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**Socio-Economic and Environmental Analysis
in British Columbia Land Use Planning**

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1. Introduction

This paper reviews the methodology currently used for socio-economic and environmental analysis of land and resource management plans in British Columbia. The review has been done with specific reference to two examples: the Lillooet Base case analysis of Robinson et al (2001) and the multiple accounts assessment of two alternative developments plans (Enemark 2001). The sample base case and impact analyses were of great help in putting flesh on the bones of the procedures. The Lillooet example is itself a good one, involving most of the fundamental issues relating to competing resource values and uses, the difficulties of obtaining local inputs, commitment and consensus, and the impossibility of obtaining a single quantitative bottom line estimate of the net benefits of a resource development plan. I was more optimistic about the process after reading the sample documents. I could then see how their contents could help all parties to work toward mutually acceptable solutions, and facilitate the search for news ways to improve employment and efficiency for forestry activities while maintaining or improving the environment for other commercial and recreational users.

The rest of this report follows the guidelines I was given: answers to the four specific questions followed by general comments on the current methodology and possible improvements.

2. Answers to Specific Questions

2.1 Is the current methodology of multiple accounts analysis appropriate?

" Each of the multiple accounts captures important aspects and consequences of land use. This is appropriate, and should be maintained under any alternative system that may emerge.

- " One key problem with the multiple accounts is that there are presently few ways of making comparisons of outcomes in the different accounts, and often within the individual accounts. This is to some extent inevitable, as the values and revenue streams being assessed are highly subjective, and often relate to projects or uses that are options rather than fact or even firm proposals. That is in the nature of the problem of establishing frameworks intended to set the stage for future developments. This is true even within individual accounts, and inevitable as between them.
- " The idea of treating First Nations issues and concerns in a separate account is problematic, for two reasons. First, it invites the inference that First Nations concerns are not to be given much weight in the other accounts. Second, it exaggerates the extent to which First Nations and other interests are to be seen in conflict with each other. The Lillooet case study shows with great clarity that First Nations issues are central to every feature of the land use process, especially in regions where the First Nations population is such a large share of the total, and where their full collaboration and participation is essential for the long-term success of any land-use plan. The centrality of First Nations issues may be highlighted by the unsettled nature of land claims in the area, but would exist even if such claims were absent or long-settled.

2.2 Are there other more appropriate methods?

- " Consideration could be given to making First Nations issues more central to the first three accounts, reducing the number of accounts from four to three. This was essentially the case in the Lillooet example (Enemark 2001), where the centrality of First Nations issues is obvious. The same reasoning may be more generally applicable.

2.3 Can analysis be improved within plan area accounts?

2.3.1 Evaluating Plan Area Accounts: Economic Development

- " It is correct to distinguish net and gross employment effects. It is also necessary to consider the net effects on employment in the plan region, since presumably the primary reason for counting jobs in the plan area at all is to increase job prospects for those living in the region. To do this requires the additional step of asking how many of the direct or

indirect jobs would be filled by those hired from outside the region. It is a classic problem with resource development projects that those hired are likely to come from afar, increasing rather than decreasing income disparities within the affected region, especially if the newcomers push up local prices for housing, etc, in a situation where the pre-existing population ends up paying higher prices while remaining underemployed. The plan area accounts should attempt to estimate the extent to which the project developers are able and willing to design their projects to dovetail with the skills and other factor supplies in the region. The willingness and ability of developers to do this may depend on the industry and type of development. Smaller scale and greater diversity may often increase the likelihood of smooth transitions and greater use of local supplies of labour and other inputs. This all relates to the differences between migration and no-migration multipliers, but no set of two numbers will capture the richness of the alternatives to be considered.

" The usual methods used to generate local multipliers for employment are based on input/output coefficients. This may be more helpful in giving a cross-sectional snapshot of what a typical resource community looks like in its employment structure, but is of much less use for marginal analysis. The input/output coefficients are generally likely to be too high for the latter purpose, to an extent that depends on a number of other factors, including the attractiveness of the region to footloose ancillary industries, retirees, and so on, and on the perceived longevity of the project or resource.

" A related issue is to assess in more general terms the extent to which the elements of alternative plans involve synergies among different users or potential users of the plan area, whether for economic or non-economic uses.

