
PINCHOT INSTITUTE
FOR CONSERVATION

**Sustainable Forestry and
Biodiversity Conservation:
Toward a New Consensus**

V. Alaric Sample

Discussion Paper DP-12-01

December 2001

Leadership in Forest Conservation Thought, Policy and Action

PINCHOT INSTITUTE FOR CONSERVATION

About the Pinchot Institute for Conservation

Background

Recognized as a leader in forest conservation thought, policy and action, the Pinchot Institute for Conservation was dedicated in 1963 by President John F. Kennedy at Grey Towers National Historic Landmark (Milford, PA) – home of conservation leader Gifford Pinchot. The Institute is an independent nonprofit organization that works collaboratively with all Americans – from federal and state policymakers to citizens in rural communities – to strengthen forest conservation by advancing sustainable forest management, developing conservation leaders, and providing science-based solutions to emerging natural resource issues. Each year, the Pinchot Institute conducts policy research and analysis; convenes and facilitates meetings, workshops, and symposiums; produces educational publications; and provides technical assistance on issues that affect national-level conservation policies and the management of our national forests and other natural resources.

Current Programs

The Institute's objectives (policy research and analysis, convening and facilitation, and developing conservation leaders) are realized annually through the following programs:

Community-Based Forest Stewardship

Through technical assistance programs and training sessions, policymakers, federal and state land management agencies, and local practitioners work collaboratively to identify, address, and develop strategies on specific initiatives that sustain and improve the stewardship of multiple-objective ecosystems and enable them to serve as a basis for stable employment and generate income in rural communities.

Conservation Policy and Organizational Change

Though much effort of the sustainable to date has focused on policy development, the Institute's independent analysis and facilitation focuses on implementation to help develop natural resource management approaches and mechanisms that integrate often-political organizational structures and long-established administrative processes with emerging conservation-oriented ideas and policies.

Leadership & Executive Development

Effective natural resource conservation begins with effective leaders. Through leadership workshops and professional development seminars, which are based on participatory decision models offered at Grey Towers National Historic Landmark, the Institute helps beginning and mid-career professionals in public agencies, private organizations and conservation NGOs redefine the relationship between land management agencies and the communities they serve.

Sustainable Forestry and Biodiversity Conservation: Toward a New Consensus¹

V. Alaric Sample²

Summary. The multiple-use forest management model has been flexible and versatile, and has been useful in accommodating a growing array of forest uses, and evolving social values regarding forest conservation and stewardship. The need to protect biological diversity in forest ecosystems presents a difficult challenge to this model, however, due to its importance and to the fact that adequate protection of many threatened or endangered species is not compatible with even moderate levels of resource development. An effective global strategy for biodiversity conservation must consider biodiversity values in temperate forest nations relative to those in tropical and boreal ecosystems, along with the potential of temperate-forest nations to minimize the effects of their own high per-capita demand for wood fiber on the most diverse, globally-significant ecosystems. Developed temperate-forest nations have a dual conservation responsibility to (a) protect their own globally-significant biodiversity hotspots and (b) minimize externalities by more intensive utilization of productive forest areas with relatively low biodiversity values. Ultimately, the overarching concept of "sustainable forestry" must be inclusive of reserves and intensively-managed plantations, as well as forests managed at moderate intensity for a wide variety of goods, services, and values.

* * *

In his landmark book, *The Cycles of American History*, author Arthur M. Schlesinger provided the theory and rationale for why history does indeed repeat itself (Schlesinger, 1986). For the past three decades, environmental activists have largely considered forestry to be an obstacle to conservation. But for the greater part of the past century, forestry and foresters were widely regarded as being in the vanguard of conservation, leading the battle against forest abuse and overexploitation, and safeguarding the health and productivity of these resources for multiple benefits and multiple generations. Gifford Pinchot's 1910 book, *The Fight for Conservation*, made an eloquent and persuasive case for expanding forestry in the United States, and was no less passionate on behalf of forest conservation than any Sierra Club treatise of today.

We are about to enter the next new cycle in forest history in America, one in which history will in many ways repeat itself. Forestry and the environmental movement in the United States have continued to mature. Forestry seems to be on its way to once again being widely regarded not as a *problem* for conservation, but a part of the *solution*.

Multiple-use forest management has served us well in this country for more than a century, and has become the prevailing approach on private forest lands as well as public. Focusing initially on securing a sustained supply of wood, multiple-use forest management has expanded its scope to protecting watersheds, wildlife, recreation, grazing and even wilderness. However, the need to conserve biological diversity—and especially to protect habitat for threatened and endangered species—represents a fundamentally different challenge to the multiple-use model of forest management. Scientific uncertainty as to just where the limits of sustainability lie, and the degree of sensitive species'

¹ Presented at a symposium sponsored by the Pinchot Institute at Grey Towers National Historic Landmark, Milford, Pennsylvania on October 22-23, 2001.

² President, Pinchot Institute for Conservation, 1616 P Street NW, Washington, DC 20036.

resilience to recover should these limits be exceeded, have resulted in a conservative approach to biodiversity conservation. In many instances, this precautionary approach regards even a modest level of human manipulation in the ecosystem as exceeding the limits of what can be sustained. With the boundaries of sustainability thus so tightly drawn, it is difficult for forest managers to discern a new pathway by which biological diversity can be conserved within the context of actively managed forests.

