North Coast LRMP

Background Paper

An Updated Planning Process for the North Coast LRMP

Ministry of Sustainable Resource Management
Skeena Region

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BRITISH COLUMBIA

Table of Contents

Abbreviations

AM	Adaptive Management
C&I	Criteria and Indicators
DSS	Decision Support Systems
EBM	Ecosystem-based Management
GTT	Government Technical Team
LRMP	Land and Resource Management Plan
NC LRMP	North Coast LRMP
RA	Risk Assessment
SFM	Sustainable Forest Management

1.0 Introduction

1.1 Purpose

This paper explains how the North Coast LRMP will adapt the province's existing LRMP framework to accommodate a number of current and emerging resource management *"elements"*. These are concepts and new directions in resource management that can help ensure that the North Coast LRMP outcome is as good as it can be, and enjoys the widest possible support. Box 1 on the following page summarizes the elements.

1.2 Background

The Province's LRMP policy[1] sets the general direction for conducting the North Coast LRMP process. Within this general direction, there is flexibility to adapt the process to accommodate regional circumstances and needs. In the case of the North Coast, early consultations revealed a need to ensure that a number of specific resource management elements (see Box 1) are integrated into the planning process. These are in addition to standard LRMP requirements and procedures such as requirements to:

- work within established provincial policies,
- consider all resource values, and
- develop plan recommendations that are within the environmental capacity of the land and reflect a balanced mix of land uses.

To initiate technical discussions on how the elements could be integrated into the North Coast plan, the LRMP process managers and the government technical team (GTT) commissioned a series of technical background reports from consulting specialists. These reports, in addition to other key existing technical reports (see report list in Appendix 1), describe the individual elements and identify steps for implementing them in a planning context. A technical workshop was held in June 2001 with GTT members and various specialists to review and confirm how the elements could be combined into the LRMP process to define an "updated" planning process for the North Coast. Appendix 2 shows the key linkages among the elements.

This paper represents a synthesis of these efforts to-date. The information inputs, the special forms of analysis, and the planning products that have been suggested as necessary for implementing the elements in the North Coast LRMP are described at an overview level in

[1] See "LRMP Statement of LRMP Principles and Process" and other documents that establish BC's general policy and procedure for LRMPs — available at the Land Use Coordination Office website at www.luco.lrmp/home.htm.

this paper. For greater detail on suggested approaches for integrating the individual elements, refer to the relevant technical papers listed in Appendix 1.

Box 1 "Elements" to be Integrated into the North Coast LRMP

Ecosystem-based Management — This approach to resource management is being implemented in several jurisdictions as a new way to meet the challenge of sustainability. For the North Coast, numerous stakeholders and First Nations have requested that the LRMP be based on principles of ecosystem management. In April 2000, the provincial government signed a protocol with several First Nations on the Central and North coasts and the Haida Gwai that commits the province to implement ecosystem-based management in the North Coast LRMP. Ecosystem-based management is aimed at ensuring the long-term co-existence of healthy, functioning ecosystems and human communities. Implementing it involves analyzing environmental information to assess threats to ecological integrity, performing risk assessment (see below) of alternative management actions, and incorporating adaptive management strategies (see below) in response to uncertainty.

Risk Assessment — This is a procedure that is being applied broadly in planning and decision-making for natural resources. Risk assessment is especially valuable when making decisions for resources with a high degree of uncertainty. The technique involves estimating the likelihood and magnitude of undesirable impacts (risks) from alternative resource management actions. The former Ministry of Environment, Lands and Parks recently completed a handbook for environmental risk assessment, which they propose for implementation in new planning and decision-making processes. Risk assessment can also be applied to social and economic values.

Criteria and Indicators for Sustainable Forest Management — Criteria and indicators are standards for defining and measuring sustainable forest management (SFM) performance. The province is participating in a series of initiatives to define and implement criteria and indicators. Established criteria and indictors can potentially be used in the LRMP process to identify SFM objectives and measures for monitoring SFM.

Adaptive Management — This is a proactive and systematic approach to managing uncertainty about the consequences of alternative resource management actions. Adaptive management is being applied in several places in BC and elsewhere. It is characterized by small-scale management experiments in the field to answer questions about cause-effect relationships. The learning that results from experimental trials is incorporated into future management decisions.

