CHALLENGES FOR THE BOREAL FOREST ZONE AND IBFRA

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ABSTRACT

This paper gives a simple overview of the boreal forest sector, and addresses a few of the challenges confronting the boreal zone. These challenges are; how to deal with sustainable boreal forest management, the structural changes in the boreal industrial sector due to globalization, and the imbalance between political commitments and real actions with respect to the boreal forest sector.

1. BACKGROUND

Boreal forests are increasingly becoming a high-profile topic on the international political agenda. Unfortunately, there are limited possibilities to discuss all of the problems associated with the boreal forests in one condensed presentation. I also do not feel that this would be a task for me to accomplish. Instead I will try to highlight a few issues which I regard crucial with respect to the future development of the boreal forests. I am especially aiming at issues which are not on the boreal forest agenda today. But before addressing these issues, I will present a very aggregated summary of some features of the boreal forests.

2. SOCIO-ECONOMIC IMPORTANCE OF THE BOREAL FORESTS

Currently, boreal forests constitute roughly one-third (1.4 billion hectares – depending on what is included in the definition of boreal forests) of the global forested areas (Nilsson, 1996a). Forests have historically played a vital role in the development of the economies and societies in the boreal zone. Settlements were only possible through the support of wood resources. Wood was used for buildings, heating, cooking, tools and transportation. Mining, ship-building, charcoal production and tar extraction were major consumers until the end of the 19th century. The evolving timber industry during the 20th century resulted in the rapid exploitation of the boreal forests. Today, the boreal countries are economically dependent on their forest sectors (table 1).

Table 1. *Economic importance of the forest sector in boreal countries.*

Country	Percentage of Gross Export Earnings	Percentage of Direct Contribution to GDP
Canada	13	4
Nordic	9-34	4-7
Russia	5	3

The forest sector's importance to the national economy in these countries can also be approached by assessing the role of the so-called forest cluster, which includes other industries and services that are directly connected to the forest sector. An example of a forest cluster is illustrated in figure 1.

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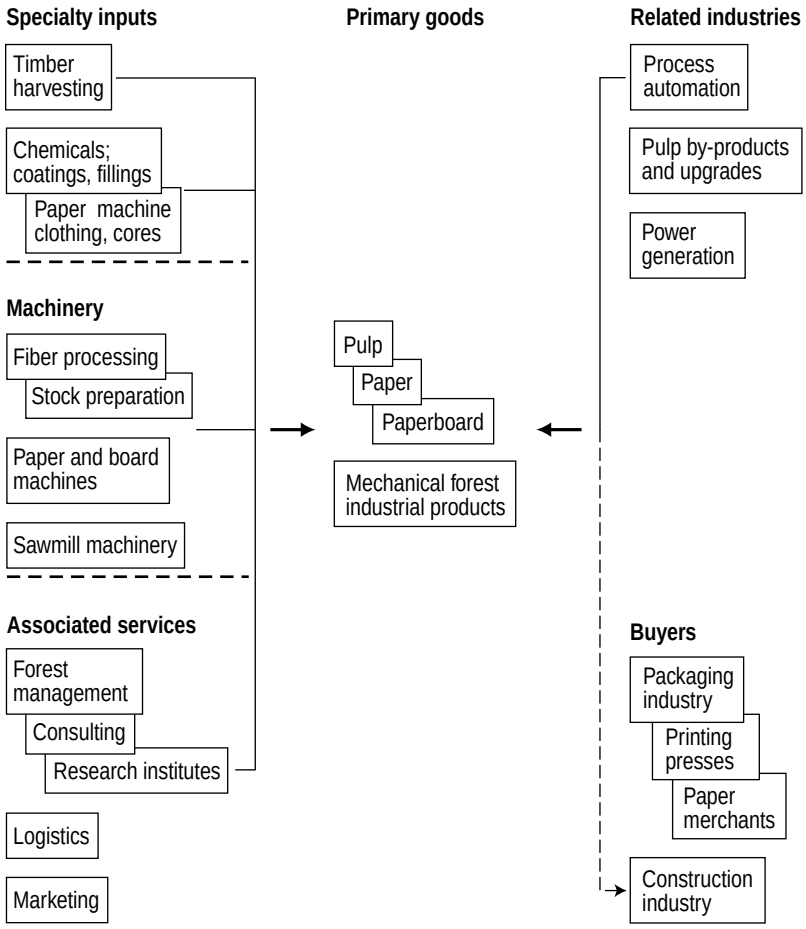

Figure 1. Example of a forest cluster. After Hernesniemi *et al.* (1996).

