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TIMBER'S LAST STAND

The timber industry is rapidly running out of natural forests to plunder. Adopting a New Forestry could help save a destructive industry from itself.

BY JOHN C. RYAN

The earth shakes as the forest giant crashes down, its crown landing hundreds of feet from the massive stump left behind. The product of countless seasons of clean air, stable climate and freedom from human disturbance, the centuries-old tree represents a windfall profit to its sawyers, one never to be realized again.

Whether it was a western hemlock or a Philippine mahogany, the tree's fall also symbolizes one of the most widespread, and visibly shocking, forms of environmental degradation: deforestation. Few images breed concern for the planet like the denuded moonscape of an Oregon clear-cut or the plot of scorched earth that was once rain forest.

Images can only partially capture the legacy of logging and the world's insatiable demand for wood products, however. Fragmented ecosystems in British Columbia, threatened native cultures in Indonesia, collapsed timber industries in western Africa, and diminished biological diversity from Germany to Java attest to the fact that deforestation is a global phenomenon.

In the tropics, the timber trade is a supporting player in a drama that sees the richest ecosystems on the planet grossly disrupted and then eliminated as forests shrink before cattle ranchers and desperate peasants. In Europe and North America, where the area under tree cover is fairly stable, foresters have overseen the conversion of diverse natural systems into uniform tree farms, as different from their predecessors as a corn field is from a prairie.

It is clear that the time for a new forestry—one that seeks to use and maintain the complexity of forests, rather than eliminate it—is now. Although it's hard to imagine a timber industry that treads lightly on the land, it should be possible, since wood, in theory at least, is a renewable resource. As human numbers and needs continue to rise, and as forests continue to dwindle, it is urgent that we learn to tap forests' varied riches without impoverishing their source. As the timber industry confronts the exhaustion of both woodlands and the public's tolerance of its practices, it faces the inevitable choice of living up to this challenge, or following its resource base into rapid decline.

Fortunately, in places as disparate as Peru's Palcazu Valley and Oregon's Cascade Range,

small bands of researchers and activists are piecing together the beginnings of a sustainable forestry.

Mining Our Heritage

Reeling from a barrage of threats, forests in many regions of the world have a dim future. If rain-forest loss is not slowed, according to British forest watcher Norman Myers, "by early next century there will be little left of tropical forests except for a few large blocks in New Guinea, the Zaire basin, western Amazonia in Brazil and the Guyana highlands." Tropical logging degrades about 11 million acres annually and, especially in Southeast Asia and central Africa, contributes to complete deforestation—now estimated to total over 34 million acres annually (an area the size of Florida)—by making entire regions more susceptible to fire and accessible to peasants and ranchers.

In the temperate zones, which provide most of the world's timber (see Table 1), logging, farming, and human settlements have spread to such an extent that, outside of remote northern regions, little primary forest remains. The coastal rain forest of British Columbia is given 15 years before it is wiped out from logging, and the estimated 5 percent of the United States' ancient groves that still exist face rapid fragmentation and extinction.

The timber trade's attraction to primeval stands appears to be unquenchable. Much like the loggers of Siberia who set up temporary camps, cut all the usable timber from the area, and move on, the international timber industry mines one source then seeks out another. Canadian and Soviet foresters are now looking to their remote, and less lucrative, northern forests, while several U.S. companies have relocated operations from the Northwest to the pine plantations of the Southeast.

The focus of the tropical timber trade shifted in the 1960s from Africa, where overcutting has brought forests and forest industries crashing down, to Southeast Asia, where similar depletion is now occurring. According to an analysis done for the International Tropical Timber Organization (ITTO), a 69-nation trade group based in Yokohama, Japan, timber exporters Ivory Coast and Ghana will likely become net importers before the end of this decade. They follow the trail blazed by Nigeria in the 1970s.

The quality and availability of wood from Southeast Asia have declined, and several nations have responded with bans on log exports or on logging altogether. As one Japanese importer declared in *Nikkan Mokuzai Shimbun* (Daily Timber News) in 1988: "the depletion of tropical timber resources in Southeast Asia has become a matter of reality today, so we have to look to Brazil for a new supply . . ."

