

**THE DEFORESTATION OF SIBERIA:
ECONOMIC AND ENVIRONMENTAL
PROBLEMS IN RUSSIAN
FOREST MANAGEMENT**

Lisa A. Tracy

Co-Director, Siberian Forests Protection Project
Pacific Environment and Resources Center
Sausalito, California, USA

Forest Industry Lecturer

Forest Industry Lecture Series

Forestry Program
Faculty of Agriculture, Forestry and Home Economics
The University of Alberta
Edmonton, Alberta
CANADA
T6G 2H1

25 April 1994

FOREST INDUSTRY LECTURE NO.32

LISA A. TRACY

Lisa A. Tracy grew up in Bend, Oregon, at the center of the US Pacific Northwest's forest management battles. She holds a BA degree in Russian Studies from Amherst College, where she completed an honors thesis on the topic of grassroots Russian political movements. A fluent Russian speaker, she has traveled throughout the former Soviet Union. Since 1989, she has followed developments in the Russian environmental movement. In 1991, she participated in a US-Russian effort to establish pilot projects in agricultural cooperatives in Moscow Region.

Since June 1992, Ms. Tracy has directed several environmental projects at the Pacific Environment and Resources Center (PERC), a non-profit policy research, public education, and advocacy organization in Sausalito, California, USA. In 1992-93, she coordinated a PERC pro-gram training lawyers from all over the former Soviet Union in environmental law and advocacy. Since 1992, she has also worked with PERC's Siberian Forests Protection Project, for which she became Co-Director in July 1993. This Project also assists the native Udege people in establishing economic alternatives to logging, educates Russian schoolchildren on Siberian tiger protection, and provides grants and equipment donations to Russian environmental organizations. She researches and publicizes Siberian forest management practices, and travels throughout Siberia and the Russian Far East to work with Russian forest scientists, environmental activists, government officials, and communities. In 1993, she helped to establish and attract support for two eco-forestry projects in Siberia and the Russian Far East.

Since January 1994, Ms. Tracy has also directed a PERC program providing organizational support and training to Ecojuris, Russia's first public interest environmental law firm.



ABSTRACT

Siberia's forests, the world's largest, occupy an area the size of the continental United States.

Siberia's forests suffer from severe ecological degradation. Much of this damage is caused by careless logging practices, including overlogging, use of heavy equipment, recklessness in fragile and permafrosted areas, overuse of herbicides, poor road-building techniques, and low regeneration success. Serious economic inefficiencies in logging techniques, labor, transportation, storage, milling, and distribution compound the problem. Excessive forest fires, acid rain, and air particulate pollution also contribute to the damage.

Russian economic and political decentralization of the past three years has not fully dismantled the old Soviet forest management structure. A 1993 Federal Forest Law puts greater power in the hands of regional and local agencies at Moscow's expense, but it raises more jurisdictional questions than it answers.

Foreign companies seeking to log Siberia's forests encounter a bleak business climate. These companies are faced with the high inaccessibility of valuable forest land, a breakdown in internal trade and transportation infrastructures, unreliable ports, high taxes, uncertain jurisdiction; and opposition from the Russian forest "mafia" and community groups.

Ecological recovery of Siberia's forests will require experimentation in low-impact logging techniques; separation of industry from government regulators, preservation of ecologically unique areas, a ban on clearcutting in permafrost regions, and further scientific research into boreal forest ecology. Creation of sustainable forest-dependent Siberian communities will require economic diversification which supports hunting, fishing, and tourism, public input in forest management decisions, and establishment of local, value-added processing facilities.

SIBERIA'S FORESTS

Comprising more than 20% of the world's total forested area, Siberia's forests are also some of the least known and understood.

Siberia is the region of Russia stretching from the Ural Mountains to the east, towards the Pacific Ocean. The land bordering the Pacific Ocean is more commonly known as the Russian Far East. In this talk, I mean "Siberia" to encompass both Siberia and the Russian Far East.

Siberian forests, known in Russian as the "taiga," comprise 800 million to 1 billion square hectares, about the size of the continental United States.

