

## Bjørn Lomborg's comments on *Nature* review, Vol 414, 8 November 2001

### No need to worry about the future

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**Environmentally, we are told, 'things are getting better'.**

#### **The Skeptical Environmentalist: Measuring the Real State of the World**

by Bjørn Lomborg

*Cambridge University Press: 2001, 515 pp. £47.50, £17.95*

The subtitle gives the book away. It rehashes books such as Ronald Bailey's *The True State of the Planet* (Free Press, 1995). As Bjørn Lomborg tells us, the book's origin was a class he taught in 1997. The original Danish version appeared a mere year later —remarkably fast, given the delays of academic publishing. It shows, too. This survey of global environmental problems — food, forests, energy, water, pollution, biodiversity, global warming — reads like a compilation of term papers from one of those classes from hell where one has to fail all the students. It is a mass of poorly digested material, deeply flawed in its selection of examples and analysis.

Lomborg admires the late Julian Simon, author of *The Ultimate Resource* (Princeton University Press, 1996). Beside Simon, Voltaire's optimistic Dr Pangloss is gloomy and Albert Einstein a theoretical novice. Simon impressed the US political right by his assertion that we have "the technology to feed an ever-growing population for the next 7 billion years". Ecologists were challenged by this remarkable rejection of basic ecological laws. At present growth rates, the human mass would exceed that of the biosphere within the millennium. Physicists should be in awe, too. Well before the allotted time, human mass would be expanding faster than the Universe.

This is a criticism of Simon (which to a certain extent is correct – he did make some outrageous claims), but irrelevant to my book. It is perhaps worth pointing out (as can be read in the Preface) that I actually set out to disprove Simon, and that I remain skeptical of parts his arguments:

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.

Thus influenced, Lomborg begins with "the litany" — the list of things wrong with the planet, and why, when we see things his way, "things are getting better". The litany quotes news magazines and a book by two science-fiction writers, but not scientists directly. No external references support the ensuing paragraphs justifying that 'things are getting better'. Quoting the primary literature troubled Simon, too.

The litany *is* the general understanding of the environment, as documented by news magazines and popular science magazines (e.g. Time and New Scientist) and popular environmental tracts as Worldwatch Institute State of the World. Thus it is not strange that I use these for documentation. On the other hand, when scientists describe their area, the presumption is that they are right, which is also why I use so much of their data in the book. (See the endnote 5 for the Litany and use of documentation:

Of course many other environmental papers and reports are available which are better from an *academic* point of view (e.g. the many reports by the UN, WRI and EPA, as well as all the fundamental research, much of which is used in this book and can be found in the list of literature).

That there is no external references to support the "things are getting better" is explained in endnote 14: "This and the following claims are documented in the individual chapters below." It seems quite strange that Pimm & Harvey should expect the "things are getting better" to be documented right there and then, as it is the subject matter of the entire book.

Like bad term papers, Lomborg's text relies heavily on secondary sources. Out of around 2,000 references, about 5% come from news sources and 30% from web downloads — readily accessible, therefore, but frequently not peer reviewed. A mere 1% are original papers in *Nature*, half as many again come from contributors to Simon's books. This bias towards non- peer-reviewed material over internationally reputable journals is sometimes incredible — for example, the claim that the evidence for pollution at New York's Love Canal was "jaded". At other times it seems fictional. "Scientific luminaries such as Harvard biologist E. O. Wilson and Stanford biologist Paul Ehrlich are the enthusiastic supporters of an ambitious plan ... to move the entire population of the US. ... people would live in small enclosed city islands." The reference is directly attributable neither to Wilson nor to Ehrlich. "Is it true?" we asked them. Ehrlich: "I know of no such plan. If there were one, I wouldn't support it." Wilson concurred.

