PREFACE

THIS BOOK IS a personal view of nutrient cycling and limitation in terrestrial ecosystems. My understanding of the subject has been shaped by my twenty years of research in the Hawaiian Islands, and by many friends and colleagues from a wide range of disciplines who have worked in Hawai'i. However, I do not intend this book as a synthesis of ecosystem research in the Hawaiian Islands; rather, I draw upon studies in Hawai'i to explore fundamental mechanisms involved in nutrient cycling and limitation in terrestrial ecosystems. In putting this work together, I have not hesitated to offer interpretations and applications that differ from those of the original investigators—including my own earlier interpretations. Many of my current interpretations are arguable—particularly in the final chapter—and I trust that readers will argue with them, and will offer alternative syntheses.

In presenting and discussing the results of numerous studies of Hawaiian ecosystems, I have focused on the stories that the data have to tell—most often using figures rather than tables, and avoiding the presentation of detailed statistical analyses of results. The primary data and statistical analyses generally are available in the original publications that are cited here. In addition, references, notes, and all of the numbers that go into each figure can be accessed at www.stanford.edu/vitousek/princetonbook.html.

Even more so than is usual, this book depends upon the contributions of many people. It is difficult to single out any of these friends and colleagues for particular thanks without seeming to slight essential contributions by others. Nevertheless, there are five people who must be acknowledged. Pamela Matson (Stanford University) has been my partner in carrying out this research and in developing its conceptual underpinnings; she has also managed to create space in a very busy life for me to pursue field research, analysis, and writing. Oliver Chadwick (Santa Barbara) has created and synthesized the soil science and geochemical components of the overall project, contributing his own research and drawing in other outstanding scientists from those communities. He has also generously provided unpublished data and interpretations for this book. Bill Robertson (A. W. Mellon Foundation) provided much of the organizational and moral as well as financial support that has made ecosystem research in Hawai'i much more than the sum of its parts. Doug Turner and Heraldo Farrington (Stanford) have managed the samples, laboratory analyses, data, field research, and logistics of Hawaiian research for more than a decade.

Other essential contributors to the particular research that is synthesized here included Claudia Benitez-Nelson, Jackie Heath Carrillo, Tim Crews, Lou Derry, Jim Fownes, Bob Gavenda, Robin Harrington, Lars Hedin, Darrell Herbert, Sarah Hobbie, Sara Hotchkiss, Barry Huebert, Kanehiro Kitayama, Andy Kurtz, Dieter Mueller-Dombois, Jason Neff, Becky Ostertag, Jim Raich, Ralph Riley, David Rothstein, Ted Schuur, Margaret Torn, and Kathleen Treseder. Equally fundamental contributions to research on Hawaiian ecosystems, and so to my understanding of ecosystems in general, have come from Steve Allison, Greg Aplet, Amy Austin, Teri Balser, Tracy Benning, Jon Chorover, David Clague, Susan Cordell, Carla D'Antonio, Jack Ewel, David Foote, Guillermo Goldstein, Mike Gomes, Sharon Hall, Flint Hughes, Lianne Kurina, Jack Lockwood, Kitty Lohse, Virginia Matzek, Lydia Olander, Bill Parton, Holly Pearson, David Penn, Stephen Porder, Carla Restrepo, Ann Russell, Paul Scowcroft, Lani Stemmermann, Don Swanson, Alan Townsend, and Lars Walker. Many other people have contributed to the research in other ways.

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A final word on the Hawaiian language, which contributes most of the place names referenced here. Hawaiian evolved as a spoken language—and so pronunciation is more critical to meaning than is the case in written languages. Each vowel is pronounced in Hawaiian—and in the written form, two symbols are used as guides to pronunciation. The 'okina (') indicates a glottal stop (like that between the syllables of the expression "uh-oh"), and the kahakō (as in the preceding ō) indicates a long vowel.