BorNet Canada

WORKSHOP PROCEEDINGS

BorNet Canadian Regional Workshop

November 17 and 18, 2001

Edmonton, Alberta

A working meeting hosted by the
Sustainable Forest Management Network

Prepared by Carolyn Whittaker and John Innes
University of British Columbia

BorNet

Workshop proceedings

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BorNet Canada is part of BorNet, an international network of researchers, forest managers and government representatives developing a synthesis of available information on the conservation of biological diversity and identifying gaps in our understanding in order to further develop coordinated research efforts among boreal countries worldwide.

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The Sustainable Forest Management Network is a national partnership in research and training excellence. Its mission is to deliver an internationally recognized, interdisciplinary program that undertakes relevant university-based research. It will develop networks of researchers, industry, government and First Nations partners, and offer innovative approaches to knowledge transfer. The Network will train scientists and advanced practitioners to meet the challenges of modern natural resource management.

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Contents

Foreword

AS LARGE-SCALE FORESTRY AND URBAN GROWTH CONTINUES ITS PACE NORTHWARD, CANADA'S boreal forests are increasingly coming under pressure. However, the biodiversity consequences of expansion and extensive forest management are complex and poorly understood. At present, there is little collaboration between the large number of government agencies, universities and non-governmental organizations conducting research on biodiversity in Canada's boreal areas. Nor is there broad collaboration among the host of researchers, resource managers and governments involved in biodiversity management. Furthermore, as 90 per cent of communities in the boreal are aboriginal, there is a large, unmet need to understand distinct cultural relationships to the land and resources in boreal forests across Canada.

As a result of this lack of collaboration and consultation, there is no clear direction or consensus regarding current research and monitoring priorities.

The BorNet regional workshop series were organized to:

- increase the exchange of information and ideas among those researching boreal biodiversity
- seek contributions to the development of a national synthesis, and
- provide direction on future research and monitoring.

To guide discussion, the workshops used as a background reference *Biodiversity Evaluation Tools for European Forests* (Tor-Björn Larsson (ed.) Swedish Environmental Protection Agency. Ecological Bulletin 50: 2001).

A template of three questions, derived during a meeting between Canada and other BorNet countries, was modified by the working groups to suit key regional issues:

- How much forest needs to be devoted to biodiversity maintenance?
- How can management effectively restore/recreate/maintain important features required to conserve biodiversity?
- How can we determine the effectiveness of these biodiversity conservation efforts?

The first question addresses the task of developing targets and benchmarks for biodiversity conservation at the landscape scale. The second question is related to implementation and management tools used to achieve the objectives articulated in Question 1. Finally, the third question explores the effectiveness of management tools and systems, outlined in Question 2, in terms of meeting targets identified in Question 1.

These proceedings were created for the use of workshop participants and others affiliated with BorNet and the Sustainable Forest Management Network. Key issues will be further addressed through an on-line conference in the spring of 2002. Results from the workshops and on-line conference will be integrated into a synthesis document identifying key strengths and gaps in our knowledge. The synthesis will be presented to other boreal countries at the BorNet international conference in Stockholm on May 27-28, 2002 and disseminated as broadly as possible. Documents are posted to the BorNet website (www.bornet.org) as they are made available.

Agenda

November 17, 2001	Introduction of participants and keynote speeches
8:00	Breakfast
8:30	Introduction to BorNet *John Innes and Carolyn Whittaker, University of British Columbia and John Spence, University of Alberta*
9:30	Biodiversity: Building performance indicators for the boreal forest *Stan Boutin, University of Alberta*
10:30	Break
11:00	Integrating biodiversity conservation practices into forest planning and operational practices *Luigi Morgantini, Weyerhaeuser Company*
12:00	Lunch
1:00	Applying conservation net theory to boreal region *Ross Wein, University of Alberta*
2:00	First Nations involvement in biodiversity management *Clifford Hickey and David Natcher, University of Alberta*
3:00	Break
3:30	Panel Discussion: Synthesizing research and management efforts in the Prairie provinces
November 18, 2001	Presentations and discussion
8:00	Breakfast
8:30	Saskatchewan forest ecosystem impacts monitoring framework *David Andison, Bandaloop Landscape-Ecosystem Services*
9:00	Thresholds *Fiona Schmiegelow, University of Alberta*
9:30	Begin discussion around key synthesis questions
10:00	The consequences of TRIAD and intensive timber production *Jan Volney, Canadian Forest Service*
11:00	Discussion continued
11:30	Recommendations for the BorNet project
12:00	Lunch

