



Decision regarding complaints against Bjorn Lomborg

1. The cases and their consideration

During the first quarter of 2002 the Danish Committees on Scientific Dishonesty (UVVU, or DCSD in English) received three complaints about Bjørn Lomborg (BL):

Case I: On 21 February 2002 DCSD received a complaint from Mr Kåre Fog, MSc, PhD, a biologist (Case No. 612-02-0001)

Case II: On 7 March 2002 DCSD received a complaint from Ms Mette Hertz & Mr Henrik Stiesdal (Case No. 612-02-0002)

Case III: On 22 March 2002 DCSD received a complaint from Messrs Stuart Pimm & Jeffrey Harvey (Case No. 612-02-0004).

DCSD has adhered to customary preliminary investigation practice and has obtained the written contributions of the parties in accordance with Section 4, subs. 2 of the Rules of Procedure for the Danish Committees on Scientific Dishonesty.

Furthermore, on 22 November 2002, DCSD received a complaint from Dr Torben Stockfleth Jørgensen, DPhil. In view of the consideration being given to the other complaints, however, this complaint was received so late on that it has not been subject to separate consideration. The complainant will receive a copy of the present ruling, which is deemed to be adequate at general level, also in relation to his complaint.

The complaints about scientific dishonesty were directed at Bjørn Lomborg's book "*The Skeptical Environmentalist*", Cambridge University Press, 2001. The complaints include many counts and deliberations. Following the round of consultative comments from interested parties, the cases considered include a total of 656 pages (Case I: 378 pages, Case II: 143 pages and Case III: 135 pages).

DCSD discussed the three cases at a joint meeting of all DCSD's committees on Tuesday, 11 June 2002. Discussions at the meeting centred mainly on whether or not the book "*The Skeptical Environmentalist*" should be classified as science. A number of DCSD members stated that the book fails to meet the customary requirements of science and that DCSD ought therefore not to deal with the case. Other members thought that the term "bad science" should not be an obstacle to a complaint being admitted for consideration by DCSD.

It was decided to form a working party under DCSD with an eye to reviewing the extensive material and considering whether a book of this nature can warrant an assessment of scientific dishonesty on the basis of the standards otherwise applied to scientific works. The Working Party was made up as follows:

Dr Nils Axelsen, MD, consultant, head of department (Chairman)
Professor Finn Collin, DPhil
Professor Jørgen Dalberg-Larsen, LLD
Professor Arne Helweg, DSc (Agronomy), research professor
Professor Margareta Järvinen, DPolSci

In September 2002 the working party submitted its report. DCSD's three committees considered the case at joint meetings on 9 October and 10 December 2002.

2. The Working Party's examination of "*The Skeptical Environmentalist*"

"*The Skeptical Environmentalist*" is published by Cambridge University Press, 2001. The book is more than 500 pages in length, as well as including 25 chapters, divided into Parts I-VI, notes totalling 2,930 numbers and more than 1,800 references (bibliography). Combined, the notes and bibliography take up 152 pages. The book has 173 figures and 9 tables. The Danish version, entitled "*Verdens sande tilstand*" (literally: "The True State of the World") is included in the Department of Political Science's list of publications in the University of Aarhus's 1998 annual report, the English-language version being listed as a monograph under the Department's research publications for the year 2001.

The contents of "*The Skeptical Environmentalist*" can be briefly summarized as follows:

Part I, *The Litany* (*klagesang*), describes how one of the sources of the litany is the Worldwatch Institute's annual reports, "*The State of the World*", which have appeared since 1984. One of the protagonists in the criticism of the Worldwatch Institute is Lester Brown of the Earth Policy Institute. Bjørn Lomborg does not feel that this and other institutions live up to their objectives and points out that the premises, the facts, must be set straight. That is what he has set out to do in this book.

Part II, *Human Welfare*, examines the size of the world's population and its development, life expectancy and health, food and hunger, and prosperity. It is

concluded that there has never been such a great degree of prosperity as now.

Part III, *Can Human Prosperity Continue?*, discusses the prospects of having sufficient future resources: food, forests, energy, non-energy resources and water. It is concluded that there are enough resources for continued prosperity.

Part IV, *Pollution, Does it Undercut Human Prosperity?*, examines air pollution, acid rain and forest death, indoor air pollution, water pollution and waste. It is concluded that the pollution burden has diminished.