Most of these forests fall into the boreal zone. These are mixed coniferous/broad-leafed forests of pine, larch, spruce, fir, birch, aspen, and other common boreal species. The dominant species is known as Siberian pine (*Pinus sibiricus*), which lives to 300 or 400 years. Larch is the most common tree, accounting for as much as 45% of the entire species composition. The southern and middle boreal forest areas are rich in undergrowth. As in Canada, Siberia's boreal forest supports thousands of species of mycorrhizal fungi, which play a central ecosystem role by fixing nutrients for trees and providing crucial stability and air pockets in the soil.

The average diameter of a mature Siberian tree is only 24 cm.¹ In the more northern boreal area, soil is generally thin and sandy, and trees are known to grow only one meter every forty years.² A large portion of Siberia's forests — more than in Canada — grows over permafrost.

Forests to the south and east, in the Russian Far East, occupy a transition zone between the northern boreal type and southern subtropical type. This ecosystem, known as the "Ussuri taiga," intermingles all of Russia's boreal species with warmer temperate species such as elm, ash, oak, maple, and yew. The dominant tree species, Korean pine (*Pinus koriansis*), produces pine nuts which are a key source of food to wild boar, deer, and other wildlife. This area has never been glaciated, allowing for a high diversity of both flora and fauna. Among the over 2,000 higher plant species in this region are 200 useful medicinal plants, including ginseng and aralia, highly valued by native and local Russian people. The Ussuri taiga is also host to the world's only temperate forest tiger — the Amur (or "Siberian") tiger — as well as reindeer, leopard, brown bear, and numerous endemic or rare bird, insect, and reptile species.

Very rough estimates put virgin forests at 40% of Siberia's total forested area. A history of underfunded monitoring and inventories, inaccurate ground and aerial analysis, and poor record-keeping makes it impossible to estimate the conditions in large areas of Siberia's forests.

In this presentation, I will discuss the threats to the Siberian forests, as well as recent efforts to preserve these ecologically important lands. First, I will summarize traditional Russian forest management practices and consider the environmental consequences of these practices. Second, I will address the effects of centralized management on Siberian forest economies. Third, I will focus on post-Soviet environmental-legal developments, giving special attention to privatization and forest legislation. Finally, I will discuss how Siberian forest management might be affected by foreign joint ventures, and the increasingly international nature of the Russian resource trade.

TRADITIONAL RUSSIAN FOREST MANAGEMENT AND ITS ENVIRONMENTAL CONSEQUENCES

An estimated ninety percent of domestic logging is done by clearcutting. Areas that have not been clearcut have been high-graded, or stripped of their largest and most valuable trees. Siberian and Korean pine have been illegally cut for years. Because these dominant species play such a central role in their ecosystems — for instance, as support for the Siberian tiger — high-grading of these trees has led to an overall decline in forest health and natural diversity.

Heavy logging equipment — weighing in at up to 15 metric tons — flattens undergrowth and compacts and erodes topsoil, destroying the mycorrhizal fungi critical in supplying nitrogen for future generations of trees.

Although studies are still at a preliminary stage, scientists estimate that Siberia's forests contain 40 million tons of

¹Rosencranz, A. & Scott, A. *Nature*, Vol. 355 No. 6358 (1992), p. 293.

stored carbon²— about two-thirds the carbon content of the Amazon's forests. Whereas tropical carbon is mainly stored in the forest biomass, Siberian forest carbon is mainly stored in soils. Soil erosion — caused mainly by high-impact logging operations — is among the greatest releasers of carbon, thereby potentially contributing to the carbon loading of the Earth's atmosphere.

In addition to the profound loss of forest cover, clearcutting also poses a serious threat to Siberia's permafrost. Solar exposure brought on by clearcutting has melted shallow permafrost on up to 50% of logged areas. These areas become swamped and eventually evaporate, leaving behind desertified soil incapable of supporting forest regeneration. Melted permafrost releases into the atmosphere not only carbon but also methane (CH₄), which has several times the global warming capacity of carbon.