" There is little explicit treatment of geography in the description of the procedures. I am thinking here of the need to consider how different development patterns affect the overall logistical efficiency of the region, and of the province as a whole. In particular, clustering of upstream and down-stream users can reduce the hauling and cross-hauling of intermediate products. This can lead to external effects beyond the direct costs falling on the buyers and sellers, since roads are typically not charged adequately for congestion effects, road hazards, and the especial risk in the transport of dangerous products. Looking ahead, if some waste products are likely to be require downstream processing in

the future, even if not now, then the opportunities for nearby treatment should be assessed before the fact. Waste dumps and long-distance haulage of toxic wastes are evidence of planning failure.

" There could also be more explicit consideration of the dynamics of development. It is no longer as simple as it may once have seemed to walk away from a mine site, or even a bush camp. Decommissioning costs, waste management, and the costs of supporting dependent communities once the main resource has been exploited, or has become uneconomic (or has perhaps never really been economic), should be considered at the front of the assessment process. This should not be taken to mean that at the end of a resource development all of the infrastructure needs to be demolished. Indeed, one of the main criteria for selecting among development plans can and should be the extent to which different phases of development are likely to mesh in a productive way. This requires an early assessment of the current and likely future attractiveness of the region for footloose occupations typified by the telecommuting knowledge worker, and increasingly by life-style conscious retirees. Between them, they may represent fodder for de-urbanizing population shifts that should be taken into account as land use plans are developed.

" When dynamics are being considered, there are two main issues: how to treat the adjustment costs, and how to combine the construction, operation, and post-operation phases. No general rules apply to the estimation of adjustment costs, while for combining the costs and benefits from different stages the key questions relate to the discount rate to be used. I shall deal with the issue here, where it is first relevant, but it applies equally, of course, in economic, social and environmental assessments at the plan area and provincial levels. For taking present values it is useful to consider adopting Feldstein's (1964) suggestion of splitting the social opportunity cost of capital from the rate of social time preference. The former is higher than the latter, and takes values of the order of 7% post-tax and 10% pre-tax, in real terms, while the rate of social time preference is surely much lower, perhaps on the order of 1 to 2%.

2.3.2 Evaluating Plan Area Accounts: Environmental Values Account

" The procedures emphasize, correctly in my view, the need to deal with spatial and

temporal scales, probabilities of adverse events, resistance and resiliency. It might also be worth taking reversibility explicitly into account. Resiliency generally relates to the ability of the environment to accommodate to changing circumstances. Reversibility relate to a special case, where negative effects are found that cause the activity to be stopped or reversed. When measuring the costs of this outcome, it is important to assess the ability of the environment to recover from the effects once the negative factor has been removed. (This is analogous to the measurement of the extent to which the damage of smoking to health can be reversed once the smoker has quit.)

- " It might also be useful to consider the precautionary principle more explicitly. Under this principle, caution is used in the resource management, especially when new technologies are being used, new types of terrain dealt with, and unprecedented changes in habitat are being considered. Slavish adoption of the principle could lead to nothing new ever being done; ignoring it can lead to large-scale accidents and wide-spread regret. The general corollary of an intelligent application of the precautionary principle is to encourage small-scale and diverse experimentation with new types of technology in advance of wider scale adoption. Careful calibration of the results of such experiments is essential if they are to be of use. In this context, to have different types of development in different plan areas, even areas with similar resource bases, can have positive scientific, social, and economic consequences, by permitting subsequent developments to learn from the richness of the preceding mix of successes and failures.

2.3.3 Evaluating Plan Area Accounts: Community Characteristics and Quality of Life

- " The listed items relate to population size, environmental values, local government revenues and services, social services, and community goals. These are all important, although they are not exactly on all fours with one another, and interact in complex ways. This may be endemic to the topic, and need not cause problems if the topics are thought of as a check list, and not as a complete set of distinct categories.
- " I deal later with governance issues more generally, but in the plan area they also need explicit treatment. To what extent does the local population take ownership of the plan, and to what extent are community members committed to making it work? If these conditions are not in place, then the plan is not likely to work well.

" Are the level and structure of community-level social capital (OECD 2001, Helliwell 2001) sufficient to take on the type and scale of developments envisaged by the plan? If not, what can be done to facilitate the development of community capacity, or to re-order developments until local participation is more likely to be fruitful? These issues are especially apposite in areas like Lillooet, where a large fraction of the population is aboriginal, with strong ties and claims to the land and local area. In plan areas more populated by footloose recent arrivals, planners can be more cavalier about envisaging a development that relies on newcomers for its success, or otherwise bypasses the interests of those currently in the community.