Accommodating biodiversity

We are now in an era in which the downward trend in biodiversity, and the potential of forest protection to slow that decline, is seen by many as sufficient reason to cease any and all forest management activities that potentially interfere with that objective.

Many of the world's most recognized and respected biologists believe that we are now in the midst of a biodiversity crisis, with extinctions of animal and plant species taking place at a rate not seen since the dinosaurs were wiped out 65 million years ago. Harvard biologist Edward O. Wilson has estimated the current rate of species extinctions at approximately 27,000 per year, or an average of 74 each day, out of a worldwide total of perhaps 10 million species (Wilson, 1992). The normal "background" extinction rate is about one species per one million species a year (Raup and Sepkoski, 1984). More than 20,000 taxa are globally rare or threatened and as many as 60,000 face extinction by the middle of this century (IUCN, 1988). According to E.O. Wilson, "Human activity has increased extinction between 1,000 and 10,000 times over this level . . . clearly we are in the midst of one of the great extinction spasms in geological history." (Wilson, 1992:280).

The world's greatest concentration of biological diversity in forest ecosystems—and the greatest threats to conserving that diversity—is in the tropics (Raven, 1997). Because of the means by which tropical rain forests cycle their nutrients, these seemingly lush and irrepressible forests are much more vulnerable to ecological damage than most temperate-zone forests, and much slower to recover from deforestation (Wilson, 1992:274). The galloping losses of forest area in the tropics are the single greatest threat to global biodiversity, a trend which is exacerbated by population growth rates in many tropical nations that far exceed those in most temperate-zone nations. "An awful symmetry binds the rise of humanity to the fall of biodiversity: the richest nations preside over the smallest and least interesting biotas, while the poorest nations, burdened by exploding populations and little scientific knowledge, are stewards of the largest." (Wilson 1992:272).

The importance of conserving biological diversity in forest ecosystems has generated policy proposals aimed at minimizing the conversion and fragmentation of the remaining large areas of native forests, and preventing the diminishment of remaining biological diversity by development for commodity production. E.O. Wilson estimates that the 4.3 percent of world's land surface currently under legal protection should be expanded to 10 percent (Wilson 1992:337). Many eminent biologists and other scientists support a proposal to set aside 50 percent of the North American continent as "wild land" for the preservation of biological diversity (Ehrlich, 1997). The largest grassroots environmental organization in the US is actively working to ban all commercial timber harvesting on federal public lands, and signed up nearly a quarter of the members of the 106th Congress as sponsors of legislation to accomplish this (Sierra Club 1999).

Many conservation biologists today point to the need to think beyond "the reserve mentality" in designing strategies for conserving biological diversity (Brussard et al., 1992). But it is also clear that reserves will continue to be a major component of any successful biodiversity conservation strategy (Hunter and Calhoun, 1996), particularly with regard to species endemic to late-successional forest ecosystems (Spies and Franklin, 1996).

Protection and production: dual conservation responsibilities

The global nature of the biodiversity crisis points up the need for a strategy that integrates the management of temperate, tropical and boreal forests with world demand for wood. Current global industrial roundwood demand is estimated at 1.6 billion cubic meters per year, and is expected to rise to 2.5 billion cubic meters per year by 2050 (FAO, 2000). Industrialized nations account for a disproportionate share of this global demand (Figure 1). Even among the developed nations, the United States stands out as one of the world's largest consumers of wood. US per capita consumption of major wood products (lumber, plywood, and paper) is about double that of Germany, seven times that of Brazil, and 15 times that of China (FAO, 2000). The US has one of the lowest average population densities among the developed nations (e.g., Oregon has a population of less than 3 million people; Germany, with a geographic area slightly larger than that of Oregon, has a population of more than 82 million), and some of the most productive forests. In spite of this, the US continues to import more than a quarter of its wood—114 million cubic meters in 1997—from harvesting in both tropical and boreal forests (Howard, 1999).