Table 1.

World's Top 15 Timber Producers, 1988[1]

Country	Volume (million cubic meters)	Share of Total (percent)
USA	417	25
USSR	305	18
Canada	173	10
China	98	6
Brazil	67	4
Sweden	48	3
Finland	46	3
Indonesia	40	2
Malaysia	36	2
France	32	2
W. Germany	31	2
Japan	28	2
India	24	2
Poland	20	1
Australia	18	1
Others	281	17
World Total	1,664	100

[1] Includes all wood products except fuelwood and charcoal.
Source: FAO, *Forest Products Yearbook 1988* (Rome: 1990)

The Road to Ruin

Even if timber is managed on a "sustained yield" basis (which considers only the yield of wood, and not any of the other benefits of forests), logging can still devastate forests. Timber harvesting typically begins with a network of roads, which themselves deforest large areas and, especially in the steeper regions now being cut, can greatly increase soil erosion and sediment buildup in streams and rivers. Approximately 8 percent of logging areas in the Pacific Northwest are cleared

ILLUSTRATIONS BY JEFFERY OH

for road building; as much as 14 percent is cleared in Southeast Asia. Myers reports that for every tree cut for timber in certain areas of Zaire, 25 are cleared making roads to get to it. In Idaho, and in northern Palawan in the Philippines, logging roads have caused erosion more than 200 times greater than on undisturbed sites.

> *"Liquidating old-growth is not forestry, it is simply spending our inheritance. Nor is planting a monoculture . . . forestry; it is simply plantation management."*

Roads expose forests to miners, hunters, and especially poor farmers; they also allow non-human invaders access to once-deep forest. Logging roads have accelerated the spread of destructive pests in the Northwest, including Port Orford cedar root rot, an always-fatal disease spreading rapidly into the remaining upland groves of the cedar, the region's most prized timber tree. As roads, logging and forest clearance spread, large areas of habitat are turned into islands in a sea of degraded lands. Research in both tropical and temperate forests has shown that such fragmented landscapes are unable to support the biological diversity present in continuous forest. Recent studies of isolated patches of Amazonian forest, for example, confirm that edges of forest "islands" deteriorate rapidly from exposure to damaging winds, exotic species, and dramatic changes in temperature, humidity, and light levels.

Some of the long-term degradation that follows from loss of tree cover, such as increased soil erosion and water runoff, can be minimized by reforestation after logging. But young stands cannot provide the wildlife habitat or high-quality, fine-grained wood of ancient forest. Industrial-style "reforestation"—the planting of rows of identical trees accompanied by slash burning, soil plowing, and the use of fertilizers or herbicides—provides even fewer environmental benefits than natural regrowth.

All told, these and other impacts add up to a global failure to sustain forests. A 1989 study for ITTO found that less than 0.1 percent of tropical logging was being done sustainably. Former U.S. Bureau of Land Management biologist Chris Maser argues that sustainable forestry isn't practiced outside the tropics either. "Liquidating old-growth is not forestry," he writes, "it is simply spending our inheritance."

The Economics of Destruction

As the world's greatest storehouses of life, forests are valuable for much more than their timber. When these riches are sacrificed to wood production, logging often becomes difficult to justify on economic grounds.

Damage to fisheries and coral reefs caused by logging-induced sedimentation has been documented around the world. The harvesting of timber worth $14 million from the drainage of the South Fork of the Salmon River in central Idaho in the mid-1960s, for instance, caused an estimated $100 million in damage to the river's chinook salmon fishery. That industry has still not recovered. Fisheries in Bacuit Bay near Palawan in the Philippines were depleted after logging commenced in 1985 on surrounding hillsides. Sediment rushing into the bay killed up to half of the living coral that supported the fishery, depriving local villagers of their source of protein.

The costs of logging have usually fallen on those who depend on intact forest—forest dwellers, downstream communities, tourism-based economies, among others. But as the area of untouched forest shrinks, it is becoming clear that the timber industry is also putting itself out of business. Tropical hardwood exports, worth $8 billion in 1980, have fallen to $6 billion, and are projected to shrink to $2 billion by the end of this decade.