2.3.4 Evaluating Plan Area Accounts: Specific Aboriginal Concerns

" This is an add-on account, presumably intended as a place to evaluate any aboriginal concerns not otherwise taken into account. As the Lillooet example suggests, a relatively full analysis should already make these issues explicit in each of the other accounts. However, there may be other plan regions where such issues may fall by the wayside without the existence of a specific account. I would tend to think it should be an unused adjunct where the overall analysis reflected fully the land claims, land use, employment and social issues where and as they are relevant in the other accounts.

2.4 Can analysis be improved within the provincial accounts?

2.4.1 Provincial Economic Development Account

" The use of provincial level employment multipliers does not square very well with the revenue assumptions used for the provincial-level revenue and expenditure accounts. With respect to employment generation, I would repeat my comments above with respect to the plan area. In the case of the province as a whole it is even less likely that a development would lead to net reductions in provincial-level unemployment rates. The most likely exceptions are where projects and developments dovetail with other declining activities in the same region.

" In the absence of reductions in unemployment, any increases in direct and indirect

employment would be matched at the provincial level by some combination of increased labour force participation rates and immigration from elsewhere in Canada or from other countries. How should increased population be valued in the development account? It is traditional to treat bigger as better in development planning, but when a broader look is taken it is by no means clear that there are sufficient economies of scale to offset congestion and rent-sharing effects, so that population increases offer no promise of increases in average per capita net benefits for residents.

- " In the absence of some evidence supporting economies of scale, the evaluation of the development account could document the likely labour and population flows with no presumption necessary about the costs or benefits of population changes. The latter would be analysed as part of the calculations of net economic and social benefits to be discussed below.

2.4.2 Provincial Environmental Values Account

- " How does and should this account differ from that at the local level? What is being added here presumably relates to whose values are taken into account, recreational values for those living in other parts of the province, and some notion of province-wide measures of sustainability, diversity, and environmental balance. At the provincial level, it is easier to conceive of specializing some regions or sites to activities that would be unwise if undertaken simultaneously on a broader level. As the document notes, issues of endangered species take on different coloration at different levels of geographic aggregation. Local danger is not without importance, but it is much less likely to be damaging, and less likely to be irreversible, than species loss that covers much wider areas.

- " Application of the precautionary principle can favour attaching positive value at the provincial level to experiments or projects being undertaken on a limited scale in particular plan areas. This is done through direct or implicit estimates of the value of the knowledge being generated by the diverse experiments taking place across the province. This diversity cuts the risks of major damages, while providing information for better informed decisions about future plans and projects.

2.4.3 Provincial Government Finances Account

- " The emphasis in these calculations is on natural resources (including those responsible for tourism) and the direct government revenues they generate. This relatively narrow focus is appropriate, at least in the first instance, because it is easier to apply, and in any case is a necessary part of a broader analysis.
- " The concentration on direct resource revenues implies that the re-distribution of income and employment between industries and plan areas, and within Canada and the world, generates no externalities with quantifiable (net) consequences for the provincial revenue and expenditure accounts.
- " Concentration on the direct resource revenues also implies, unless adjustments are made for opportunity costs, that the resource is in unlimited supply. Since this is rarely the case, except for hydro generation and some agricultural uses, the provincial revenue accounts should take explicit account of the opportunity costs. In the case of mineral deposits, Hotelling-type calculations are the norm, while for forests the calculations need also consider the present values of future harvests. In both cases one faces the discount rate choice discussed above. I am inclined to favour the choice of a social time preference rate. This has the effect of adding caution to the mix, as it increases the present value of foregone future opportunities (relative to the use of a private opportunity cost of capital).
- " Especially in the case of large-scale oil and gas, or of high-quality mineral deposits, the issue arises of how to make current use consistent with sustainability. In the narrow sense, and especially in small plan areas, sustainable development and extraction on non-renewable non-recyclable resources seems to conflict with sustainability. However, on the larger canvas, sustainability may be defined, following Hicks, in balance sheet terms, by requiring that any current use does not make future generations worse off than they would have been in the absence of the use. In the case of jurisdictions with large but limited deposits of non-renewable resources, attempts to apply notions of sustainability have involved the creation of capital funds that channel current revenues into a fund to provide for perennial future incomes. Hennesson (2001) has surveyed the experiences of Alberta, Alaska, Norway and Nauru in this regard, producing a mixed and mildly discouraging assessment. In the Norwegian case, the pressures on the management of such funds have

been reduced by deliberately adopting a slow extraction pace, thus using the resource itself as an intergenerational smoothing device.

