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## Environmental Change in Forestry: Perspectives of a Forest Auditor & Certifier

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### Introduction

The Rainforest Alliance and other regional non-profit organizations in the United States, and elsewhere in tropical and temperate forests, are currently developing and implementing forest management certification as a tool for improving forestry from silvicultural, ecological and socioeconomic perspectives. To these organizations, timber harvesting represents an important economic option. In most cases, the question is not if timber harvesting or logging will take place, but how.

The topic of this presentation is independent forest auditing, monitoring and certification. I am enthusiastic about the topic; however, this enthusiasm does not mean that such certification will be the solution to all forestry problems. It isn't. Rather, certification, and the types of forest auditing and monitoring techniques it requires, may be a valuable tool for forest management. Where is it useful, why, and how?

Before getting into the details on certification, a bit of philosophical background is important. First, there is a fairly common notion that sustainable forest management and economic development are reconcilable, and must be a constant battle between environmentalists and industry. This doesn't necessarily have to be true. Despite what many believe, neither environmentalists or industry represent organized lobbying or voting blocks. Industry representatives can be heterogeneous, contradictory, united on some issues, divided on others. So can environmentalists. There are many that segments of both sectors that are interested in serious long-term forestry can work together - certification may be one example.

In a sense, certification represents an attempt to clarify what are the best forest management practices, from silvicultural, ecological and

socioeconomic perspectives, and give recognition to the best forest managers. From an environmentalist perspective this presents a challenge because it assumes that logging is a viable option; something that many environmentalists might not agree with. From an industry perspective, it singles out the best managers and implies that other forestry organizations or industries may not meet the same standards, thus inserting a potentially divisive wedge between different forest industries. For these and other reasons, certification has not been (and probably won't be) universally welcomed amongst either environmentalists or industry.

Certification can help to address three particular concerns in terms of Eastern forests:

- 1) short-term financial management concerns often determine what happens in forestry; with the current higher prices for timber, and the dire financial conditions of many companies, it is not surprising that there are many companies that are liquidating forestry assets, in some cases high-grading or degrading forests that have been under relatively high quality forest management for the past 50 years and weakening the forest resource as a base for stable communities and economic development;
- 2) there are an increasing number of "low grade fiber" forest industries (e.g. oriented strand board facilities); this is turning the production of low-grade fiber into the primary management objective for some forests or forest lands;
- 3) despite many efforts to protect threatened or endangered species, there is little being done to see how such species, or ecosystems, can be enhanced through biodiversity management techniques in production forests; the dominant

thrust of most efforts to protect threatened species or ecosystems is to preclude logging, when in fact logging can be (but is not always) a tool for improving biological diversity; and,

- 4) at a time when most of the public is skeptical about the environmental claims of forest industry and government, independent certification provides an opportunity for third-party verification of environmental forestry claims, potentially lowering the level of conflict and allowing forest industry to devote resources to forest management, rather than "fighting it out" with environmentalists or other critics.

### **The start of forest management certification**

The original push behind certification occurred during the late 1980's, when the Rainforest Alliance and other groups promoted the concept as a positive market-based incentive for recognizing well-managed tropical forestry operations, and as an alternative to tropical wood boycotts. Since then, certification has "boomeranged" because it was found that consumers were just about as concerned about forest management in the Pacific Northwest, Northeastern U.S. and elsewhere. As a result, there are currently incipient region-specific certification efforts in virtually every region of the U.S. and Canada, as well as almost all other major timber-producing regions of the world.

### **Key elements of a voluntary forest management certification program**

Since the start of voluntary forest management certification efforts in 1989, a better understanding of the basic elements has occurred. Two basic elements for a credible program are realistic region-specific certification standards and a regional inspection capability for covering forest management and "chain-of-custody" (see below)

concerns. Both will be important to develop if certification is to be successful as a tool in Eastern forests.

### **Realistic region-specific certification standards**

Credible certification requires the development of region-specific certification standards. Why?

First, no single set of standards will apply to all situations in Eastern forests. Rather, there should be consistent principles and criteria that form a basis upon which realistic region-specific standards can be developed. Smart Wood is currently working on regional standards for five different regions in the U.S. and Canada, and a number of other countries (e.g. Costa Rica, Brazil, Indonesia, Malaysia), using as a basis the Principles and Criteria for Natural Forest Management of the Forest Stewardship Council and the Smart Wood Generic Guidelines for Natural Forest Management.

A second reason for region-specific certification standards is that, to some extent, credibility of a certifier rests on the degree of public accountability, to scientists, forest industry, environmental organizations, government, national standards organizations, and the general public. The past few years of certification experience indicate that published standards are the best way of achieving this.

Third, a well-designed process for developing region-specific standards will allow for broader input into certification. Such input will increase the likelihood of success for the certification program by facilitating increased local understanding of what certification means and how it works. A careful process can serve a valuable educational role for industry, environmentalists, public sector forestry specialists and the general public.

Fourth, the existence of written region-specific standards will make the work of certification teams much easier. Candidate organizations will better understand how certification decisions are reached, assessment team members will be able to more clearly define and complete responsibilities during an assessment, and the standards provide a consistent basis for discussions.

Successful development of such standards is not easy. Currently, forestry certification is attempting to build on existing federal, state and local forest management and conservation efforts. For example, certification standards are building on non-point source pollution control standards established through EPA, SCS, and state agencies. Such standards also take into consideration requirements set by state and federal agencies, local planning bodies, conservation groups for regional or statewide programs to conserve or manage large forest blocks through tax incentives (e.g. use value taxation). They also incorporate measures to protection of "visible" endangered species, as identified by international and national agencies, or conservation groups.

Setting good standards appears to rely on five basic elements.

First, the right people are involved, including scientists and practitioners from various sectors (industry, environmental organizations, government, landowner groups) and different fields/disciplines (e.g. ecology, forestry, social science, economics, logging, etc.). The key has been to find reputable individuals from diverse sectors. Typically, certification standards are developed by a regional committee made up of the following types of people:

- consulting forester
- social scientist
- logger
- government forester
- wildlife ecologist
- forestry researcher

- businessperson
- landowner

This committee will be required to research existing federal, state and local laws, and administrative requirements of the state forestry agency. Committee members must have a willingness to listen to different opinions from all perspectives. They must have a sense of what ideally should take place (i.e. "leadership standards"), but balanced with a pragmatic sense of what is realistic to achieve for commercial forestry operations in the region.

Second, the standard setting process must take advantage of existing initiatives (e.g. best management practices or BMPs, logger certification, the Tree Farm Program, SAF codes, etc.). In most states there is an ample amount of information on good forestry practices that can be accumulated. The challenge is to take this information and turn it into a set of standards that can be used in a forest auditing framework.

Third, viable standards tend to result from a field-oriented process where there has been near-term (within 3 months) practical application or testing of the standards. There are many examples of standards development processes lasting years; in general the standards from such processes tend to be highly theoretical and/or so complex as to require inordinate amounts of field work or analysis.

Fourth, transparency in terms of how the standards were developed and who participated is extremely important in the standards setting process. Ultimately, different interest groups will want to see that their perspective has been defended in the process. They will also want to have input on drafts, revisions, etc. The guidelines of international standards setting or accreditation bodies (e.g. Forest Stewardship Council or FSC, or International Standards Organization or ISO) indicate that they will require that a continuous process of broad consultation or input has taken place during standards development.

Fifth, standards will have greater legitimacy with the public if there is an equally strong commitment within the standards to silvicultural and environmental issues/factors. Experience in certification indicates that both perspectives are important to consumers.

Ultimately, the development of such standards will require a long-term commitment to constant improvement. Currently, most standards are being revised by the standards committee or the certifier staff on an annual basis.

A final comment on standards - one of the strengths of the certification is that it does not suggest a single definition of sustainable forestry that is transferable to all situations and conditions. Rather, sustainability is a goal, and the process of region-specific standards development is seen as a way of defining what steps might lead towards sustainability. It is crucial to understand that certification does not attempt to definitively quantify or qualify sustainable forestry. Certification attempts to provide a market-based reward to those forestry operations which are consistently making serious, long-term efforts to manage forests keeping in mind silvicultural, ecological and socioeconomic management objectives.

#### **Regional inspection capability for forest management and the chain-of-custody**

Certification requires site-specific initial assessments and follow-up audits in terms of forest management and chain-of-custody. Chain-of-custody refers to:

"The channel through which products are distributed from their origin in the forest to their end use" (from Forest Stewardship Council, or FSC, Principles and Criteria for Natural Forest Management, June 1994, Oaxaca, Mexico).

Initial assessments of forest management are usually conducted by a 2-4 person team comprised

of specialists from different disciplines, typically including a forester, ecologist and socioeconomist. Such assessments may include from 7-21 days of field work "in the forest", plus an equivalent amount of writing/analysis time. These assessments also include a process of independent peer review (usually by 3 peer reviewers). Costs for such assessments can range from US\$5,000-\$50,000, depending on the certification organization chosen, the size and complexity of the candidate forestry operation, and the range of ecological, silvicultural, and socioeconomic issues being faced by the candidate operation.

Virtually every major certification program conducts annual, and sometimes random, audits of every operation that it certifies. Chain-of-custody auditing has great similarities with financial auditing - indeed financial auditors are well-suited to the job after training in some aspects of forest products manufacturing. Chain-of-custody requires:

- \* office work - review of invoices, general ledgers, bills of lading, the General Agreement on Trade and Tariffs (GATT) Certification of Origin (for international shipments), etc.; and,
- \* visits to "in the forest" log yards, lumberyards, transport and shipping centers, primary and secondary processing centers, and wholesale and retail outlets.

Techniques used by forest industry for chain-of-custody within their own operations range from simple field book record-keeping to higher technologies such bar-code labelling. Thus, chain-of-custody auditors should be familiar with this range of technologies, typical shortcomings, and what processes need to be in place in order to ensure that chain-of-custody controls by a specific company are up to certification standards.

Forest auditing requires technical skills in the areas being evaluated. Whereas initial forest certification assessments are conducted usually by teams of 2-4 people, a typical audits is conducted

by one person, usually a forester, who is following up on issues identified during the initial certification assessment.

All of the above should make it clear that the key skills for creating and managing a certification program must include forestry, environmental and socioeconomic assessment, systems analysis, and auditing (financial and environmental).

### What is "certifiable forestry"?

In general, certifiable forestry:

- has a multi-year and multi-disciplinary planning framework;
- incorporates reduced impact logging techniques;
- is based on ecologically-sensitive silvicultural techniques;
- has positive, permanent commitments to local communities and people, and,
- has transparent planning and management procedures that facilitate "accountability" by third party auditors or assessors.

It is not necessarily "politically-correct" forestry. Small patch clearcuts (e.g. less than 20 acres) might be "certifiable", if such harvests give strong consideration to biological or ecological implications. Ultimately, certifiable forestry requires that the forest managers plan, manage, and harvest timber with a long-term (over 50 years) perspective and through a process that gives equal value to forest lands as a source of timber, as a biologically diverse resource, and as a social and cultural resource that should have a positive impact on local peoples and communities. This is not an easy balance. The very nature of timber harvesting requires compromises from each perspective.

In the short history of certification, three basic characteristics or tendencies seem to stand out in describing certifiable forestry operations:

1) loggers, foresters, biologists, and other staff work closely together as a team;

2) staff at all levels (even production staff in a manufacturing operation) are educated on, and concerned about, "the issues" (silvicultural, ecological and socioeconomic) and share a common commitment to resolving them; and,

3) certifiable operations tend to be at the "cutting edge" of forestry or forest product manufacturing.

### Costing out certification

Certification costs can be divided into two categories, direct and indirect. The direct costs of certification are those of the certification process itself, including initial forest assessments and annual or periodic audits. The indirect costs represent changes to forestry operations that a company may have to make in field operations to meet certification standards. Following are examples.

#### Direct Certification Costs

Initial Field Assessment:

\$5,000-\$50,000 once for 3 years

Periodic & Random Audits:

\$1,000-\$5,000 per year

Annual Certification Report:

\$500-\$1,000 per year

### Indirect Certification Costs

For forest management operations:

- increased supervision/monitoring
- continuous data collection/analysis
- long-term roads & infrastructure
- tagging/identification of logs batches or loads
- decreasing dependence on chemicals
- more biologist/ecologist input into forest management

For manufacturing operations:

- tagging/identification of logs/products
- batch-loading/processing
- record-keeping

4) constant growth in size of equipment which tends to have broad economic and environmental impact and may restrict harvesting options; and,

5) reconciling short-rotation forestry and long-term forest management; there have been few attempts to bridge the conflict between these different perspectives - there may be no easy way of doing this and it may be impossible, but Smart Wood experience from the tropics indicates that there are many ways that even short rotation forestry can make major contributions to biological conservation.

### **Most challenging technical issues**

Based on experience over the past four years, the major challenges being faced in terms of certification in Eastern forests (as well as other regions) today are:

1) addressing "landscape level" biological conservation concerns for either large or fragmented operations; often there is an absence of good field data and many commercial forestry operations are not accustomed to dealing with landscape issues;

2) designing and implementing efficient continuous forest inventory (CFI) for both medium-size and larger operations; Smart Wood guidelines for the Lake States region (Michigan, Minnesota, Wisconsin) request that operations managing over 50,000 acres have CFI systems and most operations of that size that we interact with are moving in this direction; most operations smaller than 50,000 acres do not;

3) organizing private non-industrial landowners (PNIFs); there have been few efforts to organize PNIFs as a commercial resource, most efforts have focussed on PNIFs from a forestry extension or educational perspective;

## Technical Studies of Environmental Issues Affecting Forest-Based Manufacturing Industries

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### Abstract

The U.S. forest products industry faces many complex environmental issues. This paper identifies four broad groups of issues and describes selected technical studies being conducted by the industry's environmental research arm, the National Council of the Paper Industry for Air and Stream Improvement (NCASI). Forest issues include forest water quality and wetlands, threatened and endangered species, and biodiversity. NCASI is testing options for maintaining and enhancing environmental quality in commercial forests. Mill issues derive mainly from concerns about discharges from manufacturing facilities and their effects on human health and welfare, aquatic communities, and ecological processes. Topics of NCASI investigations include discharge characterization, environmental effects, and costs/benefits of alternatives for complying with existing and proposed regulations. Environmental labeling issues are gaining importance as a result of government and private-sector efforts to promote products with attributes presumed to be beneficial for the environment. NCASI is evaluating the technical basis of environmental labeling criteria that may affect markets for forest products. Sustainable development is a process of balancing environmental and economic considerations to meet current human needs without compromising the ability of future generations to meet their needs. An initial focus of NCASI efforts is to develop a technical basis for sustainable forest management.

### Introduction

Interactions of the forest products industry with the environment are highly visible. The industry's manufacturing operations use large amounts of water and energy, and generate large quantities of solid waste. Timber harvest and forest management

activities disturb millions of acres every year. On a volume basis, the world's production of wood for industrial purposes is nearly one and half times greater than its outputs of steel, aluminum, plastic, and cement combined (Schultz 1992).

Environmental issues affecting the forest products industry can be classified in various ways for various purposes. In this paper, we identify four broad groups of issues, discuss current priorities within each group, and describe selected technical studies being conducted by the industry's environmental research arm, the National Council of the Paper Industry for Air and Stream Improvement (NCASI).

### Forest issues

#### Overview

Forests are remarkable natural resources. They provide clean water, habitat for wildlife, recreational opportunities, and inspiration for the human spirit. They also provide the principal raw material for paper and wood products. These products help meet human needs for shelter, communication, personal hygiene, artistic expression, packaging, recreation, and fuel.

World demand for forest products is expected to grow substantially in the future. The United States has the ability to satisfy a substantial portion of future growth in demand at home and abroad. This ability derives in part from a potentially abundant and affordable timber supply. The United States has enjoyed a competitive advantage in wood cost relative to many other countries and can maintain that advantage by investing in forest research and management. Economic and biological factors could support substantial increases in annual timber

growth rates on a sustained yield basis (USDA Forest Service 1982).

Nevertheless, the timber supply outlook in the United States is highly uncertain. Large areas of publicly owned forests are being withdrawn from timber management and allocated to habitat preservation. At the same time, state and federal regulations are imposing severe new restrictions on the management of private lands. Issues such as wetlands protection, endangered species, and cumulative watershed effects are already major factors affecting both the practice of silviculture and timber harvest. Proposals to regulate forest management to enhance biodiversity or influence global carbon budgets could exacerbate the situation if implemented.

### **Forest water quality**

Issues related to forest water quality have significant near-term implications for forest management in the eastern U.S. For example, states participating in the federal Coastal Zone Program must submit new nonpoint source management programs to EPA and NOAA by July 1995. The programs must include "management measures" that are "economically achievable" and "reflect the greatest degree of pollutant reduction achievable through the application of best available nonpoint pollution control practices technologies, processes, citing criteria, operating methods, or other alternatives". Similar requirements would be imposed across the country by Clean Water Act reauthorization bills now before Congress.

NCASI is conducting a special program of investigations to develop information to be drawn on by the industry during Clean Water Act reauthorization. Forestry-related projects include (a) national review of literature on effects of forest management on water quality and the effectiveness of best management practices (BMPs), (b) regional reviews of state programs for controlling nonpoint source pollution from forestry operations, and (c) analyses of costs and benefits of alternative

approaches for controlling nonpoint sources of pollution.

Several conclusions about forests and water quality have been reached. The quality of water from forests is the best in the nation (relative to other land uses) whether the forests are managed or undisturbed. Forestry is a relatively small contributor to the nation's overall nonpoint source problem in terms of both quantity and quality of discharge. Local and watershed-scale effects of forest management on water quality can be severe, but such effects can be prevented in most circumstances by use of basic BMPs such as stream bank protection. Additional control measures beyond the basic BMPs may be necessary in situations that present greater than normal risk of water quality impact (NCASI 1994a).

All states with significant commercial timber harvest activity have nonpoint source control programs for forestry. State programs vary greatly in approach and level of effort. In general, however, it appears that successful nonpoint source programs are those in which loggers, landowners, and foresters perceive themselves to be partners with government agencies in an effort to produce significant environmental benefits and improve the climate for the practice of forestry.

Noncompliance with BMPs by some landowners and loggers is perceived to be the most common cause of forest water quality problems in most states. High BMP compliance rates can be achieved through non-regulatory programs that include extension education and compliance monitoring. Government and landowner costs are substantially greater for regulatory programs than for non-regulatory programs (NCASI 1994b).

