

Veksø, February 20<sup>th</sup> 2002

To  
The Danish Committee on Scientific Dishonesty, DCSD.

### **COMPLAINT AGAINST BJØRN LOMBORG**

The undersigned, biologist, PhD Kåre Fog, wishes hereby to lodge a complaint against Bjørn Lomborg, lecturer at the Department of Political Science at the University of Aarhus, and author of the books "Verdens Sande Tilstand" [The True State of the World], "Godhedens Pris" [The Cost of Goodness] and "The Skeptical Environmentalist". The complaint is mainly concerned with the latter book which I shall hereafter refer to as TSE<sup>1</sup>.

I would like the complaint to be directed to the committee for the natural, agricultural and veterinary sciences and the technical sciences, since the norms of natural science research in my opinion have been breached.

### **BACKGROUND**

I have a Master's Degree in biology from the University of Copenhagen and a PhD from Aarhus University. After a senior scholarship at the Royal Veterinary and Agricultural University of Denmark I have worked as a freelance biologist within nature conservation and nature restoration. I am the author of several books, viz. a book on Nordic Amphibians and Reptiles published by Gads Forlag, and a text book on ecology, which is used/has been used at teachers' colleges and universities. The latest edition of the book is entitled "Økologi – en grundbog" [Ecology – a basic textbook] and has been published by Gads Forlag. In addition I have contributed to other books, for example to "Miljøforvaltning" [Environmental Management] (published at DSR's publishing house at the Royal Veterinary and Agricultural University of Denmark). Last but not least, I have contributed several chapters of the book "Fremtidens Pris" [The Cost of the Future], published in 1999 by The Ecological Council at the publishing house of MS<sup>2</sup>. This is a book of 320 pp, with contributions by 18 experts who point by point counter Bjørn Lomborg's assertions published in "Verdens Sande Tilstand" [the True State of the World].

After Lomborg published TSE in 2001, the Ecological Council has initiated a translation and revision of "Fremtidens Pris", in order to make it available for English readers. I have contributed 5 chapters to the new edition of the book [entitled: Sceptical Questions and Sustainable Answers].

My basis for criticising Lomborg is partly my general background knowledge about ecology, nature conservation and environmental questions, and partly the specific insight which I have gained by reviewing Lomborg's writings and checking his sources.

### **BJØRN LOMBORG'S POSITION**

Currently, Bjørn Lomborg is employed as a lecturer at the Department of Political Science at Aarhus University, although for the past 6 months he has been on leave in order to promote his book in England, North America and Australia. He is employed to manage the course in statistics.

Although Lomborg is employed within an area of political science, in his books he mainly relates to areas belonging to the natural sciences. Admittedly he also moves into areas of political science (environmental economics), but these parts of his publications fall outside the areas which I am able to review, and my complaint therefore purely concerns the natural science aspects of his writings.

In addition to his books, Lomborg has also commented on environmental science topics in the public debate, for instance in a large number of feature articles. I wish material from the public debate to be included as well, in those cases where it is relevant.

According to my judgement, Lomborg's writings are part of his professional, "scientific" work. This is partly proven by the fact that in his book as well as in the public debate, he has consistently been presented as associate professor at Aarhus University. His latest book is published by Cambridge University Press, which must indicate that it should be seen as a scientific product.

Lomborg has received assistance from several of his students; as part of their instruction by Lomborg at the university, students have assisted in consulting references, and two of the students (Ulrik Larsen and Kenneth Thue Nielsen) have published newspaper feature articles with contents which Lomborg later on has utilized/exploited in his books.

I do not know whether Lomborg has written the books during his working hours, but considering the very large number of pages containing an even larger number of details which he has produced within just 3 years, I am unable to believe that he has been capable of writing them during his spare time. They must be a result of his work at the institute.

In the introduction to TSE, Lomborg writes that it is essential not to be biased (p. 7), and that it is crucial to present the truth (p. 12, "Reality versus myths"). This must mean that the book's ambition is to be a scientific presentation, a search for the truth.

I therefore contend that Lomborg's writings belong to the area which falls under DCSD's competence.

I do not myself possess any extra copies of Lomborg's books and the books from the Ecological Council. I hope the Committee is able to procure the books. In case not, please inform me that I have to provide them for you.

#### THE PURPOSE OF THIS COMPLAINT

This complaint is handed over to the committee precisely on February 21<sup>st</sup>, because the closing date of applications for the position as director of the new Institute of Environmental Assessment is on February 21<sup>st</sup> at noon. It is likely that Bjørn Lomborg will apply.

The purpose of lodging this complaint at this moment is to ensure that the Institute's board realises that there is doubt as to Bjørn Lomborg's scientific honesty, at the time when they must decide whom to employ.

But regardless of whether Lomborg in fact applies for the position, I would like an impartial investigation of his production within the environmental area to be performed. I can not know whether the 5 members of the Committee are able to perform this assessment. But my wishes will become fulfilled in the best possible way if it is decided to set up a committee which carries out the assessment, for example so that each member of the committee undertakes to revise one chapter each in TSE.

My contention is that major parts of Lomborg's writings are pervaded with dishonesty. The purpose of this complaint is to obtain a judgement of whether I am wholly or partly right in this contention. My wish will be fulfilled if a paper can be produced stating that Lomborg's writings do not fully comply with the ethical demands of science.

In that case, it is partly a political question to decide which consequences such a paper should have for Lomborg, and I do not believe that I have the right to meddle with the political aspects.