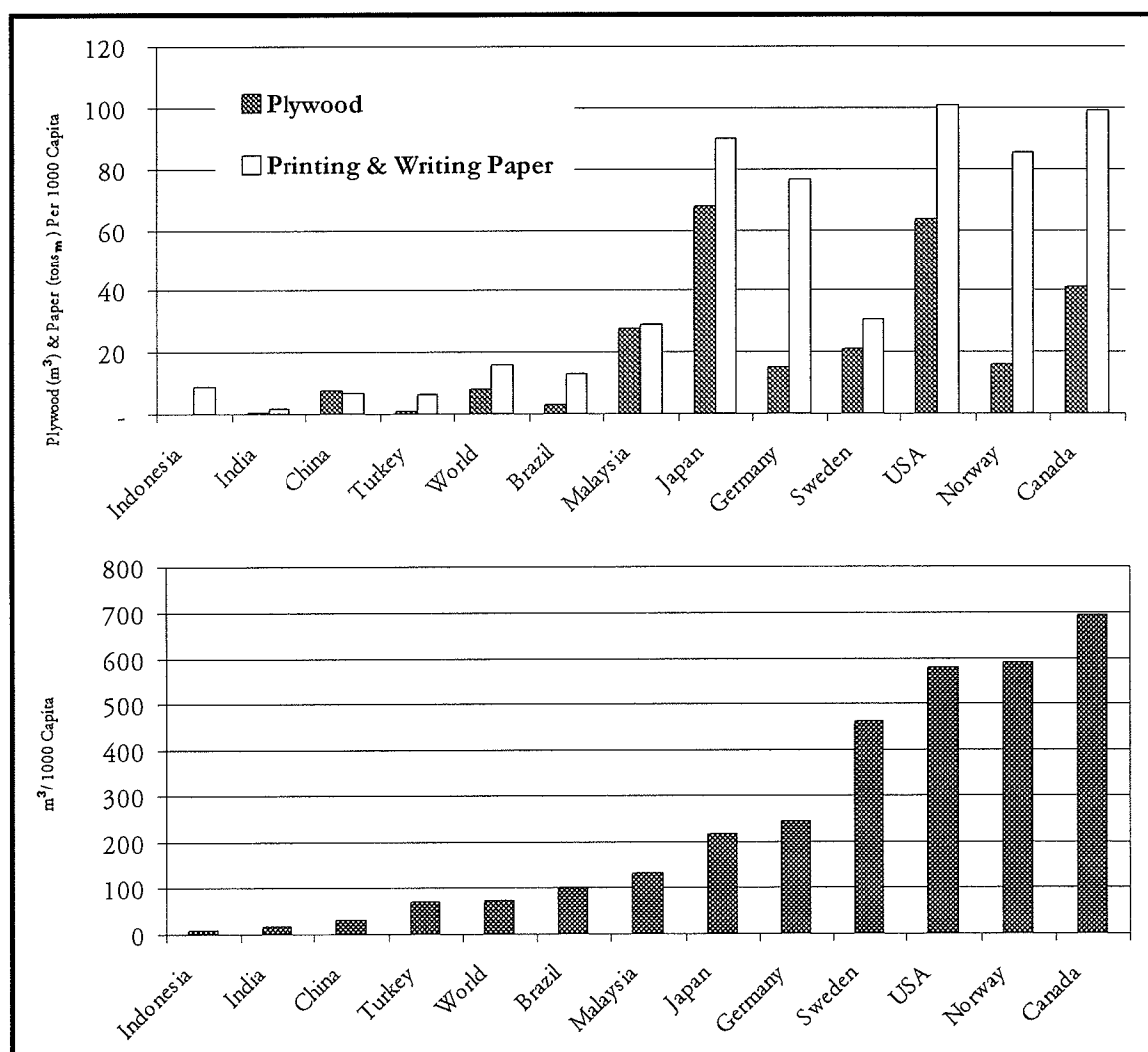


Figure 1. Apparent consumption for selected categories of forest products (FAO, 2000)

While temperate forests are comparatively less biologically diverse, “hot spots” with extraordinary concentrations of species diversity exist, particularly where there are large, contiguous areas of mostly

undisturbed native forest (Ricketts et al., 2000). For wealthy, temperate-forest nations like the US to support a credible and ethical program for biodiversity conservation in the poorer tropical nations, their own policies for sustainable forest management must encompass a two-pronged strategy of (1) protecting their own biodiversity hot spots where they exist, even when it means sacrificing economic values that could have been derived through resource development, and (2) sustainably utilizing productive forest areas of relatively low biodiversity value to help alleviate the pressure on tropical and boreal forests to meet global needs for wood fiber and other renewable resources.

US forest policy appears to presume that all forests are to be managed to provide a wide range of uses and values, with only the particular mixture of these uses varying from place to place and ownership to ownership. We have quested after the Holy Grail of “sustainable forestry” as if there were a one-size-fits-all formula—a single set of standards that could be applied equally well to forests everywhere. When we ask, “what do people want from their forests?” we should also ask as Marion Clawson did, “forests for whom and for what?” (Clawson, 1975) and perhaps add “which kinds of forests and where?”

Multiple-use forest management has proven enormously durable in many different circumstances. This flexible, adaptive approach has for the most part allowed forest managers to balance a wide variety of demands on forests while keeping within the bounds of sustainability. But most “all-purpose” tools, though convenient, are of mediocre value in any particular task, particularly when compared with other more specialized tools developed for that particular application. Multiple-use forest management is an all-purpose tool in a world in which the demands on forests are requiring the development of more specialized tools with greater precision and more direct application.

Today, the clear need to greatly improve our conservation of biological diversity in forest ecosystems worldwide, while at the same time managing these renewable resources to help meet the material needs of an expanding human population, demands recognition in both policy and practice that (1) all forests are *not* equally suited to multiple-use management and (2) there are important forest uses and values that are clearly *not* compatible with one another, and cannot be adequately protected under management aimed at accommodating a wide range of commodity and noncommodity uses.

A systems approach to sustainable forestry

The necessity of *simultaneously increasing* both biodiversity conservation and wood production, is accelerating the evolution toward three separate and distinct types of forest management (Hunter and Calhoun, 1996):

- Commercial forest plantations intensively managed for the production of wood and wood fiber-based commodities—what Leopold alluded to as “Group A” forestry (Leopold, 1949). This approach will likely be centered on highly productive private lands with relatively low value or potential value as habitat for rare or sensitive species due to their small tract size and/or history of past land use; these primarily private lands would be largely exempt from federal requirements for biodiversity conservation, particularly where the plantations derive from the afforestation of lands reclaimed from nonforest uses.
- Forests managed at a moderate or low intensity for a wide variety of goods, services, and natural values, not unlike the New England “working forest” concept, or Leopold’s “Group B” forestry. These “working forests” would provide habitat primarily as a function of being maintained in forest land use; these lands, both public and private, would encompass the majority of the forest area of the US, with the broad diversity of management approaches on individual tracts of varying size

providing an accompanying diversity of habitats in terms of age, successional stage, vegetative composition, climate and landform.