- " For British Columbia, long bedevilled by provincial spending pressures that follow the cycles of resource prices and development, there is also an argument for taking variable fractions of natural resource revenues into the general revenue account, and creating an endowment fund with the cyclically abnormal amounts. Consideration of the details of this go beyond the planning issues covered by this report. However, attempts to take some explicitly intergenerational approach would guarantee that opportunity costs of current developments are taken into account at the land use planning stage. As suggested above, taking these issues into account usually gives rise to an extraction path that is smoother and more extended than would flow from calculations based only on positive present values from immediate development.

2.4.4 Economic Efficiency of Resource Use Account

- " Here the emphasis is on estimating the effects of alternative plans on the net monetized benefits from all resources in the area (presumably this means the province, since are the provincial-level accounts).
- " I would be more inclined to head this section calculating the net effects , and make the monetized calculations one of the components rather than the only measure. After taking environmental issues seriously, one wants to avoid a bottom line that only gives them value to the extent they influence economic outcomes.
- " The discussion in the document recognizes that the scope of the analysis should extend far beyond the narrowly economic, and suggests using dollar equivalents for non-commercial values. That presumably implies that narrowly-defined economic efficiency is not the point of the exercise. Rather, the calculations and discussion in this section of the analysis are intended to draw together economic and non-economic values and objectives, preferably using imputed dollar values to do so.
- " On the basis of recent research (Helliwell 2002) I am inclined to think that it is now

getting more feasible to evaluate economic and non-economic outcomes in terms of their joint and separate effects on measures of subjective well-being. Such analysis can supplement more traditional, but inevitably narrower, attempts to use willingness-to-pay experiments in relation to environmental objectives. The combination may be necessary as well as desirable, since the methodology and data currently available for the cross-sectional and time-series evaluation of subjective well-being are not likely to be sufficiently fine-grained to incorporate different features of the physical environment.

2.5 How can the perceived problems be addressed?

- " Accept and encourage more diversity of land use patterns within larger land use planning areas. British Columbia, as the home of Canada's mountains, packaged in several different ranges, thereby has a dazzling range of local climates, growing conditions, scenery, and habitats for life of all sorts.

- " One of the perceived areas of concern was the apparent undervaluation of potential development in a number of areas (e.g. minerals and energy, tourism). My review has not suggested grounds for that concern within the guidelines themselves; whether this would happen in practice depends on the estimates made of the consequences of developments. My experience with specific project proposals is that they often over-estimate revenues and under-estimate costs; this may be a natural by-product of the enthusiasm required to design and stick with a major project. I have not found fault in general with the overall system of multiple use accounts, except where it may lead to an excessively fragmented view of the consequences of developments, and a resulting failure to see ways of meeting several objectives simultaneously.

- " I share some of the concerns about the use of the economic base model of development. I do see the value, on the basis of the Lillooet example, of describing the benchmark economy and communities in some detail. The difficulties arise chiefly in the use of average values to reflect marginal values for computing likely changes under alternative development plans. Sophisticated interpretation and a dose of salt are the best antidotes.

- " Some committee members are concerned that neither environmental or community values are adequately captured by the guidelines. These values certainly enter the accounting

framework, so the concern must relate to how they enter the overall cost/benefit assessments. If such assessments require market-based assessments of these values, then they are indeed unlikely to be captured fully unless the framework of analysis is broadened to relate to well-being rather than to a more narrowly defined measure of economic incomes or consumption. The methodology for making such assessments is still in its infancy, but the early results do suggest that many of the social and community factors, including measures of social capital and physical health, are of far greater importance to well-being than is implied by calculations that relate more narrowly to earning power. For example, living in a community where people generally think others can be trusted raises subjective well-being, in a typical industrial country, by more than moving five deciles up in the income distribution (Helliwell 2002)..

3. General Comments

" There is a need to confront trade-offs more explicitly. This is not because quantification of tradeoffs will make it possible to move to a single bottom-line estimates of costs and benefits. More importantly, and more productively, explicit recognition of how some activities may negatively affect others values and potential uses invites a second-round search for alternative plans and patterns of use that mitigate such conflicts. Indeed, examples I present later suggest that well-engineered mixed uses can sometimes be more efficient than single uses even when the results are calculated separately for the independent uses. Perhaps it will require more than the usual amount of luck and imagination to turn an initially perceived conflict into a situation with two-way positive externalities, but mitigation and damage avoidance are realistically typical possibilities. But this will not happen by accident. It requires that single-purpose users take the interests of other users directly into account at the initial stages of project design, not to meet the imposed standards of a review process, but out of genuine search guided by broader interests. This is clearly more likely to happen where those designing projects, and envisaging how multiple uses will either dovetail or clash with one another, share knowledge of and long-standing interests in, local communities and the local environment.