With this approach, the forest sector's contribution to GDP is estimated to be 10-15% in Canada. The forest cluster share gross export earnings is 41% in Finland, compared with 34% as a direct impact by the forest sector; and 24% in Sweden, compared to 17% as direct impact (Lammi, 1994). The important factor is that net export earnings are some 80% of gross export earnings as most input factors are produced domestically (Swedish Pulp and Paper Association, 1996). These estimates are based on the forest products' values and do not consider non-wood functions. Hultkrantz (1992) and Solberg and Svensrud (1992) have estimated the contribution of non-wood functions to GDP to be 35-75% of the value of industrial products in the Nordic countries. Costanza *et al.* (1997) have tried to estimate the value of ecosystem services and functions (17 different functions) and have developed an aggregated annual ecosystem services value of US$302 $ha^{-1}yr^{-1}$ (1994 US$) for the boreal forests. A value which can be seriously debated since only oceans and grasslands have lower values of the biomes analyzed.

The economic importance, as a proportion of overall economic activity, of the boreal countries' forest sectors has declined since the post-war period. Despite this decline, boreal forests continue to play a substantial role in the economies of these countries. There are very few, or for that matter any other, sectors in the boreal countries which can provide a similar contribution to net export earnings as the forest sector.

An outlook on the future consumption and production of industrial roundwood based on conventional estimates is shown in table 2.

Table 2. *Global industrial wood balance, expressed in million m^3, (Nilsson, 1996b).*

	1993		2010		2020		
	Coniferous	**Non-coniferous**	**Coniferous**	**Non-coniferous**	**Coniferous**	**Non-coniferous**	**Total**
Demand	939	540	1210-1680	730-990	1400-1540	850-1010	2250-2550
Supply	939	540	950-1210	545-745	1080-1330	585-800	1665-2130
Balance	--	--	0 - -470	+15 - -445	-70 - -460	-50 - -425	-120 - -885

These conventional estimates indicate a stable increase in consumption of industrial wood. The demand will be difficult to meet without increased forest production, utilization and higher prices on forest products. Boreal countries supplied some 40% of the industrial coniferous supply in 1992. According to these conventional scenarios, the output of coniferous industrial wood from boreal forests will have to increase by some 140-390 million m^3 within the next 25-year period. However, the share of the world's industrial coniferous supply has also been estimated to remain constant in 2010 and 2020 (Nilsson, 1996b).

The amount of timber resources is not a limiting factor for the supply from the boreal forests estimated above. It should be pointed out that, even if the calculations identifying shortages in the global wood balance are accurate, realistically these shortages will never appear. A number of balancing measures will occur on the market to achieve an equilibrium including decreases in demand due to increased prices, introduction of new and more fiber-efficient technology, substitution of products, increased supply, etc. (McNutt, 1995).

The development of the energy market will influence future utilization of forest resources. The contribution of forests in the future to electricity, heat, and gaseous and liquid fuels will depend on markets and incentives, on Research and Development progress, and on environmental requirements. Today, the costs for biomass energy production are compatible with the cost of several traditional fuels. There is a large potential estimated, and strong political pressure (e.g. Sweden), for wood for energy in the future. Forest sector managers in the boreal countries have the necessary knowledge to intensify utilization of forest resources for energy production.

There are more than one million Aboriginal people living in the boreal zone. The cultures and economies of these people are intricately adapted to their natural environment and depend upon it for self-perpetuation. The *lebensraum (*quality of life) of Aboriginal people will probably be degraded with increased utilization of the boreal forests unless special actions are taken in the future.

3. ECOLOGICAL IMPORTANCE OF THE BOREAL FORESTS

The boreal forests are finite whose productivity is restricted by the boundaries set by their physical environment and the ability of biota to survive and growth within that environment. Silvicultural activities can enhance productivity within the limits of biological constraints and economic realities. Understanding the biotic and abiotic characteristics of the present boreal forests and their dynamics under the current environmental conditions is necessary to determine the potential for biological productivity and resource management. This information is also critical for predicting future paradigms that will result as environmental, socio-economic, and political conditions evolve. In the following, I will briefly discuss the physical and biological factors determining the potential for sustainable development of the boreal forests.

Climatic Attributes

All climatic attributes combined serve to distinguish boreal forests from the more temperate areas, but the temperature control over above and below-ground biological processes and the characteristics of the snowpack are particularly important for this distinction. The below-ground temperature affects all aspects of soil biology and nutrient cycling. Forest floor conditions, overstory and understory density, and soil temperature are closely related. The amount of heat available for growth during the growing season, as well as frost events, greatly influence phenology and the development of vegetative and reproductive growth. More than 50% of the annual precipitation occurs during the growing seasons. Under certain conditions of evaporation an accumulation of organic matter will take place, which drives the development of organic soils. Snow modifies local climate through its high albedo and high thermal conductivity.