### **Endangered species and biodiversity**

Endangered species issues have tremendous potential to affect forestry operations in the eastern United States. Numbers of listed species and subspecies continue to grow rapidly. The Fish and

Wildlife Service (FWS) often mentions habitat modification caused by forest management as a factor contributing to listing (Flather *et al.* 1994). Moreover, FWS has become more aggressive in using the Endangered Species Act (ESA) to regulate private lands and influence the decisions of other federal agencies on regulatory issues affecting forest management. Interest has been heightened by the current national debate about ESA reauthorization.

Public and scientific concerns about biodiversity in eastern forests focus on clearcutting, plantation management, and old growth. Near-term impacts are greatest on National Forests and in Forest Service Research, where timber production has been substantially de-emphasized. In the longer-term, concerns about biodiversity could weaken support for industry positions on a wide range of forest policy issues.

Forest products companies have been working hard to develop partnerships with FWS and other organizations to protect listed species and other wildlife. During the past year, several companies have announced cooperative agreements that provide for special management or preservation of important habitat areas.

NCASI's Wildlife Program is testing assumptions about habitat requirements of listed species and seeking options for accommodating both wildlife and timber production in the major commercial forest regions of the United States. Topics of field studies and other projects in the eastern U.S. are listed in [Table 1](#). The field studies are documenting the occurrence and habitat relationships of a wide variety of birds, mammals, reptiles, and amphibians in managed and unmanaged forests.

## Wetlands

Forest wetlands issues have become important in recent years as a result of efforts by environmental lobby groups and some regulators to narrow the scope of the "silvicultural exemption" under Section 404 of the Clean Water Act. Normal forestry

practices are exempt from wetland permitting requirements of Section 404 if the practices are part of an established, ongoing operation and do not significantly affect the reach and flow of waters of the United States. Pine plantation management, including minor drainage, is within the scope of the exemption. The Environmental Defense Fund and others claim plantation management causes severe ecological damage to wetlands and should not be exempt from permitting requirements.

NCASI is conducting a cooperative program of field investigations on environmental effects of forest management in wetlands (Shepard *et al.* 1993). Studies are underway in ten states with participation and co-funding by individual companies, universities, and government agencies ([Table 2](#)). Results show that effects of wetland forest management on water quality are generally minor and transient. Effects on wildlife habitat will take longer to evaluate but some initial results are encouraging. For example, an intensive survey of birds, mammals, reptiles, and amphibians in "pocosin" forest wetlands in North Carolina found similar numbers of species in plantations and unmanaged areas (NCASI 1992). There were some differences in species composition: 65 species were common to both plantations and managed habitats; 18 species were found exclusively in unmanaged pocosins; and 27 species were found exclusively in plantations.

## Mill issues

### Overview

Mill environmental issues derive mainly from concerns about gaseous, liquid, and solid wastes and their effects on human health and welfare, aquatic communities, and ecological processes. Over the past ten years, there has been a growing emphasis on public disclosure of corporate environmental performance. Companies are being called upon to demonstrate the environmental acceptability of their manufacturing operations to community residents, customers, stockholders, politicians, and

government regulators. Many elements of the National Council's technical studies program are directed towards characterizing the industry's waste streams and investigating their potential impacts on the environment. This information is needed to assist the industry in maintaining its franchise to operate mills.

NCASI efforts related to three current issues of concern to the forest products industry are briefly discussed below.

### **Chlorinated organics**

For many years, chlorine, chlorine dioxide and sodium hypochlorite were the primary compounds used to bleach chemical wood pulps and some recycled fibers. Use of these chemicals for bleaching leads to the inadvertent formation of a wide array of chlorinated organic compounds, by reactions with lignin and hemicellulose (NCASI 1990, 1994c). These compounds may partition to the bleach plant effluent, to the bleach plant vent gases, or to the bleached pulp.

Use of chlorine and hypochlorite for pulp bleaching is now being dramatically reduced as the result of several factors, including a desire to minimize the formation of chlorinated organic compounds, particularly chloroform and dioxin. It appears likely that by the year 2000, chlorine dioxide will be the only chlorine-based compound used in pulp bleaching in significant quantities.

The environmental implications of these changes in bleaching practices are being intensively studied by the National Council (e.g., NCASI 1994d, 1994e, 1994f, 1994g). A considerable effort is being devoted to aquatic community investigations. For over twenty years, the National Council has used controlled streams to study the effects of bleached kraft mill treated effluent on aquatic communities.

Since the mid-1970s, experimental streams have been in place at a bleached kraft mill in New Bern, North Carolina. A second experimental streams site

was set up in the early 1980s in Lewiston, Idaho at a bleached kraft mill. Investigations conducted at these two sites are focused on the response of aquatic communities, particularly fish, to varying levels of effluent concentrations. Although these studies use whole mill effluent, i.e., the bleach plant effluent is only a portion of the total, they have been extremely useful in examining the compatibility of treated bleached kraft mill effluent with healthy and productive aquatic communities (NCASI 1993a).

Since the experimental streams have been in place, the two host mills have made significant changes in their bleaching practices. Biological effects of the changes have been studied intensively in the experimental streams. Measurements of system response have included fish reproduction and morphology, biomarkers, bioassays, and bioaccumulation of selected chlorinated organic compounds.

Other active areas of investigation include detailed chemical characterization of bleach plant effluent and wastewater treatment plant sludges; analysis of bleached chemical pulps and paper products for chlorinated dioxins and furans; simulation modeling for calculation of bioaccumulation factors for selected chlorinated organic compounds; and review of health effects of chlorinated phenolic compounds.

EPA recently proposed revised effluent guideline regulations for the pulp and paper industry as part of the agency's "Cluster Rule" (EPA 1993a). For bleached chemical pulp mills, EPA has proposed limits for total organic adsorbable halides (AOX), certain chlorinated phenolics, and chlorinated dioxins and furans. NCASI has a number of technical studies in progress which are directly related to the proposed EPA limitations. These include studies of effluent variability, sampling and analytical procedures, monitoring data analysis techniques, and achievability of the numerical limits.

### **Air toxics**

Two major EPA regulatory programs have brought about a need for comprehensive information on

emissions of so-called 'air toxics' from pulp and paper mills. These programs are the annual SARA Section 313 reporting of environmental releases from manufacturing facilities and the development of Maximum Achievable Control Technology (MACT) emission standards for industrial sources of 'air toxics'.

In response to this need, the National Council has undertaken very extensive emission characterization studies (NCASI 1993b). Compounds of importance to the industry are acetone, methanol, methyl ethyl ketone, formaldehyde, acetaldehyde, chlorine, chlorine dioxide, chloroform, hydrochloric acid, sulfuric acid, and ammonia.

A detailed study of emissions from chemical wood pulp mills will be completed by the end of 1994. This study, which began in late 1992, involved the development and validation of a new method for sampling gaseous organic compound emissions from a wide array of pulp mill sources. Emission sources at 13 kraft mills, two sulfite mills, and one semi-chemical pulp mill were tested over a period of 15 months. Sources sampled included kraft recovery furnaces, sulfite recovery furnaces, semi-chemical liquor recovery units, smelt dissolving tanks, lime kilns, mud washers, brown stock washers, deckers, knotters, bleach plants, stock storage chests, liquor storage tanks, turpentine storage tanks, tall oil processing sources, oxygen delignification systems, and paper machine vents.

The information generated in this effort will be used to assist EPA in developing MACT emission standards for the 155 chemical wood pulp mills in the United States. EPA hopes to promulgate these standards in early 1996 as part of the Cluster Rule.

Other NCASI study efforts have addressed emissions of chlorine, chlorine dioxide, and chloroform from bleaching operations, as well as their control by scrubbing and process modifications (NCASI 1994h). A study of hydrogen chloride emissions from kraft recovery furnaces will soon be completed.

Future investigations are being planned to characterize emissions from (a) mechanical pulping operations, (b) deinking plants, (c) paper machines,

and (d) boilers burning nonrecyclable paper fuels, wastewater treatment plant sludges, and other nontraditional fuels.

### **Air permitting issues affecting solid wood products manufacturing**

Plants manufacturing solid wood products including lumber, oriented strandboard, medium density fiberboard, particleboard, plywood, hardboard, and other engineered wood products must deal with air quality permitting issues arising from regulatory programs such as New Source Review, Prevention of Significant Deterioration, and state operating permits. Until recently there was very little data on emissions from these facilities, and emission limits contained in construction and operating permits were mainly based on emission factors (NCASI 1994i).

As test data have become available, it has become apparent that emissions of volatile organic compounds (VOCs) from wood drying and panel presses were larger than initially believed. It is also apparent that existing EPA test methods for VOCs, which were not intended for application to sources with significant amounts of condensable organic particulate matter, are yielding inconsistent results for wood drying sources (NCASI 1993c). These findings have led to difficulties in obtaining air quality permits for new and existing plants. It has also resulted in EPA enforcement activities against selected large companies and the installation of VOC control technologies at some panel plants.

Questions about VOC emissions have also led to questions about emissions of carbon monoxide, oxides of nitrogen, particulate matter, and formaldehyde from these plants. Therefore, the industry has an urgent need for better and more comprehensive emissions test data to respond to these questions.

NCASI has undertaken several projects to assist the solid wood sector in meeting its information needs with respect to emissions. First, studies on alternative measurement methods are being conducted for VOCs, total particulate matter, condensable particulate matter, and formaldehyde.

Second, all available test data for solid wood facilities from companies are being compiled into a data base which companies will be able to access when preparing permit applications. Third, a project has been initiated to explore possible methods for estimating fugitive VOC emissions from wood storage piles. Fourth, a suggested protocol for the sampling of emissions from lumber drying kilns is being developed. Lastly, emission factors being developed by EPA for panel plants and lumber drying kilns (for inclusion in the agency's AP-42 emission factors document) are being reviewed for accuracy.

### **Environmental labeling issues**

Environmental labeling is a process by which public or private-sector organizations identify and promote products with attributes presumed to be beneficial for the environment. Some labeling programs consider a single attribute such as "recycled" or "chlorine free" to identify environmentally preferable products (EPPs). Other programs consider several attributes combined into environmental indices.

Interest in environmental labeling and EPPs is growing rapidly. Reasons for interest in the forest products industry include:

*Some important customers want EPPs.* For example, some large retail chains that sell paper and solid wood products are developing "green marketing" programs and asking suppliers to consider obtaining third-party environmental certifications.

*Marketers want to sell EPPs.* Companies and associations want to identify forest products as EPPs to support communications and marketing programs. Objectives include (a) improve public perceptions of the industry's products, manufacturing processes, and forest management practices; and (b) respond to competitors' claims of environmental superiority.

*Governments, environmental lobby groups, and associations are making rules about EPPs.* Federal and state agencies are developing guidelines for purchasing EPPs. The Environmental Defense Fund has formed a task force of paper industry customers to develop EPP guidelines for paper products. ASTM and the American Institute of Architects are developing EPP guidelines for building products. There is potential for EPP guidelines to become EPP regulations.

*European criteria for EPPs are becoming de facto barriers to North American exports of forest and paper products.* Ecolabel programs are well established in several European countries (EPA 1993b). Efforts to develop international standards for environmental labeling programs and environmental management systems are underway in the European Union (EU) and the International Standards Organization (ISO). Reasons for U.S. industry interest in ISO environmental standards include (a) growing concern about environmental trade barriers, (b) widespread acceptance of ISO 9000 standards for product quality, and (c) perceived opportunity to participate in ISO process on an equal footing with European interest groups and develop credible alternative to national or EU standards.

NCASI is evaluating the technical basis of environmental labeling criteria that may affect markets for paper and solid wood products. Priority topics include:

*Life Cycle Assessment.* Product life cycle assessment (LCA) is an approach to conducting comprehensive evaluations of environmental burdens associated with the production, use, and disposal of products (Fava *et al.* 1991). In recent years, LCA has gained prominence as a tool for identifying EPPs. NCASI is participating in the development of data bases and model assumptions used in LCAs of forest products (Miner and Lucier 1994).

*ISO Environmental Standards.* NCASI is providing technical support to the industry in its review of draft ISO environmental standards.

*Ongoing Technical Studies.* NCASI is investigating technical aspects of key issues being debated in ISO and other organizations that are developing guidelines for environmental labeling and LCA. These issues include environmental impacts of manufacturing operations, solid waste management options, recycling, global carbon budgets, and sustainable forestry.

## Sustainable development

### Overview

Sustainable development is both a process and a goal. It requires balancing environmental and economic considerations to meet current human needs without compromising the ability of future generations to meet their needs (World Commission on Environment and Development 1987). Sustainable development has gained broad international support because it expresses hope for the future of humanity and recognizes the necessity of making difficult choices among imperfect alternatives. It implicitly rejects extreme positions of both naturalists and materialists and thus may provide a suitable framework for discussions and consensus building among diverse interest groups.

It is too soon to predict the implications of sustainable development for the forest products industry. Meanings of sustainable development may change or expand as the concept is elaborated in national and international forums. It is clear, however, that the leadership of the forest products industry has already embraced the essential element of balancing economic and environmental considerations. The leadership has committed the industry to documenting environmental

performance, setting realistic goals for improving performance, and regaining public support.

Strategies and programs for documenting and improving environmental performance and regaining public support are being developed at several levels including associations, individual companies, and operating units within companies. The following are among the important topics being discussed.

### Sustainable forestry

Sustainable forestry has become an important environmental labeling issue affecting international trade and public perceptions of forest products. Criteria of sustainable forestry are being discussed within the industry and in a variety of national and international organizations.

NCASI is developing technical information in support of industry efforts on sustainable forestry. Our research is focusing on three main topics.

*Long-term site productivity.* Maintaining the productive capacity of forest sites is essential. Determinants include soil fertility, genetic resources, and stand conditions. Soil erosion, nutrient depletion, and other problems can impair the productive capacity of forest lands. An immediate challenge is to develop information systems that will help land managers identify potential problems on a site-specific basis and prescribe effective countermeasures. A longer term challenge is to address public concerns about environmental effects of biotechnology, herbicides, fertilizers, and other tools needed to maintain and increase site productivity.

*Forest Environmental Quality.* Greater attention to environmental quality is perhaps the most important development in forestry in the past two decades. Components include water quality, wildlife, biodiversity, and aesthetics. An important research task is to develop a practical framework for measuring the environmental costs and benefits of alternative forest management regimes across landscapes and regions.

*Wood Supply.* There is a need to better define large scale relationships among timber supply, forest products, and environmental quality. For example, NCASI is investigating the role of forests and forest products in the global carbon cycle. A difficult but important task is to determine how carbon dioxide emissions are affected by using forest products in place of nonrenewable substitutes with different life cycle energy profiles. A related task is to develop sound methods for measuring the renewal of timber resources and the effects of environmental regulations on timber supplies. Of particular concern are cumulative effects of regulations and their influence on land use decisions by the nonindustrial private land owners who currently produce half of the timber in the United States.

### **Mill operating franchise**

Public acceptance of manufacturing operations is essential to the sustainable development of the U.S. forest products industry. Public concerns about local, regional, and global environmental effects of manufacturing are expected to grow despite past and ongoing improvements in environmental performance. Industry efforts to respond to public concerns will increase in the form of environmental principles, documentation of environmental performance, further development of the minimal impact mill concept, and communications programs.

NCASI technical studies are supporting industry efforts in several ways. Current studies are providing analytical methods and data bases needed to document environmental performance and optimize environmental control systems. NCASI is also participating in the evaluation of new process and waste treatment technologies to identify any potential environmental concerns. Technologies for controlling chlorinated organics in bleached pulp mill effluent and 'air toxics' are the focus of current efforts. Other longer-term priorities include technologies to increase energy efficiency (e.g., black liquor gasification, biomass drying and combustion), eliminate odorous emissions (e.g., sulfur free pulping), and minimize solid waste (e.g.,

utilization of wastes as soil amendments and chemical feed stocks).

A difficult and important task is to determine the ecological significance of contaminants present at very low concentrations in the environment. Increasingly sensitive tests such as biomarkers and trace chemical analysis are being used to judge the health of ecosystems, often without reference to measures of effects on human health, fish and wildlife populations, or plant communities. Such tests are important because (a) they are influencing regulatory programs and public perceptions, (b) reducing trace concentrations of contaminants can be very expensive, and (c) the industry itself may want to use some of the tests to demonstrate 'minimal impact'. Topics for research include (a) natural background levels of contaminants, (b) factors that influence test response, (c) contribution of industry operations to contaminant levels, and (d) potential for chronic effects of contaminants on ecosystem health.

### **Solid waste management and paper recycling**

The industry has already achieved its goal of 40 percent used paper recovery by 1995 and has committed to a new goal of 50 percent used paper recovery by the year 2000. More recovered fiber will be used at mills not originally designed with recycling in mind. Mills using recovered fiber will attempt to use more contaminated or lower quality grades than are currently used. In addition, increasing amounts of recovered fiber will be put to other uses, such as burning for energy. A substantial fraction of discarded paper will be non-recoverable and disposed in landfills.

Increasing recovery of used paper is generally perceived as beneficial to the environment. There are, nevertheless, some environmental questions that merit examination.

- \* Effects of recovered fiber use on mill raw effluent and treatment system performance.

- \* Characteristics of emissions and ashes resulting from the combustion of paper-based fuels.
- \* Beneficial uses for solid wastes generated from reuse of recovered fiber.
- \* Emissions from mills using recovered paper.
- \* Environmental fate and effects of trace contaminants present in recovered paper furnishes and final products.

## Conclusions

Environmental issues are significant factors affecting the cost structure of the forest products industry and perceptions of the industry's products in global markets. The industry is fully aware of the importance of environmental issues to its future well being and is committed to documenting and improving its environmental performance in order to regain public support.

The industry faces many difficult challenges in the environmental area. Perhaps the greatest is rapid growth and diversification of the environmental agenda. It seems at times agencies and environmental lobby groups are increasing their demands indiscriminately. These demands are consuming a large and growing share of the industry's capital and talent. Globalization of environmental issues will place additional demands on limited resources.

Growing public concern about costs and benefits of regulation combined with broad support for sustainable development will provide an opportunity to rationalize the environmental agenda and regain public support. Attributes of the industry's products such as renewable, biodegradable, and recyclable are important assets.

Environmental research is an essential part of the industry's effort to cope with current issues and find pathways to sustainability. Research is providing objective information about current environmental conditions and the effects of the industry's operations on those conditions. Moreover, research

can discover new ways of producing and balancing economic and environmental values.

Among the more difficult issues facing the industry are those related to (a) effects of forest management on biodiversity and (b) the ecological significance of contaminants present at very low concentrations in industry waste streams and the environment. Progress on these issues requires research that addresses questions of risk and aesthetics in an objective and credible manner.