Part V, *Tomorrow's Problems*, examines chemicals, biodiversity and global warming. It is concluded that the fear of chemicals and reduction of species is exaggerated, and that the colossal sums it is planned to deploy on reducing global warming will be money ill spent.

Part VI, *The Real State of the World*, is introduced thus: "Throughout this book I have tried to present all the facts, to give us a rounded feel of the real state of the world, and I have tried to compare and contrast it to our current understanding, stemming from the recurrent incantations of the Litany". The message is that priorities must be assigned and that prioritization must be done on the basis of facts. Cost-benefit analyses must be established. Being overly optimistic is not without its costs, but being overly pessimistic is very expensive. The book concludes: "Thus, this is the very message of the book: Children born today - in both the industrialized world and developing countries - will live longer and be healthier. They will get more food, a better education, a higher standard of living, more leisure time and far more possibilities - without the global environment being destroyed. And that is a beautiful world".

3. The Working Party's reproduction of the professional published critique of "The Skeptical Environmentalist" prior to the complaints to DCSD

"The Skeptical Environmentalist" has given rise to extensive public discussion and debate, both in Denmark and internationally. There have been enthusiastic reviews in some of the world's top newspapers such as the Washington Post and the New York Times, and in *The Economist*.

The magazine *Scientific American* asked four leading experts to assess Bjørn Lomborg's treatment of their own fields: global warming, energy, population and biodiversity, devoting 11 pages to this in January 2002.

Stephen Schneider: *"Global Warming, Neglecting the Complexities"* - Schneider is a particularly respected researcher who has been discussing these problems for 30 years with thousands of fellow scientists and policy analysts in myriad articles and formal meetings.

Most of Bjørn Lomborg's quotes allude to secondary literature and media articles. Bjørn Lomborg uses peer-reviewed articles only when they support his rose-coloured point of view. By contrast, the authors on the

Intergovernmental Panel on Climate Change (IPCC) were subjected to three rounds of audits by hundreds of external experts.

Bjørn Lomborg employs no clear and discrete distinction between various forms of probabilities. He makes frequent use of the word "plausible" but, strangely for a statistician, he never attaches any probability to what is "plausible". IPCC gives a large "range" for the majority of projections, but Bjørn Lomborg selects the least serious outcomes.

Stephen Schneider then provides a specific criticism of Bjørn Lomborg's four main arguments:

1. Climate Science: Bjørn Lomborg quotes an article in Nature (from the Hadley Center, 1989), uncritically and without the authors' caveats. BL quotes Lindzen's controversial "iris effect" as evidence that IPCC's climate range needs to be reduced by a factor of almost three. BL either fails to understand this mechanism or else omits to state that the data stem from only a few years' data in a small part of a single ocean. Extrapolating this sample to the entire globe is wrong. Similarly, he quotes a controversial Danish paper claiming that solar magnetic events can modulate cosmic radiation and produce a clear connection between global low-level cloud cover and incoming cosmic rays as an alternative to CO₂ in order to explain climate change. The reason IPCC discounts this theory is "that its advocates have not demonstrated any radiative forcing sufficient to match that of much more parsimonious theories, such as anthropogenic forcing."

2. Emissions scenarios: Bjørn Lomborg assumes that over the next several decades, improved solar machines and other new technologies will crowd fossil fuels off the market, which will be done so efficiently that the IPCC scenarios vastly overestimate the chance of major increases in CO₂. This is not so much analysis as wishful thinking contingent on policies capable of reinforcing the incentives for such development, and BL is opposed to such policies. No credible analyst can just assert that a fossil-fuel-intensive scenario is not "plausible" and, typically, BL gives no probability that this might occur.

3. Cost-benefit calculations: Bjørn Lomborg's most egregious distortions and feeblest analyses are his citations of cost-benefit calculations. First, he chides the governments that modified the penultimate draft of the IPCC report. But there was a reason for that modification, which downgraded aggregate cost-benefit studies: these studies fail to consider so many categories of damage held to be important by political leaders, and it is therefore not the "total cost-benefit" analysis that Bjørn Lomborg wants. Again, BL cites only a single value for climate damage - 5 trillion dollars - although the same articles indicate that climate change can vary from benefits to catastrophic losses. It is precisely because the responsible scientific community cannot rule out catastrophic outcomes at a high level of confidence that climate mitigation policies are seriously proposed. For some inexplicable reasons, BL fails to provide a range of climate damage avoided, only a range for climate policy costs. This estimate is based solely on the economics literature but ignores the findings of engineers and does not take into account pre-existing market

imperfections such as energy-inefficient machinery, houses and processes. Thus, five US Dept. of Energy laboratories have suggested that such a substitution can actually reduce some emissions at below-zero costs.