In addition to the political aspects, however, there are some ethical aspects. The consequences for society are severe if the ethical demands on scientists are grossly violated. It means that the population may no

longer trust the results of research, and that a chronic “the doctors disagree” situation arises with perpetual bickering; a situation where the government may say that since the experts disagree, we will make our decisions without any consultations.

This situation already seems to be arising, as Lomborg has been a source of inspiration for Anders Fogh Rasmussen (the Danish prime minister), and since Rasmussen in his TV transmitted speech on New Year’s Eve has distanced himself from the experts and asked people not to trust them. I see a big risk that the collective environmental science may become “disconnected”, i.e., that research may no longer be taken into account by our society’s deciding organs.

#### THE POINTS OF COMPLAINT

I have studied §3 in “Bekendtgørelse nr. 933 om Udvalgene vedrørende Videnskabelig Uredelighed”, [departmental order in respect of the DCSD], and referring to this clause I would like to point out that Lomborg is in breach of the following two points:

4. Deliberately misleading use of statistical methods

7. Consciously distorted reproduction of others’ results

Point 4 is particularly remarkable, since Lomborg is employed as a statistician.

#### **CONCRETE EXAMPLE: LOMBORG’S CHAPTER ON FORESTS**

In relation to my revision of TSE, I have scrutinized the book’s chapter 10, “Forests – are we losing them?”. The chapter takes up 8 pages of the book (pp. 110-117). Within these 8 pages, I am able to find 9 instances where Lomborg breaches the professional standards.

The question how large the world’s forested area really is, has so far been unclear, as different definitions of the word ‘forest’ have been in use in different parts of the world, and raw data have often been unreliable. For example, FAO has for many years published statistics based on official reports submitted by each nation, and some of these reports have been weakly founded or outdated. In addition, defining the term “deforestation” has been a problem. However, FAO has been able to use a unified definition of deforestation for the past 20 years, and based on its own data, FAO is therefore now in a position to make statements about the magnitude of deforestation from 1980 onwards.

In March 2001, FAO’s report on the world’s forests in the year 2000 was published<sup>3</sup>. For the first time, this report gives an authoritative and comprehensive account of forest area and deforestation in the world at large. The novelty in particular is that for the first time, the same definition of forest has been used in all parts of the world.

Lomborg has read and used this report before he published TSE during the late summer of 2001 (acknowledgements are signed on May 22<sup>nd</sup> 2001). I propose that DCSD compare the FAO report with Lomborg’s text.

In the following, I account for the 9 breaches of ethical standards, found in the chapter on forests. Page numbers refer to TSE.

Breach no. 1.

Lomborg says (p. 110): “Globally, the overall area covered by forest has not changed much since 1950, as can be seen in Figure 60.”, p. 111: “Globally, forest cover has remained remarkably stable over the second half of the twentieth century.”, and p. 115 right column: “But as we have pointed out, there has not been a decline in global forest area during this period”. These assertions that the world’s forested area is of constant size are accounted for by new plantations in the tropics and overgrowing of open land zones in the temperate zone, especially Russia. But this is contradicted by FAO.

FAO writes: "Net deforestation at the global level was estimated at approximately 9 million hectares per year and gross global deforestation at approximately 13.5 million hectares per year". The difference between net and gross loss is accounted for by plantations and overgrowing of areas. FAO's table 1 shows that the annual net loss of 9 Mha constitutes 0.2% of the world's forest area. The figures also show that the net loss is equal to two thirds of the gross loss. Thus, the gains far from outweigh the losses. This is further elaborated on in the report's table 3.

Lomborg has read FAO's report. He probably also has seen table 3, since he uses certain figures which in the whole text are only found in one place - immediately below this table, on the same page. And his text is in direct conflict with FAO's report, including table 3. Lomborg does not mention this conflict at all, except a small remark at the top of page 112. Thus, I have to conclude that Lomborg is speaking in bad faith, and that his text is deliberately misleading.

#### Breach no. 2

On p. 115, Lomborg concerns himself with the importance of plantations: "Similarly, many allege that although forest cover has remained constant, this is because we have less natural forest and more plantations.", and p. 117: "Plantations . . . actually help relieve pressure on natural forest."

The FAO report tells us something quite different. New plantations, which succeed, constitute approximately 3 Mha per year. Half of these new plantations are established through re-planting of recently cleared forest; i.e., the other half - plantations on formerly open land - cover 1.5 Mha per year. And in the report's table 3 we notice that 15 Mha of natural forest are annually cleared. Thus, felling of natural forests is far from being offset by plantations, especially not plantations on open land. Giving the readers an impression of such a relationship is misleading.

The situation described above is corroborated by other sources<sup>4</sup>.

#### Breach no. 3.

Regarding how much forest that has been cleared since man started clearing forests during the stone age, Lomborg writes (p.112): "Globally it is estimated that we have lost a total of about 20 percent of the original forest cover since the dawn of agriculture. This figure is far smaller than the one so often bandied about by the various organizations." The figure of 20% is repeated on p. 117. As the source of this figure, he indicates 4 references, all of which are secondary literature, and of which several works are known to exhibit a certain lopsidedness.

Immediately the reader will think that the figure of 20% represents the experts' best estimate of the true value. But when you look through the official figures, they say that from 43 to 49% of the original forest has been lost. A report by World Resources Institute, WRI, thus cites a figure of 49% for lost forests in the tropics, and figures of the same size are cited from the temperate areas<sup>5</sup>. These figures date back some years, so by now an additional 5% must have disappeared in the tropics, consequently altogether more than 50%. These figures must have been available for Lomborg, as he has used the same WRI report as one of his most important sources regarding deforestation in Europe.