When diverse populations of trees are replaced with genetically uniform stands, there is a double loss to future timber harvests. Plantations can relieve pressure on natural forests by producing wood quickly, but

because the natural system of checks and balances has been stripped to maximize tree growth, monocultures are prone to unravel. Widespread disease and pest outbreaks—common throughout the conifer plantations of the United States, central Europe and China, and a chronic problem in tropical plantations—can decimate entire forests, rather than localized groups of trees.

In West Germany, where forests have been logged, grazed, and raked for centuries, single-species plantations have spread to such an extent that 97 percent of forest land is covered by just three tree species. Scientists speculate (since there is virtually no natural forest left for comparison, it is impossible to prove) that the lasting damage caused by intensive forestry may have helped speed Germany's woodlands down the road to *Waldsterben:* the widespread "forest death" linked to air pollution and acid rain.

When native forests are lost, industry also loses its reservoirs of genetic variety and its scientific laboratories for uncovering the many hidden relationships that make timber growth possible. For instance, according to work done by Oregon State University entomologist Tim Schowalter and others, intact stands of natural forest are valuable as physical barriers and as sources of insect predators to stop the spread of pest outbreaks on adjacent plantations. As long as wilderness is left to tap and study, then foresters have the opportunity to learn from their mistakes. But, as industry converts native stands to plantations—putting all its eggs in the monoculture basket—its options keep narrowing.

Toward A New Forestry

How can timber be harvested without destroying forests? The answer to this question is being discovered in some very unlikely places: in a chunk of rotting wood on a forest floor, amid a buzz of insects hundreds of feet up a Douglas fir, in the fecal pellets of a flying squirrel. In these and untold other places lie the essentials of forest productivity that foresters ignore to the detriment of forests and timber production.

A small group of researchers and forest managers based at the H. J. Andrews Experimental Forest in western Oregon have been studying the lessons of natural forests and have started applying them in an attempt to reconcile the seemingly unsolvable conflict between logging and forests. The "New Forestry," as their ideas are being called, represents a fundamental change, a revolution, even, for the forestry profession, which has traditionally focused narrowly on timber production.

Perpetuation of diverse forest ecosystems has to become the focus of forestry if the forest products industry is to survive, states Jerry Franklin, an ecologist with the University of Washington and the U.S. Forest Service, and the leading proponent of New Forestry. "Already we are learning that parts of forests that we have never considered seriously are proving significant, even essential, to ecosystem functioning," he says.

One part of the forest overlooked until recently is the array of underground organisms that help keep soils fertile. Perhaps the most important of these are the "mycorrhizal" fungi that attach to the roots of 90 percent of the world's plant species and whose vast thread-like networks literally form the base of forests in the Pacific Northwest. Eaten and dispersed by the northern flying squirrel, the fungi enable trees to absorb nutrients and water from the soil and fix nitrogen. After clear-cutting, when all "host" plants and ground cover for squirrels and other mammals are removed, many of the fungus species are eliminated, robbing the land of its ability to grow more timber.

These and many other hidden linkages

discovered within forest communities demonstrate the importance of maintaining intact as many of the pre-logging conditions as possible throughout the timber cutting cycle. Similarly, foresters are starting to recognize dead trees and logs on the forest floor as essential parts of a healthy forest, not a form of waste to be burned off or shredded. Besides providing important wildlife habitat, woody debris maintains soil fertility by returning organic matter and nutrients to the soil and helping to control erosion.

On a handful of sites on the Willamette and Siskiyou national forests in Oregon, U.S. Forest Service managers are beginning to actively apply these principles to their work. They leave behind live and dead trees, corridors of trees along stream banks, and small and large woody debris. The goal is to maintain the land's productivity and its diversity. They have also begun to lump timber cutting areas together to minimize fragmentation and road building.

Every Day, Every Acre

New Forestry is no substitute for protecting natural areas: no forester can create 1,000-year-old ecosystems or bring back species driven to extinction. Environmentalists are rightly suspicious of anyone trying to sell new types of logging as the solution to deforestation. Especially where the amount of wilderness left is small, preservation is still the top priority.

