. Future increases in water use in manufacturing are difficult to quantify for two reasons. First, future industrial growth in the West is likely to be strongly influenced by government policies and actions. Second, the mix of high water using and low water using industries is not easy to predict. Industrial growth seems likely to keep pace with urban population growth, or perhaps grow a little more. Prospects in high water using industries seem reasonably good. A reasonably conservative estimate for growth in water withdrawals would be about 2 to 3%.

Mining water use. - Water withdrawal by the mineral sector totalling 626 million cubic metres in 1974 (Table 1). Return flows were relatively low in the fuel industries. The net consumption of water was 485 million cubic metres, more than four times the total for the manufacturing sector. Substantial amounts are used in secondary recovery of conventional crude oil. A rapidly growing amount is used in the separation of bitumen from tar sands. In the near future, a large amount will be used in the recovery of heavy crude in the Cold Lake area. A great deal of water is used in the mining of potash in Saskatchewan. Other forms of mining also use substantial quantities

of water. The mining sector, especially the fuel industries, is likely to continue expanding for the rest of this century. The amount of water used per unit of output seems likely to increase as well. A compound increase of 5% per year would be a conservative estimate.

Irrigation water use. - Water withdrawals for irrigation in western Canada were estimated to be 2 074 million cubic metres in 1974 (Table 1). Most of the water diverted for irrigation is lost before it reaches the root zone of the crops for which it was intended (Stanley 1978). At present efficiency levels, it is necessary to withdraw about three times as much water as is needed for crops.

The southern interior valleys of British Columbia and the Palliser Triangle in southern Alberta and Saskatchewan are arid enough to make irrigation attractive to many farmers. Very little of the irrigated land requires added water in all years or for all crops. The largest irrigation area (about 350 000 hectares or 850,000 acres) is in southern Alberta; the second largest is in southern British Columbia and there are smaller areas in Saskatchewan and Manitoba. Most of the area irrigated in southern Alberta is used for small grains and hay and a considerable amount is in pasture. Higher valued crops (sugar beets, potatoes and vegetables) occupy a relatively small portion of the irrigated land. The areas of potential irrigation in Alberta and Saskatchewan are quite large. However, any expansion of irrigation probably would be in small grains.

The full costs of land development, water diversion structures and water delivery may exceed the direct benefits from irrigation. If farmers had to bear all of these costs, irrigation might not expand much in the foreseeable future. If metered charges were introduced, water use efficiency could be expected to increase and the withdrawal of water per unit area to decline.

The distribution system for irrigation water will expand if and when political decisions are made to do so. However, the area actually irrigated will expand only if water is available and farmers believe that irrigation is profitable. Some people have argued that demands for the products of western agriculture will increase in the future and that additional irrigation will be needed to produce those products. Even if one assumes that the prospects for increased demands for food are fairly high, irrigation is only one of the ways by which production may be

increased. Farmers are likely to use more water only to the extent that irrigation is more profitable than other alternatives, including that of not increasing production. Many of the current estimates about the expansion of irrigation seem excessive when viewed from an economic perspective. In terms of water withdrawals and assuming some improvement in water use efficiency, a compound increase of about 2% per year for the remainder of the century seems reasonable. A greater increase probably would require major new water diversion, impoundment and distribution facilities. Many years would be required to plan, build and phase in these facilities.

Stockwater use. - Water withdrawals for livestock were estimated at 233 million cubic metres in 1974 (Table 1). Return flows probably were negligible, so net consumption was assumed to equal total withdrawals. The livestock population of western Canada probably will increase no faster than human population in the next two decades. It seems unlikely that the water requirements of livestock will change, but there may be some change in the mix of different species. The compound increase in stockwater use seems likely to be about 1.5 to 2%.

Thermoelectric water use. - Thermal power plants withdraw enormous amounts of water for cooling purposes, but nearly all of it is returned to the source. Total withdrawals amounted to 2 687 million cubic metres in 1974 (Table 1). The warm effluent may be deleterious to fish because it holds less oxygen than cold water, but it is satisfactory for most other uses. Much of the needs of thermal power plants can be met by recirculation through cooling ponds. How the expansion needs of the industry will be met depends on the economics of each new plant situation. Thermoelectric power production is likely to increase substantially during the rest of the century. Withdrawals may increase from 1 to 5% per year, depending on the extent of recirculation. However, the effect on net water consumption probably will be negligible in any event.

Water Use Conflict and Resolution

Competition for limited water supplies could develop at some future time as demands for various uses increase. The possibility of future conflict in water usage is greatest in southern Alberta and Saskatchewan, the only area in Canada where the term "water shortage" might be appropriate. Even in this area, the shortage of water may be more appa-

rent than real, given the predominant use of water in the production of relatively low-valued grain and forage crops which can be produced under dryland conditions. In the North Saskatchewan River Basin, by contrast, there is no real likelihood of water shortage in this century, even with heavy oil development and petrochemical expansion (Earmme 1979). The crucial water problems in this basin will continue to be those of water quality rather than water quantity.

There are various ways in which conflicting water usage and water shortage might be resolved. Most solutions involve supply augmentation or demand management. The predominant response in Alberta has been the engineer's solution of building dams to increase the portion of river flow which is usable. Such structural approaches - whether to provide water for expanded irrigation in the Oldman River Basin, more water for municipal and industrial use in the Red Deer River Basin or flood control in the Paddle River Basin - generally have not been supported by social scientists.