Welcome and objectives

John Innes, University of British Columbia

Introduction to BorNet

- BorNet is an international network on biodiversity research in the boreal forest with participants from Canada, Finland, Norway, Russia, Scotland, Sweden and the United States.
- BorNet researchers, forest managers and government representatives are developing a synthesis of available information on the conservation of biological diversity and identifying gaps in our understanding to further develop coordinated research efforts in the circumpolar boreal.

BorNet objectives

- Objective 1 – National Synthesis: Develop a national synthesis linking management tools with biodiversity requirements within the context of current assessment systems at a range of spatial scales in Canada.
- Objective 2 – International Conference: Compare national reports from Canada, Norway, Sweden, Finland, Russia, the U.K. and the U.S.; develop extension tools; develop an international research program addressing gaps identified in the international comparison.

May conference outputs

- Production of a proceedings volume in a refereed publication.
- Planning of extension activities associated with this publication.
- Development of new international research partnerships and submission of proposal(s) to relevant national and international funding agencies (EU, NSERC, SFMN).

Where are we now

- Phase 1: National synthesis
  - Regional workshops have also taken place in Sault Ste. Marie (October 13 and 14) and Prince George, B.C. (November 23 and 24).
  - National synthesis draft will be prepared by early spring.
- Phase 2: International program
  - International conference: May 27-28, 2002.
- Phase 3: International implementation
  - Extension following conference will consist of industry feedback, project dissemination, and new research opportunities.

Workshop format

- The workshop will be semi-structured, addressing three key questions.
- Initial speakers are asked to put forward ideas that can picked up in the discussions.

Workshop questions

- How much forest needs to be devoted to biodiversity maintenance?
- How can management restore/recreate/maintain important features required to conserve biodiversity?
- How can we determine the effectiveness of these biodiversity conservation efforts?

Key workshop objectives

- The strengths and limitations of knowledge should be identified and classified.
- Ranking.
- Other objectives may be specified by participants.

Desirable deliverables

- Identification of the key issues and priorities for the boreal (validated in follow-up work from December 2001 to May 2002).
- Recommendations for prioritizing research and funding resources (for SFMN, NSERC, ARC).
- Improved networking amongst boreal biodiversity researchers and managers (including boreal research database via NRIN and GFIS).
- Recommendations for developing practical tools for operational managers.

A discussion of the context for BorNet Question 1

John Spence, University of Alberta

Question 1: How much forest needs to be devoted to biodiversity maintenance?

BorNet is represented by countries at two ends of a spectrum of forest history: Canada still has a largely pristine forest whereas Finland and Sweden have very little pristine forest left. In both countries, there are similar questions regarding the range of forest values. For example, what should we be trying to save? What should the Europeans be aiming for?

One of our key questions is how much forest is needed.

- Angelstam and Andersson use 20 per cent as a critical threshold.
- Does the threshold depend on the taxon?
- What is the role of umbrella species?
- Does it depend on cover type?
- Are there specific characteristics that make a forest vulnerable?
- What is the natural course of succession?
- What are the time frames for succession?
- Are there species that are more adapted to spruce or aspen?
- Aspen-specialized species may be more mobile than spruce-specialists. Many spruce specialists are fairly immobile.
- How do we determine the configuration (patch size, connectivity)? These factors may vary according to aboriginal or industrial use. The goals are very different and will determine the outcomes.
- We need to recognize temporary versus permanent losses. We tend to look at post-harvest flora/fauna and the results of management. The key question should be: Will it come back?
- What are the lifeboats?
- They exist and work, but what are the best ones?
- How do we assess them? Natural analogues are best.
- Which taxa require lifeboats and what should they look like?
- Most companies use green tree residuals for biodiversity protection. Do they work? In Fennoscandia, the available information suggests they do not.
- Do we have things that work better?
- What limits re-colonization? This applies to species that don't need lifeboats.