Nonetheless, given that logging of primary forest is not going to stop tomorrow, New Forestry promises to minimize the damage to areas that will be lumbered. The New Forestry has been researched and applied almost exclusively in the ancient forests of the Pacific Northwest, but, as David Perry, a forest ecologist at Oregon State University, notes, although particular techniques will vary greatly, "there are certain ecological principles translatable virtually anywhere in the world." The philosophical core of the New Forestry—the goal of working with the complexity of natural systems, rather than eliminating it—can apply as well to farmland and oceans as it does to forests.

Reducing the risk of future pest outbreaks and ensuring that soil is not robbed of its nutrients makes sense whether wood is harvested from a pristine rain forest, a logged-over woodland, or an intensively cropped tree farm. As evidence builds that the intensive forestry practices used today often fail to sustain timber productivity over time, timber managers may see the wisdom of restoring natural resilience and diversity to their lands.

Since most of the world's forests are already logged over or cleared, and many of the remaining areas are severely fragmented, any attempt to protect biological diversity will have to address the lands that humans use intensively. "We could never hope to protect biological diversity solely through preservation," says Franklin, "since so much diversity occurs on commodity landscapes. . . . Protection of diversity must be incorporated into everything we do every day on *every* acre, whether preserve or commodity land."

Tropical Troubles

In primary rain forest, still the predominant resource for the tropical timber trade, the social, political and biological complexities of forest use raise doubts whether sustainable timbering is even possible. Removing too much wood from these forests, in which nutrients are found mostly in the plant life itself, not in the soil, leaves behind a nutritionally impoverished system that may take hundreds of years to rebound. Even selective logging is typically very destructive because of the tremendous diversity of tree species: loggers inevitably trample wide areas as they "cream" the forest—taking only a handful of desired species.

Third World governments, saddled with debt and swelling populations, typically see their rain forests as quick sources of foreign exchange or as safety valves for an expanding underclass. Unstable conditions outside the forest make long-term policy inside—such as enforcing minimum lengths of logging rotations or preventing illegal entry in logged-over areas—difficult to enforce. The sheer number of people looking to tropical moist forests as sources of sustenance and profit may already overwhelm their carrying capacity.

Despite the numerous obstacles, a handful of projects show how sustainable tropical

logging might work. The Yanesha Forestry Cooperative, the first Indian forestry cooperative in Amazonia, has been operating since 1985 in Peru's Palcazu Valley. Local people own and process the forest products; timber cutting is designed with protection of diversity in mind. By clear-cutting in narrow strips, leaving most of the forest intact, the Palcazu project seeks to mimic small-scale natural disturbances. Creating gaps in the forest canopy allows the shade-intolerant seedlings of hundreds of different species from the uncut areas to colonize the strips. Bark and branches are left in place to maintain soil fertility, rather than burned off.

Portico S.A., a Costa Rican door manufacturer, is probably the only timber company in the world researching natural forest management, according to Renee Dagseth of the Overseas Private Investment Council, a U.S. government agency helping to finance the company. Recognizing that its resource base of *caobilla,* a type of mahogany, was endangered by deforestation, Portico has been buying up forest land and trying different harvest techniques and rotations since 1988 to assure itself a steady supply of wood. Because *caobilla* cannot be grown outside its natural, swampy habitat, the company is buying from local farmers marginal farmland where the tree is found and hiring them as part-time guardians against illegal loggers.

These projects are both so new that it is not possible to call them successful yet. It would take decades of steady production to do that; unfortunately, few nations have the luxury of that much time. New approaches to logging that incorporate rather than ignore natural linkages and local people can, at the very least, prolong the useful life of logging areas, and buy time for other solutions to deforestation to be worked out.

Ending the Timber Bias

If the conflict between timber and forests is to be resolved, a two-prong strategy is needed: protection of large, viable areas of natural forest and new forestry practices on areas to be logged. Probably the greatest obstacle to achieving these goals is the commonly held view of forests primarily as timber factories. It is this timber bias, prevalent among foresters and policymakers the world over, that has already sent much of the world's natural heritage to the mill.