The figure of 20% was mentioned in the Danish book and is repeated unchanged in the English edition – although anyone must be able to see that the figure can not be true. In large parts of the temperate zone, far more than 20% of the forest area has vanished, and even as regards Russia (including Siberia) the figure is somewhere around 20% (with considerable uncertainty); here, Lomborg himself says: somewhere close below 20%. The average for the temperate zones therefore must be above 20%. In the subtropical zone it must be considerably higher, and in the tropics it is around 50%, as mentioned above. Incidentally Lomborg goes

through one part of the world after the other, and almost everywhere he finds that more than 20% of the total forest area has disappeared.

Thus, Lomborg's figures lie miles away from what is stated by other, reliable sources. Still Lomborg uses the 20% to criticise those that cite higher figures. And this is done in spite of the fact that he has read the WRI's report, according to which his own 20% cannot possibly be the correct figure.

#### Breach no. 4

The problems described above reappear when we reduce our field of vision to comprise only tropical forest. Concerning tropical forests, Lomborg says (p. 114): "Although precise figures are not available, the Conservation Union World, the IUCN, estimates that 80 percent of the original forest cover is still in place. Within historical times, then, just about 20 percent of all tropical forests have disappeared. Compared with the developed world, where we have cleared almost half of our forest, this is a relatively small figure."

However, the source which Lomborg refers to as saying that 80% of the tropical forests remains, is not reliable. The figure stems back from a chapter<sup>6</sup> in a symposium report where a non-expert on the subject comes up with a rather loosely based estimate. This is definitely not an official IUCN assessment. The assessment is based on an elementary error, as the remaining area of all tropical forest, dry as well as humid, has been calculated in relation to the supposed original area of *rain forest*. Thus, the figure is utterly useless. Still this figure is Lomborg's only source on this point, and in his reference (note 812) he even adds: "Several sources state that we should have lost more than 50 percent of the rain forest . . . Unfortunately, there are no references." One of the mentioned sources is a WWF home page where literature references are of course not generally made.

It is curious that Lomborg himself can believe such a figure, since he elsewhere acknowledges FAO's estimate that throughout the 1980s, 8% of all tropical forests was cleared, and throughout the 1990s 7%. Thus, altogether 15% of all tropical forest has been cleared only since 1980. How is it then possible to believe that since the dawn of the world only 20% has been cleared?

It is hardly possible to calculate how much of the original tropical forest (wet + dry) is left. But when rain forest is concerned, it is possible due to the fact that the original area may be estimated from climatic data. As mentioned above, a WRI report already some years ago estimated that until now, 49% of the original rain forest has been cleared<sup>7</sup>, and as mentioned Lomborg is familiar with this report, as he has cited it elsewhere in the same chapter.

When he employs a quite different figure from an unreliable source instead, and only that, the conclusion must be that he is writing in bad faith.

#### Breach no. 5

In his examination of how much forest has disappeared in historical times in various parts of the world, Lomborg says (p. 112): "Southeast Asia, on the other hand, has only lost 7 percent over the last 300 years."

The incredibly low figure of 7% can not possibly be true. Based on data annexed to FAO's most recent report it may be calculated that in Indochina + Indonesia, the forested area is annually reduced by 1.1%. The 7% would thus be attained in just 6 years. The same data show that the total forest area in this region comprises 46% of the total land area. It must be assumed that almost all of the region has been forest covered, thus the forest loss must be around 50%. The above-mentioned WRI report states that 66% of the original area covered by rain forest has disappeared in South and Southeast Asia.

Lomborg's figure of 7% also appeared in the Danish edition of his book, and here it could have been a misprint (for instance the intended figure might have been 67%). But the figure has been continued in the English book, so it could not simply have been a misprint. At best, it is a case of sloppiness.

#### Breach no. 6

Concerning the rate of deforestation throughout the 1900s, Lomborg tries to play down the negative tendency by employing a very broad definition of the term forest. FAO operates for one thing with the term "forest", which means areas at least 10% covered by the canopy of trees, and for another with "woodland", where less than 10% is covered by canopy, but which still contains trees with intact trunks. Lomborg presents some long time series from 1948 and 1961, respectively, for the total area of "forest + woodland", based on information given by the individual nations. These two time series dominate his figure 60 (p.111). And based on these time series, he concludes on the same page: "With the longest data series, global forest cover increased from 30.04 percent of the global land area in 1950 to 30.89 percent in 1994 . . .". Thus, he concludes that the forest area has increased slightly.

The problem about these figures lies within the definition of "forest". If the canopy cover is reduced from 100% to 11%, then it is still "forest". If the canopy cover now declines below 10% to for example 1%, then it is "woodland", but it is still included in the statistics and thus no change is apparent. Lomborg briefly comments on this problem (p.111), but concludes that his data are "the best information on the global forest area", or, in the legend: "Data availability is poor but by far the best available". This judgement is hardly shared by many others. In his note 767, Lomborg mentions that his text concerns "forest and woodland" up to 1994, but does not explain what "woodland" is, which implies misleading the readers.

