DISCUSSION OF COST BENEFIT ANALYSIS

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Revised February 1996

This paper presents a brief introduction to cost benefit analysis. This information is intended to describe the concepts involved and the basic choices which must be made in any cost benefit analysis. Silva's approach to cost-benefit analysis is explained.

A. INTRODUCTION

Cost benefit analysis tests the economic viability of an existing or proposed activity, and/or compares two or more ways of doing something. Because of prevailing social and economic structures, the standard of measure generally used is money. This leads to difficulties in establishing the worth of "unpriced values" such as scenery, clean air and personal happiness.

In a natural resources management context, cost benefit analysis involves subtracting the monetary costs of a development from the monetary value of all the benefits generated by the same development to obtain a net monetary benefit or cost for the proposed activity. "Benefits" or "costs" for various management or land use options for a particular area can be compared. Usually the method with the highest monetary benefit is selected by decision makers.

B. ETHICS OF ANALYSIS

A cost benefit analysis is based on a framework of assumptions and decisions. An analysis is a model of the interaction of economic, social and ecological factors in a study area. As with all models, a cost benefit analysis is only as good as the skill of the modelers, and reflects their personal biases and viewpoints. The combination of personal and/or institutional viewpoints which shape a cost benefit analysis model can be termed the "ethic" of the analysis.

Persons with a conserver ethic will tend to produce an analysis which places high value on the protection and the ecologically responsible use of natural and social resources. Diversity within biological, and social/economic communities will be stressed. The community will often be "locally" defined, e.g. local town or region.

A person with a short term profit/technology ethic will be influenced by an economic principle which states "dollars gained today are more valuable than dollars obtained tomorrow". Such an approach relies upon the belief that technology will overcome any social or biological/ecological problems which arise from human actions. The community is often defined as local town or region plus Vancouver or all of British Columbia.

These two hypothetical people/analysts would likely come to different conclusions given identical information.

C. VALUATION - MONETARY AND UNPRICED VALUES

Cost benefit analyses usually use monetary criteria to evaluate all considerations. This approach works well in traditional economic analysis where most factors can be easily quantified. For example an analysis of timber extraction can assign dollar values to logging costs, regeneration costs, soil degradation costs, log values, and commodity values.

However, when unpriced values are considered, the practice of valuing all inputs to a cost benefit analysis in monetary terms becomes unworkable. Factors with unpriced values include wilderness areas, pleasant views, pure water, spiritual values, cultural traditions, diverse gene pools and functioning ecosystems. Economists agree that these unpriced values have worth. However, their monetary value is difficult or impossible to establish, and these values are very open to personal interpretation.

The ethics of the analyst will have a large impact on the results of the cost benefit analysis when unpriced values are present in the study area. A conserver ethic will use unpriced values to offset or reduce short-term gains from developments which degrade these values. A short-term profit/technology ethic will largely ignore unpriced values, rationalize that technology can replace or repair damage to such values, and/or argue that similar “substitute” values can be found in other locations.

Silva uses a decision making matrix for cost benefit analyses wherein the impacts of various developments upon "unpriced values" are given a point rating. a “0” point rating means that an activity maintains or protects an unpriced value. Negative point values mean that an activity degrades an "unpriced value". Silva would usually recommend a proposed activity with the least negative point value for "unpriced values." Positive point values are not used, because they indicate that human activities can enhance natural, fully functioning ecosystems. Silva does not believe that any human activities can enhance fully functioning ecosystems.

D. TIMEFRAME AND DISCOUNTING

Time frame affects cost benefit analysis, especially with regard to natural resource development. In a simplified example, if an analyst chose to examine only the first three years of a timber management development, the analysis would be distorted because all the revenue producing activities would be included (logging, milling) but many of the costs (regeneration, surveys, protection, environmental damage) may be omitted.

Silva believes that the timeframe for cost benefit analysis of forest use should be theoretically infinite. We cannot, of course, achieve this standard, but the principle is important. Using such an approach, only ecologically responsible development is acceptable (i.e. activities where the integrity of the whole ecosystem is fully protected). Rejected are nonsustainable activities which degrade ecosystems, or those whose cumulative costs will negatively affect the future. Assessing costs and benefits over one timber management rotation is not acceptable. Cumulative degradation of the forest environment may occur over successive rotations, with large cumulative effects/costs in the future. These long-term costs need to be included in a cost benefit analysis.

Conventional cost benefit analyses discount all future costs and revenues to present value at a set interest rate. This reflects the business principle that money received today is worth more than money received in the future. The belief that a person, given the use of a sum of money for a year, can use the money to earn profits is the basis of this approach. Thus, maximizing today's dollars maximizes return on investment. If money cannot be quickly acquired profits will be lost. Discounting justifies this perception by calculating a reduced current value for all future income. The strictest interpretation of this concept would dictate that all forests should be liquidated and converted to dollars as quickly as possible.