Land and Water Base

The boreal forests are a mosaic of upland forests and wetlands with lakes and rivers interspersed. The current mosaic of floristic and forest stand patterns are maintained by the combined effects of site conditions, disturbance factors and climatic regime of the region. This mosaic is an extremely important landscape element in terms of biodiversity.

Soils and Permafrost

Features commonly referred to in a discussion of boreal forest soils are low temperatures with the formation of permafrost as the maximum expression of this characteristic, poor drainage, thick organic layers with deep organic soils in wetlands, low soil biological activity and low nutrient availability. Due to these features productivity is often limited.

Forest Composition and Distribution

Although the boreal forest is often viewed as one large cold-dominated area occupying the northern part of the globe, this simplistic view is far from realistic. Rowe (1992) identifies 45 sections of the Canadian boreal forest based on climate, physiography and tree species composition.

At the scale of the stand there can be large stand-to-stand variations in species' composition and structure. The distribution of species within the landscape varies within the boreal region even if the boreal forests have relatively few tree species (some 15 dominating species in North America and some 35 in Siberia). Species composition, species diversity, and productivity of shrubs and herbaceous plants also vary in the boreal region. Shrubs are key elements for wildlife habitat, providing both food and cover. Nonvascular plants, such as mosses and liverworts, are ecologically important boreal plants and often contribute more to plant species diversity in a stand than do vascular plants.

Biodiversity

Biological diversity may be defined as the number, variety and variability of living organisms on the earth (WCED 1992), including the sum of diversities found at the genetic, species, ecosystem, and landscape levels (Wilson 1988). It is estimated that the boreal forests contain over 100,000 species, 95% of which are arthropods and micro-organisms. Viruses are particularly abundant with over 40,000 species. Currently, only some 20% of the taxa in the boreal forests have been identified taxonomically.

The dominant tree species have varied from one interglacial period to another, and many species have gone extinct during the Pleistocene climatic fluctuations. There is also growing evidence that the current composition of plant associations is contingent upon historical accidents.

Forest Succession

As discussed earlier, boreal forests are described as a mosaic with relatively few tree species arranged in pure and mixed stands of various sizes and shapes owing to site and soil conditions, distribution of lakes and rivers, species characteristics, and disturbance history (e.g. Suffling 1993). Within any landscape, there are both long- and short-term scale processes that shape current vegetation and influence potential future vegetation. Here I will concentrate on the short-term factors (years to several centuries). The primary natural short-term disturbances that influence landscape patterns in boreal forests are fire and insects. Wind and snow breakage and diseases can also be important, but tend to follow the first two mentioned factors. Another group of disturbances are linked to flooding.

Forest Productivity

Both the primary and secondary productivity are important, but I will concentrate on the primary productivity in this discussion. It is important to take into account the tangible values of the primary productivity such as water protection, water supply, soil protection and climatic roles.

Forest biomass and annual bioproductivity of the boreal forests are of particular importance to the boreal forests in the global carbon budget (Kurz *et al.* 1993, Shvidenko *et al.* 1996). Total biomass, distribution of biomass and productivity differs depending on site conditions, species composition and stand age. For example, on cold sites the moss component may have levels of annual productivity, equal to or greater than, that of the overstory woody species.

Man-made Disturbances

The conversion of forests to agriculture, community development, mining, oil and gas exploitation and forest management have historically affected the boreal forests and will continue to do so in the future. The conversion of boreal forests to agricultural land has: decreased the area of forest, especially on rich soils; fragmented the forest resulting in remnant forest patches and increased edge effects; and changed the forest stand community structure by introducing new species.

The forest management activities that have most influenced the boreal forests as a whole are forest harvesting and forest fire management. Both of these activities change forest dynamics at all scales of resolution, from altering the landscape structure to microsite characteristics and have introduced externally operated dynamics versus natural dynamics.

Sustainability

The rational for sustainability of the boreal forests has both a pragmatic and a more idealistic dimension. The pragmatic reason is that the boreal forests are an important source of employment and economic development, as well as a source of food, fiber, water and forest products upon which people depend. The more idealistic and long-term dimension is of an ecological nature and includes the role boreal forests play in the greenhouse gas budget, maintenance of biodiversity, wilderness, wildlife habitat and spiritual values. The idealistic dimension is difficult to substantiate to the satisfaction of the general public, politicians and policy-makers. Often there is a direct conflict between the ecological issues and the pragmatic issues.

In order to achieve sustainability, all of the ecological factors contributing to sustainability discussed above must be taken into account in a satisfactory manner in any future management system.