That 5% is from news sources is not surprising – this is a book, also trying to document what Greenpeace thinks about global warming, organic farmers about sperm quality or indeed people in general about the environment in general. That 30% is from the web says nothing – by far the majority is from the UN, World Bank, Worldwatch, EU etc. as I state quite clearly (p31):

But for me the most important thing is that there is no doubt about the credibility of my sources. For this reason most of the statistics I use come from official sources, which are widely accepted by the majority of people involved in the environment debate. This includes our foremost global organization, the United Nations, and all its subsidiary organizations: the FAO (food), the WHO (health), the UNDP (development) and the UNEP (environment). Furthermore, I use figures published by international organizations such as the World Bank and the IMF, which primarily collate economic indicators.

Two organizations work to collect many of the available statistics; the World Resources Institute, together with the UNEP, the UNDP and the World Bank, publishes every other year an overview of many of the world's most important data. The Worldwatch Institute also prepares large amounts of statistical material every year. In many fields the American authorities gather information from all over

the world, relating for example to the environment, energy, agriculture, resources and population. These include the EPA (environment), USDA (agriculture), USGS (geological survey) and the US Census Bureau. Finally, the OECD and EU often compile global and regional figures which will also be used here. As for national statistics, I attempt to use figures from the relevant countries' ministries and other public authorities.

Just because figures come from the UNEP does not of course mean that they are free from errors – these figures will often come from other publications which are less “official” in nature. It is therefore still possible to be critical of the sources of these data, but one does not need to worry to the same degree about the extent to which I simply present some selected results which are extremely debatable and which deviate from generally accepted knowledge. At the same time, focusing on official sources also means that I avoid one of the big problems of the Internet, i.e. that on this highly decentralized network you can find *practically anything*.

So when you are reading this book and you find yourself thinking “That can’t be true,” it is important to remember that the statistical material I present is usually identical to that used by the WWF, Greenpeace and the Worldwatch Institute. People often ask where the figures used by “the others” are, but there *are* no other figures. The figures used in this book are the official figures everybody uses.

That Pimm & Harvey finds it problematic that there is only 1% *Nature* articles seems somewhat strange – why should my book have referenced particularly *Nature* articles more? Are *Science* articles not as good? And what about articles from the multitude of other, more specialist journals -- *Journal of the American Medical Association*, *American Economic Review*, *Papers and Proceedings, Environment, Energy Policy, Climatic Change* etc. just to name a few?

Pimm & Harvey find the bias towards non- peer-reviewed material over internationally reputable journals “incredible” in the case of New York's Love Canal. Yet, the reference to the Love Canal comes from the highly reputed *Lancet* and is backed up by a reference from *Environmental Health Perspectives Supplements*. The reference to the ambitious plan (the Wildlands Project) is a news article in *Science* (260:1868-71). Hardly a fictional reference. This reference tells us (page 1868, 1<sup>st</sup> column, bottom):

“Yet the principles behind the Wildlands Project have garnered endorsements from such scientific luminaries as Edward O. Wilson of Harvard, Paul Ehrlich of Stanford (who describes himself as an ‘enthusiastic supporter’), and Michael Soulé of the University of California, Santa Cruz, who is one of the project’s founders.”

Lomborg's great optimism about humanity's future shows up in the way he presents statistics. In the hell-hole that is so much of sub-Saharan Africa, "starving people" constituted "38 percent in 1970 ... [but only] "33 percent ... in 1996. [The percentage is] expected to fall even further to 30 percent in 2010." The absolute numbers of starving are curiously missing from these paragraphs. Roughly, the region's population doubled between 1970 and 1996. To keep the numbers of starving constant, the percentage would have had to have dropped by more than half. The absolute numbers of malnourished in the region — as well as those whom fate will spare through their death from the myriad consequences of poverty (including AIDS) — are surely inconsistent with the first-listed "global trend" in a chapter entitled "Things are getting better".

I discuss in the book, whether morally, relative or absolute numbers are most important, and conclude that relative numbers are (p64):

#### **Relative or absolute improvement?**

When we look at a problem such as hunger or a shortage of pure drinking water, the question often arises as to whether we should use absolute or relative figures.

It is naturally a good thing for the number of people starving to have fallen both in absolute figures and as a percentage. Similarly, it would certainly be bad if both the number and the percentage had increased. But what if one figure increases and the other decreases?