Discounting biases all decisions to favor today's world. In this artificial system, small benefits today can outweigh large costs tomorrow. Therefore, decisions can be justified which are good for a few people today, but which may prove very costly for us, our children, human society, and for ecosystem functioning in the future. Many people agree that discounting is not at all suitable for analysis of forest resource developments, because forests are fundamentally necessary for human sustenance and because of the long time frames involved in forest management. Mark Wigg, an American forester, and ex-Forest Service silviculturalist, explains this viewpoint as follows:

> "Very few investments in forestry are worthwhile when based on an acre by acre economic analysis. If economists were in charge of forestry, we would not have forests in the future. Discounted at 4%, a forest worth $1 million in 200 years is worth only $392 today.
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> While studying forestry in Germany, I asked my instructor what discount rates they used. The forests in the region were managed on 250 year rotations - much too long to be economical. He replied that they did not use discount rates to evaluate forestry investments. He reasoned that over the last 100 years, the German mark has been reduced in value to zero three times, but his forests have never lost their value. He questioned why anyone would want to compare the real value of a forest to the artificial value of a mark at any particular time." (Forest Watch, January/February, 1989)

Silva argues that using discounting is unnecessary. Ecologically responsible cost benefit analysis expresses future benefits or future costs as though they are obtained in the current fiscal year. Without discounting, we believe that the future, either in terms of benefits or costs, is more fairly represented and protected. Silva further believes that "unpriced values" should be subjectively evaluated. This analysis should be considered in conjunction with dollar evaluations of benefits and costs in the decision making process.

Activities in forest management, such as timber yield or water production, are alleged to be carried out on a sustainable or even flow basis. This means that the production of relatively equal, annual amounts and quality of water, timber, etc. is anticipated. Thus, to be sustainable, today's use of renewable natural resources can not result in future costs which degrade tomorrow's benefits. For example, soil degradation as a result of current activities will degrade water quality and decrease timber yields in the future. This is not sustainable, but can be encouraged through discounting which reduces future benefits and costs to trivial levels. Discounting is, therefore, not appropriate for cost benefit analysis carried out with an ethic of true sustainability (i.e. maintaining the support system for all life). This is particularly true when considered from the standpoint of a local community which may absorb the social and environmental costs of a development, while many of the benefits accrue to nonlocal organizations.

The goal of sustainable resource development is to maintain an even, annual flow of benefits and costs over the long term. This cannot be achieved if today's benefits create tomorrow's costs. An undiscounted economic analysis of a single year, or decade, of operations of a truly sustainable development (i.e. an activity which has no large deferred costs which prejudice future benefits) should correspond to a conventional discounted analysis of the same operation. Only enterprises which transfer social/environmental costs to future generations appear more economically favorable in discounted cost-benefit analyses.

E. COMMUNITY STABILITY (REFERENT GROUP)

The choice of the community, or group of people, to which the cost benefit analysis will be limited is important. Are benefits which accrue to distant communities, or to corporations external to the local community, suitable compensation for costs incurred to the local community and the local ecology? Conventional cost benefit analysis indicates that costs to a local community may be outweighed by benefits to a distant larger community or returns to a corporation external to the local community. We feel that "distant benefits" should not offset "local costs" to communities.

This concept is closely associated with discounting. By liquidating forest assets, capital can be created for business to use in distant centers. Ecological and social costs from conventional forest management which are borne by rural communities are discounted. Then these "costs" are compared to the discounted benefits in both the rural community and urban center. With this approach the negative rural impacts can be shown to be compensated for or justified on a regional or provincial scale. However, the local people and future generations, who live in the forest which may be degraded by development, are not fairly compensated. Their economy, community life-style, and environment bear the majority of the costs with a disproportionately small portion of the benefits.

We believe that this is a mistake that incurs large social and environmental costs which are often ignored by people outside the affected local community. Over time these costs are cumulative across large areas like British Columbia, resulting in not only the degradation of local communities and ecosystems, but also in the degradation of regional communities and ecosystems. Eventually, this type of narrow economic analysis contributes to the

degradation of urban centres and entire political landscapes, like British Columbia. Silva believes costs and benefits to the local community/ecosystem where developments are proposed and occur must have priority over costs and benefits to distant communities or organizations.

F. COMPLETE ACCOUNTING OF COSTS AND BENEFITS

Cost benefit analysis must account for all costs and all benefits from a project in order to be valid. Whether or not this is achieved is dependent on the ethic and the skill of the analyst. As explained above, the full accounting of costs and benefits also is related to the time frame chosen as the limits of the analysis.

Omitting costs such as ecosystem degradation, damage to spiritual values, lost opportunities for non-timber forest uses (e.g. trapping, ranching, tourism), future employment losses, decreases in future timber productivity, visual esthetics, etc. from an analysis of large scale clearcutting would bias the analysis. These costs are real, and are attributable to the planned development.

Lost opportunity costs must be included in cost benefit analysis. Lost opportunity costs arise when something must be given up to gain something else. Trapping and tourism revenues become a lost opportunity cost when large scale clearcut logging takes place in an area.

An assessment of all costs and benefits can quickly lead to modification of forestry activities. For example, despite its higher operational costs, wholistic forest use is more economically viable than conventional clearcutting because it does not incur large costs to "other forest users" and provides more employment benefits per tree cut compared to conventional timber management. Silva incorporates all benefits and costs in our wholistic cost benefit analysis. "Non-dollar" benefits and costs are considered subjectively.

G. CONCLUSION

We believe that the principles outlined above form the basis for cost benefit analyses which result in selecting the most sustainable, ecologically responsible activities. This approach can be used to evaluate the current economy of any study area, and to model the effects of proposed developments such as wholistic forest use and conventional timber management on that economy.

The failure to carry out even conventional cost benefit analysis for timber management activities in Canada has resulted in many industrial timber management operations being subsidized by tax payers. Without valid cost benefit analysis, conventional timber management has foreclosed upon economically viable "non-timber" forest uses and ecologically responsible timber management, and resulted in extensive ecological degradation.

Written and Published by Silva Ecosystem Consultants Ltd., Winlaw, British Columbia, Canada