Another possible solution of particular relevance to foresters is augmenting watershed runoff through changing forest harvest practices. Some research evidence suggests that the use of very small forest cuts can increase water output, prolong runoff and maintain water quality (Environment Council of Alberta 1979). The key question is whether such a forest practice is economically feasible.

A third physical and supply-oriented solution involves renovating the existing irrigation delivery system and raising the rather low irrigation efficiency levels in southern Alberta. This water management strategy was recommended recently by the Environment Council of Alberta (1979) as its first priority in the Oldman River Basin.

A further supply-related task in the 1980s will be to clarify the apportionment agreement among the prairie provinces. Under the present agreement, Alberta is required to deliver 50% of the mean annual natural river flow to the Saskatchewan border. The provinces probably will discuss whether the present annual accounting period is appropriate. Within Alberta, the expected contribution from each of the sub-basins (Red Deer, Bow and Oldman) within the South Saskatchewan Basin must be clarified.

A final and often neglected approach to the water shortage problem involves demand manage-

ment, through price or various non-price institutional approaches. Although the responsiveness of quantity demanded to price may be limited in the short run, the impact of higher water prices on irrigational water use may be much more important in the long run. Also, consideration may be given to altering such institutions as water rights and priority schemes.

Water quality may become a more important source of conflict than water quantity. Forest harvesting practices may affect quality (particularly turbidity) as well as quantity. However, quality problems created by forestry practices probably will be of less social concern than those created by thermal, industrial and municipal effluents.

Policy Problems Concerning Water Output from Forested Land

There are a number of conceptual and practical problems relating to policy decisions about water outputs from forested land. Water is but one of the important outputs of forest watersheds, many of which are consumed outside the watershed.

Natural resources policy is concerned with development and allocation issues. In the use of forested land which has a water output, development policy decisions may concern possible increases in the amount of land in forest and, thus impacts (probably negative) on the quantity of water output. Development decisions also are implicit in changes in forest management regimes which, in turn, may alter water output. For example, there is some evidence that water output is positively correlated with the scale of clearcutting on the eastern slopes of the Rockies (Environment Council of Alberta 1979). Allocation policy decisions concern such issues as the distribution of the current stock of forest land among various and often conflicting uses.

In development and allocation decisions, economic criteria can be used to judge whether or not a proposed policy will increase social wellbeing or be in the public interest. For development policy, the following criteria might be used: (1) efficiency - whether the benefits to society resulting from the policy exceed the social costs (as might be determined by a benefit-cost analysis) or whether the development is the best possible use of scarce investment resources; (2) equity or income distribution consequences - who gains the benefits and who bears the costs; (3) stability - the effects on variability of

income, and (4) impact - the effects on other groups and industries, economic growth effects and the consequences for regional income distribution. Some of these criteria may involve trade-offs, so there are some difficult conceptual problems in multiple-objective planning.

The criteria for allocation decisions include highest and best use, multiple use and equating the marginal values of the various forest outputs. The last criterion is met by allocating forested land so that the value of the additional production from the last unit of land is equal for all products. The marginal criterion is difficult or impossible to apply to decisions involving joint products such as water and recreation. The multiple use criterion, on the other hand, may be appropriate for such complementary uses but inappropriate for conflicting uses.

The lack of market prices for most non-timber products of the forests often makes it extremely difficult to apply some of the foregoing criteria (particularly those related to efficiency). This limitation applies especially to water because it usually is supplied to downstream users as a public good. Water charges typically reflect only the costs of withdrawal and distribution and seldom the intrinsic value of the water. Irrigation farmers in the West generally have paid only a small portion of the costs of water supply.

Some water uses (e.g., scenic views and flood control) are intrinsically public goods because the benefits are not divisible in consumption. It is not practical to price such benefits because they cannot be withheld from one consumer and sold to another. However, the benefits from agriculture, industrial, municipal and even some of the recreational uses of water are divisible in consumption and a price can be charged for them. Nevertheless, past practice has been to provide water for many of these uses at nominal charges, and the water itself has been regarded as a free good.

These conceptual and practical problems make it very difficult to assess the total benefits or the marginal benefits of water production from forest land. Although there are technical approaches for estimating the value of water (e.g., production functions and linear programming), much policy making must be done without very precise values for water. Economic analysis can suggest only the direction of change and provide a basis for qualitative judgement of the magnitudes of the benefits and costs that might be involved. Nevertheless, even a rough forecast of the degree of scarcity in various watersheds might be helpful in making development and allocation decisions concerning forested lands and associated water outputs.

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Table 1. Withdrawal and Consumptive Use of Water in Western Canada, 1974

Use	Withdrawal	Return flow	Consumption	Future annual increase
	(Million cubic metres)			(%)
Municipal	761.8	609.4	152.4	2.25
Rural residential	100.8	negl.	100.8	0.0
Manufacturing	2 017.7	1 901.5	116.2	2.5
Mining	625.7	140.2	485.5	5.0
Irrigation	2 073.5	414.7	725.7	2.0
Stockwater	233.1	negl.	233.1	1.75
Thermoelectric	2 686.8	2 674.3	12.5	3.5
Total	8 499.4	5 740.1	1 826.2	2.9

Source: Fisheries and Environment Canada. 1976. Canada water year book 1976. Supply and Services Canada, Ottawa.