4. GLOBAL CHANGE AND THE BOREAL FORESTS

An array of global changes will influence the potential responses of the boreal forests and the ways the boreal forests will be used and managed in the future. Many people instantly think of biophysical processes when global change is the subject of interest, e.g. climate change. These processes are indeed central to examining the boreal forests, but of parallel significance today, and in the future, will be a set of human-oriented forces or socioeconomic forces (Forester *et al.*, 1994). The German Advisory Council on Global Change (1993) has stressed the width of the global change concept. This concept is illustrated in table 3 in an application revised for the boreal forests. It can be seen from this table that Global Change is much more than merely climate change.

The meta-drivers of global change are human population and human behavior. There has been, and continues to be, a serious concern regarding an exploding population development. But the most recent results (Lutz *et al.*, 1997) indicate that it is unlikely that the population will be doubled by the year 2050, as earlier expected. The median estimate is a total global population of 10 billion by the year 2050, compared to 5.7 billion in 1995 (Lutz *et al.*, 199&). Population growth will probably be most rapid in the Middle East, sub-Saharan Africa and North Africa, with the population tripling by the 2050 in these regions. There will also be significant increases in the proportion of the population above 60 years of age. Western Europe, Eastern Europe and Russia are likely to experience little, if any (most likely negative in Eastern Europe and Russia), increases in the population. But in Western Europe and Pacific OECD, the proportion above 60 years of age will probably double compared to the situation today (it could be as high as 40% of the total population). In North America, a population increase of 25% seems likely with a substantial aging of the population, but not as dramatic as in Europe. The population in Latin America is likely to double with the proportion of the population above 60 years of age increasing by 20%.

Table 3. □□□

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· Depositions in relation to carrying capacity in different ecosystems	· Current and possible fixation of greenhouse gases by the ecosystems under different management regimes · Identification of regions and ecosystems which are sensitive to climate change	· Depletion and pollution of fresh water · Impact on the water cycle by deforestation	· Identification of sustainable land-use · Pollution of soil	· Ecologically sustainable use of different forest types · Identification of sustainable structure of landscapes · Management of ecosystems and landscapes for a sustainable biodiversity · The role of northern forests as a climatic stabilization factor	· Sustainable livelihood for people (with emphasis on indigenous people)	· Identification of structural changes in the economy for reduction of pressure on the environment · Identification of sound environmental policy regimes (e.g. property rights, subsidies) · Economic analysis taking environmental aspects into account	· Inter-generational policies · Assessment of social structures and processes that positively influence the environment · Improvement of culture specific strategies for promotion of the environment · Forest sector impact on regional development

Central Asia is estimated to grow by 37% and have an increase in the 60 and over age group from 9 to 25%. Southern Asia (mainly India) will double its population by the year 2050 (Lutz *et al.*, 1997).

This increase in population is still dramatic and the population development in the regions outside the boreal region will cause transboundary effects impacting the boreal forests. But the most dramatic message in this new information is the high proportion of aging people in the global population. Therefore, I expect much of the demographic research in the future will address problems connected with the aging population instead of the population growth as of today.

Most important for boreal forests in the future will be human behavior and how it affects the global environment – economic behavior (e.g. consumption patterns), social behavior (e.g. attitudes), and political behavior (e.g. cooperation or conflict). Human behavior will probably change dramatically over time, especially with the shift in age distribution illustrated above, we do not know what direction these changes will take.

5. NON-STATEMENTS

Until now, I have taken a rather conventional approach to my presentation. In the following, I will address a few issues that normally are not on the agenda for the future of boreal forests. To give ammunition to this convention (the IBFRA-meeting), I could state that climate change is not a major threat to the boreal forests. The continuing, steady decarbonization of energy systems means that concentrations of carbon dioxide will not rise above 500 ppm. It has been stated that a climate warming over the next 75 years "Will not significantly effect diet, health, income or environment. Most of the economy has moved indoors and much that has not will do so. Climate simply matters less and less (Ausubel, 1996)." Or I could state that the assumed climate change is only good for the boreal forests. Perez-Garcia *et al.* (1996) estimate that the boreal zone will have a substantially increased net primary production (+15-25%), an increased output of forest industrial products (+13-20%), increased export, and improved economics due to forecasted climate change. Mendelsohn *et al.* (1997) claim that the expected climate change will have positive market implications for the boreal region in the range of 15-29 billion US$ per year. There are indications that we have already started to move on this path with a significant increase in plant growth in the northern high latitudes during 1981 and 1991 (Myneni, 1997). In this situation, I could argue that instead of worrying about protecting existing production and forest resources we should worry about how to take care of this new production in the boreal zone. I could argue that the loss of biodiversity is an issue more of the past than the future. Ausubel (1996) reminds us that the Americans cleared forests not only for food production but also to keep down the snakes, chiggers and ticks. A similar pattern occurred in Europe and Russia with clearing of forests for health, safety, and mental security. Mankind has passed this stage by now and the snakes and bugs are back in the forests.

But I do not intend to make these statements. Instead I will concentrate on a few other issues.