" The above analysis suggests not just the need to be explicit about trade-offs, but a wider need to pin-point and measure externalities, both positive and negative. Positive

externalities will arise in situations where there are complementary possibilities for multiple uses. Particular examples will arise where access provided for one purpose supports other sorts of use.

" To better apply the precautionary principle, it is necessary to consider the possibilities of reversibility, and of the likely chains of future use that are enabled or precluded by proposed current uses. It is important that these should be considered under alternative outcomes and scales of the currently proposed use. For example, if a mining community should face earlier than hoped-for mine shut-down, the costs of this are much less if there are alternative demands for the facilities that have been put in place.

" The previous points place high value on flexibility of use and response to changing circumstances and experience. Quantification of the value of flexibility is difficult, since its value in practice will depend on the nature and unknown distributions of events not easily foreseen.

" Issues relating to the scope and structure of governance need to be addressed. More specifically, although there is little detail about exactly who is to be making the estimates, and from whose point of view, there is a top-down flavour to the descriptions that suggests an overall plan designed in Victoria. There are some attractions to this, in that it can more easily establish and enforce conditions relating to overall provincial balance. However, the variety of resources and resource issues across the province and even within resource-use areas, is great enough to make province-level planning is limited use for establishing the specifics of resource use, and especially of joint resource use, within specific plan areas. Hence there is an immediate need to establish some sort of hierarchy of land-use planning, with broad indications of promising patterns emanating from the top combined with delegated responsibility to the community and regional level for innovation and evaluation of specific use plans. For example, I could imagine that sharply different forestry harvesting patterns and the nature and extent of related downstream activity would vary considerably from one forest region to the next, or even from one valley to the next. I was struck, for example, by the densely intertwined pattern of forest, agricultural and touristic land uses operating in Grindelwald, in the Bernese Oberland of Switzerland. Within a few hundred metres there are grazing cattle, actively harvested mountain woodlots, sawmills processing the logs for local construction, hotels,

restaurants and hostels. These diverse activities share the same networks of trails, rails, water supplies, mountain lifts and roads, all appear designed to operate with the minimum disturbance and maximum positive externalities to the other activities. The result is a mixed and efficient community with a striking degree of self-sufficiency combined with maintenance of very high (including the Eiger) scenic and life-style values. This is a working community that is all the more interesting and vibrant for its mixed pattern of mutually sustainable activities. Different towns, and different cantons, in Switzerland have different patterns of resource use, and no doubt different local mechanisms for ensuring that complementarities are created and conflicts avoided. Empirical studies of well-being in Switzerland (Frey and Stutzer 2000) suggest that those living in cantons with greater and more continuous local involvement in decision-making express systematically greater levels of satisfaction with their lives. This result is likely to flow from the established link between a sense of control and life satisfaction as well as from the likelihood that close at hand are better able to see and to seize opportunities, to appraise risks, to avert dangers, and to negotiate efficient compromises. There seem to me to be obvious implications for the design and application of land-use policies in British Columbia, which has an even larger and more diverse set of natural resources than does Switzerland. The quality of governance of Switzerland, as measured by the average of many survey and other measures collected by the World Bank (Kaufmann, Kraay and Zoido-Lobaton 1999) ranks at the top of the world table, slightly higher even than the Nordic runners-up, but Canada is close enough behind to make emulation a plausible strategy. Certainly a BC-oriented review of which land-use initiatives have worked and which have not in these comparable jurisdictions would be sure to provide some useful lessons.

" An example might be given of where top-down approaches to linking and trading off resource and community values may be unsustainable and inefficient. Pearse (2001, 16-17) has argued that linking Coastal forest licence tenures to the operation of specific mills has had the effect of raising costs unsustainably, delaying the adoption of more efficient log use, and ultimately threatening, through layoffs, closures, and logging shutdowns, the communities that the rules were brought in to support. It is likely that a more community based approach to management of the forest base would produce more variable patterns from one forest region to the next. More locally based management of forest tenures could better respond to differences in the sizes and preferences of the populations and the

nature of competing and complementary activities.

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