- Notes:
1. Most of the return flow and consumption figures were estimated by the authors.
 2. For irrigation, return flow was estimated at 20% and consumptive use (irrigation efficiency) was estimated at 35%, leaving an unaccounted loss of 45% for evaporation and seepage.
 3. The estimated annual increase figures are the best guesses of the authors about future water withdrawals in this century. They are not formal forecasts.

FOREST MANAGEMENT OUTPUTS: THE ISSUES

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Ecologistics Ltd., Kitchener, Ontario.

Abstract

The economic issues of multiple-use are described. An economic decision model for multiple use is developed and related to real-world problems. The economic issues of multiple-use are related to the economic model.

Résumé

Les implications économiques de l'application multiple sont décrites. Un modèle de décision économique à usage multiple est mis au point et relié aux problèmes du monde réel. Les implications de l'application multiple sont reliées au modèle économique.

This brief paper is an attempt to identify the major issues that became apparent to me during the papers and ensuing discussions from the keynote address and the sessions this afternoon. I have noted a common theme that I would like to develop and examine for its implications to us as managers of the forest.

The theme is that we are moving into an era of intensive forest management as the demand far exceeds the supply of the many products of the forest. The impending scarcities of raw materials (pulp, lumber), energy (biomass) and food (agroforestry) are increasing the value of the forest. The result is that investment in forest management becomes more attractive. Thus, Canadian forestry is moving from an age of extensive exploitation of a fixed inventory to intensive management of a renewable resource.

The main thesis that I would put forward is that foresters will face increasingly difficult management decisions as they attempt to optimize output from the forest. The decisions are particularly complex because of the variety of possible products. This concept of "multiple use" has always been with us -

it was especially prevalent during the mid 1960s before it was replaced by "environmental impact" as the current "in" topic. However, we are now much closer to the reality of multiple use forest management on a broad scale.

In order to draw this session to a conclusion, I wish to develop with you a simple model of decision-making involving multiple products so as to gain insight on the issues we will be facing as managers of forest lands.

A Model of Forest Management Decision-Making

I believe that most university courses in forest economics would have included exposure to a concept of a production function. Such a function describes the physical relation between input and output for any enterprise. Figure 1 accompanying this paper illustrates the typical form of a production function which is subject to the laws of diminishing returns. There are three stages shown in this figure of the relation between input and output. First, total output increases at an increasing rate. Second, total output increases at a decreasing rate. Finally, total output decreases with increases in input.

As a forester, the decision faced is the selection of the best level of input. Clearly, one would never wish to be in the third level of the production function since this is counter-productive. The optimum level occurs where the cost of the last unit of input equals the additional revenue received from the output. This level can be defined graphically as the point where the slope on the production function is equal to the slope of a line which is equivalent to the cost of the input. An example of this optimum level is shown as the point of intersection of the production and input functions in Figure 2a. In this figure, both input and output are expressed in dollars, rather than the physical units of Figure 1.

The point that I wish to make with this production function is illustrated in Figure 2b. This shows how an increase in the value of a unit of the output changes the shape of the production function

Figure 1: The production function

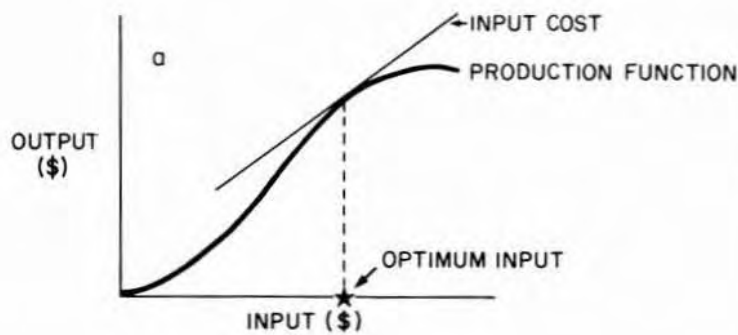
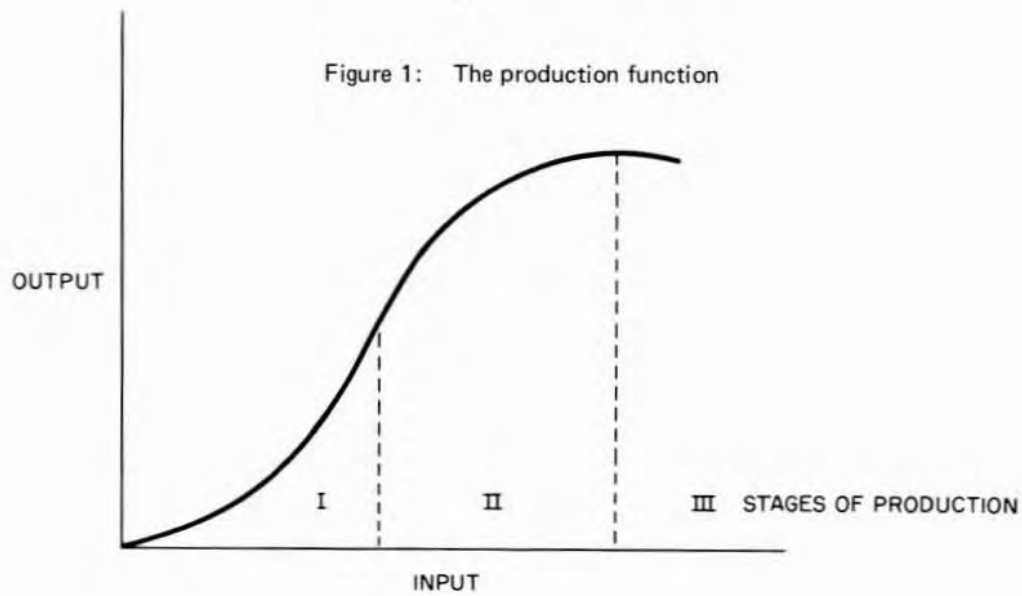