Usable sequences of numbers covering what we may in fact call forest (FAO's definition of "forest" with 10% canopy cover) are only available from 1980 onwards. Lomborg's figure 69 also contains FAO's graphs regarding "forest" from 1980 onwards. It is apparent that in the overlapping period (1980 to 1994), the curve rises for "forest + woodland" (marked "FAO database"), while the curve for "forest" is steadily declining. During the time period where we are able to check whether the "forest + woodland" curve shows something meaningful, we thus find that it does not. Since it is based on rather questionable data, only little importance should be attached to it. But in Lomborg's presentation, his graph is absolutely dominated by "forest + woodland", and the text is similarly focused in order to give the impression of a positive situation. Since Lomborg very well knows that the forest area is in fact diminishing, this is a case of manipulation, i.e. misleading of the readers.

#### Breach no. 7

Concerning how much of the remaining tropical forest is being cleared annually, Lomborg provides the following text concerning the development during the past 20 years (p. 113): "The usual FAO estimates put net deforestation in the tropics in the 1980s at 0.8 percent a year, declining to 0.7 percent in the 1990s. With the new 2001-study by FAO based on accurate satellite imagery, the estimate has declined even further to 0.46 percent."

I think that almost anyone reading this will perceive the text to mean that the clearing rate was 0.8% during the 1980s, 0.7% during the '90s, and 0.46 around the year 2000, i.e. a steadily declining trend. Only if you consult Lomborg's note 801, and consider what it says, you find that the situation is

entirely different. All of the figures (given as absolute areas being lost per year) are found in one report, FAO's report from 2001<sup>8</sup>, which I also referred to earlier.

From this report, the following data on how much tropical forest is annually cleared, may be deducted<sup>9</sup>:

	1980s	1990s
Ordinary inventory	0.8 %	0.7 %
Satellite data	0.47 %	0.46 %

The "ordinary" inventory was used in FAO's earlier reports from the 1990s, and it is based on observations on the land surface, whereas "satellite data" are based on photos from space of selected, representative sample areas. Possibly these satellite data are the most reliable, but this is not for certain. More accurate observations of vegetation types may be carried out on the land surface than from space. On the other hand, land-based observations may be lopsided in favour of localities near human settlements. It belongs to the picture that others think that even FAO's ordinary data regarding forest clearing are too low<sup>10</sup>.

Thus, two different estimates exist regarding the development in time, and the two data series may not be directly compared. But by providing the data in the sequence 0.8 – 0.7 – 0.46, Lomborg is able to arrange the figures in such a way that it looks like a regular decline.

Belonging to the picture is the fact that FAO provides an uncertainty factor on the numbers (approximately 15% uncertainty), and on this background FAO clearly concludes that the trend of declining clearing rates is not significant.

A statistician like Lomborg ought to note that a significant change is not concerned here, and inform his readers about it. The ethical standards of science also dictate that you remember to present information which speaks against your own thesis. Lomborg does not do that. Instead, he arranges the numbers in a way that seems misleading and which suggests a strong trend, where there is no significant trend.

#### Breach no. 8

Lomborg argues that the forests are best conserved by ensuring economic growth. He says (p. 117): "Exploitation is due both to individual poverty and to poor government finances. Both problems are really rooted in poor economic conditions, and solutions therefore need to include solid, economic growth, in order to ensure that, in future, developing countries will be able to afford the resources to establish a broader perspective on forest development." He provides no references supporting that economic growth should enable less deforestation – and you might as well suppose the opposite, i.e. that increased economic growth would lead to increased deforestation.

FAO's report in fact throws light on this question. In the report's table 4, some parameters such as the gross national product (GNP/capita), have been correlated with the rate of change in forest area for a number of countries. None of the parameters show any significant correlation with the deforestation. The correlation between GNP and deforestation is + 0.21, and this is not significant. When Lomborg read the report, he must have seen this, and when he argues that the best way of conserving the forests over the long term is to support economic growth, he thus argues in bad faith.

#### Breach no. 9

On p.116, Lomborg treats the issue of forest fires, and especially the contention that in the el niño year of 1997 unusually large forest areas caught fire in Indonesia. He argues that the disaster was not nearly as great as it was made out to be, and he gives two different estimates of the magnitude of forest fires in Indonesia; one is an official governmental estimate of around 200,000 hectares, the other a larger number close below 1.3 Mha based on satellite data. He adds that an independent expert said that "there is no indication at all that 1997 was an extraordinary fire year for Indonesia or the world at large." Further down on the same page, Lomborg makes this conclusion his own as well.

This account has been disputed in *Scientific American* by the biologist Thomas Lovejoy<sup>11</sup>. Lovejoy writes: "Lomborg's discussion of the great fire in Indonesia in 1997 is still another instance of misleading readers with selective information. Yes, the WWF first estimated the amount of forest burned at two Mha, and Indonesia countered with official estimates of 165,000 to 219,000 hectares. But Lomborg fails to mention that the latter were not in the least credible and that in 1999 the Indonesian government and donor agencies, including the World Bank, signed off on a report that the real number was 4.6 Mha." The report in question is explicitly mentioned in the list of references in a recent article in *Nature*<sup>12</sup> where the 1997 fires are labeled "The largest fire disaster ever observed". Lomborg may possibly have overlooked this information, but we do know that he has read the 2001 FAO report which contains an entire chapter in four sections with a clear headline "Forest fires". Lomborg must have noticed that.

In this chapter it is mentioned that the fires in 1997 were unusually extensive, and it says that "Fires were widespread in Indonesia in 1999 and 2000, but not on a scale comparable to 1997-98." Lomborg's contention that the fires in 1997 were just on the usual level is thus not true. Further down the report says: "Comprehensive global statistics on wildland fires required to make a reliable comparison of global fire occurrence in the 1980s and 1990s do not exist." This is inconsistent with what Lomborg says, i.e. that the fires in the USSR and China during 1987 were much more extensive than those of 1987. FAO says that data which may permit such a comparison do not exist.

