The Skeptical Environmentalist

The Skeptical Environmentalist challenges widely held beliefs that the environmental situation is getting worse and worse. The author, himself a former member of Greenpeace, is critical of the way in which many environmental organizations make selective and misleading use of the scientific evidence. Using the best available statistical information from internationally recognized research institutes, Bjørn Lomborg systematically examines a range of major environmental problems that feature prominently in headline news across the world. His arguments are presented in non-technical, accessible language and are carefully backed up by over 2,900 notes allowing readers to check sources for themselves. Concluding that there are more reasons for optimism than pessimism, Bjørn Lomborg stresses the need for clear-headed prioritization of resources to tackle real, not imagined problems.

The Skeptical Environmentalist offers readers a non-partisan stocktaking exercise that serves as a useful corrective to the more alarmist accounts favoured by campaign groups and the media. It is essential reading for anybody with a serious interest in current environmental debates.

BJØRN LOMBORG is an Associate Professor of Statistics in the Department of Political Science, University of Aarhus, Denmark. He has published in international journals in the fields of game theory and computer simulations.

Advance praise for *The Skeptical Environmentalist*

"Bjørn Lomborg raises the important question whether the costs of remedying the damage caused by environmental pollution are higher than the costs of the pollution itself. The answer is by no means straightforward. He has written a pioneering book."

Professor Richard Rosecrance, Department of Political Science, University of California, Los Angeles

"The well-publicized, but failed doomsday predictions made by some well-known environmentalist writers have inspired a number of rejoinders. This is the best one, by a wide margin. Its author teaches statistics in the Department of Political Science at Aarhus University in Denmark. He has marshaled an extremely impressive array of data to buttress his optimism about long-term and current trends in environment and development. On the environmental side, the book covers traditional problems like food, energy, water, and pollution, but also future problems like biodiversity and the greenhouse effect. In each of these areas, he argues that environmental problems can be managed (and in many cases have been managed already), and that trying to turn the clock back will be costlier in economic as well as human terms. On the development side, Lomborg points to encouraging trends in life expectancy, welfare, the decline of population growth, and the reduction of hunger. While he may occasionally make things difficult for himself by insisting that the world is making progress in virtually every area, this is also what makes the book such an impressive tour de force. This volume is a revised version of a much-debated Danish book from 1998, but the documentation is truly international – much more so than in the extensive US literature that promotes a similar message. Since theories of environmental conflict are generally predicated on a premise of scarcity, Lomborg's argument is of great potential importance to peace research."

Nils Petter Gleditsch, Editor, *Journal of Peace Research*, Research Professor, International Peace Research Institute, Oslo (PRIO), Professor of International Relations, Norwegian University of Science and Technology (NTNU), Trondheim

"For many scientists working with developing country issues it has long been difficult to reconcile findings from our field studies in Africa, Asia and Latin America with the pronouncements from environmental pressure groups in the industrialized world. With much better access to media and politicians a number of influential institutes and individuals have created images of a rapidly deteriorating world which is not always apparent to a significant section of the world population. What is even more disturbing is that much of the negative statements on environmental issues and on the global food situation seem to stem from relatively short-term time series, with apparent bias in selection of begin-points and end-points to make development look gloomy. There seems a sharp reluctance in some media and political circles to accept that much progress has been made in providing food for a population which is twice the size of what it was when the Club of Rome issued its doomsday scenarios. Indeed there is reluctance in the North to accept that poor people in the South have mostly done it themselves. It seems almost universally accepted in the North that the forests of the South are disappearing, depriving the globe of its green lungs, whilst serious study of forestry data indicate a much more mixed picture, with India arguably having more forests than 50 years ago.

Lomborg's book is a warning to scientists who have abandoned statistical prudence in their work. Anecdotal science can become biassed science or lead to wrong conclusions. The magnifying glass of crisis-focussed media, the scramble for competitive grants funding among scientists, and the need for pressure groups to sustain themselves, obscure less obvious and often less dramatic trends. And in particular they obscure a great deal of good news for the poor.

The concern for the environment and for the global food situation is honourable. We are all *for* a better environment and high biodiversity, and *against* food insecurity. There is a general consensus against pollution of the environment, wasteful food production methods, inequalities in access to food. There is a growing awareness of the dangers of global climate change. Lomborg does not argue against these legitimate concerns. He argues against lax and biassed use of data, particularly of time series. He warns that it is degrading science by allowing bits to be picked out of context. He is afraid that pompous statements based on flimsy evidence that also attract the media and the politicians constitute a threat to the integrity of science itself. If, in the long run, opportunistic behaviour of scientists leads to disregard of some of the basic tools of science – and statistical analysis is certainly one of them – then science itself will ultimately be the loser.

