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Forests in a Full World

by George M. Woodwell, ed.

with contributions from

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PREFACE

A Turning Point

The evolution of the human economy has passed from an era in which manmade capital represented the limiting factor in economic development (an "empty" world) to an era in which increasingly scarce natural capital has taken its place (a "full" world).

-- Daly 1993

The implications of the transition from an empty world to a full world are profound. It is the transition from a world of abundant natural resources to a world of limits, from easy access to land and water and air and fish and public space to continuously intensified competition for all essentials. The transition comes on us with the extraordinary speed inherent in exponential growth. The doubling time of the human population has been three to four decades over the latter part of the twentieth century. That speed is rapid enough. But the doubling time for the spread of technology around the world has been far less, perhaps a decade or two. The two interact to present pressures on environment that double in a few years to a decade. A world that is relaxed at a mere "half full" one year finds itself just few years later more than full, overwhelmed with competing demands on all resources. Such is the state of the world at the moment, pressed throughout to meet immediate and urgent demands to solve shorter-term problems while longer-term problems also present themselves as immediate crises whose solutions require fundamental changes that often seem beyond reach. The issue has been joined in a flood of books over the last decades, books that span the gamut from population (Grant 1996) through economics (Daly 1997) to attempts to visualize the future under various circumstances (Hammond 1998).

In contrast, a century and a half ago, Henry David Thoreau wandered across the towns of Concord, Lexington, and Carlisle in Massachusetts, just west of Boston, and had the vision to write into his abundant notes of the 1840s the suggestion that "each town should have . . . a primitive forest, of five hundred or a thousand acres, where a stick should never be cut for fuel, a common possession forever, for instruction and recreation. . . . Let us keep the New World new" (Thoreau 1984).

The land had been settled by Europeans 200 years earlier. Before that it had been for a mere ten thousand years, or twelve, out from under the ice of the Wisconsin Glaciation and for all that time the home of American aborigines, the AmerIndians, who had lived with a light hand on a rich, forested landscape. Thoreau observed that the forest maintained



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the landscape; it ran itself and restored itself after wind or fires or human disturbance. And it was potentially instructive, if preserved and if its lessons were read properly. It was, in his view, an essential part of the landscape and to be preserved as an integral part of the human habitat and of the human experience. Over much of the world forests play a large--very large--role in maintaining a place suitable for life and, especially, for people.

Thoreau did not anticipate that a mere century and a half later, as the millennium came to a close, the whole world would be considering global issues of human-caused climatic change and edaphic and human stability all tied to questions of whether the global landscape could be maintained in the longer term successfully as a human habitat before the crushing, continued expansion of human demands. Let us keep the New World new was a reasonable hope a century and a half ago. We look now at the world and ask whether we can expect the bickering tribes to join sufficiently to keep an earth stable and intact as a biophysical system to support ten or a hundred times the number of people of Thoreau's time and an explosively expanding technology whose whole purpose is to exploit the earth for human use. It is this dual challenge--the growth of the human enterprise and the erosion of essential resources--that dominated discussions leading to the report of the World Commission on Forests and Sustainable Development (WCFS 1999).

Experience is rich and the prospect of success is not encouraging. The most successful civilizations have decayed as forests were destroyed and replaced with shrublands. The shrublands were further impoverished by intensive grazing and erosion until underlying rock emerged and became the landscape. A recent chronicle by Perlin (1989) follows the course of Western civilization and shows persuasively the correlation between the decline in forests and the impoverishment of the landscape and the people. The story is similar in ancient Syria, Persia, throughout the Levant, and the Mediterranean Basin. The decline of the Mycenaean state and, later, ancient Greece paralleled the loss of forests and the impoverishment of the landscape; so, too, with Carthage in North Africa, once a rival of ancient Rome, and, still later, Rome itself. The process continues. We have the contemporary examples of Haiti and Madagascar, now overpopulated and deforested and degraded to the point where their landscapes are dysfunctional, incapable of supporting organized society. Rivers no longer flow in established channels; water from storms in the mountains appears as floods in the lowlands and carries silt to fill harbors and destroy the coastal fisheries. The stability of the landscape is a sine qua non of the restoration of water supplies, the potential of irrigated agriculture, and the capacity of the islands to feed themselves. The restoration of a functional landscape will begin, if it happens at all, with massive aid to reforest and stabilize the uplands to regain control of water flows and water quality and to re-establish an essential and potentially infinite source of timber and fuel. Although economic and political reform may be necessary, economic and political reform that ignores the basic requirement of a stable and habitable landscape, and the necessity for public support for establishing and maintaining it, will fail. A government and a modern economy require a functional landscape to start with.