Again the conclusion is that Lomborg is speaking in bad faith.

## Summary

The above proves that many cases of manipulation, misleading and error appear on the 8 pages about forests, at least around one case per page. This hopefully illustrates what I mean by saying that the book is "pervaded by dishonesty". On those 8 pages, more unreliable than reliable text is found.

I do not contend that the book contains an equal number of mistakes and manipulations throughout; the density of errors is probably slightly lower in most of the other chapters, but still high. Almost everywhere, similar mistakes have appeared when samples of the text have been critically revised.

In this case I have filled in 5 A4 pages in order to account for the errors in 8 of Lomborg's pages. If the density of errors were as great throughout the book, it would take 217 A4-pages to account for all mistakes in the book. A complaint that comprehensive would not be practicable to write and hardly for the Committee to go through either, so I expect the Committee to respect that only samples of the book are criticised.

In the following, I would like to adduce some other examples illustrating that the problems are not merely limited to the chapter on forests.

## **THE NUMBER OF STARVING PEOPLE IN AFRICA**

In their review of TSE in Nature<sup>13</sup>, Stuart Pimm and Jeff Harvey among other things criticised Lomborg's account of the number of starving people in Africa. This was described in a full-page article in *Jyllands-Posten* (a major Danish newspaper) in January, which gave rise to further debate in Danish newspapers, in which I participated. I would like to use this opportunity to give a more accurate account of this subject.

Lomborg writes that in many ways things are worse in Africa than elsewhere in the world, but even here the development is moving in the right direction. For example, on p.6 he mentions some figures regarding the proportion of undernourished people in the African populations. This subject is further outlined on p.61, for instance in his figure 24.

According to Lomborg, the percentage of under-nourished ("starving") in Africa south of Sahara was 38% in 1970, 35% in 1991, and 33% in 1996. In other words, matters move slowly and steadily in the right direction. It is of course possible to discuss whether it is relevant at all to adduce the percentages; in the same period, Africa's population has doubled, so the absolute number of undernourished people has increased dramatically. Lomborg himself encourages a discussion about absolute *or* relative (p.64). However, to put it like that is absurd. If the two ways of representing the numbers indicate different trends, the correct thing to do must be to state both the absolute *and* the relative values, as Lomborg's sources indeed do. Such a discussion can also be seen as a diversion intended to remove our attention from the most precarious issue, i.e. that Lomborg's numbers are manipulated.

In Lomborg's figure 24, two references are given, both of them FAO reports. The first is the report from FAO's World Food Summit 1996<sup>14</sup>. According to this report, the proportion of undernourished in Africa rose from 38% in 1970 to 43% in 1991. The second one is a more recent FAO report on "food insecurity"<sup>15</sup>. According to this report, the proportion has changed from 35% in 1991 to 33% in 1996. One notices a gap in 1991, from 43% in the first report down to 35% in the second. This gap is due to changes in the calculation methods. The changed calculation methods (mentioned in the second report) make the two data sets incomparable. Still Lomborg combines them, whereby he obtains a total drop of 5% from beginning to end. But this decline is composed of a decline of 8% due to changed calculation methods, and a rise of 3% due to an increased proportion of starving people. Thus where an increase may really be concerned, Lomborg is able to manipulate the figures so that we seem to see a decline.

It is very difficult for the reader to see through this manipulation, which implies a major detective effort, one reason being that one of the references is not correctly presented (see below about this).

## **THE DECREASING SPERM QUALITY**

A Danish team of researchers, headed by Professor Niels Erik Skakkebæk at Rigshospitalet, was the first to reach the media with the information that men's sperm quality in Denmark as well as in the rest of the Western world is declining, and to such a degree that it does in fact reduce some married couples' ability to have children. If this is due to chemicals in the environment, then this is the most serious effect on humans by the chemical pollution seen so far.

Since Lomborg wants to impress on the reader that the fear of chemicals is wildly exaggerated, and that in fact there is nothing to fear, then it must be important for Lomborg to demonstrate that the assertion about the falling sperm quality is not true. He has clearly started to work on this aspect from the pre-formed opinion that it would be preferable if this threat would turn out to be a fabrication<sup>16</sup>.

The interesting point is now that we know what happened when Lomborg started on this subject. I have been informed about it by Professor Skakkebæk.

According to Skakkebæk's information to me, the following happened: During the mid-summer of 1998, he was called up by Lomborg at his working place. Lomborg asked if he could have some information about the sperm quality. Skakkebæk then asked how much Lomborg already knew about the subject, and found that Lomborg hardly knew anything. He did not even know the literature review in which the phenomenon was thoroughly documented for the first time<sup>17</sup>. Skakkebæk therefore had to start his information of Lomborg from the basics. The conversation lasted a couple of hours. The result of it was that Skakkebæk sent copies of a substantial number of papers to Lomborg, so that he might learn about the subject. Lomborg told that he was very busy, as the chapter in question must be sent to print already around a week later. The two then corresponded per e-mail, in the way that Skakkebæk received a manuscript from Lomborg, in which he corrected some errors and misunderstandings. The risk of lopsidedness in the debate was also discussed. Skakkebæk thus told that on the one hand, Greenpeace had exaggerated the risk in their publications on the subject – which had made Skakkebæk to publicly dissociate himself from Greenpeace. On the other hand, an investigation in New York<sup>18</sup> showed a lopsidedness to the other side, and claimed that no decline has occurred at all. Skakkebæk took a view midway between these two extremes.