6. IS SUSTAINABLE BOREAL FOREST MANAGEMENT POSSIBLE?

After reading some 50,000 titles indicated in library indexes and through the internet using the keyword "sustainable forest management," I should of course be wise enough not to touch upon this topic at all, but I am not that bright.

Quite recently, Rice *et al.* (1997) raised the question of "Can Sustainable Management Save Tropical Forests?" They came to the conclusion that this is probably not the case. The conclusions were that current logging practices cause considerably less damage than some forms of sustainable management and the authors state, "substainability is, in fact, a poor guide to the environmental harm caused by timber operations." I will deviate Rice et al.'s (1997) original question to "Is Sustainable Boreal Forest Management Possible?".

A tremendous effort has been put into development of criteria and indicators for temperate and boreal forests through the so-called Montreal and Helsinki processes. Criteria is defined as: The essential components of forest management against which sustainability may be assessed. Each criterion relates to a key element and can be characterized by one or more quantitative, qualitative, or descriptive indicators. The development of criteria and indicators was identified as being one of the major tasks for the Intergovernmental Panel on Forests. The basic idea is that by monitoring these indicators the degree of sustainability can be measured. FAO (1997a) states that it seems plausible to arrive at a globally-agreed upon core set of national-level criteria and indicators. A further step in this direction is *certification*. Roughly defined, certification is the process of establishing whether or not

a particular forest area is achieving objectives based upon criteria and indicators of sustainable forest management.

The Helsinki Process includes 6 criteria and 27 quantitative indicators (of which 6 are difficult to implement; FAO, 1997a) and Montreal Process contains 7 criteria and 67 indicators (of which only 9 can be measured in e.g. the USA; FAO, 1997a). Russia has developed its own preliminary set of 6 criterion and 35 indicators (Strakhov, 1997).

This entire development is excellent and shows a way to move towards sustainable forest management. But will it happen?

First, it is certainly necessary that the signatories of the agreements monitor the indicators they have agreed upon. Second, currently the agreements are non-binding national indicators. There is a strong need to demonstrate and quantify what does it mean for the sustainable development at a sub-regional national level in concrete form by implementing these indicators – usage of just national indicators will only mask the problems. To my knowledge, no one has done this so far. Even if these two hurdles are overcome I still think there exist great difficulties with the entire concept.

I will use Russia as an illustration. I have selected one indicator from each criteria in my illustration and you should remember that the agreements deal with 27-67 indicators. By merely overlaying my 6 selected indicators for Russia one can see that the indicators point in different directions[3]. The indicators of the agreements are selected in a manner where there will always be conflict between the same. The questions one may ask in this situation are: What is acceptable sustainability, and what is good and what is bad sustainability? Who is going to decide this? In the end it will, of course, be a political decision at some level and at that stage a whole array of important socioeconomic factors or indicators (which are not included in the current indicators) will be the driving forces for the decision-making process.

The problems with the sustainability concept, and by that the criteria and indicator approach, has been illustrated in an excellent way by Heilig (1997). I will use his paper as a platform for my further discussion.

The concept ignores the fundamental diversity of interests. One of the major characteristics of our world is that people fundamentally disagree about objectives, values and lifestyles.

What is environmentally sound may not be acceptable for our social structure, our economy or our culture. A most serious obstacle to a universal concept is the fact that human life has to deal with more than one dimension. Stability of our ecosystems is only one of many concerns.

The concept is based on a social concept of harmony and ignores the fact that human development is driven by conflicts and fierce competition. The whole evolution of the human species indicates that we are part of the ecosystems (Behan, 1997), but we are not just happy being part of a sustainable ecosystem. We want to dominate and grow. Through all kinds of interventions, we try to shape our environment for our benefit – even if at the cost of other species and our human neighbor. By nature, we are a competitive animal.

It can be demonstrated that a strategy of simple-minded cooperation will always lose in an environment where the other players can gain a slight advantage by not cooperating (Nowak *et al.*, 1995). Human interaction is based on bargaining, open threats, economic pressure, but coercion or a strategy of limited retaliation against non-cooperation. This diplomacy of violence (Schelling, 1966) is one of the fundamental principles of all social, economic and political development, which is neglected in the current concept. This is especially crucial at a time when the world is swept by, international, global and neo-liberal economies.

The concept reduces the analysis of social, economic, cultural and political processes to a simplistic Bio-Physical Framework. It has been demonstrated that the most important social processes are not at all similar to those in ecosystems (Etzioni, 1968).

Thus, I do not think that we can achieve sustainable forest development in the boreal zone as thought, due to the fact that the current concept *does not address the fundamental social problem of power imbalance between societies and social groups and does not identify which social, economic and political structures and processes a society should use in order to promote sustainable development.* This has been illustrated for the tropical forests

[3] *Illustrations are not presented in this paper.*

by Kamari (1996) and Rice *et al.* (1997) and more generally by Jaeger (1995), we have the same situation in the boreal zone.