Madagascar and Haiti are not anomalies. They may be extremes in the continuum of progressive impoverishment of the landscape in the normally forested parts of the earth, but they are far from unique. A similar, if less conspicuous erosion has occurred in China, India, Pakistan, extensive sections of South America, Southeast Asia, the Philippines, Java, and elsewhere. As these words are written, severe storms in the northwest of North America have started landslides on partially deforested slopes in the U.S. National Forests of the Cascade Mountains and the Sierra Nevada. One slide buried an unsuspecting family in their house in the valley far below. Other slides in the region have cut roads and railroads, filled



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rivers, and destroyed forested slopes and agricultural land. Similar erosion on the slopes around Gatun Lake in central Panama threatens the Panama Canal. Virtually every river valley globally suffers in some degree from disruption by logging. The costs are rarely assigned to those who profit from the harvest; the costs are distributed as a general impoverishment of the public realm. And, they are, of course, cumulative, high, and can be highly personal.

The issue was raised before the Commission in various forms throughout its hearings and internal discussions. Forest dwellers were strongly represented in all the hearings and recounted their trials in attempting to defend their interests before governments that seem virtually always to defend commercial interests before the interests of those who live in the forest. The appeals to the Commission were reserved, but the message was clear and often reinforced by personal experience with tragedy, jailings, or evidence of a life spent substantially at war. The Chico Mendes murder over the control of land in the Brazilian state of Acre was widely publicized, but it is only one of hundreds of similar continuing confrontations over forests and land around the world. The issues of civil rights, the proper role of government, a definition of the public interest in land and land use and forests emerged as large and growing in a world of finite resources where the human population continues to expand and the economy runs on greed. The normal function of government is to supply the rules and to mediate the competition, but the rules are changing as the world becomes full.

These were the big issues that came forth in the meetings of the Commission: issues of human rights, the public's interest in a habitable earth, the stability of the human habitat. There were as well the questions of timber and logging rights and the interests of loggers who saw their livelihoods in danger as forests disappear and as conservation of remnants becomes a reality. But the big issues were emergent issues of human rights in the broadest context, a place to live that remains secure and wholesome. These are not new issues. They have been around for all of time as human populations have expanded and technological advancements have enabled the displacement of ancient cultures for profit or mere whim. The process has been defined in exquisite detail recently for India in *Village Voices, Forest Choices*, edited by Mark Poffenberger and Betsy McGean (1998).

The global human population is 6 billion at the beginning of the twenty-first century and will be expanding in these years by about 90 million annually, one new India every 12 years. At the same moment human activities in burning fossil fuels and in the destruction of forests are changing the composition of the atmosphere and warming the earth at globally averaged rates of 2-3 tenths of a degree per decade. The rate is high enough to change forests substantially, to destroy some and to expand and even invigorate others, at least momentarily. The rise in temperature will be rapid enough by some appraisals to stimulate the decay of organic matter in soils and to release additional carbon dioxide and methane, even as the oceans warm and their capacity for absorbing carbon dioxide is reduced. The probability is high that these effects will accelerate the warming (Woodwell 1995). The future vigor of forests is in question even as demands on forests for timber, fiber, fuel, land for agriculture, and for services in stabilizing the landscape all soar. The room for compromise is diminished progressively and rapidly.

The Commission heard evidence of current transitions in the human circumstance from forest dwellers. Populations expand, both within and outside the forest. The land becomes valuable for agriculture and the demand for land increases. At the same time, the value of timber in the world market increases, and large companies, often multinational companies that are skillful in avoiding both taxes and social or political responsibilities, look for ways to keep their investments in the



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technology of timber and pulp working and seek large concessions from governments to harvest forests. The forest dwellers may object, but the government finds itself in pursuit of money and joins the timber interests, sometimes in response to outright bribery and sometimes in the genuine belief that the nation will benefit from an infusion of money from the sale of the timber. The forest dwellers are driven off . . . or murdered. The forest is harvested. The land may go into succession leading to secondary forest, or into agriculture, or, under some circumstances, into impoverishment. Where is the public interest? How is it to be defined and how defended when the room for compromise that existed in an empty world disappears as the world becomes full?

The important new observation is that the world is full: there are few forests that are not used now directly in support of people who live in them. Someone calls each forest home and depends on it for subsistence. The someone may be aboriginal bands whose ancestors have lived there for thousands of years or it may be caboclos or "rubber-tappers," second to fourth generation invaders of the Brazilian Amazon Basin who may have intermarried with aborigines and have lived all their lives as subsistence dwellers of the riverine forest complex of the Basin. Who is to say that such forest dwellers do not have as good a claim on the forest as anyone else? Who is to defend their interest? And, wherever a market for timber exists or can be generated, there is competition to cut it for immediate profit, however modest.

