

ECO- ECONOMY

“One of the
world’s most
influential
thinkers.”

—*Washington
Post*



Building an Economy for the Earth

LESTER R. BROWN

ECO-ECONOMY

Building an Economy for the Earth

Lester R. Brown

EARTH POLICY INSTITUTE®

W · W · NORTON & COMPANY
NEW YORK LONDON

Copyright © 2001 by Earth Policy Institute®
All rights reserved
Printed in the United States of America

First Edition

The text of this book is composed in Sabon. Composition by
Maggie Powell; manufacturing by the Haddon Craftsmen, Inc.

ISBN 0-393-32193-2

W. W. Norton & Company, Inc., 500 Fifth Avenue, New York, N.Y. 10110
www.wwnorton.com

W. W. Norton & Company Ltd., Castle House, 75/76 Wells Street, London
W1T 3QT

1 2 3 4 5 6 7 8 9 0



This book is printed on recycled paper.

*To Roger and Vicki Sant,
who share the vision*

Acknowledgments

Anyone who writes a book is indebted to a great number of people—for research assistance, ideas, reviews, editing, and publishing. On the publishing front, my debt to W.W. Norton & Company is longstanding. When compiling the list for the page of “Other Norton Books by Lester R. Brown” that appears in the front, I realized that Norton has published 38 books of which I am either the senior author or author, including 18 *State of the World* reports, 9 editions of *Vital Signs*, and 11 other titles.

At a time when authors’ horror stories about working with publishers are common, this marriage with Norton must have been made in heaven. This delightful relationship, stretching over 28 years, began when George Brockway was president and served as our contact, and then shifted to Iva Ashner and now Amy Cherry. Working on this book, we have also benefited from working with Lucinda Bartley in the editorial department and the production team led by Andrew Marasia, who put *Eco-Economy* on the fast track. All have been a pleasure to work with.

Writing *Eco-Economy* and launching the Earth Policy Institute during the same year would have been impossible without the help of my assistant of 15 years, Reah Janise Kauffman. As Vice President of the Earth Policy Institute, she took care of endless details in creating the organization—from designing and furnishing the office space to working with Web site designers. With her assuming responsibility for all these matters, I was free to concentrate on the book.

In addition to her unflagging enthusiasm for this book from the beginning, Reah Janise transcribed the entire manuscript from tapes I dictated. As she did, she sometimes edited. She also read the full manuscript in three successive drafts, providing useful suggestions at each stage and helping to shape it.

Janet Larsen, who graduated from Stanford University’s Earth

Systems program a year ago, helped with the research from the beginning. She also critiqued the manuscript as it evolved, helping me to think through many of the issues discussed here. In addition to her diligence and competence, she brought a maturity in judgment that I have come to rely on.

Shane Ratterman became a member of the Earth Policy team just in time to help supervise the installation of the computer system. He joined the book project in midstream, helping with both research and reviewing the manuscript as we came down the homestretch.

This book is built on some new associations, as with Janet and Shane, and several longstanding relationships. The list of my books that independent editor Linda Starke has edited over the last 20 years includes all but a few of those on the Norton list. She brought her usual efficiency and discipline to the editing of *Eco-Economy*. Apart from her editing skills, Linda's cumulative knowledge of environmental issues proved invaluable.

We are indebted to Maggie Powell not only for a great job with the layout and design of the book, but also for her willingness to work on a very tight timeline. We benefited from her years of design experience.

Many individuals provided information on a wide assortment of topics. My thanks go to Earle Amey, U.S. Geological Survey; Donald Bleiwas, U.S. Geological Survey; Eileen Claussen, Pew Center on Global Climate Change; Richard Dirks, National Center for Atmospheric Research; Daniel Edelstein, U.S. Geological Survey; Robert Engleman, Population Action International; Ned Habich, U.S. Department of the Interior; William Heenan, Steel Recycling Institute; Jeffrey Kenworthy, Murdoch University, Australia; Rattan Lal, Ohio State University; Bill Liefert, U.S. Department of Agriculture; Paul Maycock, PV Energy Systems; Iris Perticone, International Geothermal Association; Patricia Plunkert, U.S. Geological Survey; Brian Reaves, U.S. Department of Justice; Karyn Sawyer, National Center for Atmospheric Research; Robert Sohlberg, University of Maryland; Karen Stanecki, U.S. Bureau of the Census; Randall Swisher, American Wind Energy Association; Kenneth Visser, U.S. Department of the Interior; and Hania Zlotnik, United Nations Population Division. Many of my Worldwatch colleagues also provided useful information at various times along the way, including Lori Brown, Seth Dunn, Christopher Flavin, Gary Gardner, Brian Halweil, Anne Platt McGinn, Lisa Mastny,