What counts is what the local society wants to happen in and for their forests. The moment that occurs is when we may have a sustainable boreal forest (Duinker, 1997). The important task is to find the mechanism for this consensus-seeking by the local societies in the boreal forests. Thus, the first recommendation to IBFRA would be:

- *to broaden its current concept with a rather basic ecological approach to include social, economic, cultural and political processes. Otherwise, the organization will not be successful in the very important work it is carrying out in order to contribute to the sustainable development and management of the boreal forests.*

7. IS THERE A FUTURE FOR THE TRADITIONAL BOREAL FOREST SECTOR?

As stated earlier, the world is swept by international, global and neo-liberal economies. The development is going very fast, the driving criteria is to be competitive and it is very powerful. This strongly influences the future of the boreal sector. Concerns are raised that this "competition fundamentalism" is incapable of integrating social justice, economic efficiency, environmental sustainability, political democracy and cultural diversity (Emmerij, 1997). However, this is how the world is ruled today.

In order to illustrate in what direction we are going, I use FAO data (FAO, 1997a and b) (fig. 2 and table 4). In figure 2, I have used a simple prolongation of the trend breaks to illustrate my message (these trend breaks are not accounted for in earlier estimates on demand in table 2). The key message is that sawnwood consumption per capita in the developing world has decreased dramatically between 1970 and 1994. In the same countries, per capita consumption of wood panels has also started to decline. There is still an increase in consumption of paper and paperboard, however this increase is weak. The increase in per capita consumption takes place in panels and paper and paperboard in the developing countries. If we look at the expected paper and paperboard consumption changes, based on FAO estimates (1997b), we get a development as illustrated in table 4.

Table 4. *Estimated increase in paper and paperboard consumption and wastepaper consumption between 1994 and 2010. Expressed in million tons.*

	Paper and Paperboard	**Wastepaper**	**Relation of Wastepaper to Paper and Paperboard (in percentage)**
Africa	1.9	0.8	42
North/Central America	28.9	22.4	78
South America	4.6	2.4	52
Asia	67.2	36.2	54
Oceania	1.7	1.2	71
Europe	23.0	17.9	78
Former USSR	2.3	1.0	42
Developed	66.3	49.9	75
Developing	63.3	32.0	51

What does all of this mean? It means that the pulp and paper industry in the boreal zone will move to areas with a rapid growth in consumption, mainly Asia and South America, to be profitable. There will still be a substantial increase in paper and paperboard consumption in the developed world, but in the future it will be less dependent on virgin fibre, as increased utilization of wastepaper will take care of most of this expansion. It means the boreal pulp and paper industry will become increasingly more global, and increasingly less dependent on boreal fibre and as a result we will not see any new mills established. This process has already started (e.g. Financial Times, 1997), the result will be a handful of big companies in the boreal zone. At the same time we have a domestic sawmilling industry in the boreal zone facing a dramatic drop in per capita consumption and a stagnating aging population in traditional markets, with the non-traditional markets incapable of absorbing this difference in consumption. In addition, with a boreal pulp and paper industry going abroad and becoming more and more dependent on wastepaper, it will decrease prices on pulplogs and sawmill chips. Income from sawmill chips for most of the sawmilling industry constitutes a profit margin of about 15% today.

A friend of order asks of course, what does this have to do with sustainable forest management and the boreal forests? The anomaly is that the overall objective with most boreal forestry is to make money. The way forestry brings in money to the forest landowner, and different operators of the forests is through sawlog production. Therefore, the overall objective in the boreal zone has been, and still is, to produce high quality sawlogs. But the world is changing rapidly and it seems that very few will be interested in sawnwood in the future.