- Native forest reserves managed first and foremost for conservation and restoration of biological diversity—what Leopold might have termed “Group C” forestry. Management of these forests would be centered on identified biodiversity hot spots of global and national significance, and will likely encompass most of the remaining large tracts of undeveloped native forest on federal public lands, some state parks, and private lands where this style of management is consistent with landowner goals and objectives.

A systems approach to defining “sustainable forestry” must encompass all three categories—bioreerves and plantations as well as “working forests” managed for multiple values and purposes (see Figure 2).

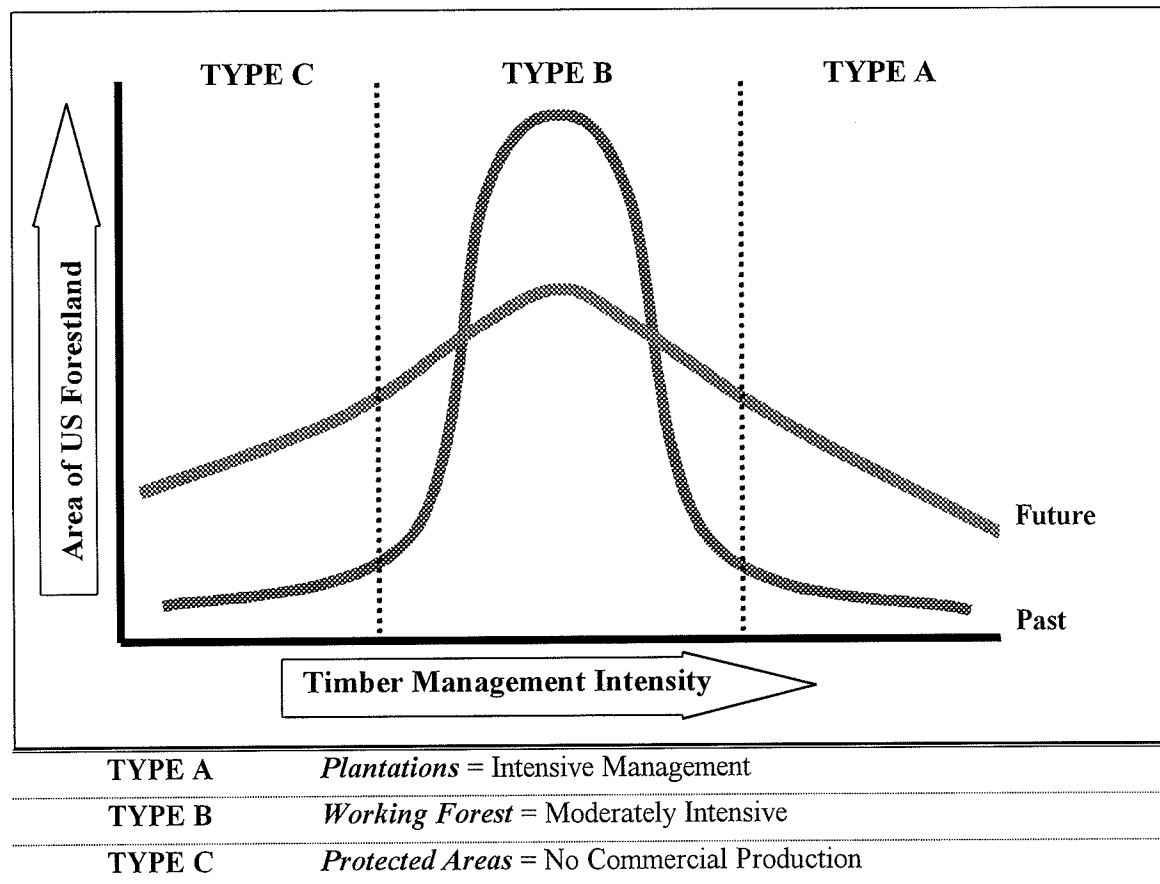


Figure 2. Forest Management Intensity Spectrum

Reinforcing the scientific foundation for sustainable forestry will require a continued high level of research activity in support of management in all three categories of forests. Substantial resources have been devoted to understanding all aspects of bioreserve delineation, consolidation and management, from the relative advantages of large and small reserves (Diamond and May, 1976; Soulé and Simberloff, 1986; Robinson and Quinn, 1992) to the rates and size of disturbance needed to maintain the ecological characteristics of old-growth forests (Spies and Franklin, 1991). Decades of traditional forestry research in the US have focused on maximizing wood and fiber yields from intensively-managed plantations, but it has been only recently that scientists have recognized the contributions that

even industrial timberlands can make to biodiversity conservation (O'Connell and Noss, 1992; Pimentel et al., 1992). Perhaps the greatest need—and greatest opportunity—for creating new knowledge in biodiversity conservation is on lands in “Group B”, those public and private lands managed for multiple uses in an almost infinite variety of combinations.