Figure 2a: The optimum level of output

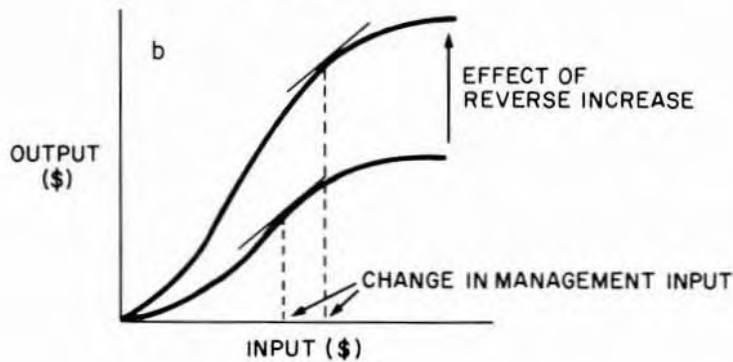


Figure 2b: The effect of a change in value of output

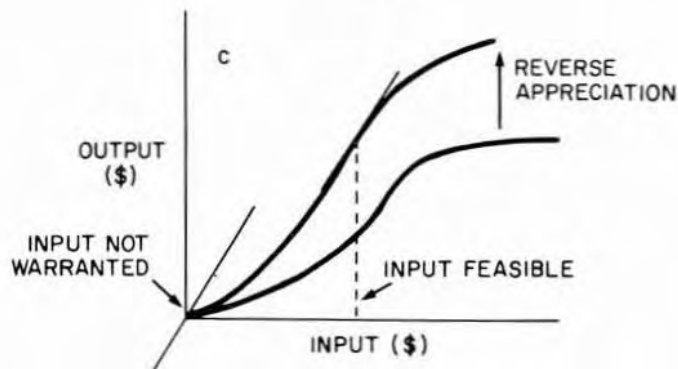


Figure 2c: Intensive management becomes feasible

and, consequently, the optimum level of input (or management).

I would suggest that the situation in forestry discussed in my introduction is similar to Figure 2c. In that figure, the price of input initially is so great relative to output that the feasibility of any management input is suspect. However, as the relative value of the output increases (either as a single product or because there are new products discovered), inputs to increase output become feasible.

The complexity of such decisions in forestry increase because of the multiple products involved. This requires, first, an understanding of the characteristics of the individual forest products and, second, the interrelations between their production functions. The following brief sections illustrate these points.

Figures 3a to 3f illustrate some of the different patterns in individual production functions for different forest products. In each case, the input is time and the function shows the output during a forest rotation. Figure 3a shows how a forest grows over time. Figures 3b and 3c illustrate two different patterns of harvesting the wood - a series of selection cuts and a clearcut. Figures 3d to 3f show potential levels of output for wildlife, recreation and water. Whitetailed deer (Figure 3d) have a peak level of output early in the age of a stand, when browse material is plentiful. A recreationist (Figure 3e) might receive the most aesthetic satisfaction from an over-mature stand with a canopy high from the forest floor. Recent studies in Alberta (Figure 3f) have found clearcutting in small patches can optimize water yields. There are two points to be realized with these simple figures. First, the outputs from the forest may have patterns over time (continuous/intermittent, high/low, etc.), requiring different forest management strategies. Second, the uses may be consumptive (causing a change in state) or non-consumptive of the mechanism of production (the forest). With these factors in mind, it is apparent that trade-offs are necessary. This requires knowledge of the interrelations between the production functions for the various forest products.

The trade-off between two products can be graphically described as in Figures 4a through 4e. These figures show the various combinations of two products (A and B) that can be generated by a given level of input. The differences between the figures are determined by the interrelations between the two products. In Figures 4a and 4b, the products

compete for the same input and there is a direct trade-off between the A and B. In Figure 4c, the two products are complementary over a part of the range of output - the amount of A actually increasing as B increases. In Figure 4d, the products are supplementary - showing no interrelation. Finally, in Figure 4e, the products conflict - each having a negative effect on the other. Each of these circumstances is possible in multiple use forestry.

The decision that a forester must make relates to the amount of each product to generate under these different circumstances. Graphically, the optimum product mix can be shown to be the point intersection of an "iso-revenue" line with these two-product production functions. The slope of this line is determined by the relative prices of the two products. In Figure 4a, product A has a higher price than B. In Figure 4b, this relation is reversed.

With the competing uses, the optimum product mix is sensitive to the variations in the prices of the products. It is not a very stable situation. In the case of complementary and supplementary products, the optimum is stable to fluctuations over a wide range of prices. The solution does not change. With conflicting uses, multiple use is not feasible. One produces all of one product or all of another. There is, therefore, a very dramatic shift in production at the point where the iso-revenue line shifts from one product to the other. Clearly, as foresters, we wish to manage for complementary and supplementary uses and avoid conflicting products.