The balance of logged Siberian forest land — including virtually all permafrosted land — has failed to regenerate. Most Russian scientists support natural regeneration, particularly in dry soils. Where artificial regeneration has been deemed necessary, the institution charged with reforestation — the *leskhoz* (local forest service unit) — has received grossly insufficient state funds to carry this out. Slow growth rates spell an average rotation period of over 120 years — too long to bring a short-term or even medium-term return on one's regeneration investment. Thin soils, short growing seasons, and erosion brought on by logging have left over seventy per-cent of logged Siberian forests inadequately restored.

Artificial regeneration has also brought on serious environmental problems in many areas of Siberia's forest. In an effort to speed up timber rotation periods, Russian logging enterprises often skip the natural early forest succession stages — characterized by grasses, birch, and aspen — by planting native conifers including spruce and pine. Weeding out the natural grasses

and deciduous species requires extensive human maintenance as well as generous use of herbicides, which often find their way into waterways used for fishing and drinking water. Every Siberian region has stories of foolish, last-minute attempts to regenerate irreparably damaged logging sites. For example, some foresters attempted to restore topsoil lost from heavy logging along the Baikal-Amur Mainline Railroad by dumping several inches of sand over the remaining soil.⁴ Finally, "regeneration" by single-age, one- or two-species plantations has replaced and simplified highly complex natural ecosystems, degrading forest health, self-regenerative capability, and biodiversity.

The practice of floating logs downstream to lumber mills has depleted oxygen, and therefore fish habitat, in many Siberian streams and rivers. Some streams and rivers have accumulated several vertical meters of sunken logs.

Forest fires occur naturally in Siberia's boreal forest, and may play a necessary role in overall forest health and regeneration. However, most Siberian foresters observe that since 1991, a combination of increased incidence of human-caused fires and drastically reduced funding for forest fire control has led to a doubling or tripling of forest fire occurrence, from 1 million hectares to 2-3 million. They also assert that over 80% of these fires are human caused. These human-caused fires disproportionately hit the particularly biodiverse and economically valuable southern coniferous forests, where human concentrations and access are greatest.

Logging roads have traditionally been built to obtain easiest access to wood. Some road-builders have purposefully placed roads through the most valuable stands, to obtain free, high-value timber; others have built roads along streambeds, causing siltation and destruction of fish habitat. Road-building by the Russian timber industry, as elsewhere in the world, has often led to forest fragmentation and unsustainable rural population growth with its attendant overhunting and poaching, mining, waste dumping, and other damaging activities.

Siberian forests have also been degraded by acid rain and air particulates. Particulates emitted by the nickel smelter at Norilsk in north central Siberia have alone destroyed 300,000 hectares of nearby forest.³ Natural mosses — which play the largest air purifying role in Siberia's intact, uncut forests — are often completely absent in artificial plantations.

² Trexler M. Minding the World's Carbon Store (World Resources Institute. 1991).

³ Levin *Ibid.* p. 15.

EFFECTS OF CENTRALIZED MANAGEMENT STRUCTURE ON SIBERIAN FOREST ECONOMIES

The Soviet Ministry of Forestry, founded in the 1920s, restructured or significantly varied its jurisdiction over two dozen times before 1991. The Ministry was a centralized structure designed to guide all aspects of forest management from Moscow, as many as ten time zones from the point of logging. It was divided into dual vertical structures: At the federal level, the Minlesprom was to centrally guide and perform all forest industry activities including cutting, distribution, and sales, while the Minleskhoz, or Forest Service, was to perform forest protection activities and regulate the Minlesprom.

This centralized forest management structure mimicked the structure of the Soviet economy in all other sectors. The Moscow bureaucrats within the Ministry of Forestry viewed Siberia as Russia's huge resource pool, to be industrialized and exploited as quickly as possible. They would decide annual production "goals" and issue corresponding shipment orders to regional⁴ and local agencies, on a monthly basis, stating how much should be cut and to which destination the logs should be sent. The regional organizations responsible for fulfilling these orders included *upravleniya lesami* (regional forest services), subordinates of the federal *Minleskhoz*, and *obedeniya* (conglomerates), subordinates of the *Minlesprom*.