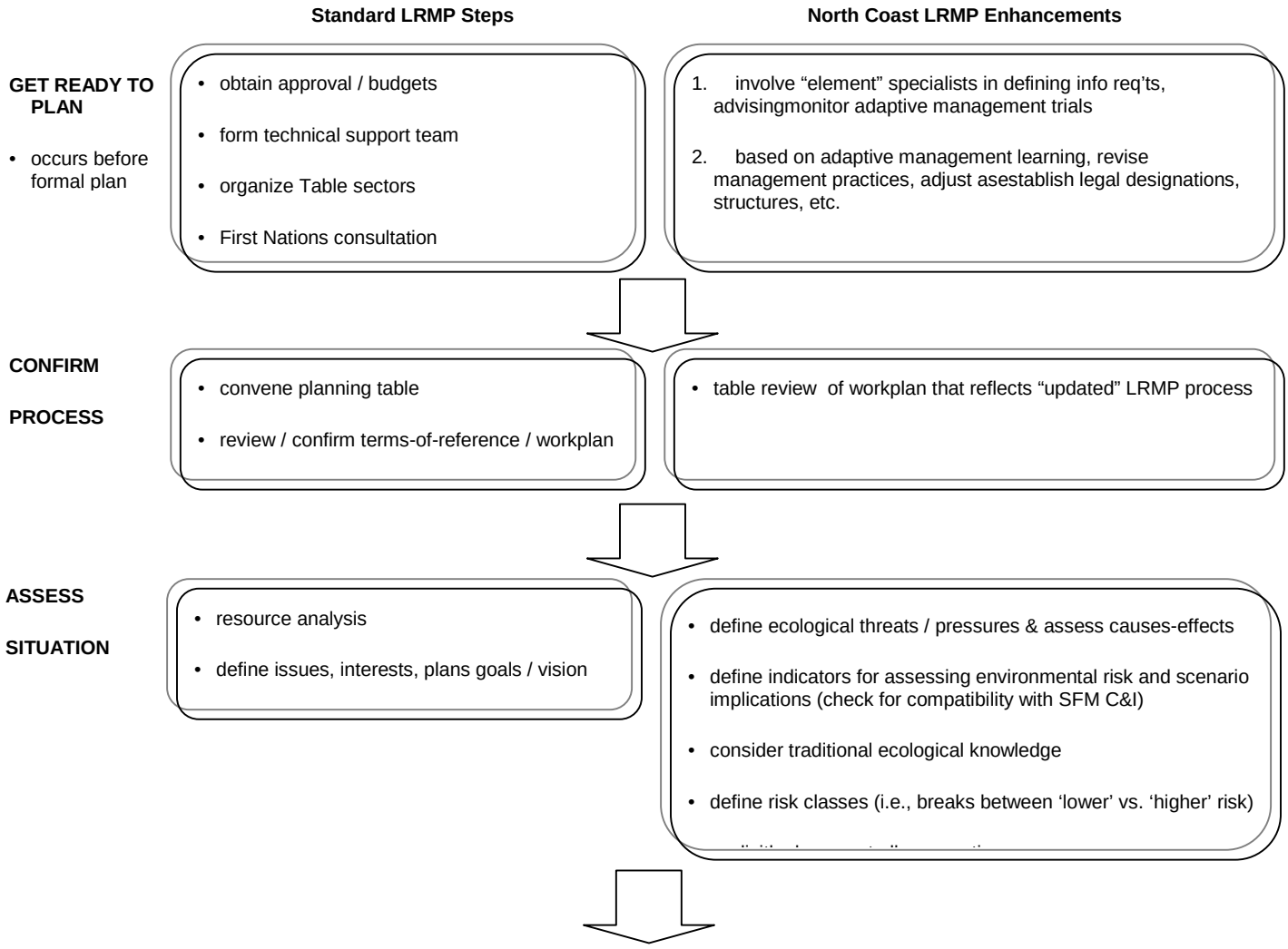
Decision Support Systems — Government, academics and the private sector have all undertaken significant work in recent years to improve the ability to analyze the potential ecological, social and economic implications of land use decisions using decisions support systems. Both government staff and stakeholders have determined that analyses for previous LRMPs have been weak in some areas, and have suggested that the North Coast LRMP can make better use of new decision support tools such as "spatial models".

Enhanced Socio-economics— Some past LRMPs have been criticized for paying too little attention to social and economic issues. For the North Coast LRMP, it is being suggested that information and discussion on socio-economic context and issues in the North Coast LRMP be better developed and brought into the planning process earlier. Initiatives will be aimed at summarizing economic opportunities and barriers, defining economic goals and holding community forums to develop an economic vision for the area. There will be focused evaluation of socio-economic implications of plan scenarios, and identification of strategies for economic development / diversification and the maintenance of community stability.

Forest Certification — Provides independent verification that a forest area is being managed according to sustainable forest management standards, as set by a forest certification organization. Although forest certification is normally a private arrangement between a licensee and a forest certification body, a LRMP can potentially facilitate successful and efficient certification. This could be achieved if a LRMP promotes sustainable forest management practices.

The following sections provide further detail on the key characteristics of the elements in Box 1 and describe main ways for accommodating them in the North Coast LRMP process. These discussions are summarized in Figure 1.

Figure 1: North Coast LRMP — Planning Actions*



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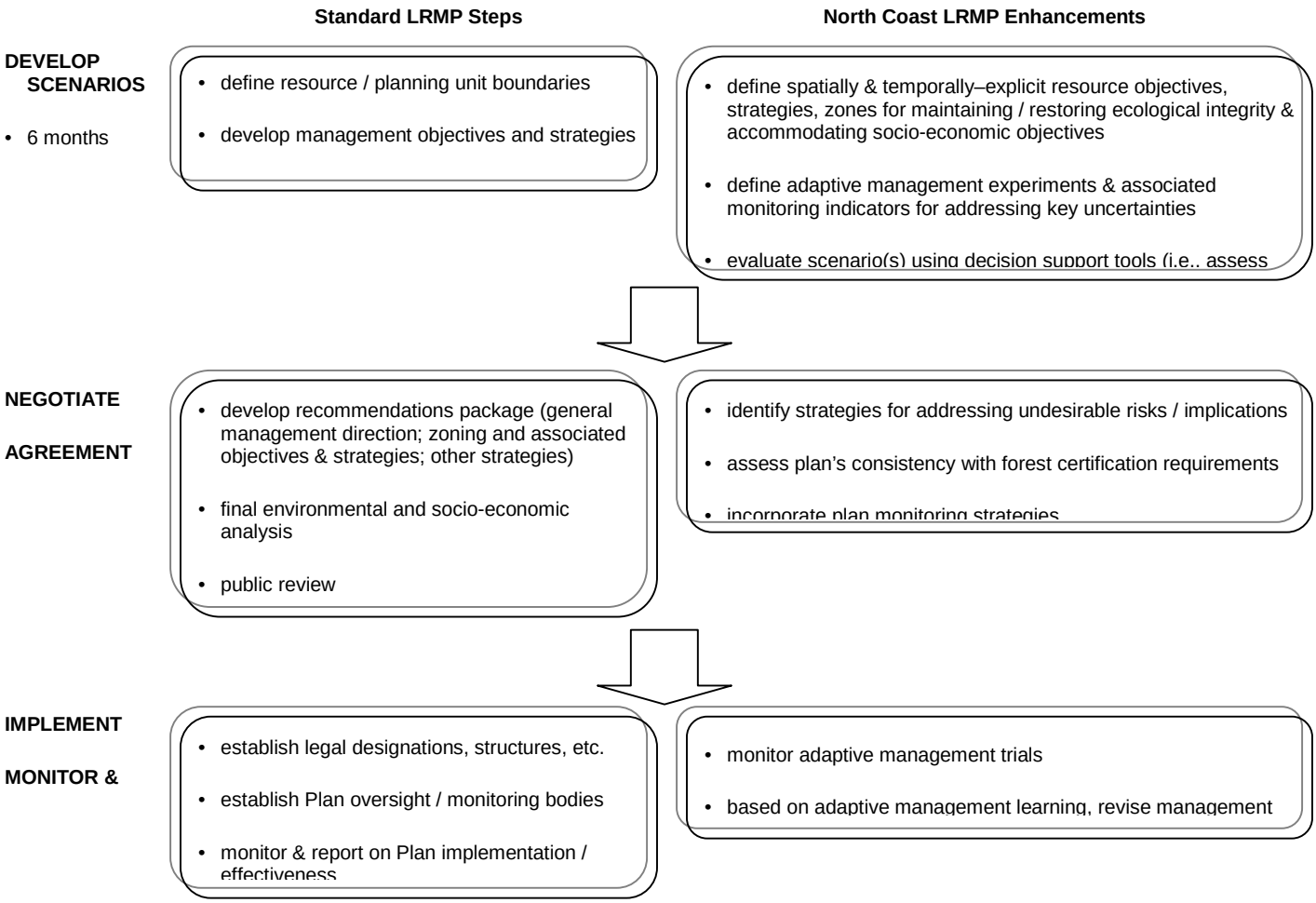