Most nations have laws and regulations proclaiming their commitment to sustained-yield or multiple-use forestry, but almost nowhere does this translate into a balanced approach to forest use. Economist Robert Repetto of the World Resources Institute (WRI) in Washington, D.C., has documented the worldwide occurrence of government subsidies that encourage destructive logging at taxpayers' and forests' expense.

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The much-heralded Tropical Forestry Action Plan, an international strategy launched in 1985 by the Food and Agriculture Organization, the United Nations Development Program, the World Bank, and WRI, is expected to accelerate deforestation because of its reliance on increased logging as a means of saving forests. The Peruvian Forestry Action Plan, for example, advocates an expansion of the road network and a four- to sixfold increase in logging, even though it recognizes that Peru's forests "are exploited in the same way as the mines of the Sierra" and describes present management as "chaos."

The timber focus also ignores the root causes of deforestation—including maldistribution of farmland, international debt, and population growth. Shifting control of

forests away from exploitative users—such as timber cutters and cattle ranchers—and toward sustainable users of forests, especially the millions of forest dwellers who have lived within the forests' limits for ages, can do much to halt forest loss. Colombia's decision in February to recognize Indian rights to half of its Amazon forests is a landmark achievement in both forest policy and social justice.

Table 2.

Per-Capita Paper Use, Selected Countries and Regions, 1988

Country/Region	Pounds per year	Percent recycled[1]
USA	699	29
Sweden	685	40
Canada	543	20
Japan	450	50
Norway	333	27
USSR	78	19
Latin America	55	32
China	27	21
Africa	12	17
India	5	26

[1] Amount of waste paper recycled compared to total paper consumption; 1987 figures.
Source: The Greenpeace Guide to Paper (Vancouver: Greenpeace, 1990)

Protecting Forests, Protecting Jobs

While the crush of human demands ensures that most forests will be used in one way or another, turning natural areas of global significance into pulp—as is happening in Alaska's Tongass rain forest and Southeast Asia's last large area of coastal mangroves in Bintuni Bay, Papua New Guinea—is a travesty considering that pulpwood can be obtained with much less impact from second-growth forests and plantations. Ending subsidies for conversion of primary forests and putting in place incentives for better management on less valuable lands could help increase sustainable timber supplies.

But new supplies will take time to develop; forests will continue to be pushed beyond their limits until the world begins to curb its spiraling appetite for wood products. Because sustainable forestry will often yield less wood per acre in the near term than timber mining, and because increased recognition of the non-wood values of forest will mean fewer acres available for timber harvest, reducing the demand for wood is an inevitable part of the sustainability equation.

Many opportunities exist to reduce wasteful use of wood products—from the 50 percent of raw wood turned to chips and dust in a typical sawmill to the 25 billion disposable chopsticks consumed annually in Japan. Less than one-third of the paper used in the United States, the world's most gluttonous consumer of paper (see Table 2), is recycled; one-half of the total is consumed as packaging.

Wherever forests are cut down, governments can act to get the most out of each tree. In the Pacific Northwest, the timber industry blames the loss of jobs upon environmentalists, yet one out of every four trees harvested in 1989 was sent abroad as raw logs, untouched by mill workers. Timber-related employment in Oregon declined by 15 percent in the 1980s, even as timber harvests reached record levels. A ban on the export of raw logs would provide four times more wood for local mills as would be set aside under a recently announced federal plan to protect ancient forests in which the rare spotted owl lives.

Policymakers can reduce damage to lands that are logged by enforcing forestry regulations, which on paper are often quite sound, and by emphasizing the long-term health of forests, rather than quick profits for logging companies. As WRI's Repetto has noted, economic tools such as pricing reforms can encourage loggers not to waste the forests they are granted access to.

Ultimately, it's essential that widespread recognition of the ethical responsibility not to trade present yields for future degradation take hold. The introduction of codes of conduct among European tropical timber importers and the growth of the Association of Forest Service Employees for Environmental Ethics in the United States are two hopeful signs in this area.

Jobs and profits based on ecological destruction simply cannot last. If societies can come to grips with this fact, perhaps we can make the transition to sustainability while there are still ecosystems left worth protecting.

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