This is the background that I wished to lay in order to pull together the discussions today.

The Issues

1. Integrated Resource Management

There are three major strategies for multiple use forest management under these circumstances. The production levels can be optimized concurrently on each acre of land, temporally by varying the mix of uses over time and spatially by separating uses but optimizing the mix over a larger unit. With the interrelations and strategies above, there is a considerable challenge for the integration of uses in intensive forest management.

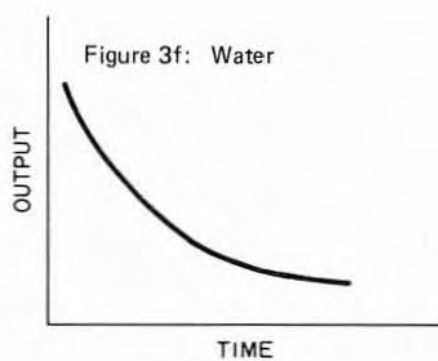
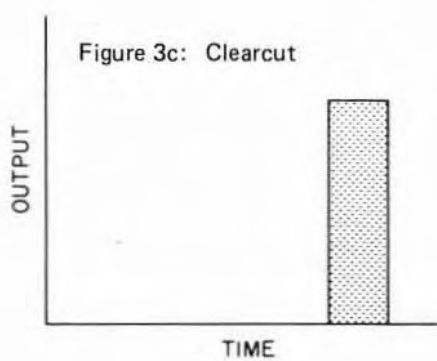
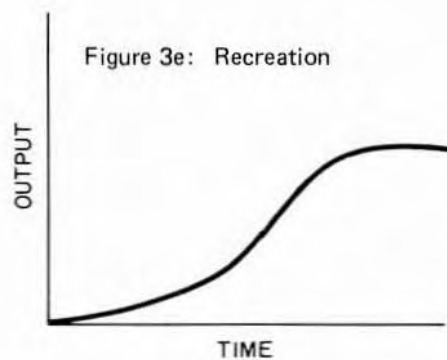
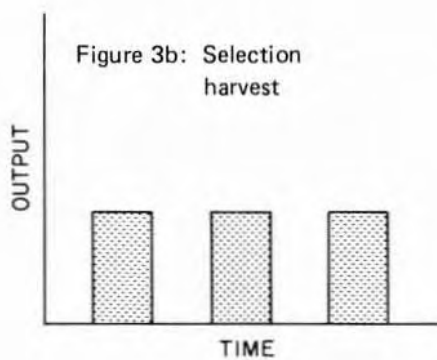
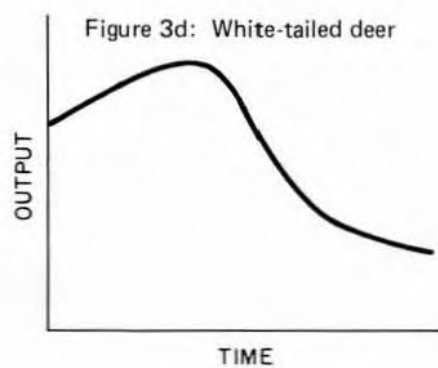
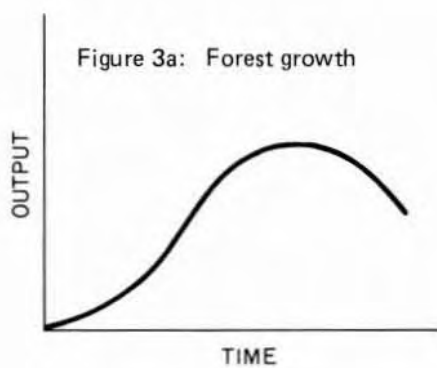