Given Lomborg's preconception of the subject, one might fear that he would stress the New York article which claimed that the danger is not real at all. And that is precisely what happened. The text in "Verdens sande Tilstand" [the True State of the World], which was available in print only 2 months later, has a section on sperm quality which mentions a large number of investigations and renders the impression that the author has a thorough grasp of the subject. We do know that this grasp was only obtained by the help of Skakkebæk 2 months earlier. The text is mainly based on the New York investigation, and on this background all other investigations are criticized. The text claims that some investigations show a fall, while others do not, and the complete picture is thus confusing. Simultaneously, Lomborg emphasizes that the frequency with which men ejaculate their sperm has been rising throughout the century, and the more often the semen is ejaculated, the less living sperm cells are found per semen sample. According to Lomborg, this might explain the apparently declining sperm quality. He ends by concluding that if you take this into account, no investigations show a significant decline any longer.

In theory, this biased presentation might result because Lomborg by accident mainly has come across those papers which are critical towards the reality of the phenomenon. But in this particular instance we know that it is not the case, as we know which literature was sent to Lomborg and thus from what he has made his choices.

It is also apparent from Lomborg's book that he has read another paper from 1997<sup>19</sup>, as he uses this as a reference supporting that the sperm quality increases with increasing interval between ejaculations<sup>20</sup>. However, Lomborg ignores that this investigation does make allowance for this phenomenon, and still finds a significant decline in sperm quality. Incidentally this has been further confirmed later on in a major literature survey of 101 investigations<sup>21</sup>.

Thus Lomborg hides from his reader that documentation of a significant decline in sperm quality does exist, even after changes in the frequency of ejaculations have been taken into account. This conclusion, which is currently based on 101 investigations, does not suit Lomborg, and is apparently ignored for that reason. Instead, Lomborg bases his argumentation on the New York investigation referred to, in which the argumentation is very questionable. It is based

on the assumption that the sperm quality is generally higher in New York than in other American cities and most of the world as well. Only if you accept this assumption, you may reach the same conclusion as Lomborg. Skakkebæk does not accept this assumption, and therefore neither the conclusion. This has vexed Lomborg.

It must be added that the text in TSE is almost unchanged compared to the text in the Danish book.

An additional detail is that Lomborg has used his books in order to throw suspicion on Skakkebæk, and that at the publication of "Verdens sande Tilstand" [the True State of the World] he took the opportunity to disparage Skakkebæk in public (in the newspapers).

## **LOMBORG'S RELATIONSHIP WITH STATISTICS**

Since Lomborg's area of employment is statistics, it is curious that the statistical aspects are so poorly treated in his books.

For instance Lomborg hardly mentions the term significance, and it is not apparent in his books whether the mentioned trends are significant or not. When I dealt with the forest chapter above, I provided several examples of how Lomborg's source explicitly states that certain relationships or trends are not significant, but Lomborg still represents the case as if they were real. A statistician can not afford to do that.

It ought to be elementary knowledge for a statistician that it is not permissible to represent development trends by the use of time series of non-comparable data. In his introduction, Lomborg touches on precisely how wrong it is to do such a thing<sup>22</sup>.

Therefore, it seems odd that Lomborg himself has made this mistake several times. Two examples are mentioned above (the deforestation rate of tropical forests; the proportion of starving people in Arica). This must lead us to suspect that he did it intentionally, hoping that the trick would not be revealed.

One would expect a person with a sense of statistics to pay due regard to the enormous statistical uncertainties which characterize numbers of the kind appearing in Lomborg's books. When the uncertainties are very great, naturally it must be wrong to present numbers with more than one decimal digit. For example he writes, cfr the above, that 30.89 % of the world's land surface was covered by forest in 1994. A very absurd example regards the question how large a share of all animal species will go extinct in the future, a figure where the uncertainty is larger than a factor 10.

In this case, Lomborg says<sup>23</sup> that the number of animal species becoming extinct globally will be below 0.208 % per decade, and probably center around 0.7% per 50 years. In all of his writings, Lomborg stresses that the true value of extinction is 0.7% of all species per 50 years. He is not able to justify why the number is not for example 0.5% or 1%.

This kind of focusing on a very precise value seems odd, but is perhaps due to the fact that the unlearned reader gains the impression of a high degree of objectivity, as though the rate could be calculated with the same reliability as when an engineer calculates the load in the construction of a bridge.

Others have criticised Lomborg's relationship with statistics on other grounds<sup>24</sup>. Thus it is pointed out as strange that he does not distinguish between different forms of probability (frequentist and Bayesian), and that he nowhere defines what he understands by the word "plausible". For example, when he mentions how much the world's temperature is going to rise until the year 2100 due to the greenhouse effect, he does not offer a single guess on what the probability of a relatively dangerous scenario might be, and he contents himself with writing that the temperature rise "will certainly" be no more than 2° C, without defining "certainly".

## **DID LOMBORG TAKE THE CRITICISM INTO ACCOUNT?**

As mentioned earlier, when Lomborg had published “Verdens sande Tilstand” [the True State of the World], it was followed by criticism from me and others, “Fremtidens Pris” [The Cost of the Future]. Lomborg replied in “Godhedens Pris” [the Cost of Goodness], which, however, proved to be of limited utility.