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**TABLE 1. Topics of field studies, literature reviews, and technical support activities in NCASI's Eastern Wildlife Program.**

**Field studies**

- Black bear population status and habitat use in Louisiana, North Carolina, and New York
- Taxonomic basis for designating certain black bear populations as threatened subspecies
- Characteristics of red cockaded woodpecker habitat on industrial timberlands
- Abundance and diversity of birds in managed forests of Arkansas, Maine, and Michigan
- Abundance and diversity of birds, small mammals, reptiles and amphibians in managed vs. unmanaged "pocosin" forest wetlands in eastern North Carolina
- Effects of timber harvesting and residual stand characteristics on habitat selection by pine martens in Maine

**Reviews**

- National Biological Survey's "Gap Analysis" Program
- Silvicultural options for meeting ecosystem management objectives
- Effects of forest management on amphibians
- Forestry, wildlife, and habitat in the East
- Habitat values of stream side management zones

**Technical Support (partial list)**

- EPA's Gulf of Mexico Program - Habitat Degradation Committee
- Atlantic salmon habitat restoration - Maine
- Karner blue butterfly - Wisconsin
- Black Bear Conservation Committee - Louisiana
- Management guidelines for red cockaded woodpeckers on private and public lands

**TABLE 2. Field Studies Supported by NCASI Forest Wetlands Program**

<u>STATE</u>	<u>PROJECT</u>	<u>WETLAND FUNCTIONS INVESTIGATED</u>
Alabama	Impact of harvesting forested wetlands on water quality	Biogeochemistry, hydrology, productivity, herpetofauna
Alabama	Effects of intensive forest management on riparian wetlands	Biogeochemistry, water quality, benthic macro invertebrates
Alabama	Hydrologic and silvicultural responses 7 years after harvesting a tupelo-cypress wetland	Productivity, plant diversity, biogeochemistry, hydrology, birds
Florida	Hydrological relationships between cypress wetlands and pine flatwoods	Hydrology, biogeochemistry, plant diversity, herpetofauna, hydric soils, wading birds, benthic macro invertebrates
Georgia	Assessment of logging road construction and silvicultural systems on Flint River wetlands	Water quality, hydrology, biogeochemistry, productivity
Michigan	Sturgeon River wetland silvicultural impact study	Biogeochemistry, water quality, hydrology, productivity
Mississippi	Characterization of hydric soils	Hydrology, soil chemical and physical properties
Mississippi	Long-term effects of harvesting practices on floristic and structural diversity of bottomland hardwood stands	Plant diversity and structure, soil properties, productivity, birds
Mississippi	Restoration of bottomland hardwood forests on a Sharkey soil	Plant diversity and productivity, soil properties
North Carolina	Water management study	Hydrology, water quality, biogeochemistry, productivity, aquatic biology
Pennsylvania	Impact of forest road crossings on riparian wetlands on riparian wetlands	Stream habitat quality, channel stability, water quality
South Carolina	Response of a blackwater bottomland to timber harvesting	Biogeochemistry, water quality, productivity, herpetofauna
Texas	Effects of timber harvesting on wetland functions of bottomland hardwoods of southeastern Texas	Hydrology, water quality, biogeochemistry, productivity, soil herpetofauna, small mammals
Virginia	Evaluating the effectiveness of BMPs on streamwater quality in riparian wetlands	Biogeochemistry, water quality, hydrology
Virginia	Effects of site preparation, drainage, and fertilization in a loblolly pine flatwood	Hydrology, productivity, soil properties, plant diversity

## Environmental Life-cycle Analysis: Wood and Non-wood Building Materials

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### Abstract

Historically, technical utility and price have been the primary criteria in the decision to use wood or non-wood building materials. Renewed environmental awareness, pressures from environmental activists, and direct government regulation will increasingly combine to affect building material choices in the future. Hence, competition between alternative products will evolve to include environmental as well as traditional price and product utility criteria.

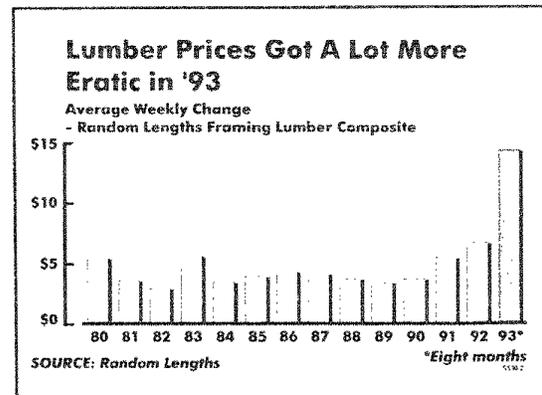
All building materials offer certain environmental benefits while entailing environmental costs. Unfortunately our present environmental knowledge and piecemeal measures leave us ill-equipped to make sound environmental choices.

This paper marries the concept of sustainable development with the practice of life-cycle analysis in a broader, holistic framework to afford a more objective assessment of the environmental consequences of using various alternative materials in specific applications. The paper also presents some preliminary results comparing wood and steel in a building application.

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As we have already heard both today and yesterday, the wood products industry is facing some tremendous challenges on the environmental front. Some of you may well think that this is a fad that will eventually consume itself and go away. I think we all now realize that this is not about to happen, and if we choose to ignore the environmental movement we do so at our own peril. Today's environmental movement is without boundaries as it stretches around the globe and intervenes not only on public lands, but is now encroaching on private property as well. Essentially, the environmental movement has changed the public's perception about how we manage forest resources and subsequently,

how they view wood products. At the same time they have created a lot of uncertainty. (Figure 1)



This uncertainty manifest itself in higher wood product prices and more volatile price swings, which in turn, has opened the door to unprecedented possibilities for substituting alternative materials for wood.

This paper address the complex issue of the environment and substitution. It introduces some concepts we need to understand so we can look at environmentally motivated substitution in an objective and constructive light. It also ties these concepts together by describing a research program we have underway at Forintek to address this and other environmental issues related to building materials and then, the paper concludes with some preliminary results of our work.

### Traditional substitution, the price system, and environmental claims

Historically, product performance and price have been the primary drivers behind substitution of wood and non-wood products. Many analysts

contend that government regulation, motivated by the environmental movement, will increasingly affect building material substitution in the future. One result is likely to be the use of a wider mix of building in any given structure as we begin to distinguish between each products environmental benefits and cost. Or in other words, competition between alternative building materials will be redefined to include environmental as well as traditional price and product performance criteria.

Unfortunately, the prevailing price system is incapable of accounting for the environment and may actually send perverse signals about the relative environmental benefits and costs associated with competing products, especially when they are made of different materials. Although in time we can expect to see more environmental factors embodied in the price system (such as carbon or Btu type taxes) and therefore in the cost of building materials, the use of market forces to achieve environmental objectives is not likely to occur quickly or on a broad front. I will return to this price system a little later in the presentation.

The environmental cloud hanging over the wood products industry coupled with the recent price volatility of wood products and the stagnation of non-residential construction markets, has the steel and concrete industries doubling their efforts to capture a share of the residential construction market.

Subsequently, each industry has begun to position themselves against the other as the obvious "green" choice with glossy brochures and marketing campaigns. Now the goal of the steel industry is to have a 25% share of the residential framing market before the turn of the century. While this is probably optimistic, just setting the target gives a pretty clear indication as to the direction they are heading.

So what we have here is a lot of environmental information being put out by all three material groups, each with their environmental claim to fame, which only tells a small part of the whole story. For

instance, steel major environmental claim is that it is North America's most recycled material, wood chooses to underscore its renewability trait and concrete counters with the claim of being produced locally from common and abundant natural resources.

And then we have the environmentalists who I think are rightfully concerned, but seem to me to be rather shortsighted. They have not yet considered that if timber is not to be a product of the forest than what do we replace timber with, and are these alternatives more or less environmentally benign.

### **Building materials in the context of sustainable development**

The combination of a maturing environmental movement, the inefficiencies built into the market price system and the piecemeal measures we presently use to gauge product environmental impacts all provided the impetus for a project we initiated two years ago entitled "*Building Materials in the Context of Sustainable Development*".

The concept of sustainable development links the common themes of maintaining, sustaining and preserving environmental processes and of dealing with environmental constraints when meeting present and future needs. Perhaps the number one problem that plagues the concept is that it is not a one time goal that can be precisely defined and then achieved in a certain period of time. Rather it is more like a moving target, because as our global population continues to grow, it puts additional pressures on our planets resources.

The concept's primary value is its broad scope and implied shift away from shortsighted and economically expedient decisions in favor of something of a more thoughtful and balanced orientation in the long-term.

The concept of sustainable development has captured the imagination of society as a whole. The business community, governments and the general

public continue to be very interested in having a means to holistically examine and reduce the environmental impacts of products, processes and our daily activities.

As a society, we have well developed methods and criteria to measure productivity and profits to help us improve performance. That is, ways of thinking about, comparing and selecting from alternatives. The challenge is to develop a similar tool to incorporate sustainable development into our decision process. One tool is emerging on the international scene which seems to offer us a method for comparing environmental trade-offs in something more than in a piecemeal way. It has more than one name, but it is most commonly referred to as *life-cycle analysis*.

It is a process whereby the environmental burdens associated with a product, process or activity is evaluated by quantifying energy, material usage and environmental releases throughout the life-cycle. Because all products, processes and activities impose some toll on the environment, we have to assess these environmental impacts on a comparative or relative scale while at the same time striving to improve their individual environmental performance.

Life cycle analysis, while originally developed in the 1970's, is still undergoing refinement and has slowly filtered down to the business unit level as a tool for allocating scarce resources among competing pollution abatement goals so industries can get the best bang for their pollution abatement buck.

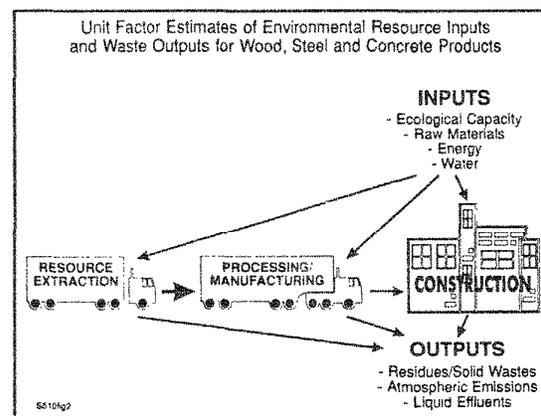
The International Standards Organization (ISO) has also established a technical committee (TC207), headed by Canada, to harmonize life-cycle analysis around the world. It is believed that this methodology will form the cornerstone for environmental claims and environmental choice programs in the future.

The important thing to remember is that life-cycle analysis is a benchmark methodology for

equivalence evaluation, improvement and comparison across products, process and activities.

While our project has a number of secondary objectives, the ultimate goal is to make available a simple model which will enable the building community to assess the relative environmental implications of using various building materials in defined applications: again within this holistic framework of sustainable development. **The goal here is not to mount an all out offensive in favor of wood, but rather, to encourage the wider use of all materials in any particular building design such that together they minimize the building's environmental impact.**

The sustainable development doctrine demands that we look at the environmental consequences of an area of activity such as building construction from a broad perspective (Figure 2). We think that our life-cycle approach is up to the task. It starts with the idea that five main activity stages define the life-cycle of a building. These include resource extraction, product manufacturing, on-site construction, building occupancy and maintenance and lastly, demolition and disposal of the building. Transportation services within and between these activity stages are also included.



What we are concerned with is how various building materials interact with and affect the environment during these five activity stages. And to this end we

have defined the sustainable development objective to be the minimization of physical environmental inputs and outputs required over the life of the building.

These inputs and outputs must also be considered in the context of various sustainable development criteria such as resource availability and renewability, product durability and recyclability as well as substance toxicity and pollution abatement levels.

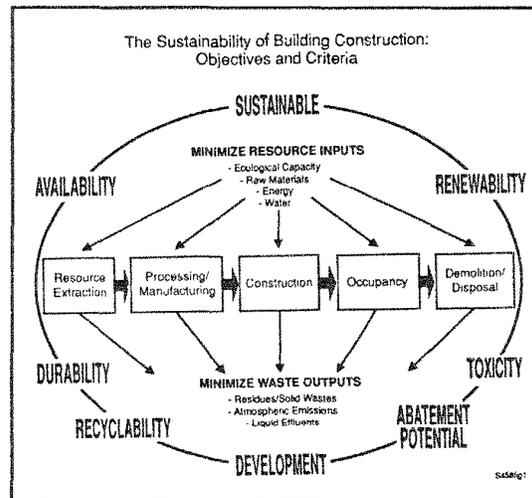
The physical environmental inputs and outputs themselves are relatively straightforward, with perhaps the exception of the term "ecological capacity". Ecological capacity denotes the numerous other effects caused by human interaction with the physical environment during the extraction phase of the life-cycle. A major task of the project is to assess some of these key effects which we then hope to incorporate into our model. So far the ongoing research on ecological capacity suggests that the raw materials for wood, steel and concrete are physically sustainable; the question we are wrestling with is at what relative environmental cost?

A project of this scope of course demands numerous skill-sets. So over a period of six months we established a multi-disciplinary research alliance of eight organizations comprised of three university programs, two private consulting firms, a government agency and another private research firm similar to Forintek to undertake this multi-faceted project.

Great lengths have been taken to structure the alliance such that the objectivity and integrity of the study is not compromised. Over the last 18 months the research alliance has completed the major analytical task. The focus of this work has been on vertical and horizontal structural assemblies using a number of wood, steel and concrete products in light commercial and residential buildings.

So far we have developed what we call unit factor estimates (Figure 3) for a number of products in

terms of their raw material requirements, embodied energy, the demand they place on the water supply, solid wastes produced and a select number of atmospheric emissions and liquid effluent; from the resource extraction stage to completion of a structural assembly on a construction site. An example of a unit factor estimate would be GJ of energy used per ton of steel or KG of CO<sub>2</sub> emitted per MBM of lumber.



In essence, the alliance's research to-date has advanced our environmental understanding on three fronts:

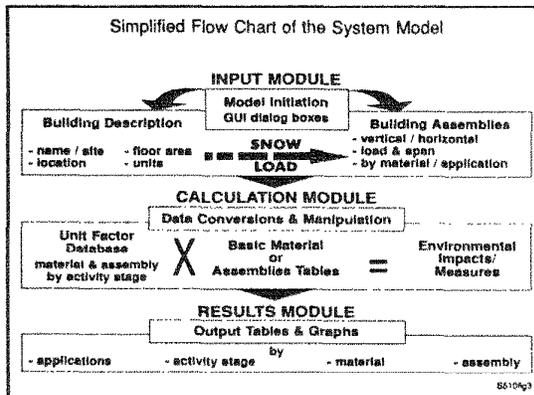
First, we have provided a new standardized benchmark for environmental assessment of building materials. So, no longer do we need to use dated information from a number of different sources employing different research methodologies;

Second, we have expanded the number of environmental variables considered beyond energy use and atmospheric emissions; and,

Lastly, we've moved the analysis forward by explicitly considering the construction activity stage.

Needles to say, however, we still have a lot of work to do.

We have also begun to construct our environmental design computer model (Figure 4). It contains a menu of typical floor, roof and wall assemblies for the three materials from which the user specifies the building's geographical location, the actual space to be modeled and the working loads and spans. The model proceeds to determine and then breakdown the required assemblies into their respective materials and applies our unit factor estimates to the materials used and in turn, compiles the total environmental inputs and outputs for that particular design. The real value of the model is that it allows the building designer to focus in on what aspects of the design are particularly environmentally costly and then try alternative materials and assemblies and materials to reduce the buildings environmental load or cost.



The model focuses on comparative building assembly designs rather than on comparing materials directly. This focus is necessary because unit measures such as a pound of wood versus a pound of steel or concrete is for all practical purposes meaningless as such measures do not consider the functional capability of each of the materials in use.

I now want to run through an actual assembly comparison using our model and data for two materials in a simple application. The application I

have chosen for comparison is a typical exterior infill wall assembly used in light commercial structures. Usually a building this type of assembly would be built using steel as the post and beam supporting structure. The exterior opening can then be infilled using a number of different products.

For the purpose of material comparison, we used 20 ga. steel studs produced in an integrated or virgin steel plant as one example, and 2x4 wood studs as the second alternative. The infill space to be modeled was arbitrarily set at 3 meters high by 30 meters long or approximately 10' by 100'.

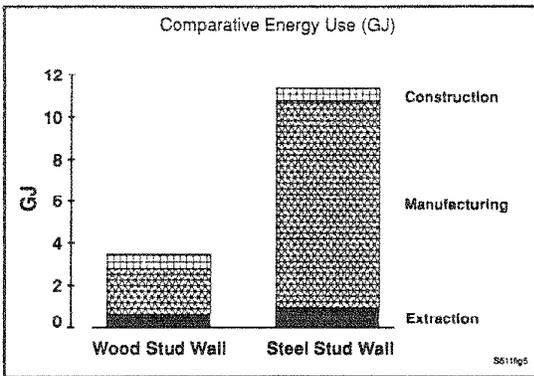
This first chart (Figure 5) summarizes the resource demands for the two alternative wall infill methods. It took over 600 kg of raw materials to produce the softwood lumber and nails used to in the wood wall assembly. So on a mass basis, the wood design is only 75% as resources intensive as the steel design.

Comparative Resource Requirements (Kg)  
(Wood & Steel Wall Assemblies)

Raw Material Required	Wood	Steel
Roundwood	597	
Limestone	2	77
Iron ore	12	509
Coal	6	252
Zinc		2
	617	840

65120g

In terms of embodied energy (Figure 6), the steel wall is three times more energy intensive than the comparable wood wall. The steel wall is more energy intensive in terms of resource extraction and manufacturing, but is slightly less energy intensive than wood during the actual process of construction.



Now minimizing energy use is a key sustainable development objective as energy, especially energy from fossil fuels, represents a major environmental impact. Moreover, (Figure 7) as builders and architects strive to make their buildings more energy efficient, the embodied energy of the building materials used becomes more significant. Here we see that energy efficient residential designs relative conventional designs are twice as energy efficient and subsequently, the embodied energy of the materials expressed as years of operating energy has grown two-fold in importance as well. We think this energy efficiency trend is going to continue unabated and may even accelerate in the near future. Hence, the wise choice of materials from the outset should be a major concern.