4. The Kyoto Protocol: Bjørn Lomborg's invention of a 100-year regime for the Kyoto Protocol is a distortion of the climate policy process. Most analysts know that "an extended" Kyoto Protocol cannot deliver the 50% reduction in CO₂ emissions needed to prevent large increases at the end of the 21st century and during the 22nd century, and that developed and developing countries alike will have to cooperate to fashion cost-effective solutions over time. Kyoto is a starting point, and yet with his 100-year projection BL would squash even this first stage.

Bjørn Lomborg's book is published by the social sciences side of Cambridge University Press. It is no wonder, then, that the reviewers failed to spot BL's unbalanced presentation of the natural science. It is a serious omission on the part of an otherwise respected publishing house that natural-science researchers were not taken on board. "Lomborg admits, 'I am not myself an expert as regards ENVIRONMENTAL PROBLEMS' - truer words are not found in the rest of the book".

John P. Holdren: "Energy: Asking the Wrong Questions"

Bjørn Lomborg's chapter on energy covers a scant 19 pages and is devoted almost entirely to attacking the belief that the world is running out of energy, a belief that BL appears to regard as part of the "environmental litany". But only a handful of environmental researchers, if any at all, believe this today. Conversely, what they do say about this topic is that we are not running out of energy, but out of environment, i.e. the capacity of air, water, soil and biota to absorb, without intolerable consequences for human well-being, the effects of energy extraction, transport, energy transformation and energy use. They also say that we are running out of the ability to manage other risks of the energy supply, such as overdependence on Middle East oil and the risk of nuclear energy systems leaking weapons materials and expertise into the hands of proliferation-prone nations or terrorists. This has been the position of the environmental researchers for decades (e.g. from 1971, 74, 76 and 77).

So whom is BL so resoundingly refuting with his treatise on the abundance of world energy resources? The professional analysts have not been arguing that the world is running out of energy, only that the world could run out of cheap oil. BL's dismissive rhetoric notwithstanding, this is not a silly question, nor one with an easy answer.

Oil is currently the most valuable of the conventional fossil fuels that have long provided the bulk of the world's energy, including almost all energy for transport. The quantity of recoverable oil resources is thought to be far less than coal and natural gas, and those reserves are located in the politically volatile Middle East. Much of the rest is located offshore and in other difficult and environmentally fragile areas. There is, accordingly, a serious technical literature, produced mainly by geologists and economists, exploring the questions of when world oil production will peak and begin to decline, and what the price might be in 2010, 2030 or 2050 - with considerable

disagreement among informed professionals.

BL seems not to recognize that the transition from oil to other sources will not necessarily be a smooth one or occur at prices as low as the price of oil today. BL shows no sign of understanding why there is real debate about this among serious-minded people.

BL offers no explanation of the distinction between "proved reserves" and "remaining ultimately recoverable resources", nor of the fact that the majority of the latter category is located in the Middle East, but placidly informs us that it is "imperative for our future energy supply that this region remains reasonably peaceful" - as if that observation does not undermine any basis for complacency.

BL is right in his basic proposition that the resources of oil, oil shale, nuclear fuels and renewable energy are immense. But that is disputed by only few environmental researchers-and no well-informed ones. But his handling of the technical, economic and environmental factors that will govern the circumstances and quantities in which these resources might actually be used is superficial, muddled and often plain wrong. His mistakes include apparent misreadings and misunderstandings of statistical data, the very kinds of errors he claims are pervasive in the writings of environmentalists. By the same token, there are other elementary blunders of a type that should not be committed by any self-respecting statistician. Thus, it is wrong that measures in the developed countries have eliminated the vast majority of SO₂ and NO₂ from smoke from coal-burning facilities: it is only a minor proportion. Other examples are given, and when it comes to nuclear energy, plutonium is such a great security problem as regards the potential production of nuclear weapons that it may preclude use of the "breeding" approach unless a new technology is invented that is just as cheap.

BL uses precise figures, where there is no basis for such, and he produces assertions based on single citations and without detailed elaborations, which is far from representative of the literature.

Most of what is problematic about the global energy picture is not covered by BL in the chapter on energy but in the chapters dealing with air pollution, acid rain, water pollution and global warming. The latter has been devastatingly critiqued by Schneider.

