

Preface

I recall speculating years ago with the distinguished Russian scholar, Victor Kovda, at dinner in his Moscow apartment, about the productivity of the currently impoverished vegetation surrounding the modern city of Tblisi in Soviet Georgia. I had seen in a museum in Tblisi an ancient oaken cart with wheels fashioned of single disks of oak cut from the end of a log fully 4 feet in diameter. Large oak trees or forests of any description do not exist in the region now. Kovda guessed that the current productivity of the region, measured as ecologists would measure it as "primary production," is 1% of what it once was. The cause was deforestation followed by the grazing of goats, sheep, cattle, and, later, over much of the land, by tillage, all of which contributed to the erosion of a thin soil.

Tblisi, a landscape that has sustained human occupation from time immemorial, is but one example of the cumulative effects of long-term human activities on the capacity of the landscape for sustaining life. The conference that was the basis for this book emerged from many years of puzzlement over how ecologists address the human-caused transitions that now dominate plant and animal communities globally. For many ecologists, perhaps most, the answer seems to be to focus on some of the more fascinating aspects of the evolution and extinction of species. But human effects and disturbance reach much farther than to extinction alone.

The current tragedy of the tropics is not simply the loss of species, but the transformation of a highly productive, self-maintaining landscape of great versatility and considerable resilience into a barren landscape of limited potential for support of life, including people. The tragedy is compounded by the widespread assumption that human interests are advanced by the transformation.

The earth's complement of living systems is being reduced now more rapidly than at any time previously by the spread of human influences. The changes are global; no part of the earth is unaffected,

no natural or human-dominated community immune. The capacity of forests, savannas, steppes, tundras, and the planktonic communities of oceans, lakes, and streams for sustaining a habitat on earth suitable for humans is in question. The causes are many and are known: mechanical disturbance such as the destruction of forest to make way for agriculture or pasture; chemical disturbance through the release of toxins that acidify rain or poison air and soils; biotic plagues induced by carelessness in managing natural communities of plants and animals. But what are the changes? Are they systematic, cumulative, predictable? At what point in their progress do they become identifiable? To what extent are they reversible? On these points we are weak in detail, fumbling and general in our scholarship. We rely on the extremes of impoverishment to show the effects because the extremes are clearer and less equivocal.

Interpretation of the importance of changes that we have called here impoverishment hinges heavily on assumptions about how the world works. Ecologists see the world as a biotic system, dependent on natural communities such as forests for the normal supply of the goods and services that maintain environment and make civilization possible. Economists and politicians tend to see business and commerce as essential; agriculturalists see different requirements and point to the potential flexibility of agriculture in the face of changing climates. The authors of this book share the view that the world is a biotic system first, and that the human habitat is the product of a series of continuous interactions between the biota and its environment. Consideration of the climatic changes now threatening us only confirms that most fundamental relationship: the human habitat, despite the spread of human influences, remains dominated by natural communities. Although these communities may not be the richest source of succor for the current human enterprise, they have the advantage that they develop and maintain themselves indefinitely without human effort. In most instances they can be shown to supply a diversity of goods and services to people on a renewable basis.

The purpose of this symposium was the definition of the major types of changes in the structure and function of natural communities exposed to chronic disturbance. The purpose was not a cataloguing of disaster or mismanagement, despite the sorry history of carelessness revealed here, but an objective appraisal of the patterns and processes, including the causes, of biotic impoverishment wherever it occurs. The emphasis was on forests because they appear to be the great biotic flywheel that keeps the biosphere operating as a place suitable

for life, but all such communities are being affected. The oceans, too, are changing in response to human activities and the changes are probably irreversible insofar as they involve changes in the chemistry of water, whether the changes are shifts in the ratios of nutrient elements or additions of exogenous toxins with which the biota has had no evolutionary experience.

We were pleased to be able to draw the attention and support of several foundations, listed in the Acknowledgments, to this problem. More than seventy scholars from around the world met in Woods Hole in October 1986 to discuss details of their experience and their perspectives on the biotic transitions that are generally seen now as impoverishment. Each carried his or her own model of what those changes might mean and what, if anything, might be done to deflect the changes. But the most important purpose was recognition that the transitions are under way, that they can be recognized, even measured, and that causes and effects and implications for the human future can be defined. Papers published here were prepared subsequent to the conference. Most have been revised for this, long-delayed, publication.

We have organized the book in much the same way that the symposium was organized, with the more general statements first, followed by what might be described as case history studies. We are soft on politics and economics and government, whose failures in controlling greed are primary causes of the failures of management outlined here. We bow to economics through Robert Repetto's splendid analysis of the causes of deforestation in the Brazilian Amazon and leave that as exemplary of current weaknesses in management.

The conference and the book will have served their purpose if they contribute to an effort to define the details of the impoverishment of the human habitat and start the process of bringing governmental interest and control to the stabilization of the biosphere. We have outlined the broad patterns of the transitions under way; we have not defined in detail a diagnostic procedure for reading the landscape. Such a procedure is nonetheless possible. It will come from future refinements in recognition and use of the patterns summarized here.

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March 1989