House Type, Location	Operating Energy GJ/yr	Embodied Energy GJ	Embodied Energy Expressed as years of Operating Energy
Conventional, Van.	107	1,000	9.4
Energy-Efficient, Van.	60	1,075	17.9
Conventional, Tor.	143	1,000	7.0
Energy-Efficient, Tor.	82	1,075	13.1

SOURCE: Cole, R. (1993)

All human endeavor results in a host of atmospheric emissions, some of which are more serious than

others. One emission that is especially topical and perhaps even critical is carbon dioxide, because of its role in global warming. Carbon dioxide emissions for the steel wall are three times that of the wood wall (Figure 8). The relative energy intensiveness of the two products explains a large portion of the carbon dioxide emission difference.

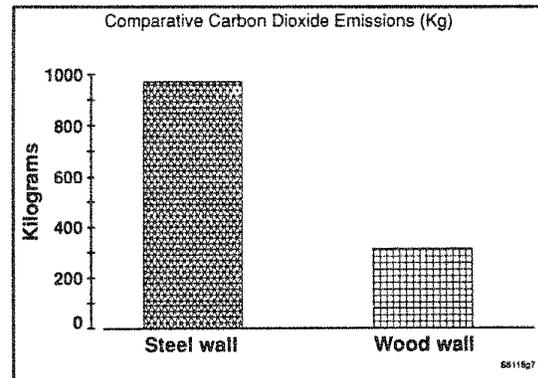
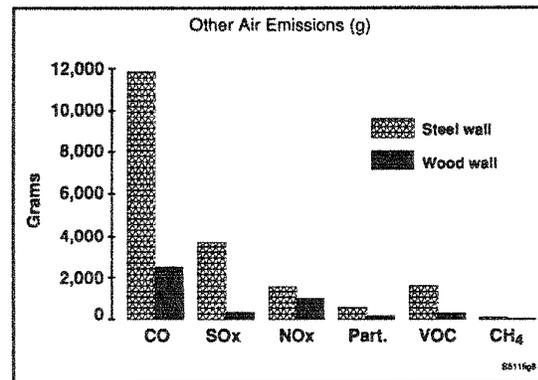
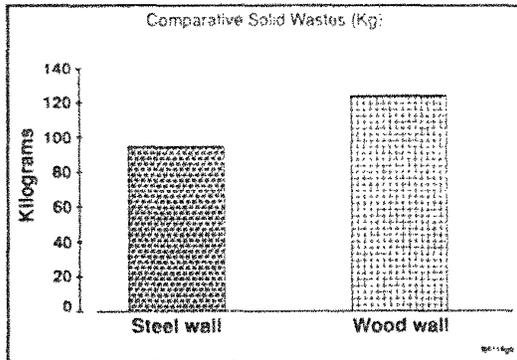


Figure 9 provides further comparison for some other important emissions. Here again, the wood assembly proves advantageous when we compare carbon monoxide, sulphur dioxide, nitrous oxides, methane, particulates and volatile organic compound emissions; all of which pose a hazard either to human health or the environment.

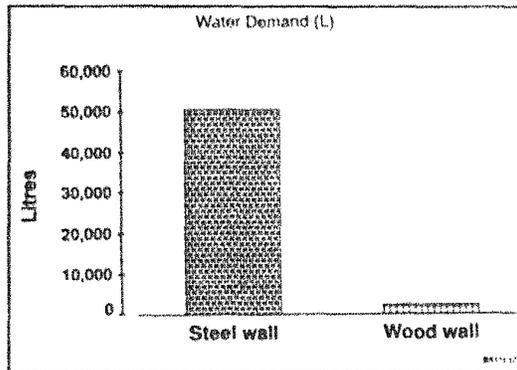


Another consideration is solid waste (Figure 10). The solid waste generated during manufacture and construction was about 30kg higher for the wood wall. This outcome is primarily due to the more efficient use of steel on the construction site as well

as the growing market for the slag by-product produced during the manufacture of steel.



The largest difference between the two material wall designs (Figure 11) was found in their comparative water use during product manufacturing, with the steel assembly demanding over 25 times more water input relative to the wood design.



Water use of course results in effluent. Figure 12 summarizes the results for similar effluent for the two wall assemblies. Again we see that for the same effluent, the wood assembly results in far less effluent than does its steel counterpart.

Effluents	Wood Wall	Steel Wall
Suspended Solids (g)	12,180	495,640
Non-Ferrous Metals (mg)	62	2,532
Cyanide (mg)	99	4,051
Phenols (mg)	17,715	725,994
Ammonia and Ammonium (mg)	1,310	53,665
Halogenated organics (mg)	507	20,758
Oil & Grease (mg)	1,421	58,222
Sulphides (mg)	13	507
Iron (mg)	507	20,758

Well that's the extent of our preliminary results to-date. As I mentioned, we still have a lot of work to do to complete the total picture. What you should take away from these preliminary results is that choosing between materials is by no means a simple task or in other words there is no SANTA - Simple Alternatives are Not The Answer.

### Environmental externality costs

I now want to provide an interpretation of these findings in terms of our present price system and relate it back to the issue of substitution. In doing so, we have to understand the concept of environmental externality costs. These are the additional costs to society in terms of human health and environmental damage that are not already incorporated into a product's price. Essentially determining environmental externality costs provides a method for estimating the full cost of environmental impacts to society. To ignore these external costs in planning, pricing and product selection values them and society, for that matter, at zero.

Perhaps more importantly, by putting a dollar value on environmental damage we begin to provide building designers and policy-makers with a measure they inherently understand and which should encourage all concerned to invest in and use,

less polluting resources and materials. Politically, these externalities amount to pollution fees or taxes.

The Pace University Centre for Environmental Legal Studies in New York State completed a lengthy study of externality costs for electricity generation, and arrived at the following dollar values for four important air pollutants as well as three non-fossil fuel electricity generation methods (Figure 13). Their work on the external cost of effluent proved inconclusive due to wide range of values reported in the literature. They indicated, however, that effluent pollution is generally less damaging than air pollution and so I have incorporated an estimate of effluent discharge costs which is pegged at one-third the value of the least costly air pollutant -- carbon dioxide. This is a very conservative estimate in light of the ranges in values reported in the literature.

Environmental Externality Cost Estimates	
Pollutant	Cost (Cdn \$/Kg)
Carbon Dioxide	0.15
Sulphur Dioxide	1.80
Nitrogen Dioxide	4.47
Particulates	2.62
Nuclear	8.08
Hydro	0.33
Renewable	1.11
Effluents <sup>1</sup>	0.05

Source: Pace University (1990) 05/26/12  
<sup>1</sup> Estimated by Forintek from Pace Study

So, with the total quantity of pollutants known, plus the quantity of non-fossil fuel electricity used, we can begin to calculate and compare the environmental externality cost of the two alternative wall assemblies. Figure 14 summarizes both the direct material costs as well as the externality costs of the two wall assemblies constructed in Toronto. As is indicated the wood wall is not directly cost competitive with the steel alternative.

Direct Material & Indirect Externality Costs (Wood & Steel Stud Infill Walls - 3 m x 30 m)		
	Wood Wall	Steel Wall
Cost of Material (Cdn \$)	\$ 410.00	\$ 350.00
Externality Costs (Cdn \$) (Inclusive of fasteners)		
Electricity (non-fossil fuel)	\$ 1.46	\$ 4.67
CO <sub>2</sub>	47.00	145.65
SO <sub>2</sub>	0.66	6.65
NO <sub>x</sub>	4.52	7.04
Particulates	0.49	1.55
Effluents	0.61	24.80
Sub-Total	\$ 54.74	\$ 190.57
Grand-Total	\$ 464.74	\$ 540.57

From an environmental cost accounting perspective, however, the wood wall assembly is only a quarter of the cost of the steel wall or is some four times more environmentally benign. Much of the gain for the wood wall assembly can be ascribed to its lower carbon dioxide emission level.

Taken together, the direct material and externality costs sum to a significant cost advantage for wood and given the price sensitivity of builders, I would hazard a guess that any builder confronted with these truer costs would choose the wood stud over the steel alternative.

Our price system has long been the primary determinant for choosing amongst competing alternatives. As is evident here, the problem is that it is not a very good environmental indicator on its own. And while life-cycle analysis offers us a method to better understand environmental trade-off and to compare competing alternatives on an equivalent basis, it is by no means a simple concept to grasp or implement. Or in other words it does not lend itself to the 20 second sound bite.

It is up to us as professionals to better understand the broader burden we exert on the environment and work towards minimizing this burden. Similarly, we must take-up the challenge of communicating this broader understanding to the public, so we can move away from the narrow and often myopic viewpoints about environmental impacts which seem to dominate our present understanding. Until then, we

run the risk of making some perverse decisions regarding the efficient use of our natural resources and hence, building materials.

## Environmental Issues for Forest Products: What is the USDA Forest Service Doing?

Thomas A. Snellgrove, Acting Director, Forest Products and Harvesting Research)

I was asked to give you a government perspective on what is being done and can be done to minimize adverse environmental impacts from harvesting and manufacturing activities. There are a number of other speakers representing "government views", including our new Chief, Jack Ward Thomas, and I want to make sure that you understand that my perspective is that of the Forest Products and Harvesting Research (FPHR) staff of the Forest Service in Washington, D. C. Much of what I will say is also applicable to university and industrial research groups, but I am speaking specifically from an FPHR view.

A little more perspective. A few years ago our staff published a "vision document" articulating the FPHR vision for the future. After all was said and done, we developed a motto that we thought captured the essence of what FPHR is about, "Meeting Needs for Wood Products and Enhancing the Environment." In hindsight, we still believe that motto expresses the philosophy of our program--to be sure, our thinking has evolved somewhat over the last three years, but the values embodied in that motto remain the same.

What I will do today is provide you with a summary of our FPHR program placed in the context of issues that we see today and project into the future. I will briefly build a case for what we think is the overarching issue in natural resources, then provide a summary of how we are addressing this issue, and close with some tangential thoughts related to moving forward with an environmental agenda.

### The case for sustainable development

Other speakers have made a strong case, either directly or indirectly, that the foremost natural resource issue facing society is sustainability. I don't need to replot that ground. I would, however,

like to emphasize the critical importance of the issue with two compelling pieces of information. The first is shown as the per capita consumption of wood products in the United States (Figure 1).

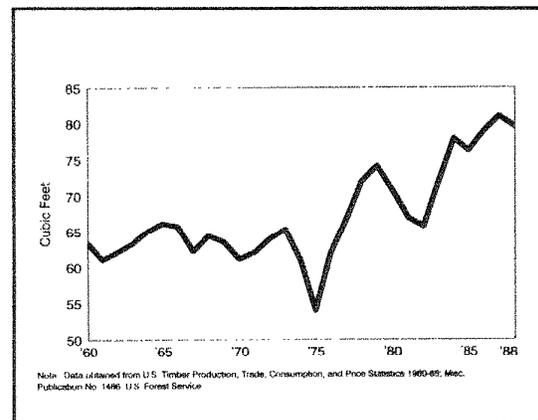


Figure 1. Per capita consumption of wood products in the U.S. from 1960 to 1988.

It is clear that even in "developed" countries consumption has not been diminished by our paperless society. It's not unreasonable to assume that per capita consumption may increase at an even faster rate in "developing" nations.

The second piece of information was taken from an Associated Press article on August 12, 1994. Paul Ehrlich of Stanford University and Gretchen Daily of the University of California said, "The world population of 5.5 billion is more than twice what the earth can support over the long term.....the Earth's maximum "carrying capacity" is about 1.5 to 2 billion people.....we're unstable now"!

Whether or not one agrees with these assumptions, or with the exact numbers, it is hard to conclude that sustainability is not a key issue facing the entire global community.

There are prefacing points that I think are important in discussing sustainability, and both involve clarification of the concept. First, we need at least a working definition, and the one set forth by the Bruntland Commission is satisfactory as a starting point. "Meeting the needs of the present without compromising the ability of future generations to meet their needs....." This definition addresses two critical dimensions of sustainability, i.e., the time dimension of current and future generations, and economic as well environmental factors.

In a similar vein, Donella Meadows, adjunct professor of environmental studies at Dartmouth College when writing in the Bennington Banner (1/10/94) addressed the importance of being clear on the difference between growth and development. She says, "...it's a step toward precision and sustainability to say growth when you mean physical size, and development when you mean, as the dictionary says, to realize the potentialities of, to bring to a fuller, greater, or better state. Development means to get better, growth means to get bigger."

### **Components of sustainability**

For our purposes then the key driver of our FPHR programs is sustainability, meaning sustainability of resources and of people. We see three general components to attaining sustainability:

1. **Begin with conservation.** Saving as much as we can through conservation is a cornerstone of our strategic framework for FPHR programs. If this were being written 100 or maybe even 50 years ago we might not be starting here (although Gifford Pinchot, Aldo Leopold and other visionaries were explicitly addressing the issue in that time period). But, there appears to be ample evidence that we have to save and extend as many of our resources as we can. Clearly, this is not a call for preservation, that is a separate issue; this is about the most effective utilization of those resources that we choose to harvest.
2. **Help ensure ecosystem health, vitality, and productivity.** In other words we need to protect our environmental capital. If we are to look to providing the full array of values that society expects from our forests now and into the future we have to ensure the integrity of those forests--it's as simple as that!
3. **Foster economic vitality.** The importance of healthy and vital economies manifests itself clearly in developing countries. One only has to look at what often happens to natural resources in countries that do not have healthy economies to understand the consequences. Clearly, a healthy economy does not preclude abuse of natural resources, but it does remove an excuse for short term detrimental actions.

### **Program responses to sustainability**

#### **Conservation of Resources**

Our research programs to improve conservation fall in three broad areas: improved utilization, recycling, and improved durability. Not everything

can be captured here, but these three areas frame our efforts in conservation.

Utilization research--Conducting research aimed at saving and extending forest resources is not a new concept for those of us involved in the forest products and harvesting arena. It is good, however, to revisit that history and think about where we should be going in the future. In the Forest Service we have been involved in improving utilization since the establishment of the Forest Products Laboratory (FPL) in Madison, Wisconsin, in 1910. Then, as now, forest conservation involved not only the protection, management, and cultivation of forests, but also more effective use of products from those forests. Over time a network of units was established in the regionally located Experiment Stations to help complement the efforts of the Forest Products Laboratory as a national center for forest products research.

Research initially focused on how to reduce the amount of waste and then moved to looking at opportunities for making use of previously unused material. Tremendous gains have been realized by improved saws and sawing practices, thereby, reducing the amount of "wasted" material in the form of sawdust and chips. The same holds true for manufacture of other products such as plywood. Attention was then focused on unused portions of logs: slabs, edgings, sawdust, material being burned in wig-wam burners, and related material that could be used to make products such as particleboard, oriented-strand board, and finger-jointed lumber. There were more advances in this area than can be enumerated here.

Forest Products Research units in the "field locations" also made tremendous progress in improving utilization. As an example, they worked with FPL and university researchers to demonstrate how "dead timber" could be used. They then worked with resource managers to assess fair-market-value. That research resulted in billions of board feet of timber that was killed by insects, disease, fire, and even volcanoes being used over the last couple of decades instead of going to waste. This "historical role" continues.

As we look into the future, statistical process control, benchmarking, and process simulation modeling are strategies that can foster significant improvements in forest products utilization and conservation (Figure 2). For example, statistical process control can be used in a furniture rough mill to minimize width deviation in the lumber ripping operation, resulting in substantial wood raw material savings. Benchmarking, to determine industry-best practices, gives the wood industry a set of standards for conversion efficiency that they can use to both measure and focus their improvement efforts. Computer-based process simulation modeling allows us to revisit many of the most critical utilization questions and provide integrated answers that address both resource utilization and industrial productivity. These areas provide more than ample opportunity for FPHR to continue making gains in conservation of resources.

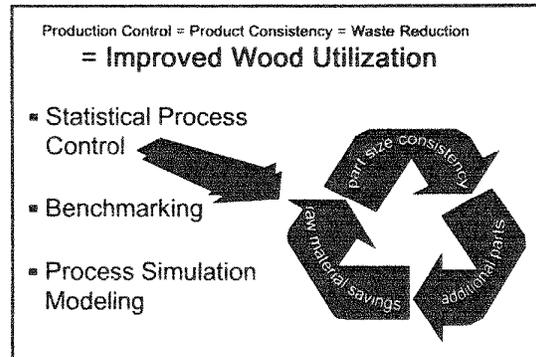


Figure 2. Schematic diagram of model for process control to improve wood utilization.

**Recycling**--Our most visible conservation program currently focuses on recycling, or conceptually, using the same fiber more than once. The recycling program originally began in response to a need to reduce landfill space. Subsequently, there has been substantial discussion of the benefits of recycling to help reduce carbon emissions. Both of these issues remain important, but the most rational and probably enduring reason for increased recycling relates to the opportunity to more effectively use our fiber resource thereby fostering conservation of our forest.

The research program initially focused on waste paper to paper opportunities. It has since expanded significantly to include paper plus wood plus a host of other materials, some renewable and some not, to develop a new generation of recycled composite products.

One of the difficulties we see in the future is to find enough suitable uses for recycled products to make major inroads into the accumulation of waste materials. We have initiated a research program aimed at developing the technologies needed to create housing components from recycled materials. The goal is to provide technologies that will allow the use of recycled products to replace 20 percent of virgin wood material currently used in housing by the year 2000. Figure 3 pictorially depicts some of

the opportunities that exist. Roof systems, exterior walls and siding, interior wall floor systems, foundations, interior and exterior components all provide opportunities to use recycled material. Research on processing technologies, performance evaluation, and economic feasibility will all be required to move the program to fruition.

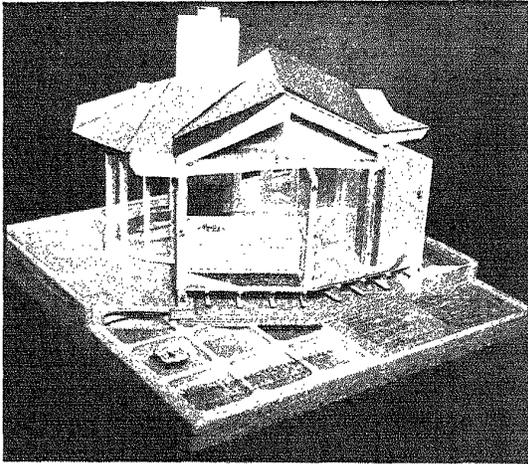


Figure 3. Cut away model of house showing potential components that could be made from recycled material.