At the local level, state-owned industry enterprises called *lespromkhozi* were in charge of logging, while *leskhozi* (forest service units) were in charge of forest protection, forest fire monitoring, replanting, licensing, and general regulation of the industry. *Leskhozi*, which each had a jurisdiction over five or so *lespromkhozi*, decided where, how, and how much the *lespromkhozi* could cut, and where they should replant. In reality, the *leskhozi* were severely underfunded, often deriving their major source of income from the very *lespromkhozi* they governed. This system served as a incentive for the *leskhozi* to allow overcutting, and a disincentive to rein in or levy fines on *lespromkhozi* for breach of regulation.

This centralized forest management command structure led to serious inefficiencies in logging techniques, labor, transportation, storage, milling, and distribution. Russian loggers and millers often joke that their equipment is "pre-Revolutionary," or pre-1917. Technology is usually old and inefficient. For example, many mills have no movable headsaw and therefore can cut to only one log size, and cutting machinery is not usually equipped to remove or make use of limbs and branches. As a result, Russian logging equipment uses up to three times more timber than most Western logging firms to produce the same product.

In many areas, Russian loggers have been paid for what they cut rather than what they load, transport, or process. In the interest of providing guaranteed work for everyone, logging sites were often overstaffed, leaving loggers to cut more trees than were transportable, or to pointlessly move logs from one pile to another. As a result of these factors and the inadequate transportation infrastructures, large piles of merchantable logs were regularly left on site to rot.

Logs not wasted at the logging site or in trucks bound for the mill were often lost at the mills themselves, which were plagued by inadequate storage facilities, fuel shortages, a centralized distribution and sales system, and a lack of transportation facilities. In the end, probably less than one-third of logged trees actually made it onto trucks, through the mill, and to the point of sale.

POST SOVIET DEVELOPMENTS: PRIVATIZATION AND THE NEW 1993 FOREST LAW

The past three years of economic and political liberalization and decentralization have not succeeded in dismantling the

⁴ Regions – In Russian, *oblast* or *krai* – are roughly equivalent in size to Canadian provinces.

old Soviet forest management structure. In fact, many economic and environmental problems, rather than disappearing or at least being alleviated, have worsened.

The Forest Law, signed by President Yeltsin in March 1993, was designed to decentralize control over forest resources. Some features of the Forest Law include:

- All forested (non-agricultural and non-urban) land remains public property. Forestry enterprises can privatize, but land cannot be privatized.

Forestry enterprises are now able to lease land for up to 99 years, as "forest users," from local *leskhozi*.

Leasing "preference" must be given to any industry enterprise that has already been working on the piece of forest land in question (Article 28).

Taxes may be levied on three levels: federal, regional, and local.

The forest user is required to perform an *expertiza*, or environmental impact assessment, prior to logging. (This is also mandated by the 1992 general Russian Environmental Law.)

There are no provisions for community input into forest management or leasing. In fact, the new Forest Law eliminates the independent, non-governmental inspectorate that existed under the old forestry law, increasing opportunities for noncompliance and corruption.⁵

The Forest Law also alters jurisdiction over forest management and regulation, diminishing the role of the Federal Ministry of Forestry. The Ministry will continue to assign all forest land into one of three "categories", or general land use designations. This includes: Class One forests — important natural areas where no industrial cutting is permitted; Class Two forests — greenbelts and urban parks allowing limited commercial logging; and Class Three forests — available for industrial forestry. The Forest Law also allows the Ministry to establish general regulations and forest leasing guidelines, and to levy taxes to finance its own operations as well as a fund for "forest protection." The law does not state how this fund will operate, or how decisions will be made regarding its goals and distribution. In sum, the Forest Law significantly stifles the role that the Federal Ministry had played for sixty years.