Lomborg's book questions the scientific basis why good news is suppressed and bad news amplified. But given that the environment is under pressure, it also questions whether we apply the correct remedies. In a world where around 1.5 billion people live on less that one US dollar a day and 2.5 probably on less than two dollars a day, we should be seriously concerned about the human dimension of our interactions with the environment. In our efforts to rescue the environment Lomborg suggests that exorbitant sums may be invested in environmental efforts that mean little to the poor, whilst only a handful of countries set aside as much as 0.7% of their GDP for development aid. If we are developing a setting, based on flawed data analysis, where rich people let butterflies count more heavily in their budgets than hungry and sick people, then we are morally on very thin ice. In a long string of examples Lomborg suggests that there is growing evidence that we may not have got our priority setting right, and that poor people may suffer from our careless handling of scarce data sets.

Lomborg questions most of our common views on the environment, the global food situation, and strategies for development assistance to the poor. He may not be right on all issues, but his plea for scientific stringency in analysis, and his exposure of false environmental prophets, are all very credible."

Stein W. Bie. Director General, International Service for National Agricultural Research (ISNAR)

"Those who feel strongly about poverty always emphasize how deep and widespread it is. But they seldom mention the great amount of people who have been lifted out of poverty over the last few hundred years or, especially, over the last few decades. A similar observation applies to those who care deeply about the environment. They tell us about the inroads of degradation and pollution all over the world, but seldom direct our attention to the results achieved in turning this process around, at least in significant parts of the world.

These attitudes have always amazed me. Although it is important to know the depth and width of a problem, it is no less important to know how it is being met and what results are thus being achieved. It is only in light of that knowledge that we can move forward with force and confidence. Such a view from both sides is the essential asset of Bjørn Lomborg's book. It presents the nature and extension of the problems we are faced with, as well as the ways along which they are being challenged and the results that are being obtained. The outcome is a hopeful view which should hearten all those who feel anxious about poverty and environment."

Jonas H. Haralz, Former Executive Director of the World Bank for the Nordic Countries.

"Based on facts and figures that are common ground to all sides of the ecological debate, this book will change forever the way you think about the state of the world. It is a remarkable, no, an extraordinary achievement."

Tøger Seidenfaden, Executive Editor-in-Chief, *Politiken*

The Skeptical Environmentalist

Measuring the Real State of the World

Bjørn Lomborg

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This is my long-run forecast in brief:

The material conditions of life will continue
to get better for most people, in most countries,
most of the time, indefinitely. Within a century or two,
all nations and most of humanity will be at or above
today's Western living standards.

I also speculate, however, that many people will continue
to *think and say* that the conditions of life are getting *worse*.

Julian Simon (1932–98), Professor of Economics,
University of Maryland (Regis 1997:198)

The book is dedicated to my mother, Birgit Lomborg.

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Preface

The idea for this book was born in a bookstore in Los Angeles in February 1997. I was standing leafing through *Wired Magazine* and read an interview with the American economist Julian Simon, from the University of Maryland. He maintained that much of our traditional knowledge about the environment is quite simply based on preconceptions and poor statistics. Our doomsday conceptions of the environment are not correct. Simon stressed that he only used official statistics, which everyone has access to and can use to check his claims.

I was provoked. I'm an old left-wing Greenpeace member and had for a long time been concerned about environmental questions. At the same time I teach statistics, and it should therefore be easy for me to check Simon's sources. Moreover, I always tell my students how statistics is one of science's best ways to check whether our venerable social beliefs stand up to scrutiny or turn out to be myths. Yet, I had never really questioned my own belief in an ever deteriorating environment – and here was Simon, telling me to put my beliefs under the statistical microscope.

In the fall of 1997 I held a study group with ten of my sharpest students, where we tried to examine Simon thoroughly. Honestly, we expected to show that most of Simon's talk was simple, American right-wing propaganda. And yes, not everything he said was correct, but – contrary to our expectations – it turned out that a surprisingly large amount of his points stood up to scrutiny and conflicted with what we believed ourselves to know. The air in the developed world is becoming less, not more, polluted; people in the developing countries are not starving more, but less, and so on.