Ashley Mattoon, Danielle Nierenberg, Michael Renner, and Molly O'Meara Sheehan.

Indeed, for information and insight I am grateful to my colleagues at Worldwatch Institute, whose work has been of great value. The frequency with which they are quoted and cited in this book provides some indication of the quality and range of Worldwatch research over the years. And needless to say, I have drawn heavily on my own many years of work at Worldwatch in writing this book.

Because of its scope, *Eco-Economy* was helped more by reviewers than most books. William Mansfield of our Board brought his many years of experience at the U.N. Environment Programme to bear on the manuscript as he read it at three different stages, helping to shape it along the way. Another EPI Board member, Judy Gradwohl, brought her perspective as a biologist and curator at the Smithsonian Institution to bear on the manuscript as we came down the homestretch. Scott McVay, president of the Chautauqua Institution and also an EPI Board member and enthusiastic supporter of the book, commented on an intermediate draft.

Toby Clark drew on his years of experience in environmental policy at the U.S. Environmental Protection Agency and the Council on Environmental Quality to provide several pages of detailed comments on a late draft of the manuscript. His comments dealing with the interface between economics and ecology were particularly useful.

Maureen Kuwano Hinkle, who worked for 18 years as the Audubon Society's agricultural lobbyist, both read intermediate and final drafts and provided encouragement along the way.

My colleague Dianne Saenz, our Director of Communications, offered useful comments on several chapters. Liz Abbett, an environmental science major at Cornell, joined us for the summer and provided many useful comments on two separate drafts of the manuscript, including some helpful structural suggestions. Both Liz and Millicent Johnson, our librarian and Manager of Publications Sales, assisted in gathering information for the book.

Among those who read parts of the manuscript and offered comments are Carl Haub, Population Reference Bureau; Ashley Mattoon, Worldwatch Institute; Sandra Postel, Global Water Policy Project; Mohan Wali, Ohio State University; and John Young, materials policy consultant. To all who reviewed the manuscript, I

am grateful. And it goes without saying that I alone am responsible for the final product.

Finally, I am indebted to Roger and Vicki Sant, who provided a generous startup grant for the Earth Policy Institute, thus allowing me to concentrate my energy on this book during the Institute's early months.

Lester R. Brown

Foreword

The idea for this book came to me just over a year ago, shortly after I moved from President to Chairman of the Board of the Worldwatch Institute, an organization I founded in 1974. In this new role and with more time to think, three things became more apparent to me. One, we are losing the war to save the planet. Two, we need a vision of what an environmentally sustainable economy—an eco-economy—would look like. And three, we need a new kind of research organization—one that offers not only a vision of an eco-economy, but also frequent assessments of progress in realizing that vision.

When Worldwatch started 27 years ago, we were worried about shrinking forests, expanding deserts, eroding soils, deteriorating rangelands, and disappearing species. We were just beginning to worry about collapsing fisheries. Now the list of concerns is far longer, including rising carbon dioxide levels, falling water tables, rising temperatures, rivers running dry, stratospheric ozone depletion, more destructive storms, melting glaciers, rising sea level, and dying coral reefs.

Over this last quarter-century or so, many battles have been won, but the gap between what we need to do to arrest the environmental deterioration of the planet and what we are doing continues to widen. Somehow we have to turn the tide.

At present there is no shared vision even within the environmental community, much less in society at large. Unless we have such a vision of where we want to go, we are not likely to get there. The purpose of this book is to outline the vision of an eco-economy.