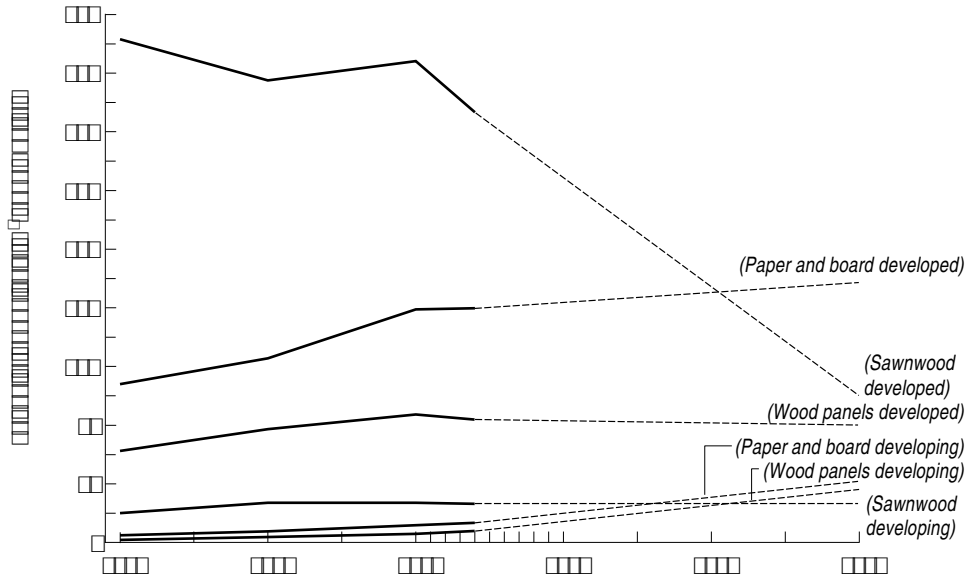

Figure 2.

If this happens, we should work with quite different objectives for the boreal forests in the future, which will result in quite different ecological and sustainability concerns (many of our current concerns may also disappear). A key issue will be who will pay for the forestry and ecological management under these new conditions. Based on the above, I would like to make two recommendations to IBFRA's future activities.

- *To include analyses of the development of the industrial boreal forest sector in the current framework. Without a strong sector I see limited possibilities to achieve sustainable development in the boreal forests, and*

- *To expand analyses to include links to, and impacts on, the sustainable development (both from a socioeconomic and environmental point of view) of the boreal forests with the development of the resources and forest sector at a global level.*

8. IS THERE A SUSTAINABLE FUTURE FOR THE BOREAL FORESTRY COMMUNITIES?

The future of human communities in boreal forested regions is a growing concern among politicians, social scientists, land managers, and most importantly, among community members themselves. As illustrated earlier, the world is swept by internationalization and neo-liberal economies. The results of this merging of forest companies are lean operations with substantial downsizing and huge layoffs in forestry operations. This often occurs in towns with only one major employer, namely the forest industry. In the boreal zone, many communities will not survive without a solid forest sector and vice versa, the forest sector operations can not be carried out without stable forestry communities (e.g. Lundquist *et al.*, 1997; Bradshaw and Lynn, 1996). Two different schools of thought with respect to natural resources and regional development exist. One is that regions having an abundance of natural resources may have an advantage over less resource-rich regions in the form of better incomes and in alternative strategies for industrialization (e.g. Gerschenkron, 1962; and Bradshaw and Lynn, 1996). The other school, the resource-curse theory, highlights the disadvantages that resource-dependent regions face in their attempts to achieve long-term economic growth (the so-called Dutch Disease). Examples of advocates for this second school are Spooner (1981), Auty (1993), and The Economist (1995).

In order to achieve sustainable forestry communities, three aspects have to be fulfilled (Kaufman, 1990): land-use aspects, industrial and employment aspects, and the social welfare and organizational aspects.

Current analyses of forest communities (Carroll and Lee, 1990) suggest that ecological and economic analyses alone are not sufficient to understand the adaptability of forest communities under stress. There must be increased cooperation among foresters, ecologists, economists and sociologists in order to address the sustainability issue of forestry communities. Muth (1990) suggests that the most productive approach to study the relationship between forest resources and sustainbility of forest communities could be that provided by structural sociology. He also stresses that the issue of sustainable forest communities are best understood in terms of a sustainable community institutional structure, rather than in terms of traditional indicators such as employment, resource supply, ecology, economics, and inhabitants.

Apedaile (1992) points out that understanding of the underlying order of the rural economic system and its place among other systems is a precondition to steering the development of the rural system. He also points out that rural-urban integration changes the system-millieu, but it does not change the underlying features of the resource-based economy, and that over time these underlying features worsen the economic performance of natural resource-based activities of the rural system. Without a solid background of the above, it will result in flawed policies for sustainable rural development. Williamson and Annamraju (1996) underline that an *adequate* of the sustainability approach is necessary to achieve forest community sustainability.