***NOTES:**

(1) "Standard LRMP Steps" column indicates the steps that are normally followed in the LRMP process. The "North Coast LRMP Enhancements" column identifies steps that are required to implement the "elements" described in Box 1. All steps in both columns combined represent the "updated" and integrated planning process that is proposed for the North Coast.

2.0 North Coast LRMP — Main Process Phases

The proposed North Coast LRMP process envisions six main phases that would be delivered over a two year period. These are shown in Figure 1 and summarized below. The six phases parallel the standard LRMP phases and allow opportunity for integration of the elements in Box 1 to enable an "updated" LRMP planning framework for the North Coast.

Get Ready to Plan — occurs primarily in the months leading up to formal initiation of the Planning Table. Delivered primarily by government staff, it focused on collecting information, preparing technical planning tools (e.g., GIS, decision support models), and organizing planning participants / sectors.

Confirm Process — is undertaken in the first one or two Table meetings. This phase primarily involves the introduction of participants to each other and to the process design. The process terms-of-reference, ground rules and workplan are reviewed and confirmed.

Assess Situation — involves a substantial amount of technical and background work that is required before land use alternatives may be considered. It is at this stage of the process that Planning Table participants familiarize themselves with the landbase and its values. Key issues are identified that the planning process will address. These may include pressures on ecological, social and economic values and associated risks, as well as unrealized opportunities. With the issues defined, the process can develop a range of goals that the plan will set out to achieve. Goals will normally reflect the stated interests of Planning Table members. Indicators for assessing the extent to which plan goals are achieved under alternative land use configurations are identified. This stage may also involve filling some information gaps and refining the tools that will be used to evaluate alternative management options.

Develop Scenarios — is where Table participants, supported by government technical resources, use technical information to develop land use "scenarios" that are capable of achieving the plan goals. A scenario is a draft statement of how lands and resources in the region will be managed in the future. Scenarios are usually represented by zoning maps and associated statements of resource management objectives and strategies. *Objectives* express the "desired future condition" for resources within the zones, and *strategies* identify how those conditions will be achieved.

Strategies could include a wide variety of management actions and commitments including: measures for achieving ecosystem-based management; adaptive management projects designed to address key uncertainties that the process has identified; approaches for maintaining cultural values; mechanisms for securing access to resources for industrial development, etc.

This phase also involves an evaluation of the projected ecological, economic and social consequences of the draft scenario. Ecological risks and social and economic impact

information are generated and provided to the Table as a basis for negotiating scenario refinements, or preparing an entirely different scenario.

Negotiate Agreement — represents the final phase of active Table involvement in plan preparation. Negotiations centre on completing and documenting a comprehensive land use plan. Goals, land use zones, objectives and strategies are refined and confirmed; implementation measures are defined; and monitoring indicators and methods are decided. The government team prepares a final written plan document / maps for Table review and endorsement. If there are issues / locations where full Table agreement is not possible, options are developed for government consideration. The final plan document is submitted to government for approval.

Implement, Monitor and Amend Plan — this final phase occurs following plan approval by government. Implementation may occur through the establishment of various legal land use designations (e.g., protected areas, higher level plan designations under the Code). Implementation may also involve the delivery of process-oriented plan commitments such as the completion and implementation of adaptive management experiments, or requirements to prepare more detailed resource management plans for localized areas.

This phase also involves periodic monitoring of government's efforts to implement the plan's provisions (implementation monitoring), and longer-term, ongoing monitoring of how well the plan is achieving its goals and objectives (effectiveness monitoring). The plan is reviewed and revised on the basis of monitoring results. A public oversight committee, normally comprising Table members, is often involved in plan implementation and monitoring activities.

3.0 Elements to be Integrated into the North Coast LRMP

This section describes the seven elements that will be integrated into the standard LRMP process to enable an "updated" and comprehensive planning framework for the North Coast. Each element is described and key actions are identified for how the element may be integrated into the planning process at a technical level.

3.1 Ecosystem-based Management

Much literature on Ecosystem-based management (EBM) has appeared in recent years as the concept gains prominence as an approach to sustainable resource management. Although there are many definitions and interpretations of it, EBM, in short, is a resource management approach for ensuring the coexistence of healthy, fully functioning ecosystems and human communities. It aims to avoid unsustainable "boom and bust" cycles, and is predicated on the logic that sustaining nature in the long term will sustain humans in the long term.