Durability Research--Using the same fiber for a longer period of time provides another way to more effectively use our resources to foster conservation. We see this research as a potential growth area in the future. The historical role in durability research focused more on development of chemical treatments and on the efficacy of those treatments. Future research will concentrate on "natural" treatments and inhibitors.

We feel that there are opportunities to improve durability other than through preservative treatments. Enhanced design technologies could improve durability without using preservatives. New practices and technologies for inspection, repair, renovation, restoration, and maintenance of

wood structures could contribute to improved durability.

### Health and productivity of ecosystems

Our new Chief has sent a loud and clear message to Forest Service employees: "We will do nothing that puts our ecosystems at risk." FPHR began making a shift that supports that premise a few years ago, and his message affirms the importance of that shift. For us it meant changing our thinking from one of efficiency of harvesting timber to one that focuses on implementation of ecosystem-based management activities in support of the multiple-use mission of the Forest Service. Examples of direct contributions that FPHR makes to help implement ecosystem-based management include technologies for vegetation management, visualization technologies, developing options for use of material generated in the course of ecosystem related activities, and understanding the impacts of different management practices on tree morphology.

New technologies will be required to carry out the different types of management practices that will be used. Flexibility and maneuverability will be critical. Ability to handle small material and non-uniform material may become more important. Cut-to-length technology is one example of this type of technology. Efficiency of equipment may not be the driver, but it will continue to be important, because implementation of ecosystem-based activities is not likely to be inexpensive.

Visualization technology that allows us to look at the consequences of management activities over time will be an important tool to help ameliorate conflict among disparate groups. Those same techniques, when coupled with Geographic Information System technologies, will allow us to visualize historical patterns of management activities and natural disturbances. It will also be useful in developing and displaying "Access Models" on a landscape scale.

Ecosystem-based activities will generate an array of new types of materials. What to do with smaller, non-uniform, and lower quality material will present challenges to resource managers. The need to remove woody material is becoming increasingly apparent through the occurrence and severity of wildfire in the Western U. S. And likewise, the importance of helping defray costs of ecosystem-based activities for non-timber objectives will heighten the importance of finding uses for this new material.

New management practices may have a profound effect on the morphology of trees. This varied morphology may be consistent with management objectives, and it may not. Managers need to understand the consequences of their practices, whether their objective is to produce habitat for the red-cockaded woodpecker, the marbled-murrelet, or to produce high-value wood products.

None of this "new emphasis" diminishes the importance of harvesting timber where that is the management objective. Harvesting timber continues to be important and will remain one of the multiple-use objectives on National Forests. Much of the research in support of harvesting, however, has been completed and we need a different emphasis to support the new approach to management.

### **Economic vitality**

Whether economic vitality is viewed from the perspective of rural economies, gross domestic product, or international competitiveness, the contribution of wood-based forest products is critical. FPHR has historically provided science and technology that has fostered local and national economic vitality. Examples of areas where strong contributions have been made, or will be made, include engineered products and design, performance standards for wood and fiber based products, and the new area of "green" or environmental technologies.

Engineered products--Research and development by a host of researchers from universities, industry, and FPHR have contributed to the development of highly visible and successful products such as laminated beams, wooden I-beams, laminated veneer lumber, oriented strand board, and wooden trusses (Figure 4).

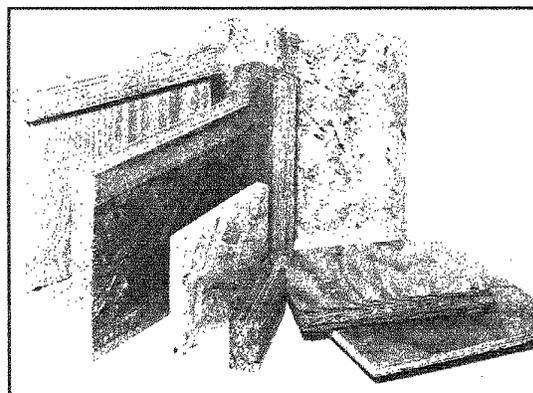


Figure 4. Engineered products that have been developed throughout forest products and harvesting research.

These engineered products have not only conserved resources, but have made a direct and substantial contribution to the U. S. domestic economy and to international competitiveness.

A new high-strength, light-weight fiber product (space board) developed at the Forest Products Laboratory, can be used in a wide range of applications from veneer-coated furniture to non-load bearing walls and dividers. Spaceboard (Figure 5) is an example of a new generation of products that can be made from a variety of feedstocks, including recycled materials, and then used in valuable residential and commercial applications.

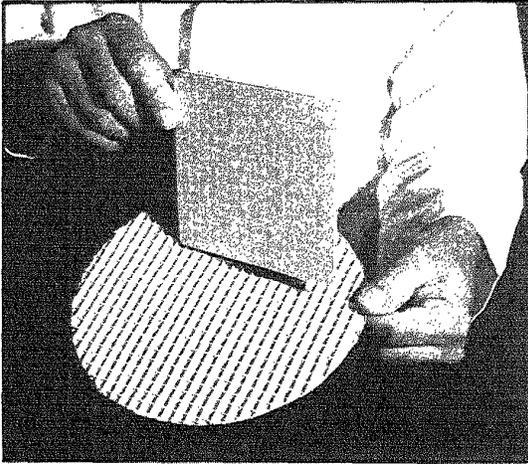


Figure 5. Spaceboard is a good example of the new generation products developed at the Forest Products Laboratory.

Environmental technologies--Also referred to as "green technologies", these products and processes have the potential to ameliorate environmental degradation and to generate revenue. Processes such as non-chlorine bleaching are being developed in response to the need to protect water quality, but they will also be valuable technologies that are exportable to developing countries. Biopulping is currently being used in limited applications and shows tremendous potential to reduce costs and pollution. Bio-based adhesives and preservatives have similar potential.

Performance standards--Performance standards are often an unsung component of research. Yet in a critical-path analysis context, few products can be commercialized without that component. Products standards are applied directly in the development of "codes" that are used by architects and builders that translate into safety to consumers. Whereas the development of performance standards is a somewhat oblique contributor to domestic trade, the lack of standards can be a direct deterrent to global trade and international competitiveness.

## Some concluding thoughts

I would like to conclude with a few somewhat tangential thoughts that might help us move toward sustainability. They are based simply on perceptions drawn from a couple decades of experience in FPHR related activities.

Society's change in values--We often talk about society's change in values--what society expects from our forests. The implication is that people are now placing value on things that were not valued before. We feel this is a misstatement. Society's values have not changed, people have always valued all of the resources that are derived from forests. What has changed are the relative proportions of the different forest resources that they want, particularly from National Forests. There is a clear message that society wants a more balanced emphasis in objectives for management of these forests. We need to recognize this, but also recognize that society continues to expect the full complement of benefits from the forests without associated tradeoffs.

Environmentalists versus industry--By using these terms we inadvertently foster polarization of groups that will ultimately have to work together to help move toward sustainability. I strongly suspect that there are many individuals working for profit-oriented corporations that would meet all expectations of someone who cares about the environment. Conversely, I suspect that many "environmentalists" see the importance of using forests for an array of benefits, including profits from wood-based products. This is not a plea for a Pollyanna-solution to genuine differences of opinions about natural resource policy. But it is a plea to recognize that there is an abundance of commonality between people categorized by those terms.

Energy cost of polarization--Building on the last point, a tremendous amount of potentially constructive energy is wasted on defending polarized viewpoints. Disparate views are a valuable part of our decision-making process.

Without robust and sometimes acrimonious debates we may settle for mediocrity in our policy decisions. But when the vast majority of energy is expended on developing and defending the extremes in policy debates, we all lose.

## THE LOWER ROANOKE RIVER BIORESERVE PROJECT-- A MODEL FOR PRIVATE-PUBLIC PARTNERSHIPS, NORTH CAROLINA

J. Merrill Lynch, Assistant Director for Protection, The Nature Conservancy -  
North Carolina Chapter

The Lower Roanoke River Bioserve Project had its beginnings as a high-priority land protection project of The Nature Conservancy. In the 16 years since its inception, the project has expanded to include partnerships with a diversity of public agencies (both state and federal), other private conservation groups, and landowners and local communities. This paper discusses the process of how the partnerships developed, the roles each partner has played, and the results in terms of the protection, conservation, and management of the natural and economic resources of the lower Roanoke River floodplain, North Carolina.

### Project background

The Roanoke River is the northernmost of the five major brownwater rivers draining the Atlantic slope of the southern Appalachian Mountains. Its headwaters are located in the Ridge and Valley Province west of Roanoke, Virginia, and its mouth is almost 400 miles to the southeast, at Bachelor's Bay in the western end of North Carolina's Albemarle Sound. The drainage basin covers 9,666 square miles. The project area consists of the drainage basin of the lower Roanoke River between the dam at Roanoke Rapids Lake (River mile 137) and the river's mouth at Albemarle Sound. This portion lies totally within the Atlantic Coastal Plain Province. The project area includes the 100-year floodplain, tributary streams, and adjacent uplands encompassing an area of roughly 800 square miles.

The lower Roanoke River floodplain is recognized as one of the most ecologically significant bottomland hardwood ecosystems in the southeastern United States (Lynch 1981, USFWS 1988). The floodplain forest corridor along the river supports old-growth examples of natural

community types and many plant and animal species including many rare, threatened, and endangered species. The river supports one of the most important striped bass fisheries on the Atlantic seaboard. The drainage basin was designated a Nationally Significant Estuary by the Environmental Protection Agency under the Clean Water Act Amendments of 1979.

### Basic facts

- \* At the beginning of the project all land in the floodplain was in private, non-conservation ownership; ownership was mainly by industrial forestry corporations and large family farms.
- \* The counties in the lower Roanoke River region are very poor economically; they have some of the lowest per capita income rates in the state and are one of the few areas with a declining population.
- \* The local economy is agriculture and forestry based; there is little industrial development
- \* The river is the lifeblood of the ecosystem; the plants and animals are adapted to a flooding regime. The quantity and quality of the water are of notable concern.
- \* There are many diverse riparian owners and users including state-owned gamelands, national fish and wildlife refuge, Nature Conservancy preserves, timber companies, farmers, municipalities, etc.
- \* The "tap" is controlled by the U.S. Army Corps of Engineers (they own and manage an upstream reservoir that regulates the

downstream water regime that affects the project area).

- \* Threats include altered flow and sediment transport regimes resulting from upstream dams, water pollution, water withdrawal, forest conversion, and exotic species.

## **Process - the evolution of the project**

### **Phase 1 -- Inventory**

The Nature Conservancy and the N.C. Natural Heritage Program co-sponsored a biological inventory of the project area in 1978. The three-year field reconnaissance and inventory, using Heritage methodology, identified twenty natural areas in the project area with high ecological significance. The natural areas represented the full spectrum of biological diversity along the lower floodplain including locations of rare and endangered species, exemplary examples of natural community types, old-growth forest stands, colonial nesting bird sites, and other elements of natural diversity. A report issued in 1981 described each natural area site, its biological significance, and priority ranking. Detailed maps accompanying the report identified ecological and ownership boundaries, and rare species locations.

This document, the Roanoke River Preserve Design Plan, became the blueprint for science-driven land protection activities on the lower Roanoke River. The plan attempted to address conservation needs based on an ecosystem, landscape-level approach. The plan focused on the natural forested corridor along the river and identified discrete areas within the corridor that needed acquisition.

### **Phase 2 -- Land acquisition/building a conservation constituency**

Using the preserve design plan both as a scientific justification document and as a marketing tool, TNC began building a conservation constituency for land protection along the lower river. The first partner

with TNC was the N.C. Wildlife Resources Commission (NCWRC), the state agency charged with managing the state's game and non-game wildlife. In this partnership, TNC was the real estate broker and the NCWRC was the owner and land manager. The State also was the funding source for the first acquisitions. Using the preserve design report as a guide, TNC began contacting landowners and negotiating acquisition of ecologically important tracts based always on a willing seller premise.

Many protection tools were used to acquire land including the establishment of a mitigation bank with the N.C. Department of Transportation, tax-free land exchanges, bargain sales, land gifts, conservation easements, and informal, non-binding registry agreements. The objective was to always find a means of protecting land that benefitted both buyer and seller.

In 1989, the U.S. Fish and Wildlife Service formally established the Roanoke River National Wildlife Refuge, identifying 33,000 acres of bottomland forest habitat for federal acquisition. TNC and USFWS began a partnership involving the purchase of lands for the new refuge, again using the willing seller-willing buyer concept. In an agreement worked out between the USFWS, NCWRC, and TNC, lands on one side of the river (Bertie County) would be acquired and consolidated in federal refuge ownership while lands on the opposite side of the river (Martin and Halifax Counties) would become part of the State-owned gamelands managed by the Wildlife Resources Commission. Using the river to divide the federal and state lands made a lot of sense for management and administrative reasons.

The Wildlife Resources Commission and the Fish and Wildlife Service also worked out a cooperative management plan for the state gamelands and federal refuge: each agency will retain primary jurisdiction over the administration of their individual properties but hunting permits for both lands will be issued by the Wildlife Commission.

Under the state's Nature Preserves Act, ecologically sensitive parts of the gamelands will be dedicated as state nature preserves and preserved in perpetuity in the natural condition.

### **Land Protection History (Progress to Date)**

Pre-1981-- Roanoke River is recognized as one of the most important areas for wildlife/fisheries in North Carolina by state and federal agencies but not a single acre in conservation ownership; ownership pattern is either large acreage industrial forestry corporations or large acreage private farms.

1978-1981-- Natural Heritage Program and The Nature Conservancy (TNC) sponsor a biological inventory of the lower Roanoke River floodplain. Inventory identifies 20 natural areas with significance as habitats for wildlife, natural communities, and rare species. Total acreage: 60,000 acres out of roughly 300,000 acres in 100-year floodplain (20%).

1982-- TNC receives a gift from Union-Camp Corporation which establishes first Conservancy preserve--Camassia Slopes.

1983-1987-- TNC teams up with the N.C. Wildlife Resources Commission (WRC) to acquire nearly 14,000 acres in six tracts in Martin, Bertie, and Halifax Counties, using various state funds such as the Endangered Wildlife Fund, the Waterfowl Fund, the Recreation and Natural Heritage Trust Fund, and the N.C. Wildlife Endowment Fund. [Funds for purchase total \$5.94 million]. These lands represented some of the best wildlife habitats along the river and all had been originally identified in the Heritage- sponsored biological inventory.

1986-- TNC/WRC/Fish and Wildlife Service meet to outline priorities for land purchases; WRC asks that FWS wait until State acquisitions are complete before announcing an intent to create a new national wildlife refuge.

1988-- FWS announces creation of proposed Roanoke River National Wildlife Refuge. Up to

now there has been little controversy regarding land purchases; all purchases have either been retained by TNC or transferred to the State. Public hearings indicate major opposition to federal acquisition, mainly from local hunters and Martin County officials.

1989-- Roanoke River NWR approved by Governor under a compromise plan. To satisfy Martin County, the Service excludes from its proposed acquisition all Martin County lands except for one tract. Lands in Bertie County owned by the State will be traded for replacement lands of equal ecological (and monetary) value in Martin and Halifax Counties.

1990-- TNC acquires almost 11,000 acres from Georgia-Pacific Corporation for \$6.4 million. Some of this acreage is added to the State Gamelands program and the rest becomes national wildlife refuge property.

The Wildlife Commission and the Fish and Wildlife Service agree to cooperatively manage both the Service's refuge lands and the Commission's game lands. Each agency retains primary jurisdiction over the administration of their individual properties. A single hunting permit for both state and federal lands are issued by the Wildlife Commission.

1990-1993-- TNC acquires almost 1,000 additional acres for the Wildlife Commission and purchases two additional private preserves bringing the total protected acreage on the Roanoke to 28,700 acres (FWS= 12,500 acres, WRC= 14,900 acres, TNC= 1,300 acres).

1991-- TNC begins its planning process for its Lower Roanoke River Bioreserve Project, a Last Great Places site. While the Conservancy and others have had tremendous success in protecting land-based resources on the lower Roanoke River (see above: from zero acres protected to over 28,000 in about ten years), a much broader conservation effort is required if all of the natural resources of the basin are to be protected.

The Conservancy can serve as the catalyst for scientific analysis of the ecological processes which sustain and regenerate the Roanoke's biological communities.

The bioserve planning process enumerates the threats to the ecosystem and develops a set of goals and strategies designed to restore and perpetuate the ecosystem processes which sustain the biological resources along the floodplain. The plan also outlines a scientific agenda that proposes the development of an ecosystem model in order to better understand the interplay of ecological processes and patterns along the lower Roanoke. It is hoped that this scientific approach to conservation will provide an important institutional example for interagency cooperation and problem solving that seeks to find workable solutions to environmental problems and avoids the "train wreck" scenario.

### **Phase 3 -- Stewardship**

The lower Roanoke River from the Kerr Reservoir to the mouth at Albemarle Sound is a complex mosaic of riverine, palustrine, and terrestrial natural communities. This diversity of natural communities is the expression of a complex interplay of edaphic, abiotic and biotic factors and processes. In order to gain a better understanding of how these processes and patterns are interrelated on the Roanoke, TNC is developing a set of linked quantitative models representing reservoir operations, floodplain hydrology, geomorphology, and community ecology. The intention is to use these models to direct our conservation agenda on the Roanoke. These models will provide tools for preserve selection design, for setting monitoring and research priorities, for negotiating a reservoir operations strategy with the U.S. Army Corps of Engineers, and for long-term management of the lower Roanoke.

### **Partnerships -- the future**

The Nature Conservancy will continue to work with our partners, the U.S. Fish and Wildlife Service and

the N.C. Wildlife Resources Commission, to protect key floodplain and riverine natural communities by acquiring priority tracts; and, to continue the partnership of joint conservation management of these lands.

The Nature Conservancy intends to design and implement a river management plan to restore and perpetuate the ecosystem processes which sustain the floodplain and riverine natural communities. This will involve forging a new relationship with the U.S. Army Corps of Engineers, managers of a key upstream reservoir, that will lead to the development of a cooperative river management plan for the Roanoke which addresses the needs of the many riparian landowners, ranging from state and federal conservation agencies to lumber mills and bottomland farmers. This management plan must be sensitive to potential impacts to the region's economy while at the same time not compromising the essential biological requirements needed to restore and maintain a healthy environment. If successful, the plan could provide the foundation for long-term ecosystem protection for not only the Roanoke River, but also for other similar southeastern bottomland hardwood ecosystems.