It is of the greatest importance that federal forest management agencies such as the US Forest Service remain fully engaged in this kind of management. In spite of a century of experimentation, scientists today are keenly aware of the inadequacy of our current understanding of forest ecosystems and our limited ability to predict the outcomes of human interventions in these ecosystems (National Research Council, 1992). The need is greater than ever for an agency such as the Forest Service to conceptualize, facilitate, and conduct research relating to the management of developed forest areas, experiment with different approaches in a variety of biophysical and socioeconomic settings, and provide a model for continuously improving forest stewardship on both public and private lands, in the US and abroad.

A national policy framework that facilitates sustainable forestry

More than any other forest use or value, biodiversity conservation has narrowed the bounds within which forest managers can accommodate all society demands within the limits of sustainability. In the case of the National Forest System, measures to protect biodiversity have greatly constrained the long-standing multiple-use mandate for the management of these resources. Forest Service leaders have turned back to the President and Congress and asked essentially, “which do you want us to manage for, multiple-use or biodiversity?” to which political leaders have collectively answered, “yes.”

This may not be the dilemma it has seemed to be. We are beginning to recognize that practicing forestry in more or less the same way everywhere should not necessarily be the most desirable goal—that such a one-size-fits-all approach sacrifices important forest values that can only be achieved with a more specialized approach to forest landscapes and forest ecosystems.

In forest areas characterized by extraordinary biodiversity values, particularly large contiguous areas of native forests primarily on public lands, we are likely to see management essentially as a bioreserve. In areas of relatively low biodiversity value, but with high productivity for meeting societal demands for wood and fiber, we are likely to see intensively managed forest plantations constrained by little more than basic principles of good land stewardship and protection of water quality. And in the majority of public and private forests, we are likely to see an infinitely varied array of approaches to multiple-use forest management that will produce moderate levels of wood and fiber while protecting a range of ecological values, including habitat for rare, sensitive, threatened or endangered animal and plant species.

None of these three elements alone can be regarded as sustainable forestry. It is the overall system—with all its elements represented at the national, regional, and local levels—that will constitute “sustainable forestry” in the future. There is no single set of standards to define how forestry should be practiced in every location and in every circumstance. Any set of standards purporting to describe a system of sustainable forestry must take into account the need for bioreserves and intensively-managed forest plantations as well as “working forests” managed to provide an array of forest values, renewable resources, and ecological services (see Figure 3).

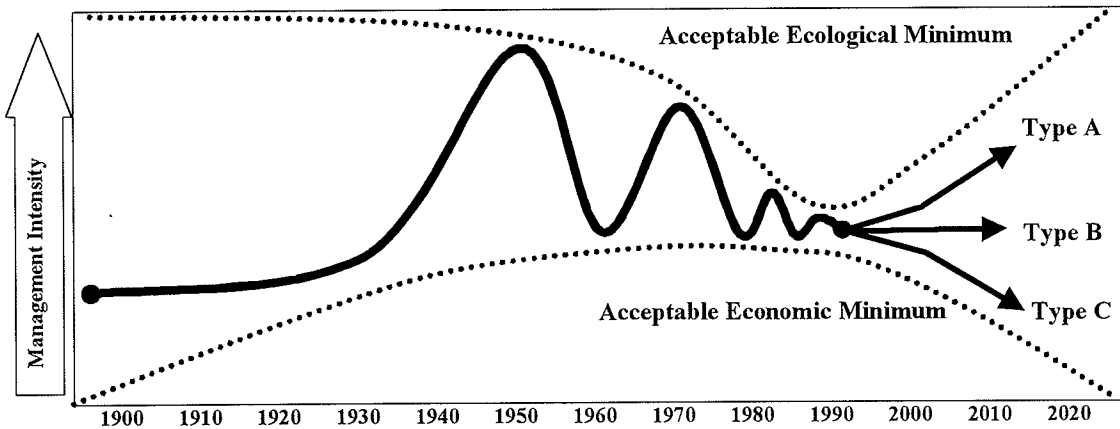


Figure 3. Forest Management and the Changing Bounds of Sustainability

The US has been meandering toward such an approach to forestry ever since biodiversity conservation became a significant public issue, but thus far we have not developed a coherent national policy framework for forestry that will support and facilitate its further development in any systematic way. The development of such a national policy framework was one of the foremost objectives of the recent 7th American Forest Congress (Langbein, 1996). The Forest Congress queried a broad cross-section of thousands of citizens all across the country on their “vision” for the future of forests and forestry in the US. What emerged was broad agreement on a set of general principles that clearly encompass the conservation of biological diversity, the support of working forests on both public and private lands, and intensive management of forests for renewable resource production where appropriate (Sample, 1998).