The good news is that when we started Worldwatch, we knew that an environmentally sustainable economy was possible, but we only had an abstract sense of what it would look like. Today we can actually describe with some confidence not only what it

will look like but how it will work. Twenty-seven years ago, the modern wind power industry had not yet been born. Now, worldwide, we have behind us a phenomenal decade of 24 percent annual growth.

Thanks to the U.S. Department of Energy's National Wind Resources Inventory, we now know that North Dakota, Kansas, and Texas have enough harnessable wind energy to satisfy national electricity needs. In the United States, wind electric generation is projected to grow by more than 60 percent in 2001. With the low-cost electricity that comes from wind turbines, we have the option of electrolyzing water to produce hydrogen, the fuel of choice for the fuel cell engines that every major automobile manufacturer is now working on.

Wind turbines are replacing coal mines in Europe. Denmark, which has banned the construction of coal-fired power plants, now gets 15 percent of its electricity from wind. In some communities in northern Germany, 75 percent of the electricity needs are satisfied by wind power.

A generation ago we knew that silicon cells could convert sunlight into electricity, but the solar roofing material developed in Japan that enables rooftops to become the power plants of buildings was still in the future. Today more than 1 million homes worldwide get their electricity from solar cells.

Today major corporations are committed to comprehensive recycling, to closing the loop in the materials economy. STMicroelectronics in Italy and Interface in the United States, a leading manufacturer of industrial carpet, are both striving for zero carbon emissions. Shell Hydrogen and DaimlerChrysler are working with Iceland to make it the world's first hydrogen-powered economy.

What became apparent to me in my reflections a year ago was that to achieve these goals, we need a new kind of research institute. Thus in May of this year, with fellow incorporators Reah Janise Kauffman and Janet Larsen, I launched the Earth Policy Institute. *Eco-Economy: Building an Economy for the Earth* is our first book. We have also begun issuing Earth Policy Alerts, four-page pieces dealing with topics such as worldwide wind power development and the dust bowl that is forming in northwest China. These pieces highlight trends that affect our movement toward an

eco-economy.

No one I know is qualified to write a book of this scope. Certainly I am not, but someone has to give it a try. Every chapter could have been a book in its own right. Indeed, individual sections of chapters have been the subject of books. Beyond the range of issues covered, an analysis that integrates across fields of knowledge is not easy, particularly when it embraces ecology and economics—two disciplines that start with contrasting premises.

People appear hungry for a vision, for a sense of how we can reverse the environmental deterioration of the earth. More and more people want to get involved. When I give talks on the state of the world in various countries, the question I am asked most frequently is, What can I do? People recognize the need for action and they want to do something. My response is always that we need to make personal changes, involving everything from using bicycles more and cars less to recycling our daily newspapers. But that in itself will not be enough. We have to change the system. And to do that, we need to restructure the tax system, reducing income taxes and increasing taxes on environmentally destructive activities so that prices reflect the ecological truth. Anyone who wants to reverse the deterioration of the earth will have to work to restructure taxes.

This book is not the final word. It is a work in progress. We will continue to unfold the issues, update the data, and refine the analysis. If you are interested in receiving the four-page Earth Policy Alerts, please visit our Web site at <www.earth-policy.org>, where you can sign up to receive them as they are released.

Our goal is to publish this book in all the world's major languages. In addition to the North American edition, there will also be a U.K./Commonwealth edition designed to reach most of the rest of the English-speaking world. In East Asia, arrangements are already being made for Chinese, Japanese, and Korean editions. We are also working on Italian and Portuguese editions. And we know that EPI Board member Hamid Taravaty from Iran is planning a Persian edition.

This book can be downloaded without charge from our Web site. Permission for reprinting or excerpting portions of the manuscript can be obtained from Leah Janise Kauffman at <rjkauffman@earth-policy.org> or by fax or mail.

We welcome your input in analyzing these issues. If you have any thoughts or recent papers or articles that you would like to share with us, we would be delighted to receive them.