The Nature Conservancy will continue to forge partnerships with a variety of interested parties in order to succeed in long-term protection of the river and its resources. This effort will require considerable public and private funding for acquisition, management, scientific research, and analysis. Broad public support will be essential.

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## CONSERVATION PARTNERSHIIPS HOW TO GET TO A WIN - WIN!

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### Abstract

Successful partnerships don't just happen, they require planning, hard work and individuals committed to making it happen. Finding common ground is a key challenge for any partnership. The welfare of the resource - plant, animal or ecosystem - is usually a theme that groups can rally around. Partnerships are successful or fail for a number of reasons. This paper discusses those reasons and ways to structure partnerships to assure that they become a win - win proposition. Five successful partnerships are also discussed.

### Introduction

Webster's dictionary defines partnership as "a relationship resembling a legal partnership and usually involving close cooperation between parties having specified and joint rights and responsibilities." "Partnership" has become a buzz word of the nineties. Countries, states, municipalities, government agencies, conservation groups, and private industries are all forming partnerships. Government agencies are partnering with each other, with conservation groups, and with industry. Conservation groups and private industry are beginning to realize the synergy created by healthy partnerships. The whole partnership idea, especially conservation partnerships, is gaining momentum.

Partnerships have been around a long time. During the last three decades, partnerships have focused on different things. The 1970s were characterized by personal partnerships as the baby boomers came of age. The 1980s saw an explosion of business partnerships - some friendly, others not so friendly. Now the 1990s find us forming partnerships to make the world a better place to live.

R. S. Whaley (1993), in his article "Working Partnerships: Elements for Success", gives three reasons why collaborative arrangements (partnerships) in the renewable resources field are more important today than in the past.

First, are the conflicting social goals created by the strain between economic growth and environmental health. While these two goals seem to conflict, they are not mutually exclusive. It is very difficult to have environmental quality without economic stability. Continued pressure on the world's natural resource base will increase this strain.

Mr. Whaley's second trend centers around the increasing democratization of decisions. Citizens are organizing themselves into activist groups, and getting their voices heard. Oftentimes these views do not agree with us or our employers.

The third trend focuses on information. We are drowning in information. Information is easily transportable, it's sharable, it's difficult to keep secret, and it's expandable.

Mr. Whaley makes the argument that "the latter two trends - the empowerment of citizens in the policy process and the ubiquity of information - cry out for coalitions and partnerships not just for political reasons but so that the professional community can most effectively bring its particular expertise to decisions."

### Partnership benefits

*Unique resource protection.* Managing and protecting unique resources is usually the landowner's responsibility. Landowners normally have neither the expertise nor the revenue to protect their unique resources. Protection could be as

simple as protecting a small waterfall from degradation or as complicated as managing a fire sub-climax community dependent on periodic burning. Partnering with the right organization helps assure that the necessary practices are implemented.

*Third party validation.* The forest industry's management practices are often criticized. Some criticism is justified, most is not. Forming partnerships with the "other side," getting their input into management strategies, allows them to become more familiar with what's going on and more importantly, feel they have a stake in the outcome. This can turn critics into supporters.

*Public relations.* Publicity generated by successful partnerships is definitely a plus. Leveraging the positive publicity generated by strong partnerships is a way to capture economic value from these efforts.

### **Partnership risks**

*Requires getting along with our adversaries.* This might be a scary thought, but usually, once you start working with a group, you find more common ground than you thought possible. The fact you might be perceived as being to the left of center on an issue and actually trying to get along with these people is a perceived risk by some. We would not want to be perceived as breaking away from the flock - would we?

*Outside review of management practices.* External review of long-held management strategies is risky. What if the strategies are found to be no longer valid or are in direct conflict with certain environmental goals? The struggle associated with changing entrenched practices can sometimes shake a corporation to its core.

*Legal questions.* When entering long-term partnerships, whether for business or conservation goals, legal details must be addressed. Partner liabilities create concern. A cancellation clause of

some type is usually necessary. Anti-trust concerns arise when entering a partnership with a competitor. Anti-trust questions can make partnerships extremely difficult if it becomes necessary to discuss long-range management strategies.

*Public relations.* Just as PR can be a benefit, it has associated risks. PR campaigns centered around ill-conceived projects with no real substance usually expose the project for what it is - something developed just for publicity with no real benefits for the resource. This type publicity is very difficult to overcome.

### **Ingredients for a successful partnership**

*Focused.* Successful partnerships must be focused. Mission, goals, and objectives must be clearly understood by all involved parties. Unfocused projects quickly become too broad, partners lose interest, and the efforts die a slow, miserable death.

*Designed to do what's right.* Partnerships focusing on natural resource issues require that the resource, and ultimately society, benefit. Understanding this makes it much easier for partners with diverse backgrounds to focus on the issue, and to do what's right for the resource. Partnerships that only take on the appearance of doing what's right and never deliver real results are sure to fail.

*Committed partners.* All the players in a partnership must be committed to success. Partners have to be willing to work, and work hard, to reach a win/win scenario.

*Trust.* Trust between partners is a key element of any successful partnership. Trust does not happen overnight. It must be built, much the same way grapes ferment into a fine wine. Trust cannot be built if all the partners show up with "hidden agendas." Each needs to know what the other is bringing to the table.

*Project champion.* The most critical ingredient in any successful partnership is the project champion.

This person needs to be committed to doing whatever it takes to make the process work. This must be an individual and not the organization he or she works for. This person must have organizational skills, be able to keep the process moving, work to reach consensus, and produce a product that meets expectations.

### **Why partnerships fail**

Partnerships fail because they don't include any of the successful ingredients just mentioned. But, there are other reasons.

*Too many partners.* Efforts to include all affected groups can result in alliances becoming too large to be effective. By trying to reach a win for everyone, you are driven to the lowest common denominator and often lose any real substance the project may have had. The delicate balance between including the right partners and getting the group too large is critical to a partnership's success.

*Fear of the unknown.* Many potential partnerships fail because the partners fear they will discover something that they cannot live with. This might be valid in a few cases. It is usually paranoia that disappears once the process begins and commonalities among the different parties begin to surface. Successful partnerships take time - time to build trust and to remove that fear of the unknown.

### **Successful partnerships**

Partnerships come in many different shapes and styles. Following is a discussion of five partnerships, each for a different reason, but all having the essential elements for a successful alliance.

- *Addressing a single issue.*

The Black Bear Conservation Committee (BBCC) demonstrates how effective an alliance of many different partners can be when it focuses on a

specific problem: the restoration of the Louisiana Black Bear. The BBCC represents a broad-based effort by landowners and representatives from state and federal agencies, private conservation groups, forest industry, agricultural organizations, and the academic community to work together for management and recovery of a wildlife species. The proposal by the U.S. Fish and Wildlife Service to list the Louisiana Black Bear as threatened under the Endangered Species Act brought to the forefront the need to actively address management and recovery of the bear. However, formation of the BBCC is a positive action to benefit the resource, rather than a reaction to this proposal.

Jimmy Bullock, BBCC chairman, described the committee's success very well when he said "...all that has been accomplished thus far has been the result of a group effort, a group in which individual agendas and egos have been set aside, and the focus directed toward the benefit of the resource."

- *Learning more about a sensitive ecosystem.*

International Paper and the National Biological Survey recently announced a partnership to learn more about a sensitive ecosystem, the pitcher plant bogs of southern Alabama. Specifically, two rare plants and a rare bird will be studied on International Paper timberlands in Baldwin County, Alabama. Both the plants and the bird are candidates for the Endangered Species lists, but are not yet listed. The hope of this partnership is that more scientific information about these species will result in better conservation practices that will increase their numbers and keep them from endangered species status.

- *Benefitting from a group's expertise.*

Ducks Unlimited (DU), a nationally known conservation group whose primary goal is to increase North American waterfowl populations, has formed numerous partnerships with many different organizations, both federal and private. DU personnel have extensive knowledge of waterfowl habitat and management. What they do not have is

extensive landholdings. Forest industry companies own millions of acres but generally have limited expertise with waterfowl management.

A partnership between these two groups allows DU to leverage its expertise to achieve their goals, while the landowners benefit from the increased recreational opportunities afforded by increased waterfowl populations. A win/win for both groups.

- *Validating management activities.*

The National Wild Turkey Federation (NWTF) and a dozen forest industry companies have formed a unique partnership that will benefit wild turkeys and their habitats on about 40 million acres of industrial forestlands across the United States. Through a series of memorandums of understanding, the companies have agreed to include certain management strategies into their land management objectives. These strategies are designed to integrate forest management with maintenance and improvement of wild turkey habitat.

The NWTF has endorsed industrial forest management as a viable option to produce wild turkey habitat. The NWTF also has valuable expertise within its organization to assist in designing these strategies, much the way DU does for waterfowl. This partnership represents a synergistic relationship between two organizations, who at one time thought their differences were too great to work together. However, once the efforts were under way, significant common ground existed that resulted in an alliance that will have long-term benefits for a prized gamebird - the wild turkey.

- *Pooling resources to benefit a unique natural resource.*

The Copenhagen Hill Environmental Preserve became a reality in 1991 when The Nature Conservancy and International Paper signed a cooperative agreement to protect 440 acres owned by International Paper in the Copenhagen Hills near the town of Columbia, La. This site contains 16

rare plants and the only cedar woodland in Louisiana.

The Nature Conservancy originally approached International Paper with a request to donate or sell the land to them. The site had been designated the top candidate for protection in Louisiana by the Louisiana Natural Heritage Program. Because of its location, surrounded on all sides by company land, it was not feasible for International Paper to donate or sell the property. After lengthy discussions with TNC, it was determined that the best way to protect the site was through a cooperative agreement.

The Nature Conservancy will conduct biological research to protect and enhance the habitat and assist with management of this unique area. International Paper has agreed not to disturb the area and to prevent damage from free-ranging livestock. The company will also provide labor and equipment to carry out management activities.

The true winner in this project is the Copenhagen Hills Environmental Preserve. This unique ecological area has been protected through the collaborative efforts of two partners committed to doing what's right for the resource.

## Summary

Demand for natural resources will continue to increase and come from more user groups. Not only will more people have a stake in what happens but they will also exert tremendous influence on how natural resources are managed. We can no longer just "take our marbles and go home!"

Who has the biggest stake in these debates? Some would argue that the landowner will have to sacrifice most. Their management strategies would have to be altered to accommodate the needed environmental provisions. They might not be able to meet all their economic objectives.

What stake do environmental organizations have when they enter into a strong partnership? Many of

these groups survive on conflict and controversy. James Watt's tenure as Interior Secretary and the Exxon Valdease oil spill generated tremendous revenues for certain environmental groups. Some of the more radical groups view compromise as defeat.

So who loses? Hopefully, no one. Successful partnerships must not have losers, only winners. Get yourself a project champion, check your agendas and egos at the door, be willing to work hard, and a successful partnership will result. The true winners of any successful environmental partnership are the natural resources that we all work so hard to maintain. Keeping this focus enables all the partners to work for the ultimate goal - a win/win for everyone.

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## Policy Tools to Influence the Management of The Forest Resource of the Eastern United States

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### Abstract

Many policy tools currently are being used and others can be brought to bear to influence the direction of forest management in the Eastern United States. Most of the forest resource in the East is not directly controlled by government but owned by private individuals and corporations. When governments adopt policies changes which apply broadly to all forested lands (such as the Endangered Species Act, wetland-protection regulations and cancellation of the registration of forest pest control chemicals) they affect not just how the forest resource itself will be managed (as on National Forests) but also the freedom of private property owners to manage as they wish and the value of their property. Changing policy (e.g., restricting imports) or restricting the availability of timber (e.g., wilderness classification, designation of endangered species critical habitat) does not reduce the demand for forest products but moves the environmental impact to another region or country. Landscape-level ecosystem management may be a means of assigning private forests the lead role in the East in producing fiber while the public forests take the lead in providing amenities.

Tools are aids for performing work. Foresters' tools typically include calipers, diameter tape, Biltmore stick, Abney level, increment borer, planting bar, grub hoe, axe, saw, wedge, and peavey.

Forest resource policy-makers' tools are quite different. Forestry schools in the past typically have not devoted much time to teaching forestry students how to use them, but they--not the yield tables in the Forestry Handbook--often determine how much wood will be harvested from a particular tract in the United States.

### Policy-making tools in general

Policy-makers' tools include:

- Statutory law, or legislation. It's the end product of election campaigns, lobbying by interest groups, and Congressional or state general assembly debate.
- Administrative law, mainly rules and regulations. It is produced by public agency career employees, usually through a public involvement process.
- Case law, or court opinions. Written by judges, it is the result of lawsuits--litigation initiated by plaintiffs who may be individuals or may be interest groups representing a class of individuals.
- Public relations. "PR" includes both broad public education and sharp-focused media campaigns designed to influence public opinion. Public opinion helps determine who is elected to legislative bodies, which laws are passed, the policy "spin" in new regulations, who is appointed to the bench, and therefore how court decisions come out.

### Statutory law

Statutory laws authorize program and appropriate funds. Government programs require both an authorizing statute and appropriated funds to be viable.

Three well-known examples of forest resource policy-making statutes are the Wilderness Act of 1964, the National Environmental Policy Act of 1970, and the National Forest Management Act of

1976. These are seen by their advocates as tools to protect the beauty, diversity and productivity of the forest environment. They set aside undeveloped "old growth" forest areas, require environmental impact assessments before timber sales or other development proceeds, and require the preparation of national forest land use plans that conserve biological diversity. Opponents have described them as authorizing counterproductive lock-ups of productive land and as "paralysis by analysis", but the majority of the members of Congress, representing the will of the American people, voted for them, and they are the law of the land.

Money to put such policy tools to work on the ground is doled out annually in separate legislation called appropriations bills. Appropriations bills are written by House and Senate appropriations subcommittees, including the Subcommittees on Interior and Related Agencies which decide how much money the USDA Forest Service and all Department of the Interior agencies will receive each fiscal year.

Authors of appropriation bills begin with the President's Budget, which is prepared by the Office of Management and Budget (OMB) based on agency requests and the President's priorities. But the final result--the Act of Congress--often differs markedly from the agency's or President's request because interest or pressure groups cause appropriations committee members to make changes. Additions to the President's Budget are called "Congressional add-ons". For many years the Forest Service's State and Private Forestry budget has been the result of a Congressional add-on; the OMB, year in and year out, eliminates the Forest Service's State and Private Forestry budget request and Congress restores it.

Authorized programs can be killed through "defunding"--denying them any money. Appropriations committees often go beyond the simple financing of agencies to provide specific program-management (policy) direction in their money bills. As a result, agencies may receive conflicting policy direction, from differing instructions from their authorizing

committees, from their appropriations committees, and from the White House.

Anyone who would like to change forest resource policy--not just government agency legislative affairs specialists and the big private industrial trade and environmental-protection associations' lobbyists, but any citizen with the ear of his or her congressperson--can easily obtain access to the rough and tumble U. S. federal legislative process. Any citizen with an idea for a new law--anyone in this room, for example--can have his or her idea converted to draft legislation. Members of Congress, with the assistance of the Congressional Research Service, can convert any concept into a bill and introduce it. It is referred to a committee, which may or may not choose to hold hearings on it and move it along. New forestry legislation constantly is being drafted and peddled on Capitol Hill, to put new forest policy tools into the hands of forest resource managers . . . and lawyers.

To show you how easy it can be to change forest policy, here's an example from the time 20 years ago when I was on the resource development faculty of Michigan State University. To fulfill a legislative drafting class requirement, a law student at the University of Michigan drafted a state wilderness bill. He sent a copy to the member of the Michigan House of Representatives from his district just "for his information." That legislator liked the student's bill so much that, although no one had asked him to do so, he put it in the hopper for formal introduction. It was printed and assigned to a committee for hearings. Only after hearings were scheduled did the Sierra Club and the Natural Areas Council learn of its existence. They were so upset that they hadn't been asked for input during the bill's drafting that they almost killed it. I was asked by the sponsor to smooth ruffled feathers and organize support. The bill was passed promptly and is the basis of the State's popular wilderness and natural areas system. Like the federal system, Michigan's wildernesses and natural areas are set-asides within existing state parks and forests.

Statutory law--found, at the federal level, in the U.S. Code--is as dynamic and ever-changing as a natural forest. In place of logging, fire, insects and windstorm, the agents of change on Capitol Hill include media attention, grassroots letter-writing blitzes, re-election campaign contributions, and direct lobbying by interest groups. Intense pressure on individual legislators--in effect, the threat to defeat them in the next election if they don't cooperate--results in the constant passage of legislative amendments. Each legislative session produces new laws requiring new regulations and creating new "causes of action" for lawyers to litigate.

### **Administrative law**

Rules and regulations are written and adopted by government agencies to tell the world how they--responding to the philosophy of the political party in power -- interpret the often-purposely-vague language of an authorizing statute. The same statute may be interpreted differently by different Administrations. The Carter Administration interpreted all the constraints of the Endangered Species Act as applying to the actions of U.S. government employees and the use of U.S. funds in other countries, as well as within the U.S. The Reagan and Bush Administrations did not.

Skillful forest resource policy-makers find ways to influence the content of the agency's draft and final regulations. Federal regulations are advertised as being under consideration in the Federal Register and published in final form in the Code of Federal Regulations. The Environmental Protection Agency's pesticide-registration decisions--such as its decision to prohibit the use of the herbicide 2,4,5-T to kill broad-leaved brush in reforestation projects--and the Army Corps of Engineers' Clean Water Act-based regulations defining wetlands are examples of administrative law-making.

The Forest Service's original national forest planning regulations, adopted under my supervision during the Carter Administration to interpret the

complexities of the National Forest Management Act (NFMA), were drafted by an apolitical Committee of Scientists and fine-tuned in response to constructive criticism from all sides. The NFMA regs were critically reviewed during the Bush Administration's regulation-reduction campaign led by Vice President Quayle but survived relatively intact because of the broad consensus achieved on their contents the first time around.

An inclusive definition of administrative law also includes:

- decisions on program staffing levels (some programs have died from lack of interest within the agencies to which they were assigned);
- micromanagement of field offices (see the Forest Service Manual and all agencies' environmental impact statement-preparation guidelines for examples of programmed decision making); and
- administrative-appeal decisions made by agency higher-ups. Appeals are the administrative remedy judges say must be exhausted prior to suing the Forest Service in federal court. The chief of the Forest Service can reverse a forest supervisor's or regional forester's decision through the appeal process.

### **Case law**

Case law is the collective body of published court opinions--the essays judges write to conclude trial, appellate and supreme court-level lawsuits. They determine the outcome of the case at hand and influence outcomes of future similar cases in the same and other jurisdictions.