Indeed, one of the most striking features of the Forest Law is the granting of free rein to Russia's regions and localities to develop their own forestry laws and practices. The Forest Law leaves intact regional *upravleniya lesami* and local *leskhov* and *lespromkhov* structures, often assigning them joint jurisdiction over forest resources with parallel regional and local legislatures and administrations. Regional legislatures are given jurisdiction to adopt regional land-use legislation, write guidelines for forest auctions and leasing, and levy regional taxes. The regional *upravleniya lesami* share joint responsibility with regional government administrations on forest inventory, monitoring, regulation, and allowable cut.

District (*raion*) legislatures now determine the "local form of user selection" — in other words, processes and criteria for choosing lessees. They have the option of choosing auctions or direct negotiations, but are not required to open the process to competitive bidding. District legislatures also determine taxing and leasing rates.

District government administrations and *leskhozi* jointly grant forest lands to forestry enterprises through the "form of user selection" determined by the legislature, and jointly conduct all forest inventory, monitoring and regulation of *lespromkhozi*, and protection against fires and pests.

Although the drafters of the Forest Law intended to clarify the forest management roles of regional and local bodies, in fact they raise more jurisdictional questions than they answer. The Law leaves unclear the extent to which regional *upravleniya*

⁵ Grigoriev, A. *Taiga News* No. 5 (1993). P. 2

lesami have gained freedom from federal interference, or gained the right to interfere in local leasing decisions or procedures. Regions are given jurisdiction over everything except "federally recognized lands" — which are not defined here. In addition, Article 5 requires regions to continue to "provide a timber supply for the national needs." Because criteria for determining this "national need" are not set forth, the Forest Law offers the Ministry of Forestry little direction as to how to proceed with implementation.

Second, the Law does not define a mechanism through which regional and local legislatures, *upravleniya lesami*, *leskhozi*, or other agencies holding "joint jurisdiction" might battle out differences between themselves. While *leskhozi* have long shared an uneasy *de facto* joint jurisdiction over forested land with local governmental hunting agencies, or *gospromkhozi*, the new Forest Law barely mentions the *gospromkhozi* — it neither eliminates them nor defines their role.

On the local level, few provisions are made to avoid corruption or conflict of interest. The new Law does not ban *leskhozi* from owning shares in local forestry enterprises which may be applying for the *leskhozi's* favor.

The most glaringly lacking definition is that of "forested" land itself. How are forested lands to be distinguished from non-forested lands? Since non-forested land is governed by different laws and government agencies than forested land — for example, by the agricultural codes and the Ministry of Agriculture — this distinction is important.

Until the Ministry of Forestry significantly elaborates the new Forest Law through detailed regulations and instructions — which have been only slowly forthcoming — ambiguities will remain regarding jurisdiction, leasing and reforestation requirements, taxation mechanisms, and the definition of "forest" itself. These ambiguities make effective implementation of the Forest Law difficult, if not impossible.

THE EFFECT OF SIBERIAN FOREST MANAGEMENT ON FOREIGN JOINT VENTURES

Domestic and foreign firms logging Siberia's forests are inheriting the economic and environmental damage from decades of mismanagement — and are likely to continue to face these problems for years to come. The new Forest Law, and the opening up of Russia's forests to foreign loggers and forest products traders, have provided little in the way of opportunities for foreign firms. In fact, aside from an influx of Chinese barter traders and a handful of joint venture logging operations by Japanese, Chinese, Korean, and European companies, foreign logging in Siberia is somewhat of a myth.

From an industry point of view, investment in Siberia's forests is inhibited by numerous factors, among them:

The disappearance of most of Siberia's more productive and accessible forests. Forests in the relatively productive regions of Krasnoyarsk, Irkutsk, Tuminskaya, and Khabarovsk are fairly devastated. Much remaining wood is skinny, low-quality, and expensive to access and transport.

The lack of transportation infrastructure. Most railways remain state-owned, while operating costs and fees rise monthly. Fuel and spare parts are chronically scarce and difficult to obtain at any price. Usually companies must finance and construct their own roads, even aside from expense considerations, problems in obtaining equipment, fuel, and labor make this logistically difficult.