I asked myself why I was so definitely convinced that the environmental situation is bad and ever deteriorating. And if I was wrong in my beliefs about the environment, I was probably not the only one. Thus, I contacted one of the leading Danish newspapers, the centre-left, *Guardian*-like *Politiken*, and suggested to them that I write some articles about our understanding of various environmental problems. The outcome was four articles, that gave rise to one of the biggest Danish debates, spreading to all newspapers, and covering well over 400 articles, commentaries and critiques. Later, I tried to follow up on the debate with a book, covering a much wider area and attempting to address all our main worries.

However, the entire debate seemed peculiarly incomplete. To begin with, I was surprised that the only reaction from many environmental groups was the gut reaction of complete denial. Sure, this had also been my initial response, but I would have thought as the debate progressed that refusal would give place to reflection on the massive amounts of supportive data I had presented, and lead to a genuine reevaluation of our approach to the environment. Surprisingly, I met many, even amongst my close friends, who had only read the critical commentaries and drawn the simple conclusion that I was wrong, and that we could comfortably go on believing in the impending doomsday. This suggested that doomsday-visions are very thoroughly anchored in our thinking.

I teach statistics at the University of Aarhus and basically my skills consist in knowing how

to handle international statistics. Normally you associate statistics with a boring run-through of endless rows of numbers – a problem I must every term convince new students is not necessarily true. Actually, statistics can be thoroughly exciting exactly because it confronts our myths with data and allows us to see the world more clearly. This excitement, I hope, is also apparent throughout the book. Though it contains much quantitative information, knowing the state of our world should be stimulating and invigorating, the challenge to our world view healthy and rewarding.

If I mention my profession at a party, it is seldom that I avoid a comment which rightly or wrongly builds on something which the English Prime Minister Benjamin Disraeli (1804–81) is supposed to have said: "There are three kinds of lies: lies, damned lies and statistics."[1] And it's actually true that statistics can be used to manipulate the truth. But used judiciously statistics is the best source of information about our world.

Why? Because the small part of the world that we see amongst our friends and acquaintances and in the media seldom shows a balanced picture of the whole world. For many different reasons our friends and acquaintances are much more similar to ourselves than the average population. Thus, basing our impressions of the world from friends alone will bias our views. Likewise, on TV we often get to hear stories which are twisted and sensationalized in many different and predictable ways (see chapter 2 on the problems of truth and the media).

In this way, statistics offers us a way to see the world more clearly. Indeed, statistics is in many areas the only way we can make a scientifically sound description of the world.

I have let experts review the chapters of this book, but I am not myself an expert as regards environmental problems. My aim has rather been to give a description of the approaches to the problems, as the experts themselves have presented them in relevant books and journals, and to examine the different subject-areas from such a perspective as allows us to evaluate their importance in the overall social prioritization.

The key idea is that we ought not to let the environmental organizations, business lobbyists or the media be alone in presenting truths and priorities. Rather, we should strive for a careful democratic check on the environmental debate, by knowing the real state of the world – having knowledge of the most important facts and connections in the essential areas of our world. It is my hope that this book will contribute to such an understanding.

Language and measures

This book presents a lot of data. In making complete sentences out of specific data, I have often selected fluency over cumbersome accuracy, which nevertheless should be available through the endnotes or the figure captions. When I write 'today' it typically implies the most recently available data, which could be anywhere from 1997 to 2001, depending on the speed of data collection and the time span involved.

Any data book in the English market has to consider the question of measures. This book mainly uses metrics, but whenever 'human-size' data are involved, I try also to indicate the imperial measures.[2] Thus, when discussing the American waste production (Figure 114, p. 207), the national waste is denoted in million metric tons. (I doubt if anyone truly has a feel for the magnitude of 150 million tons of landfill waste, and it would probably not help much to say 330 billion pounds instead.) Here, the important comparison is with the – equally incomprehensible – figures from 1960 or from 2005. However, when talking about the average daily waste per American, a change from 3 pounds in 1985 to 2.5 pounds in 2000 is readily comprehensible.

Timing throughout the book is in Common Era (CE) and Before Common Era (BCE). Energy is denoted by Joule (J) or kilo-watt-hours (kWh). Exponentials are used to denote large numbers, i.e. 5e6 means $5x10^6$, or a five followed by six zeros (5 million). The conventional prefixes are used throughout, with k (kilo, thousand), M (mega, million), G (giga, billion), and for really large numbers E (eta, 1e18) and Z (zeta, 1e21).[3] Celsius is used for temperature, with one degree Celsius being 1.8 degrees Fahrenheit, and 0°C being 32°F.