A key case law ruling was the Scenic Hudson decision made in 1965 by the Second Circuit Court of Appeals in which the court held "that the public interest in environmental resources . . . is a legally protected interest affording these plaintiffs . . . standing to obtain judicial review of agency action".

This and subsequent case law such as the Supreme Court's 1972 ruling in Sierra Club v. Morton--the Mineral King ski resort case--have opened the court system's doors to private environmental group plaintiffs and have put the litigation policy tool in their eager hands.

## **Public relations**

All forest products corporations would like to be known as "tree-growing people" and qualify for "green" certification. Good public relations, important to a government agency's funding level, also is essential to the success of an industrial trade association's legislative and administrative lobbying campaigns and to the parallel and often contrary lobbying efforts of any private environmental-protection group.

Included in every forest policy-maker's tool box is something often called "public education". Examples: Industry- and agency-subsidized teacher-training programs such as Project Learning Tree, industry support for television news-analysis shows and documentaries with politically conservative hosts, and corporate or institutional advertising. The Society of American Foresters' annual "Walk in the Woods" day--walks are led by Blue Ridge Chapter volunteers at Virginia's Explore Park, for example--brings professional foresters and the lay public together in a constructive way.

Environmental groups sponsor television action specials on "the last of" the great bears, great whales, or great forests. Every interest group uses magazines, newsletters, direct mail, telemarketing, field trips, nonviolent protests, media events and similar efforts to win the attention and support of a larger public for their policy-change agenda.

## **The "forest resource" defined**

Agreement among forest policy players on the meaning of the term "the forest resource" isn't automatic. The famous Bill Barton-Ross Whaley

debate at the 1992 national convention of the Society of American Foresters (SAF) proved this. The debate between these two recent ex-presidents of the SAF was reproduced in the January 1993 Journal of Forestry (Disley 1993). Barton objected to "the erroneous concept of managing huge acreages of forested land for myriad reasons other than for timber, [a concept which] poses many threats to the profession and to a needed, vibrant industry." Whaley noted that "society is asking for help in looking at forests as an international resource; as a filter for excess climate-influencing gases; as an indicator that things are okay with our natural world; and as a legacy that will be available for our grandchildren to enjoy." There's a bit of a difference there.

How did the Nation's first chief forester, Gifford Pinchot, describe a forest? In prose pretty close to poetry, I found. In the first chapter of his Primer of Forestry, Pinchot wrote:

"Although it is composed of trees, the forest is far more than a collection of trees standing in one place. It has a population of animals and plants peculiar to itself, a soil largely of its own making, and a climate different in many ways from that of the open country. . . . The forest is as beautiful as it is useful." (Pinchot 1900)

That's about as holistic a view as Aldo Leopold's, in Sand County Almanac--"Every farm woodland, in addition to yielding lumber, fuel, and posts, should provide its owner with a liberal education" (Leopold 1949)--or Chris Maser's, in The Redesigning Forest:

"Our dream--a sustainable forest--must be bold enough to allow change not only in the forest but also in our thinking because the land is not to be conquered but is to be nurtured. We must also understand, accept, and remember that the world is always in a state of becoming, in a state of change, so that nothing is ever 'finished.' Thus, if we try to hold things constant, like yesterday's timber values projected into tomorrow's forests, then it is like driving through life looking in the rearview mirror.

Today's decisions will design and sustain or destroy the forests of tomorrow." (Maser 1988)

### Forest resources are assets

The dictionary says resources are available capital or assets. The forest resource includes many assets. They include wildlife habitat and attractive settings for homes and for outdoor recreation, and they produce clean air and water as well as timber.

The forestry community's task is to convince voters in the political center, not committed to either the anti-all-clearcuts environmental camp or to an extreme industry position, that America can have beautiful forests and use them, too. The public relations tools I've described can be used to gain popular support for these four propositions:

1. Continued production of forest products such as paper and lumber is essential for the well-being of human society.
2. The manufacture of substitutes for wood, such as steel, aluminum and concrete, consumes far more fossil fuel, produces far more greenhouse gases, causes more mining and therefore punishes the natural environment far more than using wood.
3. Forcing commercial wood harvest offshore by increasing the acreage of domestic forestlands closed to logging worsens global environmental problems. It encourages the logging of rare tropical hardwoods and the destruction of the habitats of endangered wildlife species in other countries with weaker environmental protection law enforcement than we have.
4. Therefore, society at large, environmentalists included, should work to provide incentives that encourage an economically robust domestic forest products industry that meets sensible biodiversity-conservation and environmental-protection standards in its own enlightened self-interest.

### Global consequences of U.S. policy changes

Roger Sedjo, a senior fellow at Resources for the Future, described the "Global Consequences of U.S. Environmental Policies" in the April 1993 number of the Journal of Forestry (Sedjo 1993). Then, together with Clark Wiseman, David Brooks, and Ken Lyons, he produced an RIF Discussion Paper in February of this year entitled "Global Forest Products Trade: The Consequences of Domestic Forest Land-Use Policy" (Sedjo 1994). On the issue of relocating environmental impacts, Sedjo et al. concluded:

"In a world where wood products are heavily traded internationally, prohibiting logging in some areas will almost surely result in the relocation of the timber activities to other regions and reallocate environmental damages to other forested regions. In a global economy, logging will continue regardless of U.S. policy since logging restrictions in some regions will simply be offset by logging increases elsewhere."

On the matter of wood substitutes, Sedjo observed:

"Reduced timber availability might be expected to result in higher wood prices, both locally and globally, and therefore promote materials substitution. Although materials substitution may appear to be environmentally desirable, a careful examination of alternative materials suggests that substitution is not an unmixed blessing. Most materials are probably more environmentally destructive than wood."

Paper can be produced from substitutes for wood which are less environmentally destructive than wood. The Spring 1994 number of the Forest Voice, the periodical of the Native Forest Council, includes an article entitled "Solutions to the Global Forest Crisis" which notes:

"Long before there were chain saws, pulp mills, and dioxin-poisoned rivers, there was paper produced from hemp, straw and other common plants. Kenaf and hemp are both annually renewable and have low

water requirements. Combining hemp and straw produces chlorine-free, acid-free, and ink-free paper." (Native Forest Council 1994)

Not all wood substitutes harm the environment more than wood.

### **Exporting the environmental impact**

Sedjo predicts that expansion of the U. S. National Wilderness Preservation System and the creation of more set-asides for endangered species critical habitat in the U.S. may cause significant increases in forest harvest and associated environmental harm elsewhere, such as in the Russian Far East. I toured the Russian Far East in 1992 and can imagine the extensive damage to watersheds and to the habitats of rare species such as the Amur tiger that could be caused by the unconstrained sale to multinational conglomerate corporations of long-term logging rights there. There are no grassroots "watchdog" environmental groups, no NEPA, and no Endangered Species Act in Russia. Russia today is a struggling third world state, not a place where concern for the future of other species is likely to be given high-priority attention.

The same conditions exist in other forested countries that could serve as alternative sources of U.S. timber supplies. I agree that we should think twice before driving more forest harvest offshore by creating more U.S. wilderness and wildlife habitat set-asides. There are other ways to skin this cat, however, than through a moratorium on forest set-asides for recreational and endangered species-protection purposes in the U.S. If all the forests now set aside in the U.S. were thrown open to logging tomorrow (including 96 million acres of designated wilderness in 564 separate units), soon the very last of the old growth would be converted to redwood decks, rayon shirts, and chop sticks. After this logging blitz we'd find ourselves once again short of domestic timber supplies, but without any old growth or old growth-dependent fish and wildlife species.

### **Policy tools to reduce demand**

The focus of forest products conferences usually is on ways to increase the supply to satisfy a growing demand. But there are some ways to address the timber-supply crunch by working on the demand side of the issue. Government policy tools can be used to reduce demand for virgin wood fiber.

The main cause of the increasing demand for product is the growth of the global human population. Hal Salwasser's essay on "Ecosystem Management" in the current (August 1994) Journal of Forestry begins by noting:

"During the past 300 years the global human population has grown elevenfold, from an estimated 500 million to more than 5.5 billion. [It has] doubled in the last 40 years [during which time] industrial wood production has doubled and is now matched in volume by the use of wood for fuel."

Salwasser quotes these Worldwatch Institute projections: Between 1990 and 2010 the human population will grow by another 33 percent and forests will decline by 7 percent for a per capita decline of 30 percent (Salwasser 1994). Newsweek's August 1, 1994 number included a feature article entitled "No Room, No Rest", with a subhead reading: "Crowds and conflicts. Backpackers vs. mountain bikers. Lines, lists and limitations. All across the country, our recreational areas are being overrun with vacationers and clogged with restrictions" (Adler 1994).

Many foresters visibly blanch when told they should limit the size of their own families and support local, national and international family planning efforts. In an official policy position the Society of American Foresters "encourages efforts to place before the public scientific information on the dangers of unlimited population expansion" (SAF 1993). I am a population control activist and believe we should eliminate all government subsidies for large families and require strict enforcement of our immigration laws to protect the quality of our lives and those of our grandchildren.

The population of the U.S. is growing faster than that of any other developed country. American society and North American natural resources are showing the strain (McCarty 1994).

### **Policy tools to increase supply**

I was the assistant secretary of agriculture for natural resources in the Carter Administration. President Carter is a forest conservationist, so I had firm support in the White House for USDA programs to assist private forest landowners and mill owners. We made important strides, including passage of the Renewable Resources Extension Act to create a separate natural resources staff in the Federal Extension Service to encourage state universities to provide more technical assistance to forest landowners and mill owners and other forest products industries.

In speeches I made during that time (1977-80), I advocated adoption of a variety of forest resource policy tools to increase the timber supply. They still make good sense:

- I advocated tax reform to eliminate oppressive and "highest use" taxation of forests and provide tax credits, write-offs for reforestation, and stabilization of taxes over the lifetime of the timber crop. I applauded the Internal Revenue Service's decision allowing companies that pollute land and water in the course of operations to deduct the cost of cleanup as a business expense (Conservation Fund 1994).
- I supported forestry incentives. These included direct economic incentives to assist the small woodlot owner with site preparation, reforestation, and timber stand improvement, using Virginia's cost-share program as the model.
- I proposed providing more market information and marketing assistance for forest landowners.

And I also put the government on record in favor of actions to increase the industry's efficiency and to reduce the rate of increase in the demand for timber (Cutler 1979a). At a Conference on Resource Conservation at the Brookings Institution in January of 1979 (Cutler 1979b) I noted:

"The amount of timber available for use can be dramatically affected by improvements in processing technology for both use of wood now considered residue and for increasing efficiency in converting raw material into finished products. There is tremendous potential for getting more product from the trees now being harvested. Better designs or engineering and systems to protect wood products from decay in use can save a great deal of timber."

I laid these opportunities out again in a speech to the Timber Supply Issue and Options Conference sponsored by the Forest Products Research Society in San Francisco in October of 1979 (Cutler 1979c):

"We must deliberately seek to hold down the rise in demand for raw timber by meeting consumer demand more efficiently. We can do this by increasing the recovery of wood fiber in high-value products, by improving the efficiency in using wood products for construction and other purposes, and by developing wood fiber recycling systems to reduce our reliance on new wood fiber."

"We have the technology to do these things," I concluded. Today, 15 years later, as the result of more public- and private-sector research and development, we have an even better chance to achieve such desirable wood-conservation objectives.

### **A tool to save biodiversity, not reduce timber supply**

I'm always looking for policy tools to protect wild ecosystems that don't threaten the economies of nearby human communities. I described a way to do this in a February 1993 Journal of Forestry article

entitled "A Land Exchange Program to Protect Biodiversity" (Cutler 1993). Here's my proposal:

Use the National Wilderness Preservation System to protect native biological communities that require insulation from man's activities afforded by wilderness-classification to survive. This can be done with minimum impact on the economy through the following no-net-gain-of-public-land approach. Each addition to the Wilderness System justified for biodiversity-conservation purposes would be matched by the deletion of land from the public domain of comparable market value containing plant and animal species well protected elsewhere. The result: a more ecologically diverse public domain of the same size with former public lands of commercial interest traded to industry in exchange for unusual habitats.

If this idea were implemented, both those interested in biodiversity conservation and those interested in jobs derived from the commercial use of natural resources would win. The overall tax base would not be affected. An example of how this idea can work is given in a sidebar article in the February 1993 *Journal of Forestry*: In 1990, the U.S. Bureau of Land Management traded a potato farmer 4,000 acres of good farmland it owned near Glens Ferry, Idaho for the farmer's 3,800 acres of prime sharp-tailed grouse habitat--clearly a win-win outcome that could be replicated many times over.

### **A tool to coordinate plans of forest neighbors**

I would like to encourage neighboring forest landowners to share their forest resource management objectives and, by pooling that information, create multi-million-acre de facto forest plans for the forested regions which surround Eastern cities. The land use mosaic created simply by mapping and aggregating landowners' current, varying objectives might very well show that almost every needed use is in fact being provided. It could document the fact that society has a shot at receiving almost every kind of forest-based service it wants

under the present land ownership pattern, with a little fine-tuning.

Public land managers with long planning horizons can be expected (or can be encouraged) to provide "core reserves" containing wilderness, rare species, trout streams and long-rotation hardwoods (Morton 1994). Some private owners will want to manage their stands intensively to produce the softwood needed for lumber and paper, while acknowledging their responsibility to protect roadside aesthetics and streamside zones. Others will want to manage for high populations of fish and game for their own families' recreational enjoyment or as a source of income through leasing the access to their lands to sportsmen.

When a private owner discovers his lands contain unique public values, such as endangered species habitat and spectacular scenery easily seen from the highway, the public can step in and reimburse the private landowner to keep him financially whole. Land exchanges can be arranged. Private land trusts can offer economic incentives including development easements with tax benefits. Cost-sharing programs can be used. Society at large should reimburse the private landowner for any major loss of freedom to derive income from his land associated with protecting a unique public value.

If forest planning in the East were to take place at the city-centered region level, with full participation of the private sector and local governments as well as the administrators of national and state forests, and with full coverage by the news media, the public might come to recognize and applaud the essential role of private forest landowners and industries. With increased public awareness and appreciation of the role private forests play in the local economy, private forest managers might come to be regarded as local heroes for providing jobs, the way Norfolk Southern and General Electric are regarded in the Roanoke Valley.

## Specific forest resource policy recommendations

The ideas just expressed are in synch with those recommended in a book published in March of this year by the World Resources Institute called Breaking the Logjam: Obstacles to Forest Policy Reform in Indonesia and the United States. Written by Charles Barber, Nels Johnson, and Emmy Hafild, it offers an extremely useful list of forest resource policy-tool ideas (Barber 1994). I will conclude my presentation by summarizing the suggestions of Barber, *et al.* They represent enough grist for our policy-tool-making mill to keep us all busy in Washington, in our state capitals, and in our home communities for years. Barber's recommendations:

"In the United States, overcoming structural problems in forest policy-making will require the following steps: Develop a new alliance of all who stand to benefit from forest policy reform. Improve participation in forest planning and policy development so the public gets more involved in defining what Americans want from their forests. Give scientists and professional natural resource managers more say in determining what resource-use levels are sustainable. Initiate pilot efforts to manage forests regionally, integrating the needs of deferent sectors and landowners.

"A transition to more sustainable forest economics will require the following steps: Use natural resource accounting methods to determine the true status of the resource base, the trends affecting it, and the full values of alternative uses. Eliminate below-cost timber sales and other policies that invite waste or subsidize special interests at the expense of the public. Invest the savings from the elimination of public subsidies to private timber interests in the restoration of degraded forest lands and the economic diversification of communities that have grown dependent on federal timber resources. Replace federal programs for sharing revenues from timber sales with fair and consistent compensation to counties that have tax-exempt federal forest lands in their jurisdiction. Encourage the development of markets for sustainably priced forest products,

including timber, recreation, wildlife and fisheries, watershed protection, and such other non-timber resources as biodiversity. Establish incentives to encourage private investment in sustainable timber management on commercial timber lands and small tract of non-commercial lands.

"Steps to improve the balance between rights to use forest resources and responsibilities to maintain them include: Strictly enforce existing responsibilities to maintain forest resources on public and private lands. Identify the forest areas most important for biodiversity and other non-timber 'forest values' and protect the areas where logging and non-timber values are found to be incompatible. Develop forest ecosystem management plans that anticipate conflicts between commodity-extraction and the conservation of endangered species and other non-commodity values.

"Possible actions should be developed by task forces composed of individuals representing diverse interests with a stake in area forests. This should include representatives of government agencies (local, state, and federal), private landowners and businesses with a stake in the area's forest resources as well as representatives of local communities, non-governmental organizations, and interested members of the public. Such task forces might call for voluntary actions by private and public interests, or for policy changes accomplished through tax and fiscal incentives, reform of existing laws and institutions, or new regulations."

I haven't given you any policy-change panaceas. We can agree that many of the answers to our forest resource management difficulties will be found, not in Washington, D.C., but in regional and local resource management forums.

One barrier hard to overcome may be the traditional reluctance of the private sector to play the forest planning game in public view. I can only offer you all my conclusion, from 40 years' experience with the media, that the more the public understands your business, the more they will support it. The news

media and the general public are potentially strongly supportive of people who work hard for a living and provide jobs and needed products for society.

As President Clinton is discovering, this is an age of skepticism regarding the efficacy of big government and a time when private enterprise is being given the benefit of the doubt. Take advantage of that window of opportunity! Go public with your goals and your plans. As long as you're not harming the environment, you may be surprised at the support you'll generate and possibly at the incentives the public will be willing to provide to make your forest resource management efforts more profitable.

Thank you.

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## A Successful Failure: The Old Modern Conference (Conference Summary Part I)

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### Abstract

A reaction to the total conference, this paper suggests the conference is no longer an appropriate format for discussing very complex, multi-factor problems with strong value dimensions. The grounds for frustration with the conference are not with its conduct but with its topics, a growing urban class, new attitudes and demands. Fourteen suggestions are made for what an awakening and to what future "discussions" may mean. Many of the difficulties presented during the conference have been repeated at least for 40 years. Perhaps there are alternatives.

### Introduction

You have heard what was said. Ms. Manning will help analyze and compare these things. Let me share with you a reaction, not a summary, and what I believe is an important result of this conference. It is a singular perception, a whole brand new concept that I did not have when I walked into the hotel. It is my perception that we have witnessed an extraordinary event. We have been a part of it and viewing it at the same time. A hundred men and women in "tight times" decided consciously and deliberately to come together to discuss "environmental issues affecting forestry and forest products industries in the Eastern U.S." We have met for 2.5 days ... and "discuss" we did! But now we feel frustrated. In the most modern of settings with the most modern of equipment with assistance from extremely well-informed people, we feel ill-at-ease. We did not succeed.