A key goal is to adopt resource management policies and land use plans that maintain "ecological integrity". This is achieved keeping ecosystems' natural processes intact, or

restoring these where they have been degraded. So, for example, an EBM land use plan might identify specific resource management strategies for maintaining or restoring: nutrient cycling, energy flow, hydrological patterns, natural disturbance patterns (e.g., fire), vegetative succession, and predator-prey relationships. Social and economic objectives are also an integral part of an EBM approach.

The Central Coast LRMP has agreed in principle to implementing ecosystem-based management and their deliberations provide an important reference point for the North Coast LRMP Table. The Central Coast definition of EBM is

> *"a strategic approach to managing human activities that seeks to ensure the coexistence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics and processes of whole ecosystems such that component species and human social, economic and cultural activities can be sustained."*

Overarching EBM principles that have been adopted for the Central Coast LRMP are listed below. The Central Coast has also adopted more specific ecological and socio-economic principles, and principles for recognizing First Nations interests and rights in the planning process. This definition and the principles have been used in technical preparations for the North Coast LRMP process.

Central Coast LRMP – Overarching Principles of EBM

- Healthy, fully functioning ecosystems provide the basis for sustaining communities, economies, cultures and the quality of human life; therefore, ecological sustainability is fundamental to land and marine management.
- Empowered and healthy communities play a leadership role in sustaining healthy ecosystems, cultures and economies.
- Focus planning on the needs of the ecosystems and the values that you want to maintain.
- Planning should be done over ecologically and economically relevant time frames and involve regional, landscape and site scale planning.
- Incorporate the best of existing knowledge (e.g., traditional, local and western science) into planning and decision-making.
- Knowledge of natural processes and human interactions is incomplete and inherently limited, and decisions made in the present can pose unacceptable risks for the future. Apply the precautionary principle and practice adaptive management in decision-making. Monitor the consequences of decisions and adopt a learning approach to planning.
- Maintain natural, social and economic capital in the region and preserve the full range of options for future generations.
- Respect individuals, communities of interest, including businesses, and cultures.

The challenge in implementing EBM in a strategic land use planning process is determining how much emphasis will be placed on resource management strategies to maintain and restore ecological integrity, relative to strategies for achieving social and economic objectives in the short term. This challenge of balancing and reconciling competing goals is, however, not new to planning processes; in fact, this is a primary task of a planning process. What is important for enabling EBM in the North Coast LRMP process is to ensure that the right kinds of information on ecosystem attributes and functions, and critical thresholds of ecosystem integrity, are brought explicitly into the planning process. Also, the right kinds of technical analysis must be conducted so that complete information is available on options for achieving regional-level ecological integrity while maintaining social and economic stability, and so that the ecological and socio-economic risks of the options are clearly understood. The availability of sound scientific and technical information will provide a proper basis for Table recommendations on how EBM principles will be interpreted and delivered through the North Coast LRMP.

Implementing EBM in the North Coast LRMP

A number of important technical planning steps are needed to apply EBM principles in the North Coast LRMP process – see summary in Box 2.

Box 2 Key Actions for Implementing Ecosystem-based Management in the NC LRMP

- Collect ecological information (e.g., ecological boundary mapping, forest cover, selected species populations and habitat mapping, natural disturbance regimes, etc.).
- Collect information on regional / local economy and social structure.
- Identify pressures to ecological integrity (e.g., rare and endangered species, ecosystem under-representation, ecosystem elements of concern, cumulative impacts, etc.).
- Identify factors that contributed to social and economic health in communities.
- Define ecological "baselines" (e.g., historic range of natural variability, habitat requirements for selected species, water flow requirements, etc.).
- Define risk assessment indicators.
- Develop resource management alternatives that address identified issues / pressures.
- Evaluate ecological risk of alternative management strategies (using pre-selected indicators).
- Monitor approved plan and adaptive management trials (using pre-selected indicators).
- Adjust plan on basis of monitoring results.

A first requirement is to collect enough information to understand critical ecosystem components. Information is needed on such things as: ecological boundaries (e.g., biogeoclimatic zones, sub-zones & variants); current patterns of forest cover (e.g., forest age distribution, patch sizes); populations and distributions of selected species; the quality and distribution of key fish and wildlife habitats; and the historic patterns of natural disturbances (e.g., fire cycle). Information is also needed on ecological pressures in the plan area. Examples could include: species, populations or habitats that are rare, threatened or endangered; ecosystems that are currently under-represented in protected areas; or, the identification of external threats and potential cumulative impacts arising from different land use sectors.

Once the required information is in place it must be analyzed to focus planning discussions on the main ecological issues. The process proceeds to identify and assess risks that are inherent in alternative management strategies for addressing the issues. Risk is basically determined by assessing how "far away" a management scenario takes us from the natural state. So, for example, if a forest management alternative is being considered that would, in time, result in a vastly different forest age class distribution compared to the natural condition, then that alternative may be rated as a "high risk" management alternative.

Based on iterative evaluation of alternative management strategies a variety of resource management approaches may be incorporated in a proposed land use plan scenario, such as those below, in efforts to minimize risks to ecological integrity:

- identification of relatively large protected areas for maintaining natural ecological processes,
- identification of smaller protected areas for maintaining rare or critical ecosystems,
- strategies outside of protected areas for maintaining or restoring key habitats or critical ecosystem components (e.g., riparian shorelines) and connectivity opportunities,
- adaptive management strategies for addressing uncertainty about the long-term effects of particular management practices on ecosystem components; etc.

Similar risk assessment approaches are undertaken for socio-economic objectives where risk indicators might include measures such as harvest or employment levels. Various strategies for minimizing socio-economic risks may be incorporated into the LRMP such as zoning appropriate areas for intensive silviculture, or proposing broader economic diversification strategies for the plan area.

Implementation and monitoring of an approved land use plan – the final phase in the standard LRMP process – are additional requirements for EBM delivery. Plan implementation occurs primarily when government establishes various legal land use designations to effect the plan's direction (e.g., protected area or Forest Practices Code designations). Plan implementation also occurs through subsequent, more detailed landscape unit and operational planning that must be consistent with the broader LRMP direction.