Therefore it was of interest to notice to which degree Lomborg had taken the criticism into account, when *The Skeptical Environmentalist* was published. Many sections of the text are almost unchanged compared to the Danish version, but some things are changed, and on certain points he has adjusted the text according to the adduced criticism. This applies to certain adjustments in the section about temperature rise in relation to the sun spot theory. The overall impression is, however, that Lomborg has taken very little account of the criticism, and that most of the manipulations found in the Danish book are still found in the English-language version.

I would like to mention an example of how Lomborg has allowed for the criticism which I myself have advanced on the subject of biodiversity. My comprehensive critique of Lomborg’s Danish text on biodiversity has only resulted in a single adjustment in Lomborg’s English-language book. This is the place where Lomborg mentions the coastal rain forest in Brazil<sup>25</sup>. On this matter, he says that even though only 1/8 of the original rain forest remains, not a single animal or plant species has become extinct. I have objected to this, arguing that according to the official IUCN red list 1 bird species and 10 plant species which used to exist in this area are now extinct. According to IUCN, “extinct” means that the species has been missing for at least 50 years. Many more may have died out since then, especially considering that the area is very poorly investigated.

However, in his English book Lomborg continues to write: “Similarly no species of plants was reported to have become extinct.” There is a reference to a note, which at a closer look proves to contain the sentence: “Fog reports that since then, 10 plant species have been declared extinct (1999: 133).” Most likely only very few readers are still checking out all of Lomborg’s notes when they have arrived at note 2068, and most of them will never discover that some species have in fact become extinct in the area. In addition, Lomborg makes reference to Fog (1999), i.e., to a Danish text which his English readers are unable to check. The English-spoken reader is thus left at a dead-end, and he does not discover that in fact data from the official global red list are concerned.

Such an approach seems to be typical of Lomborg. On one hand, formalities have been respected – he has in fact mentioned my criticism. On the other hand, he may to an undiminished degree render the positive impression that he wishes to give, as very few readers will notice the note in question. In my view, this is also a form of misleading action.

## **REMARK ON THE REFERENCES**

On the face of it, Lomborg’s incredibly numerous notes (almost 3,000) and references (approximately 1,700) seem impressive, and the intention may have been to impress the reader and signal great objectivity and wide reading. However, it should be added that only a minor part, perhaps around 25%, of the references refer to primary scientific literature. The number of such references are in reality only around 4-500.

But the question is whether the list of references is as useful as it seems. Thus, a review of the book says<sup>26</sup>: “In addition to errors of bias, the text is rife with careless mistakes. Time and again I sought to track references from the text to the footnotes to the bibliography to find but a

mirage in the desert.” One example of such a mirage may be references to Danish-language literature, as in the above example of extinct plant species, where reference might sooner have been made to the official, English-language IUCN report. But it is remarkable that references which do not work, partly appear in those places where the reference is particularly important for the evaluation of Lomborg’s argumentation. Thus, he attaches enormous importance to the estimate that 0.7% of all species are going to become extinct in the course of 50 years. In note 2075, reference is made to Stork (1997). When you find Stork (1997), you are led further on to ”In Wilson et al. 1997”. When you next try to find Wilson et al. 1997, then this reference does not figure in the book, and you find yourself at a dead-end. The correct reference is Reaka-Kudla, Marjorie, Don E. Wilson and Edward O. Wilson (eds.) 1997 . . . , which is found in the list of references. But how is the reader supposed to find that out?

Another example: In order to discover the manipulation with the number of starving people in Africa, it is crucial that you find FAO’s report on food insecurity from 2000. It is found in the list of references as FAO 2000c, as reference is made to the internet address <http://www.fao.org/news/2000>. In a newspaper letter in February 2002, Lomborg still makes reference to this internet address. But the “news” web page in question does not exist any longer, and thus you may not immediately find the report. The current internet address is <http://www.fao.org/sof/sofi>. This example illustrates the inappropriateness of basing such a large proportion of the references on internet addresses.

#### **OTHER PROFESSIONAL AREAS**

When I have merely presented examples from rather few parts of Lomborg’s writings here, this is because I hope that a few samples are sufficient. In the case that DCSD should want further documentation I am able to present similar examples from more chapters. I may mention certain examples from Lomborg’s chapters 3 through 6 concerning human welfare and chapter 9 about fish, as well as more detailed criticism of chapter 16 concerning acid rain, and 23 about biodiversity. Criticism of other chapters may be provided by other persons or with reference to the English-language book which the Danish Ecological Council is currently preparing to publish (the text is ready already and may possibly be submitted if the Council allows it).

#### **CRITICISM RAISED BY OTHER PERSONS**

I am aware that complaints against Lomborg will be submitted to the DCSD also from abroad. Professor Stuart Pimm, Center for environmental research and conservation, MC 5556, Columbia University, 1200 Amsterdam Avenue, New York 10027, USA, has recently sent a complaint to Århus University. I have now agreed with him that he is also going to submit a targeted complaint to DCSD within relatively short time, and I hope that DCSD will treat my and his complaints as one case.

Provisionally I am able to communicate that Stuart Pimm has written the following in his letter to Århus University: ”Along with Jeff Harvey, I reviewed the book [The Skeptical Environmentalist] for Nature. We consider it to be very seriously flawed. It is:

- \*frequently misleading
- \*highly selective in the data that it presents
- \*unusual in the way it reports statistics, and
- \*often misquotes other scientists to their detriment”

In addition it may be told that Pimm also criticises the possibly only scientific publication which Lomborg has gotten published in a

peer-reviewed journal, i.e., his article on the iterated prisoner's dilemma in American Sociological Review.