There is no space to deal with the other energy-related chapters, but their level of superficiality, selectivity and misunderstandings is roughly consistent with what has been reviewed here.

"Lomborg is giving skepticism - and statisticians - a bad name."

John Bongaarts: "Population: Ignoring Its Impact"

Bjørn Lomborg's view that the number of people is not the problem is simply wrong. The global population growth rate has declined slowly, but absolute growth remains close to the very high levels observed in past decades. Any discussion of global trends is misleading without taking account of the

enormous contrasts between world regions, where the poorest nations of Africa, Asia and Latin America have rapidly growing and young populations, whereas Europe, North America and Japan have virtually zero, and in some cases even negative, growth. As a consequence, all future growth will be concentrated in the developing countries, where four-fifths of the world's population lives: from 4.87 to 6.72 billion between 2000 and 2025, or just as large as the record-breaking increase in the past quarter of the (21st) century. This growth in the poorest parts of the world continues virtually unabated. The growth has led to high population density in many countries, but BL dismisses concerns about this issue, based on a simplistic and misleading calculation of density as the ratio of people to land. In Egypt this would make 88/km², but deducting the uncultivated and unirrigated part of Egypt, it makes 2,000/km² - no wonder Egypt has to import foodstuffs! Measured correctly, population densities have reached extremely high levels, particularly in large countries in Asia and the Middle East. This makes demands in terms of agricultural expansion on more difficult, hitherto untilled terrain, increased water consumption and a struggle for the scarce water resources between households, industry and farming. The upshot will be to make growth in food production more expensive to achieve. BL's view that increased food production is a non-issue rests heavily on the fact that foodstuffs are cheap; but BL overlooks the fact that it is large-scale subsidies to farmers, particularly in the developed countries, that keep prices artificially low.

Appreciably expanding farming will result in a reduction of woodland areas, loss of species, soil erosion, and pesticide and fertilizer run-offs. Reducing this impact is possible but costly, and would be easier if the growth in population were slower.

BL overlooks the fact that population growth contributes to poverty. First, children have to be fed, housed, clothed and educated - while economically non-productive - then jobs have to be created once they reach adulthood. Unemployment lowers wages to subsistence level. Counteracting population growth has fuelled "economic miracles" in a number of East Asian countries.

BL overlooks the fact that the favourable trend in life expectancy is due to intensive efforts on the part of governments and the international community, but despite this, 800 million are still malnourished and 1.2 billion are living in abject poverty. Population is not the main cause of the world's social, economic and environmental problems, but it is a substantial contributory factor. If future growth can be slowed down, future generations would be better off.

Thomas Lovejoy: "Biodiversity: Dismissing Scientific Progress"

In less than a page, Bjørn Lomborg discounts the value of biodiversity both as a library for the life sciences and as a provider of ecosystem services (partly due to the general absence of markets for these services). When he does get round to extinction, he confounds the process by which a species is judged to have been made extinct with estimates and projections of extinction rates. In contrast to BL's claim, the loss of species from habitat remnants is a widely documented phenomenon. A number of factual errors are highlighted. BL

takes particular exception to Norman Myer's 1979 estimate that 40,000 species are being lost every year, failing to acknowledge that Myer deserves credit for being the first to point out that the number was large and at a time when it was difficult to do so accurately. Current estimates are given in terms of the increases over normal extinction rates. BL cynically spurns this method, because such estimates sound more ominous. Instead, he ought to acknowledge that this method is an improvement in the science. These rates are currently 100 to 1,000 times' the normal, and are certain to rise as natural habitats continue to dwindle.

The chapter on acid rain is equally poorly researched and presented. BL establishes that acid rain has nothing to do with urban pollution, though it is a fact that nitrogen compounds (NO_x) from traffic are a major source. Errors are pointed out in BL's view of acid rain on forests.

The chapter on forests suffers from BL not knowing that FAO's data are marred by the weight of so many different definitions and methods that any statistician should know they are not valid in terms of a time series. There are errors in the figures from Indonesia in 1997. BL confuses forests with tree plantations, and asserts that the only value of forests is harvestable trees. That is analogous to valuing computer chips for their silicon content only.

It is important to know that while deforestation and acid rain are reversible, extinction of species is not.

BL entirely overlooks the fact that environmental scientists identify a problem, posit hypotheses, test them and, having reached their conclusions, suggest remedial policies. By focusing on the first and last stages in this process, BL implies incorrectly that all environmentalists do is exaggerate.