- When will we know that a stand is on the right track to enable successful recolonization? When can we start thinking about another pass through the area?
- What is the proper temporal perspective?
- What are appropriate goals? There has been an inadequate discussion of goals so far.
- All taxa everywhere? Is there commitment for this? TRIAD?
- Should some taxa be restricted to reserves? TRIAD?
- What is the biodiversity significance of non-merchantable areas? Industry argues that there is a lot of land being left, and that this is sufficient for biodiversity. For arthropods, this may be the case, but there is very little information to substantiate the idea.
- Do all taxa need large areas on extensively managed land? What should be the goals? Should we be aiming to conserve all taxa, or can we afford to lose some? What does the public desire? To what state/condition do we have to return the forest after harvesting?
- What are the constraints on intensively managed land? Is this a relevant concept? Can we simply ignore biodiversity on intensively managed forest (just like with corn fields)? In the SFMN, the only projects funded in the first few years on intensive management focused on biodiversity impacts.
- Do we look at communities or species? What do we really want? The East slopes have three to four communities – we might be aiming to preserve representative communities. Or should we be ensuring that all species are present? Communities may not be functioning in their original capacity. This is a combination of fine-filter and coarse-filter approaches.
- How finely do we discriminate habitats? At what level should we be working? It turns out that mosaics are continuums. The plant community work of Ian Corns shows that we are dealing with communities. This goes back to old ideas about whether communities are real. Was Gleason or Shelford right?

Questions and comments

- Aboriginal people could be an indicator of biodiversity. We need to link biodiversity to cultural sustainability of forest-dependent peoples. We need discussions with indigenous peoples to see what species are crucial for their cultural survival. Are they an umbrella species?
- Why focus on reserves? What are we trying to preserve? Is this simply an extension of the European idea of land management? It was suggested that the reserve emphasis may not fit the Alberta environment.
- Scientists affirm that preserves are key to sustaining some species (e.g. buffalo).

"Biodiversity is closely connected to aboriginal cultural sustainability."

Integrating biodiversity conservation into forest planning and operational practices

Dr. Luigi Morgantini, Ph.D., Weyerhaeuser Company Ltd.

ABSTRACT: It is widely believed that the long-term sustainability of boreal forest ecosystems and the ecological requirements of most species can be addressed by emulating the inherent natural processes of disturbance and succession characteristic of a site and/or region. This can be achieved by maintaining a variety of stand sizes, seral stages and stand attributes and structures across landscapes, within the range of natural variation in the system.

Despite our limited understanding of forest ecosystems, there is an urgent need for forest management to ensure that current practices do not leave forest ecosystems devoid of structural diversity and in simple, uniform landscapes with truncated age class distributions. It is within this context that current landscapes can provide an initial baseline that may need to be adjusted as we gain a better understanding of the natural range of variation and historical vegetation trends. Current landscape patterns can act as an initial benchmark for management scenarios where timber requirements, as well as recreational demands and aesthetic consideration are addressed. Monitoring the response of processes (nutrient dynamics, etc.) and plant and animal communities will provide a measure of success.

Over the last five years, Weyerhaeuser has aggressively adopted new practices aimed at conserving biodiversity across all Forest Management Areas in Alberta. A pragmatic approach to structure retention within harvest sites is being fully implemented. Specific strategies to maintain coarse woody debris, snags, single live trees as well as clumps and patches within cutblocks have been developed and are being monitored. The simple approach of advising forest operations to leave as much structure as possible, to take advantage of opportunities whenever they occur, for instance by anchoring structure retention to wet areas or other ecologically significant sites, has resulted in significant structural retention in cutblocks. Surveys conducted in 1999 and 2000 showed an average of respectively 34 and 24 economically viable trees /ha left within cutblocks, with diameter ranging from 13 to 40 cm (dbh).