Monitoring ecological integrity and socio-economic indicators provides a basis for knowing if the plan's EBM objectives are being achieved, and for learning from any adaptive management strategies that have been implemented under the plan. Monitoring results are use to re-evaluate and, where appropriate, revise plan strategies for achieving EBM.

3.2 Risk Assessment

The above description of EBM refers to the need to evaluate the ecological risks that are associated with alternative land use plan scenarios, as a basis for helping planning participants arrive at a recommended land use plan. The idea of risk assessment (RA) stems from our inability to fully comprehend causes and effects. Ecological, social and economic systems are too complex to really understand the implications of any land use plan that we may create. The best that we can do is to understand the risks that are inherent in alternative courses of action – risks of foreclosing ecological, economic or social options – and take steps to manage risks. A LRMP approach that incorporates RA acknowledges basic uncertainty by taking specific steps to address it in the planning process.

RA requires an evaluation of two separate but linked components: likelihood and consequence. Firstly, what is the projected likelihood of loss or damage occurring to an ecological or socio-economic value as a result of a particular management action (e.g., removing x% of forest cover in a given area within a specified timeframe, or preventing access to mineral exploration / development in a particular area?) Secondly, what is the projected magnitude of the consequence (i.e., how big is the potential damage or loss?)

If both the likelihood and consequence of an alternative management action are estimated to be low, then the risk may be considered low. Where both likelihood and consequence are predicted to be high, then the risk is similarly high and the option may be considered to be high risk, regardless of the benefits. Alternative management actions or land use scenarios can be ranked – lower to higher – according to their level of ecological or socio-economic risk. Risk assessment results are made available to planning participants or decision-makers as part of plan scenario evaluation.

Although some amount of perception and subjectivity are inevitably part of RA, its benefit lies in a structured and disciplined approach to support decision-making.

Implementing RA in the North Coast LRMP

Main tasks required to implement RA in an LRMP process are summarized in Box 3. Note the close parallels between RA and EBM actions; in fact, risk assessment is considered to be an essential element of EBM.

Implementing RA in a LRMP context first requires creating the building blocks that are needed to conduct the assessment. For ecological values this entails identifying the particular ecological values that will be assessed for risk, and identifying the "benchmarks" that will be used for risk comparison purposes.

For example, in the case of "feature" wildlife species (such as grizzly bear, wolverine, woodland caribou, mountain goat, moose and deer) it may be possible for ministry biologists to estimate the natural levels of habitat that were (or continue to be) available for these species. This becomes the "low risk benchmark" against which alternative habitat supply levels may be compared. For example, a scenario containing resource management strategies that provide high quality grizzly habitat (e.g., through access restrictions, reduced forest fragmentation, etc.) may be rated as lower risk than scenarios that place less emphasis on strategies for grizzly habitat conservation.

Box 3 Key Actions for Implementing Risk Assessment in the NC LRMP

- Assemble baseline ecological information.
- Identify environmental values affected by land management strategies (e.g., ecosystem components that are under pressure).
- Identify indicators for use in evaluting risk (i.e., indicators that relate to the pressures).
- Define low risk "benchmarks / thresholds" for the indicators (e.g., historical range of natural variability, habitat requirements for selected species).
- Define risk classes (i.e., logical breaks for defining lower risk vs. higher risk).
- Assess environmental risk of resource management alternatives (i.e., the base case and land use plan scenarios) – by comparison to the low risk "benchmarks / thresholds".
- Identify risk reduction strategies in the form of iterative land use plan scenario amendments.

A key requirement for environmental risk assessment is to obtain the necessary information / mapping that will allow a technical risk assessment of the resource values that are selected for analysis. In addition, criteria are required for deciding the logical breaks between risk classes — i.e., for deciding when a predicted change in an environmental value, as a consequence of a particular management action, is considered to be lower versus higher.

RA for social or economic values could be approached in a similar fashion. It may be, however, that predicting and reporting on the major socio-economic implications of alternative plan scenarios using conventional analytical tools (e.g., multiple accounts analysis) is preferred over a RA approach. For example, reporting on the employment or taxation consequences of a draft plan scenario using absolute numbers of jobs or dollars provides a concise and well-understood representation of predicted impacts. Interpretation of quantifiable measures into non-quantitative, subjective risk measures may be less valuable for socio-economic issues than it is for ecological values where accepted, quantifiable measures do not exist.

RA, whether it is for ecological and / or socio-economic values, will be performed at the LRMP stage where alternative plan scenarios are being evaluated including an evaluation of current and projected land management that would occur in the absence of a plan.

Once performed, RA results can be consolidated with other scenario evaluation information and provided to the Planning Table, as a basis for moving forward in their land use negotiations.

3.3 Criteria and Indicators for Sustainable Forest Management

Work at international, national and local levels has been underway for a number of years to develop a common understanding of what is meant by "sustainable forest management" (SFM). For example, the Canadian Council of Forest Ministers' Criteria and Indicators initiative defined a comprehensive suite of SFM criteria and indicators (C&I) for the purpose of enabling a periodic national assessment of progress towards SFM, and to guide the development of domestic SFM policies.

Criteria are broad goal statements. Indicators are means of tracking the achievement of criteria. An example of a SFM criterion might be, "maintain or restore viable populations of all native species". A related indicator might be, "amount of habitat that is available for species at risk".

The main value of having SFM C&I available to an LRMP process is that they represent widely-vetted and accepted definitions of SFM standards. Using these C&I in the LRMP process to help define appropriate goals and indicators for measuring progress towards plan goals could help make the LRMP process more efficient and effective.

Implementing C&I in the North Coast LRMP

Box 4 summarizes main ways that SFM C&I may be integrated into land and resource management planning.