Continued discussion between BL and the critics in Scientific American Bjørn Lomborg, in his replies to the scientists mentioned, accepts virtually nothing of the full-scale criticism levelled at him. On Scientific American's homepage (15 April 2002) *John Rennie* and *John Holdren* presented a powerful rebuttal of Bjørn Lomborg's replies to Scientific American's examination of the four topics, also including a critique of BL's style of argument. This is how *Holdren's* rejection is set out under the headings:

"Misrepresenting what I wrote, Obfuscating what he wrote,
Persistent conceptual confusions, Vagueness where specificity
was required, Illusory precision where only approximations are
possible, Concluding observation"

Time Magazine devotes 60 pages on 2 September 2002 to a series of articles under the heading "How to Preserve the Planet and Make This a Green Century". Bjørn Lomborg's book is referred to on page 58 under the heading "Danish darts. Reviled for sticking it to the ecological dogma. Bjorn [sic] Lomborg laughs all the way to the bank." It says the following about the scientific critique: "Some scientists say they initially hoped to ignore Lomborg, but in the wake of this book's popularity have reacted with a fury rarely seen in academia. Peter Raven, chairman of the American Association

for the Advancement of Science, calls Lomborg 'the prime example in our time of someone who distorts statistics and statements to meet his own political end.' A dozen esteemed scientists, including Raven and Harvard's Edward O. Wilson, are demanding that Lomborg's publisher cut him loose. 'We are deeply disturbed that Cambridge University Press would publish and promote an error-filled, poorly referenced and non-peer-reviewed work', they write in a letter calling on Cambridge to transfer publishing rights to a popular, nonscholarly press."

The Working Party concludes its examination of the criticism thus:

The topics dealt with by Bjørn Lomborg's book are of great social import and hence of corresponding political interest. It is the view of the Working Party that the many, particularly American researchers, who have received Bjørn Lomborg's book with great gusto, even in a specifically negative fashion, are unlikely to have even given the book the time of day unless it had received such overwhelmingly positive write-ups in leading American newspapers and in *The Economist*. The USA is the society with the highest energy consumption in the world, and there are powerful interests in the USA bound up with increasing energy consumption and with the belief in free market forces. The USA is also responsible for a substantial part of the research into this and other areas dealt with by Bjørn Lomborg.

Bjørn Lomborg claims that he has presented all the facts and has substantiated this with a large body of notes and a bulky bibliography. The exchanges of views between Bjørn Lomborg and his critics are technical, scientific and scholarly in content. What is not usual in "common" specialist-scientific discussion is Bjørn Lomborg's personal attacks and apparent inability to take part in such a discussion, cf. the critique of BL's style of argument and of the fact that he, so to speak, accepts nothing of the massive criticism.

Apart from the unusually widespread professional disagreement with Bjørn Lomborg, the critics are offended at his belittling a number of researchers and lumping researchers together with environmental activists, parts of the serious scientific research community at any rate being accused of having misunderstood the relevant concepts, of misrepresenting relevant facts, of understating uncertainties, of cherry-picking data and of not acknowledging errors when these had been proven - in a nutshell, at members of the research community being guilty of large-scale infractions of the researchers' code of conduct.

4. The Working Party's examination of the three complaints

In the three complaints, BL is accused of fabricating data, selectively and surreptitiously discarding unwanted results, of the deliberately misleading use of statistical methods, consciously distorted interpretation of the conclusions, plagiarism of others' results or publications, and deliberate misrepresentation of others' results. Together, the three complaints cover the bulk of the chapters in *Bjørn Lomborg's* book. In Case III Stuart Pimm and Jeffrey Harvey use an extensive portion of the published criticism, including

the Scientific American discussion, as a basis for their complaint.

In his replies, BL dismisses practically all the counts on which he offers his position, but as with the discussion in Scientific American, his rebuttals are not accepted by the complainants.

5. The Working Party's deliberations on the scientific process and dissemination of scientific results to the public

The scientific process

In the report that formed the basis for the creation of DCSD in the health science domain, the following brief description of the scientific process was given:

"The result of scientific work is *knowledge, cognition*, in the form of notions, assumptions and *hypotheses* about 'the correct correlation between things'. Given that the point of the exercise is to broaden our knowledge, the actual core of science is the critical reasoning conducted in the scientific literature, based on documented observations. By virtue of this process, it is decided whether new ideas can withstand massive criticism and be declared sound, and whether less sustainable ideas should be sidelined."