My way of understanding this problem in moral terms involves setting up an ideal, moral choice situation. The idea is to imagine the problem from the point of view of an individual who must choose

in which society he or she wants to live. The point is that the individual does not know his or her position in society (a sort of “veil of ignorance”). This ensures the universality of the moral evaluation.

For the sake of argument, let us say that there are only two types of people—those who die of starvation and those who survive. We can thus describe society A and society B:

- (A) A world in which 500,000 die of starvation out of a population of 1,000,000.
- (B) A world in which 750,000 die of starvation out of a population of 2,000,000.

In society B, the absolute figure has increased but the relative figure has fallen. To me the obvious choice in this situation is that society B is better than society A (although a society without death would naturally be preferable). My risk of dying (of hunger) in society B is 37.5 percent, against 50 percent in society A. My argument, then, is that the relative figure is the more important in a comparison, in which the absolute and relative figures point in opposing directions.

One can naturally criticize this choice on moral grounds, and argue that the society with the lowest absolute figure is the best (i.e. that A is better than B). But a view such as this meets a significant challenge in the form of yet another hypothetical society:

- (C) A world in which 499,999 people die of starvation out of a population of 500,000.

In this situation the absolute point of view has the substantial weakness in that it would also prefer society C to society A. Very few people are likely to see this as the right choice.

Therefore, when the absolute and the relative figures each points in its own direction, the relative figure will probably be the more morally relevant way to evaluate whether mankind’s lot has improved or deteriorated.

Thus, I present the relative numbers, (especially in this context where Pimm & Harvey has taken the quote, where the issue is whether the *Global Environment Outlook 2000* is overstating their case, claiming that crop yields could be cut by half within 40 years – totally contrary to every other prediction). Somehow suggesting that not presenting also the absolute numbers is suspect disregards this relative/absolute discussion. Moreover, I devote a whole section to discuss the Sub-Saharan plight (p. 65ff). Finally, even for Sub-Sahara life expectancy has increased till 1990, and ‘only’ remains stagnant till 2010, not actually declining (p. 52, fig. 16).

Often, Lomborg misses the critical literature in exactly the same ways as did Simon. For example, consider the chapter on biodiversity. It starts out with the by-now standard denigration of consensus estimates on extinction rates and omits relevant papers in even obvious places — including the paper demonstrating that Simon’s estimates are three to four orders of magnitude below everyone else’s.

I denigrate them, because the often quoted and very high die-off numbers are wrong and inconsistent with even the UN data – see below. Again, this is a discussion against me, not against Julian Simon.

The text employs the strategy of those who, for example, argue that gay men aren't dying of AIDS, that Jews weren't singled out by the Nazis for extermination, and so on. "Name those who have died!" demands a hypothetical critic, who then scorns the discrepancy between those few we know by name and the unnamed millions we infer. Exactly repeating Simon, Lomborg juxtaposes the small number of named dead species against the huge number of species for which we have no knowledge at all. After pages of confused argument, his extinction estimate of "0.7 percent over the next 50 years" is strikingly discordant with the 10– 40% of well-known species that teeter on the brink of extinction just from human actions to date. About 2% of well-known species are already so desperately rare that we don't know whether they do survive. Lomborg finds comfort when some are rediscovered. Like terminally ailing humans, their lingering survival does not allay fears about the unfolding epidemic.

Pimm & Harvey get unclear here, since they resort to ‘a hypothetical critic’ but presumably it is meant to be read as if it was me. But I do not juxtapose the small known number of extinct

species to the large number of unknown species – both in the text and in the table, I point out that the known number of extinctions is a serious underestimate: “Note that because of the severe regulations for documenting extinctions these figures certainly underestimate their true number” (p. 250, cf. p. 252).

Pimm & Harvey then claim that the 0.7%/50yrs is strikingly discordant with the 10-40% threatened species, but these are two entirely different measures. Actually, the book documents an analysis of the 1000 birds claimed to become extinct, and finds that primarily because of conservation efforts – “relatively few of these species are likely to become extinct by 2015” (p255). Thus, it is likely that the 10-40% is a vast overestimate of the actual number of species that will go extinct. Pimm & Harvey could attempt to argue that the category ‘threatened’ is a better measure of biodiversity than ‘extinct’ (though methodologically probably much harder to keep constant over time) – but merely contrasting the two numbers to imply that I am wrong in my biodiversity loss estimate is plainly an incorrect argument.