Box 4 Key Actions for Implementing Criteria & Indicators in the NC LRMP

- Consider / adopt existing SFM criteria when developing a plan area vision / goals.
- Consider / apply existing SFM criteria when developing land use plan scenarios (i.e., resource management zones, objectives, strategies).
- Consider / select existing SFM indicators for evaluating the merits of alternative land use plan scenarios.
- Consider / select existing SFM indicators for monitoring and reporting on LRMP effectiveness (i.e., post-implementation plan monitoring).

C&I can relate to a LRMP process in several ways. The first is where the planning table identifies goals for the plan area and applies them when developing land use plan scenarios. Reviewing and selecting existing SFM goals (criteria) could make the goal definition exercise far easier. And, when land use scenarios are being prepared, existing SFM criteria and indicators can guide the development of area-specific resource management objectives and strategies.

A second way that C&I may be integrated into the planning process is when planning participants are assessing the potential implications of plan scenarios. To do this, assessment indicators are needed to evaluate the extent to which scenarios will achieve plan goals. Reference to existing SFM indicator lists could assist the indicator selection process. For example, a plan goal might be to "conserve biological diversity", and a SFM indicator might be the "distribution of forest age over time"[2]. Once a land use scenario is developed, it could be evaluated using decision support systems (see section 3.5 below) to identify the future forest age class distribution that would occur under that scenario at various times in the future. This result could then be compared to other scenarios, or to age class distribution "benchmarks or targets", to determine how well the scenario could be expected to achieve the goal of biodiversity conservation.

A third place where SFM criteria and indicators may be employed is during LRMP monitoring. Post-implementation plan monitoring entails periodic measuring and reporting on various environmental or socio-economic indicators to determine the extent to which plan goals and objectives are being achieved. Having an existing set of SFM indicators available can make the process of selecting effectiveness monitoring indicators more efficient. The above example of forest age class distribution is the type of indicator that could be used for long-term monitoring of a plan's effectiveness in achieving biodiversity conservation. To choose an example of a social SFM goal — "to ensure an equitable distribution of benefits

[2] Both of which are accepted SFM C&I.

from forest management" — a monitoring indicator could be selected that measures the extent to which Aboriginal communities in the plan area participate over time in forest management activities.

3.4 Adaptive Management

Adaptive management (AM) is a proactive and systematic approach to managing uncertainty about the consequences of resource management strategies. AM may be implemented in either a "passive" or "active" manner. *Passive* AM would involve post-implementation monitoring LRMP outputs / outcomes in order to determine if a plan's strategies are "working" to achieve the defined plan goals. In contrast, *active* AM involves actively generating information by deliberately designing management experiments for testing alternative management strategies in selected locations in the plan area. The experiments and the associated monitoring of key indicators are aimed at learning which strategies are more effective. Policies and practices are then "adapted", based on lessons learned.

Active adaptive management experiments are usually thought to be most efficient where:

- there is substantial uncertainty, typically manifest as indecision or disagreement over the best way to reach a specified goal or objective. i.e., there is no clear "best" management strategy, and the risks or costs of applying any one management strategy everywhere on the land base are unacceptably high;
- the uncertainty falls within the scope / jurisdiction of the LRMP to address (e.g., uncertainty about the impacts of global warming would not be within the Table's mandate to try resolve);
- the uncertainty can't be resolved by other more cost-effective means (e.g., upgrading an existing resource inventory);
- it is impractical or too risky to postpone management decisions until formal research addresses the uncertainty;
- it's possible to apply principles of good experimental design;
- the results of the experiment can be applied more widely;
- the risk of an undesirable outcome from the management experiment is acceptable (i.e., impacts are reversible, only affect a small area, or do not impose unacceptable costs).

Implementing Active AM in the North Coast LRMP

Proposed actions for implementing active AM in a strategic land use planning process are summarized in Box 5.

Box 5 Key Actions for Implementing Active Adaptive Management in the NC LRMP

- Where uncertainties arise, apply the following "decision tree" questions: (1) is the uncertainty within the scope / jurisdiction of the LRMP? (2) is an active AM experiment the best option for resolving the uncertainty?, (3) is it possible, practical and worthwhile to design a management experiment?
- Where active AM is identified as a suitable approach, design an AM experiment (i.e., clarify assumptions, develop / compare alternative experimental designs, develop detailed AM plan).
- Incorporate the AM trial as a strategy in the LRMP, or recommend that AM experiments be conducted at a lower planning level.

AM could be approached in a LRMP in a few different ways. One approach could be to identify uncertainties during the LRMP that would be addressed through AM initiatives at a subsequent, more detailed planning process. For example, if an uncertainty was identified during the LRMP process about how grizzly bears respond to human interaction, then a landscape unit planning process could define an adaptive management experiment to test the merits of alternative strategies for managing human interaction with grizzly bears. The LRMP would define the uncertainty issue and advise how to approach it at a more refined planning level that has the advantage of being more technical in nature.

Another approach for implementing AM in the LRMP process would be for the LRMP itself to define one or more AM experiments to address scientific uncertainties that the Planning Table and the government technical team identify as warranted. For example, if there was uncertainty about the habitat requirements of caribou, the LRMP may identify geographic areas where different habitat management practices would be applied. These practices would be implemented and monitored as part of overall LRMP implementation and monitoring activities.

Regardless of the approach that is followed, a key challenge in implementing AM in a LRMP setting is being selective in defining active AM experiments. Disagreements on resource management approaches are normal in a multi-party planning process. The fact that disagreements emerge should not necessarily be taken to mean that active AM experiments are always warranted.

3.5 Decision Support Systems

Information on land and resource values and human uses of resources enters every phase of the LRMP process. It's easy to become overwhelmed by information in a LRMP – the challenge is to be highly selective in the information that is collected and how it is used. Decision support systems (DSS) help address the complexity of the information and issues and provide additional rigour to the analysis process for the LRMP.

Decision support systems include a range of analytical tools, ranging in complexity from qualitative judgement by experts to complex mathematical models. Computerized,

mathematical models are a key component of DSS, allowing the government technical team to assess the long-term special and temporal implications of planning scenarios proposed by the Planning Table. Models express a quantified relationship between a set of inter-related factors. They provide a simplified picture of the workings of the larger system. If a change is made to one or more of the model's inter-related factors, the resulting effects can be measured.