The implementation of a landscape approach, with the creation of a range of patch sizes in operating areas and the maintenance of post-rotation mature forest stands, has proved to be more challenging. A specific strategy to retain a percentage of the landscape in late seral conditions has been developed based on ecological or historic considerations. A shift away from the traditional 2-3 pass system to dispersed harvest sites to ensure interspersion of patches of different age, size and composition is being implemented. However, it is not clear whether landscape patterns resulting

from forest management practices will address the conservation of biodiversity and provide habitat opportunities for all species.

The success of the new approach in integrating biodiversity conservation into forest planning and operational practices needs to be assessed. A commitment to monitoring the implementation and effectiveness of new practices is critical and needed.

Questions and comments

- Complexity and paralysis: It is important to recognize the complexity of biodiversity and to ask whether our hypotheses are correct.
- Industry is finding that scientific research is not addressing the key questions regarding biodiversity. Industry must respond over very short time frames and cannot wait for the science to be available.
- Industry should get more direction from government processes such as Integrated Resources Management and other planning processes. However, industry gets very little direction from current planning processes in Alberta.
- The design of forests for biodiversity preservation varies across the country. Alberta has a very different context to Ontario. BorNet should help coordinate among these.

"Forest industry practices such as harvesting pattern have changed (emulating natural disturbance, variable retention), but are we performing better at maintaining biodiversity?"

Applying conservation net theory to the boreal region

Ross Wein, University of Alberta

ABSTRACT: Increasing human impacts on landscapes, through fragmentation of ecosystems and losses of biodiversity, is a worldwide concern. In highly industrialized countries, such as Great Britain, the conservation movement is currently focused on expensive programs to protect isolated fragments of habitats. Unfortunately, these small areas have long been isolated and have lost both genetic and species diversity, especially during extreme events such as drought, fire, biological infestations or social unrest. In circumpolar boreal regions, resource extraction by forest, mining, agriculture and petroleum industries is proceeding at an unprecedented rate. Compared to temperate regions, natural areas are rapidly being lost; we should be focusing on what should be protected so that inexpensive conservation options are available to future societies.

I wish to argue that we must link present and future protected areas into Conservation Nets. The theory of Conservation Nets has developed out of the field of island geography and fragmentation ecology and is now being promoted in many landscapes. I am defining Conservation Nets as a scale-independent concept that includes a series of protected areas, with buffer zones, that are linked by multiple corridors that also have buffer zones.

I present a case study for the continental climate regions of the boreal regions. Here moisture is limiting and clean water is become increasingly valuable to society. In addition, with the urbanization of our increasing population, recreation areas (often strongly associated with water bodies) are increasingly valued. In many circumpolar countries protected areas have been designated with little thought to connectivity (e.g. Special Places program in Alberta) so that the remainder of the landscape (90 per cent?) can be "developed." Researchers and managers are well aware that this large "developed" area holds much biodiversity and industry is sponsoring much research into resource extraction methods that minimize biodiversity loss within industrial development strategies. That research should continue, but I suggest that research is critical to understanding how to establish, manage and monitor Conservation Nets that provide high quality ecological services. I suggest that Conservation Nets that include river valleys and associated water bodies will be of critical importance to future societies in the boreal region.

Questions and comments

- Rivers are corridors for only some species, so why should there be a focus on them?
- The ravines in Edmonton are green strips but are not connected. We need to maintain connectivity. Rivers represent a natural opportunity.
- Given the amount of protection in Alberta, the rest of the industrial forest needs to be managed for multiple values. Intensive forestry and agriculture have no place there.
- We should start to reclaim the marginal agricultural land for forest land. There are a lot of opportunities for large-scale nets on the landscape.