Lester R. Brown

phone: 202.496.9290
fax: 202.496.9325
e-mail: epi@earth-policy.org
Web site: www.earth-policy.org

Earth Policy Institute
1350 Connecticut Ave., NW
Suite 403
Washington, DC 20036

August 2001

Contents

Acknowledgments	vii
Foreword	xv
1. The Economy and the Earth	3
<i>Economy Self-Destructing</i>	7
<i>Lessons from the Past</i>	14
<i>Learning from China</i>	17
<i>The Acceleration of History</i>	19
<i>The Option: Restructure or Decline</i>	21
I. A STRESSED RELATIONSHIP	
2. Signs of Stress: Climate and Water	27
<i>Temperature Rising</i>	28
<i>The Ice Is Melting</i>	30
<i>Sea Level Rising</i>	34
<i>More Destructive Storms</i>	37
<i>Rivers Drained Dry</i>	39
<i>Falling Water Tables</i>	43
<i>Facing Water Scarcity</i>	46
3. Signs of Stress: The Biological Base	49
<i>Fisheries Collapsing</i>	51
<i>Forests Shrinking</i>	55
<i>Rangelands Deteriorating</i>	58
<i>Soils Eroding</i>	62
<i>Species Disappearing</i>	68
<i>Synergies and Surprises</i>	72

II. THE NEW ECONOMY

4. The Shape of the Eco-Economy	77
<i>Ecology Over Economics</i>	78
<i>A Monumental Undertaking</i>	81
<i>Restructuring the Economy</i>	83
<i>New Industries, New Jobs</i>	85
<i>History's Greatest Investment Opportunity</i>	92
5. Building the Solar/Hydrogen Economy	97
<i>The Energy Efficiency Base</i>	99
<i>Harnessing the Wind</i>	102
<i>Turning Sunlight into Electricity</i>	107
<i>Tapping the Earth's Heat</i>	110
<i>Natural Gas: The Transition Fuel</i>	112
<i>Getting to the Hydrogen Economy</i>	114
6. Designing a New Materials Economy	121
<i>Throwaway Products</i>	123
<i>Materials and the Environment</i>	126
<i>The Earth's Toxic Burden</i>	131
<i>The Role of Recycling</i>	135
<i>Redesigning the Materials Economy</i>	138
7. Feeding Everyone Well	145
<i>A Status Report</i>	147
<i>Raising Cropland Productivity</i>	150
<i>Raising Water Productivity</i>	154
<i>Restructuring the Protein Economy</i>	158
<i>Eradicating Hunger: A Broad Strategy</i>	163
8. Protecting Forest Products and Services	169
<i>Fuel, Lumber, and Paper</i>	170
<i>Forest Services</i>	172
<i>Sustainable Forestry</i>	176
<i>Lightening the Load</i>	178
<i>The Role of Plantations</i>	181
<i>Reclaiming the Earth</i>	183

9. Redesigning Cities for People	187
<i>An Urbanizing Species</i>	188
<i>Car-Centered Urban Sprawl</i>	191
<i>Urbanization and Obesity</i>	195
<i>Urban Rail and Bicycle Systems</i>	199
<i>Planning Cities for People</i>	202
III. GETTING FROM HERE TO THERE	
10. Stabilizing Population by Reducing Fertility	211
<i>Breaking Out or Breaking Down</i>	213
<i>Africa Breaking Down</i>	217
<i>Filling the Family Planning Gap</i>	220
<i>The Role of Female Education</i>	225
<i>Using Soap Operas and Sitcoms</i>	227
<i>Stopping at Two</i>	228
11. Tools for Restructuring the Economy	233
<i>The Fiscal Steering Wheel</i>	234
<i>Tax Shifting</i>	236
<i>Subsidy Shifting</i>	240
<i>Ecolabeling: Voting with Our Wallets</i>	244
<i>Tradable Permits</i>	248
<i>Support for Fiscal Restructuring</i>	249
12. Accelerating the Transition	253
<i>United Nations Leadership</i>	255
<i>New Responsibility of Governments</i>	257
<i>New Role for the Media</i>	259
<i>The Corporate Interest</i>	261
<i>NGOs and Individuals</i>	265
<i>Crossing the Threshold</i>	269
<i>Is There Enough Time?</i>	274
Notes	277
Index	323

Eco-Economy