For example, SELES[3], the landscape modelling program that will be used in the North Coast LRMP, simulates the dynamics of the forest. When the Table develops a land use scenario that includes strategies for forest management, the implications of that scenario for defined forest components can be assessed. Depending on how the model is constructed, a model "run" could tell you how much young vs. old forest might occur under the scenario at various times in the future. This would allow biologists to estimate the amount of ungulate habitat that would be available under the scenario, and assess the potential implications in terms of population viability and risk.

DSS may also include other (non-modeling) ways of providing information on the implications of alternative land use scenarios. For example, GIS generated statistics about land and resource area and precentages can be interpreted using expert opinion to identify implications.

Refer to Tab 7 (LRMP Information and Analysis) in the North Coast LRMP Participant Handbook, for a more complete description of how information / analysis will be employed in the North Coast LRMP process.

Implementing Decision Support Systems in the North Coast LRMP

Approaches for implementing DSS are summarized in Box 6.

Box 6 Key Actions for Implementing Decision Support Systems in the NC LRMP

- Collect / integrate spatial resource inventory information into a GIS.
- Anticipate the questions that will require answering in the planning process.
- Develop spatial models that are capable of answering the questions.
- Document all modeling assumptions and uncertainties, and vet these with the Planning Table.
- Use models to help develop alternative land use scenarios.
- Analyze implications (environmental, social, economic) of alternative land use scenarios using models and GIS-generated statistical information.

The first tasks in model building are to clarify the questions that need answering, and to define the inter-related factors that affect the ability to answer the questions. Uncertainties and assumptions about cause – effect relationships need to be documented. Model building can be done by government technical staff during the "Get Ready to Plan" phase (see Figure

[3] SELES = Spatially Explicit Landscape Events Simulator

1), but it is important for the conceptual model design and the inherent assumptions to be vetted and possibly refined by the Planning Table to ensure acceptance of model results.

The main LRMP phases when decision support models are used is when the Table develops and evaluates land use plan scenarios (see Figure 1). Models will allow Planning Table participants to engage in "gaming" (i.e., trying out different management approaches to see how they play out over time.) The models will also allow detailed assessment of the short- and long-term implications of final plan scenarios. They can be particularly important for enabling risk assessment of the alternative scenarios.

Integrated, spatially-relevant decision support models for the North Coast district will be developed for biodiversity, grizzly bears, minerals and timber economics. These four topics were selected because they are likely to be key topics for the LRMP Table and because the complexity of addressing these issues warrants use of a computer modeling approach to analysis. Due to the time required to build models, they will only be used where a simpler tool does not provide an adequate result.

3.6 Enhanced Socio-Economic Component

LRMP processes in BC have typically integrated socio-economic values and information in several main ways. One method has been to describe existing economic and social conditions in the plan area and forecast what these conditions will be in the future in the absence of any changes to existing resource management direction. This so-called "base case analysis" can provide a comparative context when trying to understand the implications of alternative land use plans that the Table develops.

Another method has been to evaluate the social and economic consequences of alternative plan scenarios. For example, employment, revenue, community stability, cultural, etc. implications of scenarios are described by employing various socio-economic indicators. Socio-economic evaluation results are normally integrated with environmental evaluation results to comprise a scenario evaluation report for Table consideration.

A final way of integrating social and economic values and information is to identify various socio-economic transition or diversification measures that may be available or recommended as a result of the planning process.

Enhancing the Socio-economic Component of the North Coast LRMP

Proposed actions for enhancing the consideration of socio-economic issues / interests in the North Coast LRMP are summarized in Box 7.

Box 7 Actions for Enhancing Socio-Economics in the NC LRMP

- Develop comprehensive social and economic descriptions in the "base case" analysis.
- Summarize existing socio-economic goals / options that have been defined in previous socio-economic planning initiatives (e.g., Prince Rupert Economic Development Strategy).
- Conduct community-based economic visioning workshops and feed results into planning process.
- Integrate First Nations' traditional knowledge / cultural values into analysis for the planning process.
- Develop specific social and economic goals, objectives and strategies as part of alternative land use scenarios.
- Identify indicators for assessing progress towards socio-economic goals.
- Improve the rigour of methods to evaluate socio-economic implications of alternative land use scenarios (using GIS-generated statistics and decision support models).
- Develop socio-economic transition / diversification measures for addressing socio-economic issues.
- Monitor long-term effectiveness of the plan in achieving socio-economic goals and objectives.

The North Coast LRMP envisions a planning process that improves upon the standard LRMP approaches for addressing socio-economic values and information. The process design and terms-of-reference place a high priority on ensuring that socio-economic issues are an integral part of LRMP discussions and solutions, and are brought forward early in the planning process. Existing initiatives such as the Prince Rupert Economic Development Strategy, "Joint Solutions", and "Turning Point", and will provide a foundation for ensuring that socio-economic values and options are brought forward. Community workshops to define an economic vision for the region are anticipated to run in parallel with early stages of planning negotiations. Socio-economic issues and goals for the plan area, and for individual resource categories (e.g., forestry, mining, tourism, etc.) will be specifically defined.

The social and economic implications of alternative land use plan scenarios will be assessed by independent consultants using GIS tools and models for mineral and timber resources that have been developed specifically for this purpose. The Table will have a hand in developing evaluation indicators that will be applied / measured in the technical assessment of scenarios. And, following plan implementation, the long-term effectiveness of the plan in achieving socio-economic goals and objectives will be monitored.

3.7 Forest Certification

Forest licensees are motivated to obtain certification under one or more forest certification programs in order to secure access to markets that are increasingly demanding confirmation that their wood purchases come from sustainably managed forests. Approved, independent auditors assess the sustainable forest management performance of certification applicants / registrants vis a vis defined performance standards that vary by certification program.