The breakdown of internal trade ties within Russia and the former Soviet Union, causing overall logging rates to decrease since 1989. For instance, Siberia's Chita Region can no longer obtain equipment from Kazakhstan; as a result, its overall logging rate has decreased.

The lack of clear jurisdiction over forest resources among federal, regional and local agencies.

The lack of clarity regarding with whom to negotiate. Often foreign enterprises must obtain the agreement not only of the local

leskhoz, but also most other local and regional government agencies. Proposed projects can be controversial, and negotiations drag on for years. Russian forest enterprises and government agencies can restructure and change management several times per year. Current privatization of Russian forestry enterprises often leaves a host of unsettled management, shareholder structure, and financial questions.

The Russian "forest mafia." In some areas, a few regional kingpins officially or unofficially control all resource allocation decisions, inevitably favoring their own domestic enterprises.

- A legally mandatory, and real preference for local, already-established forestry enterprises.

A lack of contract law to back up foreign enterprises should their local partners breach contract.

The Wild West atmosphere at Russian ports and the railroads that feed them. Logs are often stolen or switched by railroad and port workers for sale on the black market. Many foreign companies regularly receive late, inadequate, or poor-quality shipments, or no shipments at all.

A large, unpredictable tax burden. In summer 1993, one community in Primorsky Region faced a combined local, regional, and national tax burden of 117% for its forest products. Among these taxes are labor, value-added, export, and community support (e.g. hospitals and schools). Taxes are levied without warning at any level; it is difficult to find out which taxes will be enforced at any given time. This makes business planning difficult.

Steady devaluation of the ruble.

What some foreign companies characterize as an unreliable Russian workforce. Weyerhaeuser Corp., for example, arranged for several hundred Russian workers to plant seeds in the Far East in summer 1993; when company representatives arrived for the planting, the Russian workers had all gone elsewhere without warning.

Anti-foreign sentiment. Many Siberians believe that foreign companies wish to extract Siberian resources with little economic benefit to local people. This attitude has been con-firmed by experience in some areas.

Opposition by local hunters, native groups, environmental groups, and forest-dependent communities. Hyundai Corp., for example, was forced by native and environmental opposition to back out of a logging contract in Primorsky Region.

TOWARDS BETTER FOREST MANAGEMENT AND ENVIRONMENTAL PROTECTION

Many Siberian environmental organizations are focusing their forest protection efforts on creating or expanding nature preserves and national parks. While laudable and often successful, these efforts do not address the health of the Siberian forested land that has been logged or is open for logging. In many instances, creation of preserves has merely moved logging activity from the preserve to equally fragile nearby sites.

My recommendations would include:

Set aside forest areas of unusual character or especially high biodiversity. Once logged, these areas cannot be replaced.

Use environmental impact assessments conscientiously, with mechanisms for public input in forest management decisions.

Ban clearcutting in permafrosted forest lands.

Respect traditional forest lands of native peoples. These peoples should have decision-making authority over any economic activity that takes place on their land.

Separate industry from government regulators. All *leskhozi* should be required to solicit competitive bids from all potential lessees.

Establish greater interaction and field experimentation between scientific institutes and foresters. Scientific field support should experiment in lower-impact logging techniques and assist with forest restoration. There should be independent (i.e. non-industry) funding for scientific institutes.

Develop alternative logging practices that preserve native ecology.

Establish small-scale processing facilities in forest-dependent communities. Value-added forest products create jobs and sell for much greater profit than unmilled logs, allowing communities to survive on lower logging rates.

Develop local industry to produce lower-impact, higher-efficiency cutting and processing technology. Foreign technology is expensive, and is not designed for the fragile ecological conditions in Siberia's forest. Local banks as well as foreign aid can assist in the development of this local technology.

Require foreign joint ventures to provide meaningful local economic benefit, including jobs and processing technology.

Preserve diverse local economies which rely on traditional hunting, fishing, beekeeping, food-gathering, and recreation in addition to, or instead of, timber. Timber stumpage fees should be priced to more accurately reflect the full costs of replanting, road-building, and loss to other forest values such as hunting, fishing, food and medicinal products, and water and air purification.