Finally, and surprisingly, Pimm & Harvey do not comment on the fact that the 0.7%/50yrs falls squarely inside the latest and most authoritative UN extinction estimate of 0.1-1%/50yrs (p256). If I am wrong, they ought at least do us the favor of telling us why the UN Global Biodiversity Assessment is also wrong.

On future trends based on forest losses, his flawed examples are unoriginal. "In the US, the eastern forests were reduced ... to fragments totalling just 1–2% of the original area ... this resulted in the extinction of only one forest bird". The correct percentage is close to 50%, and the number of extinctions four, plus two seriously wounded. Those extinctions constitute 15% of the bird species found only within the region (the only ones at risk of global extinction). They strikingly confirm the predictions made from the species-area models that Lomborg disparages.

This example, as well as the forest and bird loss, is from the biologist Simberloff, writing for the World Conservation Union (IUCN), as referenced in the text. If he is wrong, Pimm & Harvey should criticize him. That the argument is unoriginal is entirely correct – I merely quote another scientist’s research. It is much more surprising that Pimm & Harvey neglects the much stronger argument from IUCN, where they looked at the Brazilian Atlantic rainforest (p. 255).

As we saw above in the chapter on forests, about 86 percent of the Brazilian Amazon rainforest is still intact. On the other hand, Brazil’s Atlantic rainforest has been almost entirely cleared, with only approximately 12 percent extremely fragmented forest left. According to Wilson’s rule of thumb, one ought to expect half of all the species to have become extinct. However, when members of the Brazilian Society of Zoology analyzed all 171 known Atlantic forest animals, the group “could not find a single known animal species which could be properly declared as extinct, in spite of the massive reduction in area and fragmentation of their habitat.” And 120 animals in a secondary list “show no species considered extinct.” Similarly no species of plants was reported to have become extinct. The zoologists allege that “closer examination of the existing data ... supports the affirmation that little or no species extinction has yet occurred (though some may be in very fragile persistence) in the Atlantic forests. Indeed, an appreciable number of species considered extinct 20 years ago, including several birds and six butterflies, have been rediscovered more recently.”

An industry has arisen debunking this book chapter by chapter. At present, it includes a website (<http://www.anti-lomborg.com>); a series of essays planned for *Scientific American*; a guide for journalists documenting Lomborg's more egregious errors being assembled by the Union of Concerned Scientists; and various published pamphlets. We have provided only a sampler.

The only presently available text is the anti-lomborg.com. It seems somewhat surprising that Pimm & Harvey chides me for including matters from the web (though at least I use government and international organizations as reference material), when they here refer the reader only to a web-site containing some fairly light-weight discussions of small parts of the book. Moreover, many of the commentaries at this web-site are provided by the academic, who threw a pie in my face instead of debating me at a meeting in Oxford, England. The

reader can be the judge of the appropriateness of including such references in a review in *Nature*.

But *Nature* instructs its reviewers to do more than merely describe a book's contents; we must examine its wider implications. The only such implication we see causes us to ask why Cambridge University Press would decide to publish a hastily prepared book on complex scientific issues which disagrees with the broad scientific consensus, using arguments too often supported by news sources rather than by peer-reviewed publications. Certainly, controversy is part of science, but extraordinary claims require the extraordinary scrutiny that comes from competent peer review — something that appears to be missing in this case.

The summary does not seem to hold up – Pimm & Harvey have not been able to establish how my arguments disagree with the broad scientific consensus (the only attempt in *Biodiversity*, does not even discuss that my estimate lies well within the UN interval), and it does not show that I primarily use arguments backed by news sources instead of peer-reviewed publications.

Basically, the question to ask Pimm & Harvey seems to be: if I really am so wrong, why don't you just document that?