Figure 4a: Competing products

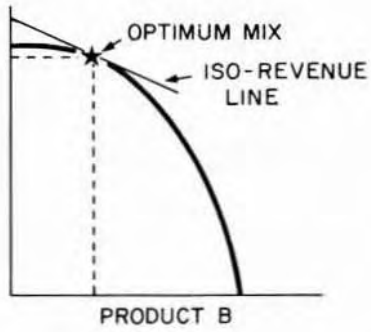


Figure 4b: Competing products

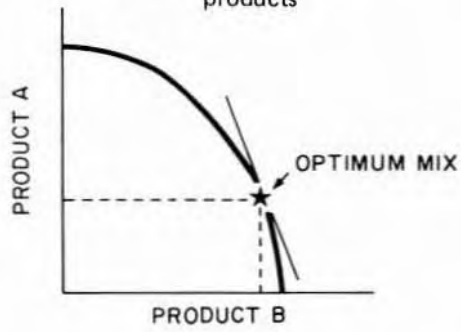


Figure 4c: Complementary products

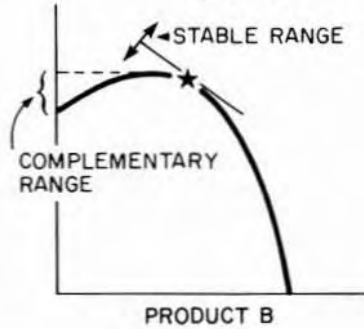


Figure 4d: Supplementary products

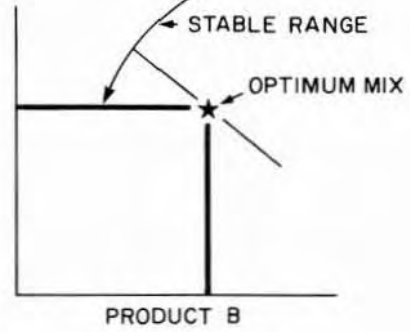
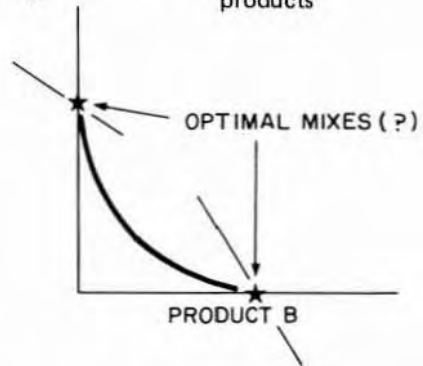


Figure 4e: Conflicting products



2. The Resource Base

With the complexity of the decisions described above, do we possess sufficient knowledge to make rational decisions? I feel that the present state of knowledge is only rudimentary in relation to the variety of our environment and the characteristics of the different potential forest products.

3. The Decision Mechanism

The models developed in this paper are simplistic, but do illustrate several essential points. In order to be closer to reality, one would need to develop a more complete decision mechanism allowing for incorporation of intangible values, policy imperatives, equality in the distribution of benefits

(who gains and who suffers) and the many other factors foresters face.

4. Time, Uncertainty and the Discount Rate

At the same time that the impending resource scarcities are making intensive forestry feasible, the future is becoming less certain and interest rates climb. Such circumstances discourage investment in forestry which is a very long-term proposition. It is yet to be seen whether the appreciation in the value of forest products (which may occur differentially between products) will offset the increased cost of long-term investment.

Our task as managers of the forest is not easy.

DISCUSSION

R. MORLEY CHRISTIE

Director, Resource Planning Branch,
Department of Renewable Resources,
Yukon Territorial Government.

First of all, let us deal with the timber aspect when preparing multi-discipline land use plans. Earlier today Mr. Jones dealt primarily with world demands for timber. From a government planner's point of view, this only gives us a general trend of what to expect in our area. When we get into planning, and regional planning in particular, we tend to deal more with the specifics of what we can expect to be coming out of a region. Market studies can tell us whether to expect an increase or decrease in productivity. This hopefully will provide the timber people with an objective view of what is going to happen in the future, such as whether markets are going to require increased or decreased production and whether it is going to be on a larger or smaller land base. If this means more industry and industrial plants, the critical factor from a government planner's point of view is the start-up time and the kind of infrastructure we are looking at.

Mr. Addison, I believe, brought from the wildlife point of view a big problem government planners have: Lack of objectives for wildlife management. This is prevalent right across Canada, from my experience anyway. This lack of effective objectives, is partly due, I think, to the fact that wildlife has been looked at by people who try to stop all development. These people generally have a reactionary point of view when they examine resource proposals because they have not been able to form strong objectives. This is starting to change and I think as wildlife takes a more prominent role within society, objectives for wildlife management will become much clearer. As a result, it will be easier for the other resource sectors to see what the wildlife people are trying to achieve.

Recreation, as Mr. Meis pointed out, does not have a lot of hard values. How do we measure the value of recreation? We can take a look at what type of developments people are demanding today, but as he indicated, there is a strong diver-

gence among particular points of view. Those people involved in campground management will realize nowadays you don't put in very many tenting sites because they are not going to be used. The average traveller today is using, in the Yukon anyway, campers, tent trailers, and small holiday trailers. Tents are primarily used by the backpackers and not the family camper. We have the people, who generally tend to be in the older age bracket, who have large motorhomes as this is an easy way to travel. Younger people are also slowly starting to acquire the large motorhomes. Thus different people are demanding different types of developments, which makes the values of recreation difficult to evaluate.

Water, also, is difficult to evaluate. We tend to look at quality more than quantity from the point of view of planning, in that our pressures generally tend to be from the environmental people. The environmental people, as well, do not have firm objectives concerning what they want. They appear to want to maintain the status quo. They don't have true objectives, and that makes it very difficult when you are trying to develop a resource plan.

The planner plays the role of trying to be non-biased in his approach, but this is often difficult, as most of us come out of a particular resource discipline. A more important aspect of this role, from a government planner's point of view, is for each of the resource agencies and non-resource people to state what their objectives are. If we know what all our objectives are, compromises can be made. As a result, we can measure what this compromise is going to cost. Too often planning has been done by a planning agency only, with no active participation by the resource users. Fortunately this trend is changing and planning is now going to the team approach, where all the resource managers play an active role in the planning process. To be successful, all participants must be open-minded because they have two roles to play.

First, they are representing their own agencies, and thus they have to try to maximize their agency objectives. Secondly, at the same time they have to assume the role of a good land manager, and that often is the most difficult part to play. This is because individual biases must be critically examined to determine if they are a relevant concern. Everybody must feel that they are part of

the process. If people from all the resource agencies feel that they are part of the process, I think completed plans will tend to be implemented. No one is going to receive all their demands; however, as Dr. King said, we have to effectively determine the dominant uses, and from that, determine how we can accommodate the minor uses.

NORM G. BROCARD

Supervisor Resource Development,
Simpson Timber Company.