First Nations involvement in biodiversity management

Clifford G. Hickey, Ph.D, Professor, Department of Anthropology, University of Alberta, Leader, Sustainable Aboriginal Communities Group of the SFMN

David Natcher, Ph.D, Department of Anthropology, University of Alberta

ABSTRACT: Our presentation summarized our work to date synthesizing SFMN-funded research projects in the Caribou Mountains/Lower Peace River of northern Alberta. We also included some other research projects in the synthesis. Since there have been around 15 projects undertaken in a variety of disciplines, we felt it was time to take an overview and identify gaps, weaknesses and strengths. From this we intend to: a) derive a broad regional research strategy for the next several years; b) begin to identify ways to achieve an Integrated Resource Management Plan; and c) draft a "model" of research and policy development for other regional nodes of the Sustainable Aboriginal Communities Research Area of the SFMN.

Questions and comments

- All BorNet questions impose values. What do we know? What are we doing that is different?
- The biodiversity issue on the table should be measured cleanly before we can find a balance. We should start looking at the questions in the absence of any constraints. Then we should build in the boundaries presented by stakeholders. We should not mix biodiversity with cultural continuity. For the question "How much is enough" we need to get a clean answer, then work from it. Can we produce the scientific answers at the moment? The question "How much forest brings satisfaction" is different from "How much forest do we need to enable species perpetuation?"
- We must know the trade-offs. The value-laden process in Scandinavia led them somewhere they would have preferred not to have gone. We need to determine the consequences of land use decisions on biodiversity so that we can measure these against changes in productivity, changes in culture, and changes in capital flow.

"Can we separate the measurement of biodiversity from values?"

- Are aboriginal persons indicators of biodiversity conservation? A native from 100 years ago could not survive today. Are traditional lifestyles an appropriate measure? Culture is changing. As long as the forest is there as a recognizable forest, aboriginal persons will continue to adapt. Cultures change, but Indians are still recognizably Indians. Indigenous cultures have a richness that is related to the variety of utilized niches in landscapes. Therefore, if the interest is in the protection of biodiversity, First Nations provide a documentable way of looking at things. If such an approach is adopted, there is no need to look at each of the little elements in each niche. This is where TEK comes in – people will explain the niches on which they depend. BorNet cannot be divorced from First Nations – if it is, it will create a model that is well-informed and protects biodiversity, but misses something, namely First Nations.
- In the light of uncertainties, resource managers need answers right now that will both meet the needs of species maintenance and be acceptable.
- BorNet should not be another Sustainable Forest Management Network. It should not try to be everything to everyone. Biologists are the wrong people to ask questions of how much is enough.

Saskatchewan forest ecosystem impacts monitoring framework

David Andison, Bandaloop Landscape-Ecosystem Services

ABSTRACT: Like many other provinces in Canada, Saskatchewan is concerned about the sustainability of its forests. Accordingly, it has developed a provincial monitoring program.

However, unlike other monitoring programs, the Saskatchewan framework goes far beyond simple measurements and comparisons to target objectives. We have developed a more integrated framework of monitoring activities, which essentially becomes an integral part of the forest management planning and management cycle. For instance, the framework relies on the use of a "desired future forest condition" (DFFC), derived from the needs and wants of society. The DFFC process quantifies plan objectives and establishes indicator targets. We also adopted the use of the natural range of variation (NRV) as the foundation or first filter for decision making. In this way, biological health is recognized directly as being the necessary ingredient of all other aspects of sustainability.

To further ensure that monitoring becomes an integral part of the overall process of managing forests, and not just another add-on activity, the Saskatchewan framework specifically identifies five key elements: co-ordination, assessing, communicating, learning, and improving. The Saskatchewan government must be fully prepared to coordinate all activities, and everyone who has an impact on forest land must be identified and share responsibility in the process. The indicators themselves are being developed as a linked set of quantitative predictions that are built on each other, as opposed to a simple shopping list. For example, indicator Type A might be the vegetation pattern resulting from chosen DFFC, which would lead to a prediction of indicator Type B on certain species, both of which would lead to a prediction of indicator Type C on the socioeconomic impacts, and so on. Active learning and direct feedback occurs through these links, and the acknowledgement that many indicator "baselines" have yet to be established. In addition, the exact reason for failing to meet indicator targets must be identified, whether it was just an unrealistic target, external influences, poor planning, or even conflicts with other objectives.