The certification standards that are of greatest relevance to BC are: (1) the Canadian Standards Association (CSA) program standards which closely parallel the Canadian Council

of Forest Ministers criteria and indicators for sustainable forest management; (2) the Forest Stewardship Council (FSC) standards which closely reflect ecosystem-based forest management principles; and (3) the US Sustainable Forestry Initiative (SFI) standards that require applicants to meet several principles and numerous more specific objectives and performance measures.

Although forest certification is a private arrangement between licensees and certification agencies, the manner in which a LRMP is undertaken and the planning products that are generated can play an important role to facilitate forest certification, should licensees decide to apply for it.

Facilitating Forest Certification in the North Coast Through the LRMP Process

Forest certification in the North Coast can be facilitated through the planning approaches summarized in Box 8.

Box 8 LRMP Actions / Products That Can Facilitate Forest Certification in the North Coast

- Develop comprehensive plan goals, objectives and indicators in a participatory manner (i.e., involving stakeholders, First Nations, communities, other levels of government).
- Develop LRMP products that can be incorporated / cross-referenced in SFM plans that are required in forest certification audits (e.g., descriptions of how sensitive forest values will be protected, other spatially-specific resource management direction);
- Define clear strategies for implementing / enforcing LRMP provisions, and follow-up on these through LRMP implementation and monitoring / reporting.

One main way that LRMP processes may help pave the way for forest certification is to define plan goals, objectives and indicators for forest lands in a participatory manner. The main forest certification systems encourage public and First Nations participation to ensure that forest management approaches reflect local realities and accommodate the needs of local interests. A high level of direct public and First Nations participation are hallmarks of the LRMP process. The participation of these interests in preparing plan products, notably indicators for measuring sustainable forest management performance, will mean that forest certification applicants will not have to re-cover this ground in a separate public consultation / planning process.

A second way the a LRMP may facilitate forest certification is to generate a land use plan that includes the components that certification auditors require to be reflected in sustainable forest management plans for the area under application. For example, in the case of CSA certification, indicators of sustainable forest management are required, as noted above. Under the FSC system, an applicant's forest management plan must, among other things, describe the resource base in the application area; identify how "high conservation value" lands will be protected; describe silvicultural systems that will be employed; identify how

forest dynamics will be monitored; and, define how species at risk will be protected. LRMP content that helps to define or clarify these issues can make a licensee's bid for certification far more efficient and effective.

Finally, a strong commitment to LRMP implementation can significantly affect certification success. When evaluating certification applications, auditors look for assurances that performance standards (e.g., protection of "high conservation value" forests) will be achieved over the long term. Having strong and enforceable measures in place, such as higher level plans or other legal land use designations, can help meet auditors' expectations. Plan implementation using government-controlled legal designation tools lies outside of a licensee's individual control, and, from a certification perspective, it is therefore important that these tools are applied as part of the broader LRMP process. Implementation monitoring and reporting on results can help clarify accountabilities for plan implementation and this too can potentially assist with forest certification.

Appendix 1 Technical Background Papers on LRMP Concepts / Elements

An Adaptive Management Framework for the North Coast LRMP, prepared by Brenda Taylor, September 30, 2000.

An Ecosystem-based Management Planning Framework for the North Coast LRMP, prepared by Rachel Holt, March, 2001.

Criteria and Indicators Briefing Paper, prepared by Barbara Beasley and Pamela Wright, March, 2001.

Environmental Risk Assessment (ERA): An Approach for Assessing and Reporting Environmental Conditions, Habitat Branch, Technical Bulletin 1, MELP, June, 2000.

Managing Risk Within a Statutory Framework, available on MOF, Compliance and Enforcement Branch website.

North Coast LRMP Information and Analysis Tools, Government Technical Team, March 6, 2001.

North Coast LRMP Proposed Economic Framework (Draft), January, 2001.

Socio-economic Assessment in Ecosystem-based Management, prepared by Diane Wilson. To be completed March 2002.

Appendix 2 Linkages Among the "Elements"

The table identifies some of the key connections between the "elements" discussed in this paper.

	Ecosystem-based Management	Adaptive Management	Risk Assessment	Criteria and Indicators for SFM	Forest Certification	Decision Support Systems	Enhanced Socio-economic Component
Ecosystem-based Management							
Adaptive Management	EBP advocates AM for addressing uncertainty						
Risk Assessment	EBP evaluates risk to ecological integrity of alternative management actions	AM is approach for managing risks associated with uncertainty; AM involves assessing risks of alternative management strategies					
Criteria and Indicators for SFM	criteria identify ecological goals (SFM); indicators used to assess progress towards ecological goals	SFM indicators may be used to assess alternatives during planning, and to monitor long-term plan effectiveness	Risk assessment indicators can parallel SFM indicators				
Forest Certification	FC performance standards (especially under FSC) include requirements to maintain ecological values	Standards under some FC systems require "continuous learning" which is consistent with AM; AM monitoring results could be useful during FC audits	SFM plans developed for FC purposes, which borrow from LRMPs that have employed RA, may be viewed favourably by FC auditors	LRMPs that define SFM indicators can facilitate certification success / efficiency			
Decision Support Systems	DSS (models) used in EBP to understand risks to ecological integrity under alternative management scenarios	AM involves exploring management options using DSS as basis for deciding on active AM experiments	DSS (employing spatial / temporal models) essential for undertaking RA	DSS should be capable of assessing scenario performance relative to key SFM indicators	SFM Plans developed for FC purposes (and the LRMPs that these may be based on) require DSS to ensure public / FC auditor acceptance of SFM plan		
Enhanced Socio-economic Component	EBM presumes identification of socio-economic goals; and ecological-social-economic trade-offs, within limits	AM could be applied to address uncertainties in socio-economic systems (not only environmental systems)	Risk of adverse socio-economic impacts of alternative scenarios could also be assessed	SFM C&I can include socio-economic measures	CSA/FSC standards may include socio-economic performance measures	DSS are used to estimate socio-economic consequences	