Simpson is a private company, largely family owned and founded by a Canadian, who left Quebec in the 1880s with a strong development initiative. He worked at building mines and logging railroads in the U. S., wound up in the Puget Sound country in the 1890s, was very impressed by the local timber stands, and went into the logging business. His descendants still own and manage Simpson Timber Company, which has about 6,000 employees, and two Canadian subsidiaries, one of which, Simpson Timber Company - Alberta, Ltd., is jointly owned with Alberta Energy Company. The other, Simpson Timber - Saskatchewan, Ltd., is in Saskatchewan. Simpson has always been growth-oriented but in a somewhat modest way, as you might expect, due to the nature of our ownership, which does not give us quite the same financing opportunities that large public companies like Weyerhaeuser, Crown Zellerbach, MacMillan Bloedel and others have.

Someone spoke about the slope of the various demand curves and so forth. I have suffered through the slopes of these things, and they are a very accurate barometer of the company's expectations and development thrust. In lean times, development is the lowest thing on the Company's capital - alternative totem pole. And in times when lumber prices and other commodities prices are high, the pressure is really on and they can't understand why you don't have at least a dozen nice development opportunities ready for them.

Obviously, Canada now plays and will continue to play an increasingly important role in providing U. S. and world wood supplies. Some literature available at this conference points out that Canada's total wood shipments are in the order of

\$13 billion a year. The industry is Canada's most important source of employment, a total of 228 thousand people working for it directly, and of course there are hundreds of thousands in secondary jobs in service industries. More foreign earnings are generated by export of forest products than by any other commodity. The industry's contribution to the trade value balance is about 7 billion dollars annually, nearly as much as mining, agriculture, fishing and fuels combined. So the development of manufacture of forest products and their export is an excellent medium by which Canada can improve its balance of trade.

From a selfish corporate standpoint, it is an opportunity for Simpson and other companies to apply their expertise and capital in the development of resources in the generation of profit. That is a six letter word, not a four letter, as it is currently fashionable to think about profit. After all, it is a means of generating capital, and it is one of the things that has made Canada and the U. S. strong countries.

How does Simpson decide on appropriate development opportunities? We, in the process of conducting our business, use whatever economic assistance we can find. Simpson runs an inhouse econometric model which attempts to forecast the future prices of various commodities, lumber, plywood and so on. This involves variables of total residential construction expenditures, net free reserves, which are the amount that banks have to lend over and above their required reserves, total construction expenditures, a GNP deflator, total softwood shipment volumes and stumpage prices. We have subscribed to other models and market studies.

Some mentioned here would be SRI, DRI and others that we subscribe to and that have been commissioned from time to time to give us some direction and establish some objectives in our development work.

A couple of examples follow, relating to our Canadian developments. In Saskatchewan, for instance, the development was based on timber utilization to a smaller size than was previously used for lumber production in that region. I worked on feasibility studies and, later, in the logging and forestry operations in the development. Here we chose to develop a stud mill. Our economic analyses showed that such a simple straightforward product was best suited to that particular timber, and to the local work force. Our market studies showed that spruce - pine studs could make significant gains in a U. S. market previously dominated by Douglas-fir and Southern pine. As a result of these studies, we created a very efficient, 50 million board foot per year stud mill in the Hudson Bay, Saskatchewan location, employing one of the first, I believe, if not the first, chip-and-saw machines in Canada. We produce a high quality product which now has a high market acceptance. The mill currently runs at a rate of about 75 million feet of studs per year.

In Alberta, in 1973, we were successful in being awarded the Whitecourt FMA, over a million acres of Crown timber. In this case, our market studies, conducted by a combination of U. S. and Canadian consultants, persuaded the company against further stud production. As a result, we installed a 100 million foot per year random-length dimension sawmill to manufacture dimension lumber out of timber which is harvested to a 6-inch-diameter stump and 4-inch top. In Saskatchewan and Alberta, I believe we are the only people making dimension lumber out of timber harvested to those sizes. This key decision (and it is a tough business to make dimension random length lumber out of small timber) was based on economic and market analysis. For a few years (the mill started up in 1975) it looked like we made the wrong decision but, as of right now, there is developing a substantial difference between the market price for studs and dimension lumber. Hopefully, in the long run, our prediction will be right, and we will have made the right decision to install dimension rather than stud production. These are some minor examples on how economic-forecast analyses are used by companies such as Simpson.

I would like to make a couple of comments on presentations made today. In regard to wildlife,

because I have been involved in some of these multiple use considerations, the question in my mind as a developer and operator is "How much?" and "What cost?" At the university we have struggled through a few courses in economics and heard about marginal analysis, but somehow, in practice, the ideas seem to be swept under the rug and lost. The market, the economist tells us, is a pretty efficient method for allocating various uses and assigning various values.

I would like to read from an article by John Walker, in which he said, "The market is very impartial, one dollar, one vote. The businessman who correctly estimates what society wants is rewarded. Incorrect estimates are penalized. It is very difficult to continually ignore the discipline of the market and remain in business. Government agencies, however, are insulated from market forces. It becomes very easy for government officials to substitute their own special view of the future or that of some special political constituency for the view expressed by society-at-large in the market place. Taxes, subsidies, regulations based on the police power of state and even eminent domain are all available tools to carry out government programs. Successful implementation of any government land-use plan that interferes with market allocations requires that these other tools be used."