A recent report by the World Wildlife Fund suggests that a significant expansion of the area of intensively-managed forest plantations could allow the world’s major forest products companies to meet a substantial share of the global demand for industrial roundwood from a relatively small proportion of the world’s forest area, and open up new opportunities to provide outright protection to high conservation value forests, particularly those with globally-significant biodiversity values (Howard and Stead, 2001).³ WWF is so convinced of the value of this approach that they have called upon the world’s ten largest forest products companies to collectively increase the area of intensively-managed forest plantations by 5 million hectares per year—for the next 50 years (World Wildlife Fund, 2001). With this level of investment, WWF estimates that as much as 80 percent of the world demand for industrial roundwood in 2050 can be met from less than 20 percent of the world’s forests. Furthermore, WWF asserts this can all be done consistent with the Forest Stewardship Council (FSC) criteria for green certification, meaning that much of that 20 percent will be new planted forests on retired marginal crop and pasture land, rather than plantations created by converting natural forests.

What would such an approach mean for the United States? In some ways, we are already tending in this direction, with wood production shifting increasingly to industrial timberlands and other private forests, and biodiversity conservation becoming a primary management goal in many public forests. Nevertheless, significant policy and political barriers remain to achieving either of these objectives efficiently or effectively. We are perhaps within reach of a new political consensus—one in which both the forestry community and the environmental community actively support the idea that intensively-managed forest plantations *and* protected areas in high conservation value forests have an essential place in a comprehensive strategy for sustainable forest management.

³ World Wildlife Fund (WWF) is the world’s largest independent conservation organization, with 4.7 million members (more than one million in the US alone) and a global network active in some 100 countries.

Conclusion

Policymakers have an opportunity—and a responsibility—to further develop this potential for broad public consensus on forests and forestry, and to shape a policy framework that will support and facilitate this kind of practical approach to accomplishing “sustainable forestry.” It has been suggested (Binkley, 2001) that a consensus agreement might include considerations such as:

- devoting 20-30 percent of the landbase of plantation projects to ecological services
- strict control of offsite impacts of plantation-based timber production, especially the movement of silt, fertilizer or herbicides into waterways or groundwater
- agreed upon limits on the use of yield-enhancing chemicals such as fertilizers and herbicides, focused on minimizing use and maximizing impact
- agreed upon limits on the use of genetically modified organisms (GMOs) to instances in which it can be demonstrated that gene flow out of the plantation is not possible
- a commitment not to log old growth forests

Numerous more limited opportunities exist to create a policy framework that enables and encourages public and private forest land managers to make rational choices that will tend to be consistent with and supportive of this general approach. For example, a more expansive approach to reauthorizing the Conservation Reserve Program in the 2002 Farm Bill could provide landowners with the incentive to turn marginal crop and pasture land into productive forest plantations. Raising or eliminating the \$10,000 per year cap on the Reforestation Tax Credit would give new encouragement for undertaking the significant up-front costs of establishing forest plantations. Expanded use of “safe harbor agreements” under the Endangered Species Act could insulate land owners who establish forest plantations through afforestation, providing greater assurance that they will be able to recoup their investment.

More than any other nation, America has a dual conservation responsibility to fulfill. We have an obligation to protect our remaining “hot spots” of biological diversity—and bear our share of the local, short-term economic effects of doing so—and at the same time meet our share of the demand for renewable wood and fiber that we ourselves generate, without shifting an undue burden on biologically rich forests in other regions of the world. And we have an opportunity to begin a new cycle in forest history in the United States, one in which forestry and foresters are once again regarded as an essential part of the solution to the challenge of conservation and sustainable forest management.

References

- Binkley, C.S. 2001. “Forestry in the Long Sweep of History,” Unpublished paper. Boston: Hancock Timber Resources Group.
- Brussard, P.F., D.D. Murphy, and R.F. Noss. 1992. Strategy and tactics for conserving biological diversity in the United States. *Conservation Biology*, 6:157-159.
- Clawson, M., 1975, *Forests For Whom and For What?* Baltimore: Johns Hopkins University Press.
- Diamond, J.M. and R.M. May. 1976. Island biogeography and the design of nature reserves. In: May, R.M., ed., *Theoretical Ecology: Principles and Applications*. Philadelphia: W.B. Saunders.
- Ehrlich, P. 1997. Statement on The Wildlands Project, at <http://www.wildlands.org>.
- FAO, 2000. Global Outlook for the Future Wood Supply From Forest Plantations. Rome. United Nations Food and Agriculture Organization.