### **OVERALL CHARACTERIZATION OF LOMBORG**

Altogether, I would like to characterize Lomborg's activities as follows, partly based on what has been said above, and partly based on additional documentation which I am able to submit if this should be desired:

- 1) Lomborg is pervaded by dishonesty in all of his writings.
- 2) He is consistently biased.
- 3) He carries out many different kinds of manipulation, manipulation with data sequences as shown here, but also many other kinds.
- 4) In a number of cases, it is possible to show that he is writing in bad faith and hence with malicious intent.
- 5) He does not follow ethical norms demanding that he must not omit information which speaks against his own theses and in favour of the opponent's.
- 6) He does not ensure that it is possible to check all of his sources, by using an unreasonable number of Danish references in an English-language book.
- 7) His relationship with statistics leaves much to be desired and is not worthy of a lecturer in statistics employed at the university. He rarely gives the reader the opportunity to assess the uncertainty of the results.
- 8) In certain, rather few, cases, actual lies are implied.
- 9) He often misuses and distorts quotations.
- 10) In many cases, he tries to create distrust in certain experts. The example of Skakkebæk is merely one of many.
- 11) He often tries to express himself in ways ensuring a maximum chance that the opponent or the attacked party becomes frustrated, angry, enraged, or otherwise emotionally excited, evidently based on the idea that the opponent's excitement will benefit himself in the eyes of the public when they decide whom to side with.
- 12) For no sensible reason, he tries to create general distrust of the profession of environmental experts at large, for instance by indicating that biologists invent problems in order to have more grants<sup>27</sup>, and by using value-laden words about others, to use the word "admit" very often about others when they say something which is in accordance with Lomborg's theses.
- 13) Considering the above, especially the consistent selectivity, no scientific value may in my opinion be attributed to Lomborg's products.

### **CONCLUSION**

I would like to receive feedback from DCSD regarding how the Committee intends to treat the complaints from me, Stuart Pimm and possibly others, and as stated I am willing to provide further material and documentation to the Committee to the extent which I am capable of.

Kind regards

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- <sup>1</sup> Bjørn Lomborg (2001): *The skeptical environmentalist*. 515 pp. Cambridge University Press.
- <sup>2</sup> H. Schroll et al. (eds.)(1999): *Fremtidens Pris. Talmagi i miljøpolitikken*. 329 pp. Mellempfolkeligt Samvirke og Det økologiske Råd.
- <sup>3</sup> FAO (March 2001): *The global forest resources assessment 2000. Summary report*.  
Ftp://ftp.fao.org/unfao/bodies/cofo/
- <sup>4</sup> FAO: *State of the world's forests 1997*.
- <sup>5</sup> WRI: *World Resources 1994-95*, Table 20.3 pp. 320-321.
- <sup>6</sup> W. V. Reid (1992): *How many species will there be ? Chapter 3 in T.C. Whitmore & J.A. Sayer (eds.): Tropical deforestation and species extinction. The IUCN forest conservation programme & Chapman & Hall*.
- <sup>7</sup> WRI: *World Resources 1994-95*, Table 20.3 pp. 320-321.
- <sup>8</sup> FAO (March 2001): *The global forest resources assessment 2000. Summary report*.
- <sup>9</sup> FAO (March 2001): *The global forest resources assessment 2000. Summary report. Section 10 and 14 herein*.
- <sup>10</sup> R. Steele (1999): *Environmental issues of Asia and the Pacific. I: Regional surveys of the world. The far east and Australasia 1999*. 30<sup>th</sup> ed. Europa publications Ltd.
- <sup>11</sup> T. Lovejoy (2002): *Biodiversity: Dismissing scientific process. Scientific American January 2002*, pp. 73-75.
- <sup>12</sup> F. Siegert, G. Ruecker, A. Hinrichs & A. A. Hoffmann (2001): *Increased damage from fires in logged forests during droughts caused by El Nino. Nature 414 (6862): 437-440*.
- <sup>13</sup> S. Pimm & J. Harvey (2001): *No need to worry about the future. Nature vol. 414, Nov. 8<sup>th</sup>, pp. 149-150*.
- <sup>14</sup> FAO (1996): *World food summit 1996. Technical background document: 1. Food, agriculture and food security. www.fao.org/docrep/*
- <sup>15</sup> FAO (1999): *The state of food insecurity in the world 1999. www.fao.org/sof/sofi/*
- <sup>16</sup> TSE pp. 238-241.
- <sup>17</sup> E. Carlsen m. fl. (1992): *Evidence for decreasing quality of semen during past 50 years. British medical journal 305: 609-613*.
- <sup>18</sup> H. Fisch et al. (1996): *Fertility and sterility 65(5): 1009-1014 & 1044-1046*.
- <sup>19</sup> S. H. Swan et al. (1997): *Have sperm densities declined ? Environmental health perspectives 105: 1228-1232*.
- <sup>20</sup> TSE p. 240 to the right.
- <sup>21</sup> S.H. Swan et al. (2000): *The question of declining sperm density revisited: an analysis of 101 studies published 1934-96. Environmental health perspectives 108 (10)*.

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<sup>22</sup> TSE p. 24.

<sup>23</sup> TSE p. 255 below right.

<sup>24</sup> S. Schneider (2002): Global warming: Neglecting the complexities. *Scientific American*, january 2002, pp. 66-69.

<sup>25</sup> TSE p. 255. See especially note 2068.

<sup>26</sup> T. Lovejoy (2002), see above.

<sup>27</sup> TSE p. 254.