- we did not see emerge a concept of more scientific observations
- we saw no new pattern of rational thinking

- we heard about magic, emotion and relations to "the whole", not just parts
- we praised forestry as practiced well and taught in superior schools for over 50 years
- we have no new concept or definition of an "environmentally sound forestry operation"
- we have no new plan for recognition of superior practices
- a new research cooperative has not emerged
- I noticed no new incentives proposals to counteract disincentives

I suggest the need for an awakening. I am not at all sure I know the consequences of my observation. I struggle toward the light and I request your help. I do not make this observation to be evil, or impolite, or just to create editorial attraction. It is a call to awareness; a call to seek new strategies for achieving the important objectives stated for us all by the steering committee and Dr. Dolan. It is an expression of a need to awake together. Our conference itself is educational. Old conferences were good; appropriate for their day. They no longer work for the modern problems (Suwyn) with which we all grapple.

I am like the mule hit with a 2x4. (Perhaps it was laminated.) This conference finally got my undivided attention. I have known there were changes but the reality has finally engulfed me:

- we cannot agree on anything in the university; within the society; between societies; between the public, bureaucrats, environmentalists, or industrialists -- except in the most general and vague concepts.
- we have very diverse education; many people do not graduate from high school.
- there is diverse commitment to and skepticism about our political system .
- there is extreme difference in socio-economic groups; abject poverty to striking richness.

- strange patterns of knowledge among the public about nature, forests, and animals gained from piecemeal TV.
- irreconcilable differences in public as well as corporate policy and actions.

The points: we are frustrated. Frustration is reasonable. Things have changed. Old solutions, once excellent, no longer work. We have been engaged in a good old process, the conference, one that no longer works. We have to find another way in the future to express what we mean when we say we have a desire "to discuss issues." We does that really mean? The conferences for discussing complex issues is now, I believe, passee.

I am making this observation in parallel with another one about U.S. citizens. We have heard it several times. There are mostly city folks out there; 70%. In Texas, 8 out of 10 university enrollees come from 5 major cities. No one in our voting, Congress-calling, letter-writing, injunction-filing, sign-carrying, marching public has ever seen a chicken killed, chopped wood, gotten a jeep stuck, or tied down things in a night storm. The point: things have changed; people have changed. They just don't understand (and its not our fault.) We assume they know too much. Dr. Les Pengelly of Montana State University used to say of the public: never underestimate their intelligence; always underestimate their information (1964).

We have together witnessed a phenomenon of our times, a step-function change: Old tried and proven solutions, the conference itself as an example, do not work in the new situation. We have a brand new social, international, physical, biological, even religious situation. You certainly see the new situation as well or better than I do:

- phone calls are not to people
- phone calls are not returned
- complaints are net with counter complaints or shared sympathy
- a public meeting to educate is often an embittering event

- publications on any research topic now exceed our ability to read the abstracts
- publication lists, are too long to scan for relevance
- software is now excessive, taking more time to learn it than the time it will save once learned.
- the USFS is said to be "broke" (Thomas)
- the Berlin wall is down; our Enemy is divided
- wars break out like lighting fires in a dry forest

We are all like slow readers who can master speed reading but cannot afford the time off to go to the class. To emphasize my point: We are in a brand new situation.

My wife thinks I'll never kill myself. She claims I'll never finish the suicide note. My list of environmental concerns and factors is very long. I cannot explain anything about the complex environment in a "paragraph or two." To be brief about something as large, complex, and complicated as the environment with its combinations and permutations is to be wrong. To act as if we could be brief is to be silly: to show that we do not know what we do not know. The public sees through silliness and arrogance. The dimensions of any environmental situation are so great that the average, well-educated forestry graduate cannot possibly discuss it well. That person cannot even list all of the relevant factors.

I hasten to add that I have met many below-standard graduates of our forestry and wildlife schools and as a taxpayer I am incensed by them and as a professor I am embarrassed. The university has gotten by without scathing comment in this conference. It is now rare for us to be treated so kindly. We admit, as others around us, to some real problems. There is guilt enough on all sides to share. Grade inflation has occurred; curricula have diversified; and (I speak from experience) synthetic courses are presented to advanced students who have little in their heads to synthesize. We do not do comprehensive wildland management half as well as we know how.

It may be that the "old ways" of doing business will not work and that nothing else will either. Other civilizations have destroyed themselves. This is an un-American thought and more pessimistic than I usually allow but I think the evidence is squarely on the side of rational hopelessness. I struggle on with a little hope. I do wish you will ponder with me alternatives. We can "fix it", achieve objectives outlined by Dolan at the start of the conference, but the work ahead is enormous, available, but far from operational. The conference, based on my one-person observation, failed. We had a wonderful conference that through no fault of its planning or conduct or facility, failed. It did so because the problem was insurmountable. We have asked too much of it. Perhaps we have asked too much from our current way of doing business. The problems, however, are real and there are possibilities for skillful, strategic action that can turn things around. No one will be sufficient; the list here is suggestive of the types of work I think are needed. (You have heard supportive comments during the conference.)

I do not know the full meaning of the needed awareness that I perceive, but it probably includes actions such as:

1. Talk "total systems". Perfect knowledge about 2 parts of a 10-point problem with no knowledge of 8 parts will usually result in decision failure. Reasonable effort on all parts is needed.
  2. Build and use large computer simulations. Let a particularly obnoxious person with a proposal enter that idea and see what will be an index to all of the consequences -- to him or her and others.
  3. Deny the equality of every opinion. One-person; one-vote is silly. Jefferson himself insisted on education as fundamental for democracy. I love Thomas' work but his emphasis on the hump in the curve is probably wrong. Castro was in the tail of the curve and look at Cuba. You cannot talk center-of-the-
- population and also leadership. A leader is in the tail of the curve about which Thomas spoke.
4. Work for the new modular manager -- a person (1) better educated in a specialty (2) with a connector or linking thought patten, and with (3) planned, long-term education. Efforts to educate generalists have failed (there are exceptions that do not deny this observation). They are rare and cannot be produced. They emerge over time. Producing generalists is like teaching a pig to sing: It wastes your time and annoys the pig.
  5. Several speakers (Petrick, Legg) suggested the need for more information brought to each decision. Holtje argued for multi-group, inter-agency coalitions to improve management. Given the vast needs (tens of thousands of units, diversity of areas and situations, dynamics, costs, and layoffs) alternative ways (other than teams) are needed to use the knowledge now available (e.g., expert systems, models (Meil), and dynamic planning systems).
  6. Return to the oldest phrase in education: To believe the message is to believe the messenger. Mr. Ticknor made the point as he emphasized the lack of trust by society of its resource institutions. We all have to work at this national illness that creeps into society from gambling, sports frauds, political failures, and crime on the street or in the office. We are all infected by this evil pathogen.
  7. We need to do serious financial analyses. Many forester do not "like economics." Many wildlifera do not even have one course in economics or finance. When only 16% of the regional land base is in federal lands (Aplet) we must think of the other 84% as productive and not just units of "reserved productive forests", not just wood (for that may bankrupt you) but all uses together in a managed, financial, entrepreneurial unit. Only a little over half of all tree-covered land in the U.S. is classed as "timberland". Perhaps it will be wise to work

on sustained profits, not just wood produced, from all of the many (yet unexploited uses) of such tree-covered land.

8. As agencies cut back while needs increase, there will be new roles for action groups, new enterprises, and groups (Heissenbuttel) to meet these needs. There will be less need "to discuss" because these NGO's can move out of many political and regulatory loops and traps.
9. We're trying to get one phrase, "ecosystem management", to do too much work; carry too great a load. Our topics are too numerous, too mixed for it to work. We need 10-20 work groups to (as Giltman said) "carry these concepts across the city limits into urban America." We need to work with out words in a more scholarly way. We cannot plead for more science one day with its increased precision and rigor and wonder why college-educated citizens are amused by "biodiversity", "sustainability", "land ethic", and "forest health" and otherwise meaningless (or at worst confounding) words. Why should "financial analysis" be assumed to be part of "ecosystem management". Why do ecologists spend so much time deriving a precise definition for "ecosystem"? Does it really meaningless to do so? Convinced that people are a factor in primitive ecosystems (Buckner), is it therefore logical that modern vacation homes and logging camps should be included? Viewscapes? Why should the public follow us down such an ambiguous pathway? Stop the emphasis on the ecosystem. Asking scientists to do more science and arguing for a more scientific approach and then using words unscientifically and irrationally will not serve us well. Not just ecology but interactively the 4-E's -- ecology, economics, esthetics, and energetics are needed. A regional strategy (Aplet) will include these. The total system, not forest system, not natural system (Legg), not eco-system but total system is needed. We can now do it. We have new tools.
10. We need to present the limits to the human system. Often called a "scare tactic", the alternative is a positive "score" that can be followed and presented as a synthetic index to every person's question of "how are we doing?"
11. The field demonstration may work well in small local areas (Cutler) but we're talking about work over 80% of the land. And it costs energy and time to get people to demonstrations. Many do not know once they have experienced it what to do with the observations. They have only urban experience. The demonstration has to be taken by TV to the public. We're not talking about educating 2000 kids - merely 300 million children and adults in a parade passing at 3 per second (Rains).
12. We need a new "Rules of Order" (as in "Roberts Rules") for discussion and public involvement. Perhaps incorporating assistance from the courts that allow well-meaning action from trustworthy people to proceed in achieving long term social objectives.
13. We have to separate better the managed land, the owners, and the citizen's role. We badly need to segment our publics. We have many small owners; many not interested in harvests; many having acreage with trees but not ruled as timberland (20 cubic ft/acre/yr)

I was 34 yesterday and now I am 61. I've seen plenty of changes but:

in 1954 I heard the same appeals for more education. 50 years and 50 million dollars later I heard the same yesterday, and today.

in 1964 I heard the need for better understanding of the ecosystem and for cooperative efforts ("partnership") (Foreman, Lynch, McGlinchy).

in 1974 I gave 35 public lectures on the population crisis.

in 1984 I heard the appeal for baseline studies and ecological inventories.

in 1984 I heard we have 50 years of oil left.

in 1984 Odum published Systems Ecology (and concern for energy-based modeling of ecosystem wanes).

I've heard it all. The Conference repeats the past but perhaps that is necessary because we are slow learners and we still see no alternative solutions. We've got to do better; not more but new and better. For the sake of the gods, all of them, all of us, and my grandchildren and yours, don't do it all over again.

- Target your work in the decision makers -- don't do general stuff
- Strike at the sensitive points; don't wrestle fat problems.
- Lay aside classical science. Science is great but it is a process; seek knowledge by however you can get it. There is no more money, no more time. Too many species. We must be more like the medical doctor -- single patient, unique, adaptive decide today -- check and revise tomorrow. We've been led astray by the scientific paradigm after Sputnik.
- Use the power of the computer, particularly expert systems and hypermedia.
- Look for and use analogies: the life cycle of yesterday evening (Meil) is isomorphic with ecologic succession of yesterday morning (Buckner).
- Form diverse companies and when demands increase and state and federal servers decrease (as we were told by Thomas), the time may be right for the new varied organization to exploit the gold-horde of knowledge of past research.
- Learn energy budgeting - whole system energy

budgeting and lead society into the fossil-energy short world coming within the life-time of people here.

I have enjoyed being with you. I have learned. I have been stimulated. Now it is time for me - I hope all of you - to go to work, into the woods, lab, mill, and office. We can really do the really important things if we select them carefully, then do them better than in the past. No more discussion -- it is time for thought, decision, and action.

## Conference Summary Part II

**Gloria Manning**, Assistant Director for Resources, Cooperative Forest, State and Private Forestry, USDA Forest Service

### Summary

Environmental Issues Affecting the Forestry and Forest Products Industries of the Eastern United States . . ." Where should one start in summarizing a week's conference dedicated to that topic? Well can you imagine Willie Nelson in the background dressed in his normal attire singing "This Land is My Land, This Land is your Land from California to the New York Harbor . . . From the Iowa Farm to the Texas Border . . . This Land belongs to You and Me. From the highway corridors to the cottonwood flowers . . . I love this land . . . this land belongs to YOU and ME . . . There in lies the problem. This week we have heard most aspects of the issue. We have heard the passion in the voices of the speakers as they addressed their environmental concerns. We have heard the audience plea for consideration and fairness . . . It is a matter of choices . . . no-one ever said that the matter of choice was easy . . . Which choice should we make for this land that belongs to you and me? A more basic question might really be . . . does this land really belong to you and me.

One of the objectives of this conference was to provide some answers . . . including a balanced review of the methods and policies used to direct the use of the eastern forest resources over the past fifty years; direction to policy makers in government, industry, and environmental organization for future use of the resource; and strategies we as individuals should undertake to provide management for these lands.

As we develop this strategy, we are to clarify what:

- (1) an environmentally sound forestry operation really is
- (2) identify examples of good cooperation among the many entities
- (3) identify steps needed for improvement

- (4) promote multi-disciplinary research
- (5) promote multi-disciplinary approaches
- (6) provide motivation for organizations to meet and work on compromises
- (7) create more incentives for good practices rather than disincentives

If you stop and think for a moment, you could say this conference was a "success." I'd venture to guess that each one of us will leave having heard something that made us feel good about the way the forest resources were being managed and the cooperative spirit of the different groups and individuals. I'd also venture to guess that each one of us heard something that caused us to raise an eyebrow or even to think "with that attitude" we will never agree on how the resources should be managed.

We did, however, agree on the generalities . . . but the specifics? Well that's another matter. Let's access the situation: We agreed: that environmental issues are here to stay and we have to deal with them. Sustainable development is a good goal; ecosystem management is a good process by which decisions should be made; the only constant is change.

We all want an environmentally sound forestry operation . . . we agreed that there is a need to view the southeastern forest resources in a systematic way . . . ecosystem management . . . an ecological approach . . . natural systems sustainability.

Generally, we agreed that the public needs and desires should be considered; all resources should be valued and private properties rights should be respected.

A happy group right. . . now we can all go home assured that we have reached a consensus and the

forest resources in the eastern United States are managed as we all wished.

Not exactly. There are questions still needing answers. If we are to manage using an ecological approach we need a historical baseline . . . Now history WAS . . . so there is no problem in recreating what WAS . . . is there? Again, we were presented with differing viewpoints about the condition in which we inherited this land and the role of humans as they impacted this land. We saw evidence of having received lands nobody wanted and turning them into old growth ecosystems. We saw evidence of natural phenomena changing dramatically the biological make-up of an ecosystem. The question then becomes who gets to determine the management vision for that ecological unit? What role will the public needs and desires play in that vision?

Often the trust level of the public is low resulting, sometimes, from misinformation . . . sometimes from errors made by the land steward and sometimes just because of the culture of that particular public (only trusting that in which they are familiar). How do we reconcile this disagreement is an issue needing much more work.

Sustainability of the resources was a goal embraced by all. We all echoed the message that there is a need to manage these lands in a manner that will guarantee the existence of these "forest resources" for the next generation. The specifics on the management strategies that will accomplish this and the needed resource balance are, however, still open for debate.

Private property and its role in this whole question of ecosystem management is an area of wide spread concern. Much of the environmental issues are predicated upon concessions of private land owners in achieving strategic management of the forest resources. Private land owners while supporting the stewardship of the land fear the impact upon their landowner rights. Do we provide incentives to compensate landowners for benefits foregone as they provide resources for the "public benefit?" Is

it necessary to utilize regulations to protect the forest resources for the public benefit? Or a more basic question might be is the proposed strategy really for the public benefit or is there an ulterior motive by the environmentalist . . . is it really just an attempt to prevent management of the forest resources . . . or are we really endangering the future of the planet with the manner in which we manage these resources?

Does it sound as if the issues are so complex that there is no solution and the Conference was just another gathering lamenting the impact of environmental issues upon the forest industry? An astounding NO.

This week, we witnessed several examples of strides the timber industry had made in addressing environmental issues and concerns. We saw formal partnerships outlining goals and objectives needed. Included are things such as:

- (1) Maintenance of biological potential of the forest in the East to provide all values.
- (2) Maintaining forest health through natural processes and management practices.
- (3) Collaborative planning among federal, local, and private entities.
- (4) Management based on science while acknowledging emotions (spiritual values).

You have heard that we, all the people, need to be committed to the resources, have a knowledge of the resource, be flexible, and accept change . . . at least some degree of change. There was a strong message of the need to educate the masses and even a stronger message for respecting private property rights.

What can you take away from this conference and commit to helping to achieve the goals or reaching agreements in the areas of dissention?

There is a movement to draft the Farm Bill for 1995. You have indicated a need to have incentives for land-owners to help pay the extra cost of

implementing some of the needed actions. This is an opportunity.

You expressed concerns about the Endangered Species Act . . . not in its intent but its' methods ... it too is being considered for reauthorization.

The Clean Water Act is also up for rcauthorization. Another of your interest area.

You indicated you'd like to see good regulations. . . You are the tax payers, you are the voters . . . Both Federal and State agencies listen when you speak.

You stated a concern about the lack of understanding about the forest resources in the Eastern United States as the general public . . . a group of citizens in Florida started a tour allowing tourists to visit the forest and see for themselves what actually happens in a clear-cut operation and why clearcutting is necessary for the long-leaf pine ecosystem.

We have seen evidence of people with different ideologies sitting down over lunch and solving some of the worlds most pressing problems. Could you possibly pick up the phone and start with some-one in your community? Or are you going to leave this conference simply stating these problems, concerns, actions, goals and objectives? can we realize "we are in this together" and commit ourselves to action:

No-one makes a greater mistake than one who does nothing because if would only be a little or as Margaret Meade said it so eloquently "Never doubt that a small committed group can change the world." Before you leave we are asking you to make a commitment. It doesn't have to be earth shattering, it can be as simple as inviting one of the persons you have met here this week to lunch and talk over some of the areas in which you disagree . . . visiting a school and talking to a class about the importance of managing forest resources. Or it can be as time consuming as commitment to work on the reauthorization of the Endangered Species Act. . . Write this commitment on the not page in your program and sign it. Give this along with your

address to Dan Dolan. Dan will check with you to find out how you fared with your pledge. This is what it will take to accomplish the goals of this program and this is what is needed to sustain the forest resources of the Eastern United States for both the environmentalist and the forest products industry.