- Farnsworth, N.R. 1988. Screening plants for new medicines. In: Wilson, E.O. and F.M. Peter, eds., *Biodiversity*. Washington, DC: National Academy of Sciences.
- Howard, J.L. 1999. *U.S. Timber Production, Trade, Consumption and Price Statistics 1965-1997*. Gen. Tech. Rep. FPL-GRT-116. Madison, Wisconsin: USDA Forest Service, Forest Products Laboratory.
- Howard, S. and J. Stead, *The Forest Industry in the 21st Century*. London: World Wide Fund for Nature, 2001).
- Hunter, M.L. and Calhoun, A. 1996. A triad approach to land-use allocation. In: Szaro, R.A. and D.W. Johnston, eds., *Biodiversity in Managed Landscapes*. London: Oxford University Press.
- International Union for the Conservation of Nature (IUCN), 1988. *Plant Conservation Programme*. Gland, Switzerland: IUCN.
- Jensen, D. 1987. Concepts of preserve design: what we have learned. In: Elias, T., *Conservation and Management of Rare and Endangered Plants*. Sacramento, California: California Native Plant Society.
- MacCleery, D. 1993. *American Forests: A History of Resiliency and Recovery*. Durham, NC: Forest History Society.
- Langbein, W. (ed.). 1996. *Seventh American Forest Congress: Final Report*, New Haven: Yale School of Forestry & Environmental Studies.
- Leopold, A. 1949. *A Sand County Almanac, and Sketches Here and There*. New York: Oxford University Press.
- Lindblom, C. 1965. *The Intelligence of Democracy*. New York: Free Press.
- National Research Council. 1992. *Forestry Research: A Mandate for Change*. Report of the NRC Panel on Forestry Research. Washington, DC: National Academy Press.
- O'Connell, M. A. and R.F. Noss. 1992. Private land management for biodiversity conservation. *Environmental Management* 16(4):135-151.
- Pavlik, B.M. 1996. Conserving plant species diversity: the challenge of recovery. In: Szaro, R.A. and D.W. Johnston, eds., *Biodiversity in Managed Landscapes*. London: Oxford University Press.
- Pimentel, D., Stachow, U., Takacs, D.A., Brubaker, H.W., Dumas, A.R., Meaney, J.J., O'Neil, J.A.S., Onsi, D.E., and D.B. Cornelius. 1992. Conserving biological diversity in agricultural/forested ecosystems. *BioScience* 42(5):354-362.
- Raven, P.H. 1987. We're killing our world: preservation of biological diversity. *Vital Speeches of the Day*, May 15, 1987, pp. 472-478.
- Schlesinger, A.M. 1986. *The Cycles of American History*. Boston: Houghton Mifflin.
- Sierra Club, 1999. Statement on National Forest Protection and Restoration Act, at <http://www.sierraclub.org/forests/bill-97.asp>
- Raup, D.M. and J.J. Sepkoski. 1984. Periodicity of extinctions in the geologic past. *Proceedings of the National Academy of Sciences* 81:801-805.
- Ricketts, T.H., Dinerstein, E., Olson, D.M. and C.J. Loucks. 2000. *Terrestrial Ecoregions of North America: A Conservation Assessment*. Washington, DC: Island Press.
- Robinson, G.R. and R.F. Quinn. 1992. Habitat fragmentation, species diversity, extinction, and design of nature reserves. In: Jain, S.K. and L.W. Botsford, *Applied Population Biology*. The Netherlands: Kluwer Academic Publishers.
- Sample, V.A. 1998. *Principles of Sustainable Forest Management: Examples from Recent US and International Efforts*, Discussion Paper 98-01. Washington, DC: Pinchot Institute for Conservation.
- Sedjo, R. and D. Botkin. 1997. Using Forest Plantations to Spare Natural Forests. *Environment* 39(10):15-20 (December).
- Sohnngren, B., Mendelsohn R., and R. Sedjo. 1999. Forest Management, Conservation and Global Timber Markets. *American Journal of Agricultural Economics* 81(2):1-13 (February).
- Soulé, M.E. and D. Simberloff. 1986. What do genetics and ecology tell us about the design of nature reserves? *Biological Conservation* 35:19-40.

- Spies, T. A. and J.F. Franklin. 1996. The diversity and maintenance of old-growth forests. In: Szaro, R.A. and D.W. Johnston, eds., *Biodiversity in Managed Landscapes*. London: Oxford University Press.
- Spies, T.A. and J.F. Franklin. 1991. The structure of natural young, mature and old-growth forests in Washington and Oregon. In: Ruggiero, L.F. et al., *Wildlife and Vegetation of Unmanaged Douglas-fir Forests*. General Technical Report PNW-GTR-285. Portland, Oregon: USDA Forest Service.
- Szaro, R.C. and B. Shapiro. 1990. *Conserving Our Heritage: America's Biodiversity*. Arlington, Virginia: The Nature Conservancy.
- Thomas, J.W. 2000a. Testimony before the House Committee on Resources regarding oversight of USDA Forest Service, September 21. Washington, DC: U.S. House of Representatives.
- Thomas, J.W. 2000b. The U.S. Forest Service: what now? In: Sedjo, R. (ed.), *A Vision for the Forest Service: Goals for the Next Century*. Washington, DC: Resources for the Future.
- Wilson, E.O. 1992. *The Diversity of Life*. New York: W.W. Norton and Co.
- World Wildlife Fund, 2001. "Top Ten Companies Can Help Save the World's Forests." Press release, March 14, 2001. Washington, DC: World Wildlife Fund.
- 16 U.S.C. 1531. 1973. The Endangered Species Act of 1973. P.L. 93-205, 87 Stat. 884.
- 16 U.S.C. 1600(note). 1976. The National Forest Management Act of 1976. P.L. 94-588, 90 Stat. 2949.
- 36 CFR 219. Federal regulations pursuant to the National Forest Management Act (16 U.S.C. 1600(note), revised November 9, 2000, Federal Register 65:218, 67567-67581.