The ultimate success of monitoring is thus strongly linked to all five activities. So, even if most of the indicator targets are met, if the *process* of monitoring did not result in improvements to the indicators or targets, better understanding, more efficient strategies, more effective policies, and more cooperation, we have failed. So far, the framework has been presented to and endorsed by the forest industry, public advisory groups, ENGOs, and the provincial government, and peer reviewed by three renowned national experts. Three indicator groups have already been developed collaboratively with industry consistent with our system outlined above, and we will begin the process in 2002.

Questions and comments

"We should try to minimize the risks of losses to biodiversity by maintaining a diverse and complex landscape."

- Who should be paying for monitoring? Should it be government, industry or some other organisation?
- Are baselines static or dynamic? They are rolling. Control areas are represented by the north – but they are not measuring the same things. Vegetation does not constitute real biodiversity!

Direction to the BorNet Canada synthesis

Carolyn Whittaker, BorNet Canada

ABSTRACT: The Canadian BorNet Synthesis aims to develop a framework for assessing the status of our knowledge regarding the management of biodiversity in the boreal forest. The three key synthesis questions were agreed upon by our international steering committee and will be used to organize our international conference in Stockholm. In this workshop, we have had presentations and discussion around these key themes as a group. There are some important underlying questions that have not yet been discussed that are key to the organization of our synthesis report and the framing of the baseline information. First, in regards to the characterization of the boreal, how should we stratify the forest and what forest types should we consider? Once we have developed an ecological characterization of the boreal we must identify our gradient of disturbance across the boreal. This poses two questions: Where can we get the biodiversity consequences of current management? And how should we tabulate the range of management approaches?

Finally, in order to understand the impacts of the disturbances or historical and current management approaches on biodiversity, we need to know which species are the habitat specialists in the western boreal.

Questions and comments

- If natural disturbance is our template, the full spectrum of disturbance is not there; we are practising extensive management. There is an ecological time lag that will distort the magnitude of any effect. The emphasis on late seral stages could lead us to species-specific management. Before we divide up the landscape we should plan for old growth. The amount of old growth can move around through time, and should not be restricted to protected areas.
- Conversion to agriculture on the fringe of the boreal is significant and contributes to the loss of unique and important areas in the south, such as the Peace River District.
- The BorNet final product should be a metric of a series of impacts on taxa groups like owls, large carabids and an effort to find the ecological components. We should compare severely impacts versus areas that are hardly impacted.
- What is the forest management and silvicultural history in Canada? We need to characterize the managed forest. What are the unique groups of taxa? For such information, we need to go to the experts. How did forest management start and progress? How do Canadian stands and landscapes compare with European equivalents? We can do things differently here, so we need to set the stage for these discussions.

- We need to stratify current management, but without going into too much detail. Can we compare clearcut versus structured cuts, and treatments such as herbicide application? There are a small number of studies published we can use. What are the potential consequences of different management actions? What are the available data sets (e.g. model forests)?
- We need to construct dose-response curves across the boreal using existing information. We could use the old FIDS database and more detailed studies that are linked to geographic locations.
- In the absence of data for diversity, landscape-scale forest structure could be used in case studies using GIS. An impediment is the lack of a suitable monitoring system.
- A coarse level of stratification would distinguish spruce from pine and deciduous and mixedwood. We could use ecozones, characterizing both climate and vegetation response to disturbance. We could identify strata that will map onto biodiversity. However, do indicators respond to human impact within the strata?
- There is a forest type gradient as one proceeds westward; it changes toward Ontario. We need to consider the transition to lodgepole pine and we also need to make sure that the classification system addresses natural disturbance.
- Land in Alberta is over-allocated, so protection will be challenging; there are smaller protected areas in FMAs that could be considered.
- There is a good baseline in areas such as Prince Albert – we should talk to Peter Murphy about this.