We, in the forestry community, have not been very successful in tackling forest community problems in the way I have outlined above. Given the conditions we are facing in the boreal zone with a stagnating and aging population, the continual, substantial downsizing of the workforce in forest communities (Financial Times, 1997), the strong structural changes expected in the boreal forest sector, and the crisis situation in the Russian forest communities (Lundquist *et al.*, 1997), I have the following strong recommendation to IBFRA:

- *Start a program with the objective to find the soul of the future boreal forest communities (Robson, 1996). The keywords in this program should be integrated analyses, structural sociology, and community institutional structures. The program must aim to produce results for sustainable development of boreal forest communities.*

9. WHERE IS THE LOGIC AND WHERE ARE THE SCIENTISTS?

During the last 10-15 years and especially during the 1990s, demands on the forest sector by society and governments have increased dramatically. Societies and governments require that a new set of principles be implemented to improve social, economic and environmental benefits of the forests. These demands can be illustrated by the conclusions from the 7th American Congress:

- *The forests should sustainably provide a range of goods, services, experiences and values that contribute to community well-being, economic opportunity, social and personal satisfaction, spiritual and cultural fulfillment, and recreational enjoyment,*

- *The forests should be sustainable; support biological diversity; maintain ecological and evolutionary processes; and be highly productive, and*

- *The forests should be managed with consideration for global implications.*

This will require tremendous resources in the form of people, money and a healthy forest industry to implement these principles and visions. But what are governments doing? They are implementing policies which totally contradict the points made above. This can be illustrated by data kindly supplied to me by Dr. René Samson, Canada, and Dr. Sven Svensson, Sweden. They stress that there are uncertainties in the data, but the trend is assumed to be correct (tables 5 and 6).

Table 5. *Relative Development in Canada.*

Year	Person-year in Canadian Forest Service	Canadian Forest Service Budget (Deflated to 1990 Values)	Public (Provincial and Federal) Funding on Forest Management (Delfated to 1990 Values)
1989/90	100	100	100
1990/91	101	73	104
1991/92	100	81	96
1992/93	96	91	90
1993/94	103	94	85
1994/95	97	87	93
1995/96	89	70	?
1996/97 estimate	71	46	?

Table 6. *Relative Development in Sweden.*

Year	Number of Service Days by the Regional Forestry Boards	Regional Forestry Boards Budget (Delfated to 1991 Values)	Maximum Amounts of State Subsidies to Forestry (Deflated to 1990 Values)
1989/90	--	--	100
1990/91	--	100	75
1991/92	100	90	48
1992/93	97	89	33
1993/94	66	72	44
1994/95	66	73	24
1995/96	75	76	33

When comparing the increased demands with public allocation of manpower and money to forestry, it can only be concluded that this equation is not sustainable. Therefore, a logical question is if the different political commitments made, both at national and international levels, to reach sustainable development (all aspects) in the boreal zone is just lip service. With this simple overview the conclusion points in that direction.

And where is the scientific community in this non-sustainable equation? Our usual attitude is that we are scientists and do not get involved in policies and politics. Therefore, the boreal scientific community is silent. But in reality, as stated by the Director General of UNESCO, "Science is a highly political issue and part of the political decision-making process and therefore science must make its voice heard (Nature, 1997)." Hellström and Palo (1995) point out that research and development in forestry should be regarded as one of several instruments in forest policy-setting.

It can be concluded that there is a rather low probability that those visions set in the boreal zone to achieve sustainable development can be reached with current governmental allocations. This has to be made clear to the decision-makers and the scientific community has to act as the messenger.

My final recommendation to IBFRA is:

- *To get heavily involved in the policy debate with respect to the future of boreal forests. Your important work and results will only be implemented by an active role in the debate on future policies for sustainable development in the boreal zone.*

10. SUMMARY

I have attempted to illustrate, at an aggregated level, how vital the boreal forest zone is from an ecological, economic and social point of view. But I also concluded that the boreal forest zone and boreal forest communities face serious structural changes in the form of stagnating (or declining) and aging population, resulting in changed attitudes in many respects. Due to the globalization of the forest industry, the boreal zone faces a challenge with structural changes, of which we do not know the outcome. It can also be concluded that

the current allocation of resources to the boreal forest zone by the public will hardly make it possible to achieve those visions set by societies and governments for a sustainable boreal forest zone.

The boreal forest zone and the scientific community in the zone face challenges which have to be approached in a non-traditional way to become successful. To summarize, I make the following recommendations to the players and scientists in the boreal forest zone and IBFRA:

- *To broaden its current concept with a rather basic ecological approach to include social, economic, cultural and political processes otherwise the organization will not be successful in the very important work it is carrying out in order to contribute to the sustainable development of the boreal forests.*

- *To include analyses of the development of the industrial boreal forest sector in the current framework. Without a strong sector I see limited possibilities to achieve sustainable development in the boreal forests.*

- *To expand analyses to include links to and impacts on the sustainable development (both from a socioeconomic and environmental point of view) of the boreal forests, with the development of the resources and forest sector at a global level.*

- *Start a program with the objective to find the soul of the future boreal forest communities (Robson, 1996). The keywords in this program should be integrated analyses, structural sociology, and community institutional structures. The program must aim to produce results for sustainable development of boreal forest communities, and*

- *To get heavily involved in the policy debate with respect to the boreal forests. Your important work and results will only be implemented by an active role in the debate on future policies for sustainable development in the boreal zone.*

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