Bringing that home to what was said today, the question comes up in my mind concerning the cost of providing, for instance, game habitat and things like that within your management agreement area. All these protective buffers along the roads and particular sizes or designs of clearcuts are loaded onto the forest manager, usually without regard for the costs or without any attempts to compensate for the costs. The multiple-use concept, as has been mentioned already today, is not a very useful tool to accommodate these other uses. We know, and I don't think anybody would argue with the fact, that large clearcuts are not compatible with moose and they are not sympathetic to the manager's desire to limit legal or illegal killing of moose. I think that some attempt has got to be made to assess the value of a living moose herd, or of X numbers of moose per square mile, or the value of the marginal moose, if you like, harvested by resident or non-resident. If that were done, we could get on with the business of identifying the optimal locations for moose management and the value to society as a whole. Thus we could trade that off against the timber production in an area quite easily, and we could come to better decisions about where we produce the moose and how we manage the

timber. I was happy to see that Mr. Mies today mentioned that even though they are often referred to as intangible the values of these things can be measured. As it stands, the cost of providing undefined amounts of these other uses willy-nilly on all areas that we attempt to manage for timber production is getting expensive. As the competition gets tougher and as the timber opportunities we are looking at get leaner, I submit that the cost of doing these things is going to get prohibitively expensive. When that happens, development starts to trail off, production starts to trail off and the opportunity to (for instance) capitalize on export of timber products will not be as great as it should be.

Another example comes to mind following Dr. Travis Manning's comments about water demand vs. water needs, or water requirements. The watersheds in our FMA and other cutting areas in Alberta, outside of FMAs, are well protected by some pretty heavy constraints on cutting by watersheds. I would not pretend that these are not valuable considerations any resource manager has got to acknowledge. The

question is whether or not the water in the North Saskatchewan has a greater value than the water in the Athabasca watershed. After all, one supplies potable water, irrigation and effluent disposal to a very dry and relatively heavily populated region. The Athabasca, on the other hand, flows through a sparsely populated region, is not extensively used for irrigation, supports a somewhat dubious fishing and swimming opportunity (I have done both in the Athabasca), and eventually flows into the MacKenzie River and the Beaufort Sea where I suppose it lubricates the drill stems for Dome Petroleum and maintains the sperm whale population. I do not know how fussy the sperm whales are about water quality. I am being a little facetious, but while we may not be able to evaluate the marginal value of water in one watershed compared to the other, we certainly ought to recognize the fact that one is intrinsically more valuable than the other right now. There should be some difference in the way we protect one watershed vs. the other, yet there are blanket rules that apply to all watersheds.

J. A. WADDELL

Manager, Resource Development,
E. B. Eddy Forest Products Ltd.,
Espanola, Ontario

Ladies and Gentlemen, I will be very brief for two reasons: first of all, we did not receive papers from the speakers, and I do not extemporize very well. Secondly, time is running out and one of the objectives was to involve the audience as much as possible in discussion and, as last speaker here, I can cut myself short.

I am going to speak strictly from the very narrow perspective of an industrial forester. The Ministry people think we are very narrow, so I won't disappoint them. I speak as a resource manager for a timber license of about 5,000 square miles. We are within easy driving distance of a population of about 350 thousand people, so there is considerable pressure on our license for uses other than timber extraction.

We face the same situation that most companies, certainly in the East, face. We have a finite land base, and our allowable cut is required by the present mill, even without consideration of any expansion

plans. Over the past 10 or 15 years, as everywhere else, we have had a tremendous increase in demand by other land users, some legitimate and some maybe not so legitimate. We have faced a series of land withdrawals, areas we are prohibited from harvesting, for a variety of reasons, and the net result has been an eroding land base.

There is no question that these demands will continue to escalate. Also, our demand for timber will continue to escalate. I think that it has been abundantly shown here today that there is going to be an increased demand for timber. So we have two curves, and how do we reconcile them? I do not have any easy answers. I think right now in Ontario we are more or less lurching from crisis to crisis and managing our land on an ad hoc basis.

One thing that I want to stress is that for every constraint on our cutting operations and for every bit of land withdrawal, there is a price someone must pay, and it eventually must be reflected in the

cost of the manufactured product. Now, I said I was going to be narrow, and that is narrow, but that is telling it the way it is. As long as the company can pass that on to the consumer in terms of increased price, okay, we can live with it. But when the time comes when we can't, these land constraints or whatever will force industry into a very difficult position. And then resource management and land planning will be of little avail. So that has to be kept in mind constantly.

As Norm referred to in the instance of wildlife, we can put a value on an acre of timber, a cunit of timber, or whatever, and we think that the wildlife people should be able to do the same in terms of moose population or deer population. What is it worth? What is this square mile of land worth in terms of recreation or wildlife, as compared to timber. The eventual decision may still be to withdraw it from timber production. Fair enough,

but at least the trade-off is known, and the different values will be known, and the people will know what they are paying to have that land extracted from timber production.

In Ontario at the present time, we are going through a process known as strategic land use planning, in which we are attempting to identify the various land uses and the capabilities on all the lands in the province. The various land users are stating what they believe their legitimate needs are, both by brief and in public hearings. The Ministry of Natural Resources will eventually have the final decision as to what lands are allocated for what purposes. We hope when this is finished, the situation will be much better than it is today, which, as I say, is not the greatest. As I mentioned, I do not have any easy solutions to the problems that we face, and I would like to hear comments from anyone in the audience who would care to offer some.

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