PINCHOT INSTITUTE FOR CONSERVATION

PUBLICATIONS

Grey Towers Press is an activity of the Pinchot Institute for Conservation that fulfills the education and outreach parts of the Institute's mission by publishing materials on its independent research, conferences, and related programs for the conservation community. Publications available from Grey Towers Press include:

Policy Reports

- [] **(PR-08-01)**
Ensuring the Stewardship of the National Wilderness Preservation System
by Perry L. Brown, Chair, Wilderness Stewardship Panel, 2001

- [] **(PR-07-01)**
Allocating Cooperative Forestry Funds to the States: Block Grants and Alternatives
by Perry R. Hagenstein, Nadine E. Block and James W. Giltmier, 2001

- [] **(PR-06-01) \$20.00**
The Evolution of Forestry Education in the United States: Adapting to the Changing Demands of Professional Forestry by V. Alaric Sample, Nadine E. Block, Paul C. Ringgold and James W. Giltmier, 2000

- [] **(PR-05-98) \$10.00**
Land Stewardship Contracting in the National Forests: A Community Guide to Existing Authorities
by Paul C. Ringgold, 1998

- [] **(PR-04-97)**
Regulatory Takings: A Historical Overview and Legal Analysis for Natural Resource Management
by Susan M. Stedfast, 1997

- [] **(PR-03-97)**
A Federal Commitment to Forest Conservation on Private Lands: The Story of State and Private Forestry by James W. Giltmier, 1997

- [] **(PR-02-97)**
Toward Integrated Resource Management on the National Forests: Understanding Forest Service Budget Reform by V. Alaric Sample, 1997

- [] **(PR-01-95)**
Natural Resources Strategic Planning: Components and Processes
by V. Alaric Sample and Dennis Le Master, 1995

Discussion Papers

- [] ***(DP-12-01)***
Sustainable Forestry & Biodiversity Conservation: Toward a New Consensus
- [] ***(DP-11-01)***
Fire and Water: Developing Mechanisms for Community Stewardship of Natural Resources
- [] ***(DP-10-01)***
Collaborative Stewardship Training Opportunities: A Report to the USDA Forest Service
by Jeff M. Sirmon.
- [] ***(DP-09-01)***
Industrial Timberland Divestitures and Investments: Opportunities and Challenges for Forestland
Conservation by Nadine E. Block and V. Alaric Sample.
- [] ***(DP-05-00)***
Mobilizing People into Action: The Future Leadership of an Agency by Andrea Bedell Loucks and
Will Price.
- [] ***(DP-04-99)***
Forest Certification Handbook for Public Land Managers by Catherine M. Mater.
- [] ***(DP-03-99)***
Understanding Forest Certification: Answers to Key Questions by Catherine M. Mater.
- [] ***(DP-02-99)***
The Evolution of American Forest Policy: An Appraisal of the Past Century and a View to the Next
by V. Alaric Sample.
- [] ***(DP-01-99)***
Improving Performance and Accountability at the Forest Service: Overcoming the Politics of the
Budgetary Process and Improving Budget Execution by V. Alaric Sample and Terence J. Tipple.
- [] ***(DP-02-98)***
Third Party, Performance-Based Certification of Public Forests: What Public Forestland
Managers Should Know by Catherine M. Mater, V. Alaric Sample, James R. Grace, and
Gerald A. Rose.
- [] ***(DP-01-98)***
Principles of Sustainable Forest Management:
Examples from Recent U.S. and International Efforts by V. Alaric Sample.

Discussion Papers, continued

- [] **(DP-02-97)**
Evolving Toward Sustainable Forestry: Assessing Change in U.S. Forestry Organizations,
edited by V. Alaric Sample, Rick Weyerhaeuser and James W. Giltmier.
- [] **(DP-01-97)**
Log Sortyards and Other Marketing Systems by Carol Daly.
- [] **(DP-01-96)**
Building Partnerships for Sustainable Forestry Research,
by James W. Giltmier and Mary Mitsos
- [] **(DP-08-01)**
Partnership with the USDA Forest Service: Improving Opportunities and Enhancing Existing
Relationships by Andrea Bedell Loucks and J. Peter Kostishack, August 2, 2001
- [] **(DP-07-00)**
Watershed Restoration Workshop, Clearwater National Forest: July 10-13, 2000

Pinchot Distinguished Lecture Series

- [] Forest Stewardship: Marsh, Pinchot and America Today by David Lowenthal, 2001
- [] Rethinking Public Land Governance for the New Century by Daniel Kemmis, 2000
- [] A More Perfect Union: Democratic and Ecological Sustainability by Hanna J. Cortner, 1999
- [] Whither, or Whether, the National Forests? Some Reflections of an Unreconstructed Forest Economist
by Perry R. Hagenstein, 1995
- [] Gifford Pinchot with Rod & Reel & Trading Places: From Historian to Environmental Activist,
Two Essays in Conservation History by John F. Reiger, 1994
- [] The New Face of Forestry: Exploring a Discontinuity and the Need for a Vision
by Dr. John C. Gordon, 1993
- [] Gifford Pinchot: The Evolution of an American Conservationist by Char Miller, 1992
- [] Adventure in Reform: Gifford Pinchot, Amos Pinchot, Theodore Roosevelt and the Progressive Party,
by John A. Gable, 1986

Books

- [] Gifford Pinchot and the Making of Modern Environmentalism,
by Char Miller, 2001. (\$25.00)
- [] Gifford Pinchot: Breaking New Ground,
introductory essay by Char Miller and V. Alaric Sample, 1998. (\$25.00)
- [] Land Stewardship in the Next Era of Conservation,
by V. Alaric Sample, 1995. (\$8.95)
- [] Population Change, Natural Resources and Regionalism,
edited by Ann Christine Reid, 1986. (\$4.95)