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Acknowledgement also goes to the large number of researchers who have read through different parts of the book. For different reasons, not all have wished to be mentioned, but they have all contributed with constructive suggestions and useful information, although definitely not all agree with my overall conclusions. Naturally, the customary caveat holds – only I am responsible for the contents of this book.

A big thanks to leader of research at the Center for Development Research, Jannik Boesen, administrative consultant Dr. Arne Høst at the University Hospital in Odense, professor of geology Henning Sørensen, Martin Einfeldt and Søren Fodgaard from the Danish Forestry Association, senior consultant Helle Buchardt Boyd from the Danish Center for Toxicology, Stefan Brendstrup from the Center for Social and Environmental Research, physicist Peter Thejll from the Danish Meteorological Institute, and Jes Fenger, National Environmental Research Institute of Denmark, who commented on large parts of the book.

The most gratitude goes to all the scientists in the field, from universities and research institutes, who actually measure the world in so many different ways, and all the statisticians within government agencies and international organizations who painstakingly assemble and publish the bits and pieces of the information that is presented in this book. A special thanks to the many scientists who have helped with some of the more particular requests: Mark Aldrich from the World Conservation Monitoring Centre, Chuck Allen, Michael Grillot and Harriet McLaine from the Energy Information Agency under the US Department of Energy, Ed Dlugokencky and P. Tans from the Climate Monitoring and Diagnostics Laboratory of the US National Oceanic and Atmospheric Administration, John H. Dyck from the US Department of Agriculture, Dr. Johann Goldammer at the Max Planck Chemistry Institute, Dr. Jim Hammitt at the Department of Health Policy and Management, Harvard Center for Risk Analysis, Dr. Annette Pernille Høyer at the Copenhagen Centre for Prospective Population Studies, senior researcher Alan McHughen at the University of Saskatchewan, Kåre Kemp at the National Environmental Research Institute of Denmark, chief librarian Patricia Merrikin at

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A lot of good friends have spent an inordinate amount of their time reading different chapters and excerpts of the book. Carol Anne Oxborrow has read through heaps of material, and she has given me a better feel for the subtleties of British English while sharpening my expositions in many places. Bill Jeffrey has – despite the recurrent interruptions of his two 3-years olds – managed to get all through the first draft of the book, and his comments have forced me to clarify and strengthen the arguments, while he has also showed me the difficulty of mastering the American side of English. I also want to thank Lars Nørgaard, Martin Ågerup, Simon Henriksen, Henrik Kjærsig, Henrik Kjærgaard, Tom Yoo Kjær Nielsen, Jacob Heide Pedersen and Ulrik Wittendorff. Their good suggestions, constructive criticisms and honest reactions have contributed to making a much better book. In particular, I want to express my gratitude to my long-term friend, colleague and mentor, professor Jørgen Poulsen for his inspiring and always challenging thoughts. Likewise, I want to thank Nikolaj Vibe Michelsen, who has helped shape a lot of the arguments and who willingly let me test out a lot of new (if not always smart) ideas. Finally, I would like to thank my patient students, my good colleagues and here especially professor Søren Risbjerg Thomsen at the Department of Political Science, University of Aarhus. They have supported my research and provided me with an impetus to carry on, while they have also been wonderfully forgiving when sometimes I have turned up late or forgotten a deadline.

I have been fortunate to have a publisher who has supported me all along. My editor, Chris Harrison, has throughout believed in the book and carried it through the many Byzantine quirks of book publishing, while contributing with many good questions and useful advice. Likewise, production controller Caroline Murray, senior design controller Peter Ducker and David Barrett and his colleagues at Servis Filmsetting have all given the book a great layout and handled all the intricacies of getting graphs designed on the screen to look good on paper. Also, marketing director Sloane Lederer and Diane Goddard have worked enthusiastically on promoting the book.

While every effort naturally has been made to ensure that all the information in this book is correct, errors will undoubtedly still have crept in. In the days of old one would have to wait till the book – maybe – was reprinted and the statements could be corrected, but with the internet, this can be done immediately. Thus, I will endeavor to post any mistakes on the book's web-site: www.lomborg.org.

When I first read the interview with Julian Simon in Los Angeles, February 1997, I had no idea that checking up on his statements would end up taking more than four years of my life. But it has been an exhilarating and challenging experience and it has taught me a lot about our world and about my own myths.

The world is not without problems, but on almost all accounts, things are going better and they are likely to continue to do so into the future. The facts and information presented here should give us an opportunity to set free our unproductive worries and allow us to focus on the important issues, so that we may indeed help make an even better world for tomorrow.

Aarhus, 22 May 2001

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