Summary of group discussion

All of the workshops were unique, and represented regional views across Canada. The issue of the role of traditional biological science and cultural values of sustainability was discussed at length. Unlike the other workshops, there was no agreement here regarding the challenge of combining ecological or biological and humanist goals and strategies in understanding biodiversity management.

Question 1: How much forest needs to be devoted to biodiversity maintenance?

Suggested modifications to the question: "How do different proportions of reserve areas affect biodiversity?" or "Is it necessary to have protected areas on the landbase to meet biodiversity goals?"

There was disagreement regarding the role of protected areas in Alberta. Scientists feel that large reference areas will be needed to maintain biodiversity and that the current protection is inadequate (especially in light of climate change and the ecological lag between harvesting and the manifestation of impacts). The Alberta government suggests that protected areas should not be a focus of BorNet in Alberta. The land is already allocated. This discrepancy points to the differences between those dealing with the political realities of management of land and those that are working in scientific spheres of study. For the purposes of BorNet, we need to find the balance between these two realities and bring the scientific expertise into the realities of current political and cultural contexts. Further, BorNet research must recognize the need to better address the practical questions of government and industrial resource managers.

"We are making decisions now based on limited knowledge. The decisions will preclude options 60 years from now."

Following a presentation on thresholds, there was discussion on the question of the role of retrospective studies and whether they are feasible in Canada.

The time span of industrial forestry in Canada is short; the impacts are only 20 to 30 years old in Alberta. Ecological time lags will alter our understanding of responses in our landscapes. For example, the 20 per cent threshold identified today may have to be changed as more information becomes available regarding time lags. Thresholds are not a point of no return, rather they are a point of rapid change. We should use targets, but be explicit about the likely directions of change.

We need to talk specifically about the loss of old growth forests. We need to plan for how we will deal with related issues, such as linking areas of post-rotation age forest that have been allowed to develop over time. We need to plan now for the connectivity of future landscapes. It is apparent from the European experience that maintaining forests is much easier than recovering them.

We can use population-level simulation modelling as a surrogate for predicting outcomes for different management options and forecasting risk in the future. If we are using natural disturbance as a template, we can emphasize frequency distributions and ranges. We will have to assess decisions ranging from 3 to 50 per cent retention, but in reality we need a range of percentages.

Finally, we know that species do not occur uniformly across the landscape, but we do not know which species are really sensitive to habitat alteration or even if we should focus on these species. It is suggested that we are really dealing with a few species with narrow requirements that depend on some landscape elements that are most at risk; most of the rest of the species are likely not at risk.

Some workshop participants suggested we should not go species by species, rather we should look at communities dependent on old growth forest and translate what we know into actual management strategies. There are also key gaps in our understanding of dispersal and important elements such as post-glacial relics, fire skips and fire itself as a dispersal filter for some species.

Question 2: How can management effectively restore/recreate/maintain important features required to conserve biodiversity?

There was agreement in the group that the entire landscape needed to be considered for biodiversity maintenance, but we do not understand the role of, amongst others: green tree residuals, current harvest patterns and the recovery of biodiversity post-harvest (early successional communities, harvest and salvage). Further, industry representatives find that scientific research is not addressing key questions regarding biodiversity. Managers need thresholds and answers to questions like "How much is enough" that are quantifiable and acceptable to the public.

Barriers to biodiversity maintenance in Alberta include allocation of land, the tenure system, lack of coordinated monitoring and inventory data, cumulative impacts of oil and gas and conversion of land for agriculture.

Although the group agrees that a community approach is important, we need to consider that the species that are habitat specialists (particularly in habitat types that are limited) and are not mobile may require particular management strategies for long-term maintenance.