Normally we establish governments, at least in democracies, with the expectation that, among other necessary functions, they will define and protect the civil rights of citizens. But governments, even in democracies, are vulnerable to the influences of economic gradients, sometimes with the earnest conviction that the public interest is being served, sometimes in error, and sometimes through blatant corruption. The possibilities of managing competitive interests in forests, however, are far greater if the human enterprise is expanding into a large realm not otherwise in contest than it is if the realm is diminished and heavily contested. The world has filled and land and other resources are more and more intensively contested. Compromises that could be reached in an earlier time are no longer possible. In these circumstances a new set of considerations enters the public realm, one that has more to do with what will work in a biophysical sense than what will work in an economic or political sense. The issue turns to landscapes and how to keep them integral and functioning in support of the entire human endeavor. The marketplace does not serve that function; government must. The insights as to what will work and the appraisals of the margin for error are a technical realm that is foreign to most politicians, lawyers, and economists. The need for technical experience adds a need for science to the function of government. Land-use plans are, moreover, unpopular in that they appear preemptive. They are also protective in that they can be used to protect the interests of forest users of all sorts, timber and pulp interests as well as forest dwellers and the public's interests in stable water courses, reliable water supplies, the stability of valleys, and supplies of timber and fuel.

The transition marks the end of an epoch. It happens also to mark the end of the millennium, an appropriate time for a re-evaluation of purpose and direction. The public interest emerges with a new, global element of finality. The global public interest is embodied in the observation of climatic disruption through global warming. Forests have a large, if secondary, role. That role is suggested here by the structure of this collection of essays: the global considerations stand first, for once, and the classical considerations of forestry and commerce are summarized into an ecologist's context. Energy is emphasized to show the magnitude of the transitions underway. The whole leads to the realization that in a full



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world, protecting the functional aspects of environment becomes a major issue, and landscape planning becomes a demanding challenge to governments. A definition of the global influence of forests is, even now, not simple. The emergence of widespread recognition of the importance of forests in supporting both economic necessities and biospheric stability is addressed by Woodwell in Chapter 1 and amplified with specific reference to the destabilization of climate through disruption of the global carbon budget by R. A. Houghton in Chapter 2. Houghton continues the discussion in Chapter 3 by examining the demands of agriculture for new land as long-used land becomes impoverished and is abandoned. The demands for new land have fallen heavily on forested regions and constitute a major factor in deforestation, defined here as changes in land use.

The issue, however, is not simply the area of forests. Scientists observe that the changes in chemistry of air, water, and land compounded with numerous other environmental changes, including the introduction of exotic plants and animals, cause cumulative changes in forests that can only be described as "impoverishment." Woodwell addresses the topic in Chapter 4 drawing heavily on his experience with ionizing radiation and persistent poisons to suggest a scale for appraising increments of impoverishment now conspicuous around the world. Woodwell continues the discussion briefly in Chapters 5 and 6, first addressing drainage basins and the well-established influences of forests in determining the quality and quantity of groundwater and runoff. He carries the discussion further in Chapter 6 under the title "Forests and Climate," showing that, despite the obvious importance of the topic, climatologists have not provided definitive detailed analyses of the obvious role of forests in regional and global climates. The topic is surely a major concern of the next years as climatic disruption proceeds under an unprecedented global warming.

The pressures on forests for timber and fiber continue to grow as the human enterprise expands. Sten Nilsson has had many years of experience in appraising the use of forests in meeting these demands and provides a detailed appraisal in Chapter 7 of what can be anticipated over the next years as climatic disruption proceeds. The topic is expanded further by Peter Kanowski in Chapter 8 through an authoritative and somewhat optimistic analysis "Plantation Forestry at the Millennium." The necessity for reducing, even abandoning, fossil fuels as the major source of energy powering industrialization has raised the question of the potential of forests for providing biomass energy. The potential demands are very large as shown in a comprehensive discussion by Larson and Johansson in Chapter 9. The alternatives to a massive assault on forests as a source of fuel are a major shift toward the conservation of energy through improved efficiency in use and a shift toward greatly increased reliance on solar energy.

There is no escape from the conclusion that part of the cost of growth into a finite realm is intensified planning to support intensified use. Ecological land-use planning to assure the protection of the civil rights of each citizen against the intrusions of all, and to protect the interests of all from the intrusions of each, is the touchstone of success in such a world. Some of the elements of planning are already emerging. One is the establishment of the large forested "Extractive Reserves" for the benefit of rubber tappers in the Brazilian state of Acre. The reserves are removed from consideration for transformation into grazing land and from consideration, at least for the moment, as a source of timber or pulp. They are the dwelling place of hundreds of families of forest dwellers who use the forest nondestructively for their livelihood. The lands are mapped and must be protected from intruders, but their existence is provided by governmental action, first, in establishing the reserves and, second, in defending their purpose.



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The challenge for the scientific community is substantial and the community has not responded with the vigor and detail required. But once the issue is drawn, as outlined by Brian Kerr in the penultimate chapter, current techniques of measurement and monitoring, including satellite data and computer-drawn maps, provide ample basis for an objective appraisal of what will work in stabilizing virtually any landscape for the indefinite future while providing as well for support of people. This insight, the new issues at the end of the millennium, are not those of "sustainable forestry," but of sustained use of the landscape, the core innovation required in the transition to a full world whose biophysical stability is increasingly at risk.

The chapters in this book are arranged to emphasize the change that marks the present time and sets a new, far more complicated agenda in management of human affairs.

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