Increase dialogue, exchanges, and joint work between boreal forest ecologists in Russia, Canada, Scandinavia, and elsewhere. We will not be able to advocate and pursue responsible logging practices in the boreal region until we have acquired a much better understanding of boreal forest ecology.

FOREST INDUSTRY LECTURE SERIES

1. Industrial Forestry in a Changing Canada, by C. Ross Silversides. 17 November, 1977.
2. The Role of Integrated Forest Companies in Western Canada, by W. Gerald Burch. 15 March, 1978.
3. Premises of Energy Forestry in Sweden, by Gustaf Siren. 7 March, 1979.
4. Agro-forestry - Prospects and Problems, by K.F.S. King. 27 September, 1979.
5. The Role of the Federal Government in Forestry, by F.L.C. Reed. 5 March, 1980.
6. Breeding for Variable Environments, by Gene Namkoong. 14 August, 1980.
7. Federal Forestry Commitments in the 1980's, by Roger Simmons. 5 December, 1980.
8. Space, Time, and Perspectives in Forestry, by Kenneth A. Armson. 26 November, 1981.
9. Labour's Role in Forest Resource Management, by John J. (lack) Munro. 25 March, 1982.
10. Stocking Control and Its Effect on Yields, by Dr. Peder Braathe. 4 November, 1982.
11. Timber Management Scheduling on Public Lands - Why the Future is Not Like the Past. Dr. K.N. Johnson. March 29, 1983. Talk only, paper not available.
12. The Canadian Schools of Forestry - Retrospect and Prospect. Dr. V.J. Nordin. January 19, 1984.
13. Increasing the Land Base and Yield Through Drainage. Dr. J. Paivanen. March 15, 1984.
14. Forestry Productivity Limits: Real, Imagined and Potential. Dr. Conor Boyd. January 24, 1985.
15. Air Pollution and Forest Resources - The Nature of the Threat. Dr. Peter Rennie. March 28, 1985. Paper not yet available.
16. Land Use Planning for Forest Harvesting and Environmental Concerns. John A. Marlow. November 28, 1985.
17. Northern Forest Management for Wildlife. Gordon W. Gullion. October 16, 1986.
18. From NSR to Intensive Forest Management. Hugo Von Sydow. 12 March 1987.
19. People - Managing Trees: Understanding Today's Environment for Natural Resource Management. Mary Jo Lavin. 19 November 1987.
20. The Social Renewability of Forestry. Harold R. Walt. 30 March 1988.
21. Forest Policies: Public Duty and Private Action. Adam H. Zimmerman. 1 November 1988.
22. New Dimensions in the Development of Forest Policy: A View From the Trenches. T.M. (Mike) Apsey. 16 March 1989.
23. Vision and Reality - The View From Sweden. Bjorn Hagglund. 17 October 1989.
24. The Contribution of Old Growth to the New Forestry. Jerry F. Franklin. 4 April 1990.
25. Developing Silvicultural Alternatives for the Boreal Forests: An Alaskan Perspective on Regeneration of White spruce. John Zasada. 7 November 1990.
26. Forestry After the End of Nature. Clark S. Binkley. 20 March 1991.
27. Sustainable Forestry: Can We Use and Sustain Our Forests? J.P. Kimmins. 21 November 1991.
28. Environmental Regulations and the Implications for Canadian Export. Don G. Roberts. 18 March 1992.
29. Forest Health Issues: An Entomologist's Perspective. David L. Wood. 18 November 1992.
30. Unconventional Wisdom: Reflections on Polarization, Politics, Prosperity and the Future of the Canadian Forest Industry. David L. McInnes. 9 March 1993.
31. The Canadian Forest Products Industry. Competitive Challenges in the 1990s. Patricia M. Mohr. 10 November 1993.
32. The Deforestation of Siberia: Economic and Environmental Problems in Russian Forest Management. Lisa A. Tracy. 25 April 1994.