The consequences of a TRIAD approach and intensive timber production were also discussed. The group agrees that Alberta is more likely to follow the U.S. model than European examples of intensification. All of the forest in Alberta is allocated, and in less than 10 years the first pass will be completed. There is a parallel to Finland following World War Two. We need to emphasize biodiversity in a combination of protected areas and managed forests as the protected areas are not adequate to meet the needs of species with broad geographic ranges. The question of the appropriate scale for setting targets remains unresolved.

Question 3: How can we determine the effectiveness of these biodiversity conservation efforts?

The biggest challenge to setting targets and thresholds will be frequency distributions, as they are not uniform across the landscape and there will be quite a bit of variation. There is a danger of taking a single species approach and that the process will become too cumbersome and expensive. Suites of species or communities that are sensitive to change would be a better approach.

It was suggested that the condition of northern forest-dependent communities and the systems of indigenous knowledge could be used as an indicator of biodiversity. Northern communities who live their day-to-day existence in contact with the boreal have a unique knowledge and awareness of changes that are occurring in these ecosystems. Bringing this unique knowledge to play in understanding biodiversity within a management framework is a key challenge for BorNet's biodiversity synthesis and research. There was a suggestion to consider aboriginal sustainability as a response indicator in a dose-response model. Consensus on this point was not reached. Other members of the workshop considered indigenous and local knowledge to be outside the scope of biodiversity science and the political and cultural differences imposed by the integration of cultural and biological epistemologies was seen by some to unnecessarily complicate Bornet's mandate.

The role of social science in BorNet

There was no consensus regarding the role of social science in BorNet. It was suggested that all of the key BorNet questions have values associated with them. The group generally felt that we should start looking at the questions in the absence of any social/economic and cultural constraints. This approach suggests there is a prior biological question: How much is enough to ensure the preservation of all species? And the secondary more qualitative question is then: How much would be socially acceptable?

In this approach, we would build in the constraints presented by stakeholders after the scientific assessment was completed. The question remains whether we can separate the measurement of biodiversity from the values associated with it. There was agreement that once the thresholds were developed, the information needs to be presented to all different stakeholders in order to balance the trade-offs between biodiversity and other values.

HOW TO PROCEED

- Natural disturbance management should be used as a template.
- Setting targets is absolutely critical.
- The focus should be on communities, not single species, but there should be a combination of coarse- and fine-filter approaches.
- We should adopt a stratification framework using an ecologically-based classification system that incorporates natural disturbance.
- Gradient studies should focus on the community level.
- We should help coordinate among different provincial contexts for biodiversity management.
- Retrospective studies will be difficult with the time lag in Canada, but we can do some work with population-level simulation modelling. We should look to those areas where there could be a gradient and then look to Europe for the longer-term context.
- The BorNet final product should be a metric consisting of a series of impacts on groups of taxa over a gradient of impacts, temporal as well as spatial, and a characterization of what the managed forest looks like. We should construct dose-response curves across the boreal using existing information. In the absence of data for diversity, landscape-scale forest structure could be a surrogate.
- Our report should include an identification of the unique taxa groups and an overview of forest management and silvicultural history.
- We need to identify the available data sets, e.g. model forests.

Participants

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BorNet Canadian Regional Workshop

November 17 and 18, 2001 • Edmonton, Alberta

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BORNET PROJECT OVERVIEW

PHASE 1
NATIONAL SYNTHESIS

Canada: Three BorNet regional workshops

Finland: FIBRE program

Sweden: MISTRA program

Funding – Canada: SFMN;
Sweden: MISTRA, Finland: FIBRE

PHASE 2
INTERNATIONAL PROGRAM

International conference May 2002

- Networking
- Development
- Knowledge gap analysis

Funding – Canada: NSERC IOF and SFMN;
Sweden: MISTRA; Finland: BITUMI

PHASE 3
INTERNATIONAL IMPLEMENTATION

Industry feedback

Project dissemination

New research opportunities

Funding to be sought –
Canada: SFMN, private sector