The best quality control is achieved when science is published in scientific journals. These are prolific in number and, particularly within health and natural science, output is high. Every specialist discipline has a kind of hierarchy of journals, and special interest and attention attaches to those located at the top end of the range in terms of scholarly scientific quality. High quality is statistically correlated with the stringent requirements imposed on the manuscripts submitted with the aid of their adjudicators, referees who provide the authors with pointed, critical counterthrust. A manuscript will often pass back and forth several times, with the possible addition of new observations and lines of reasoning, before a final editorial stance is taken on publication or rejection. The referee system is a mainstay of the scientific world. So it is with good reason that researchers ascribe great importance to where a scientific paper has been published.

Dissemination of scientific results to the public

Safeguarding the public's legitimate interest in being kept informed of progress in research is the ongoing subject of many deliberations in many scientific fora and on the editorial boards of many journals etc.

It is out of keeping with good scientific practice for a researcher to publish by bypassing specialist academic fora, i.e. to notify news media of a result that has not yet been subjected to professional scrutiny in the customary fashion. Good journals make publication conditional on no such form of publication having taken place. It is in the interest of all parties that these simple guidelines be followed in order to deter unclear, unreliable or possibly

misleading information from being disseminated to the public, thus ensuring that the public debate and any potential political consequences rest on a foundation that is as sure-footed and substantial as possible.

Furthermore, when researchers make statements to the press about research results, their opinions are often ascribed greater importance than those of non-researchers, regardless of whether such statements relate to topics remote from their own area of expertise and in which they therefore have no qualified opinion to match their formal position and any academic degree they may hold. This requires researchers not to misuse their title and position in communications with the public.

6. The Working Party's recommendation to DCSD

Against the backdrop of their review of the material, the Working Party has discussed the question on which DCSD had directed it to take up a position:

Can a book of this nature warrant an evaluation of scientific dishonesty on the basis of the standards otherwise applied to scientific works?

No consensus on the Working Party was forthcoming in its reply to this question, as *some* members of the Working Party argued that the book is *not* science/research but in its manifest onesidedness gives the appearance of a topical debate-generating book, while *other* members of the Working Party argued that the book *has been* presented and, in wide circles including the scientific community, perceived as research/science and must therefore be assessed in accordance with scientific standards, i.e. be examined on its individual merits in accordance with the Executive Order on the Danish Committees on Scientific Dishonesty.

7. DCSD's consideration of the complaints

As already mentioned, there has been extremely extensive correspondence during DCSD's deliberation of the matter. Rather than record this in detail, DCSD has deemed it fit to present not only the Working Party's summary but the complaints in full, complete with appendices, so that as an appendix to this ruling, incl. the discussions in Scientific American, they form part of the description of the case. The same applies to Bjørn Lomborg's replies to the complaints. The interested public will thus be granted an opportunity to have full access to the facts of the case.

The whole of DCSD can endorse the Working Party's description of the three complaints and of the problems associated with the issue of whether Bjørn Lomborg's book should even be evaluated on the basis of scientific criteria and thus with determining the continued course of action in its consideration of the case.

Nor during DCSD's discussion of the cases has there been consensus as to whether the book "The Skeptical Environmentalist" is a scientific work and should be assessed in accordance with scientific standards. Some members do not regard the book as science, but rather as a debate-generating book. In this, they refer to the fact that, with the vast breadth of topics treated and the lack of qualification of any scientific method - including criteria for the selection of sources - the book does not present the appearance of a scientific work but precisely that of a provocative debate-generating publication. Other members refer to the fact that Bjørn Lomborg himself has opted to present himself as Associate Professor of Statistics at the Department of Social Sciences at the University of Aarhus and has given his book scientific shape by virtue of the copious use of notes and references. Adding to this that the book appears as a research monograph in the University of Aarhus Yearbook for 2001 and is widely perceived as being scientifically founded, these members did not feel that DCSD could merely decline to deal with the complaints.

Accordingly, by way of conclusion to this discussion, all members of the three DCSD committees concur in the view that DCSD should not simply decline to take a position on the complaints.

Both in Denmark and abroad, in broad professional circles and particularly from the pens of natural scientists, powerful professional objections have emerged concerning the correctness of the conclusions cited by Bjørn Lomborg. The correctness of Bjørn Lomborg's conclusions is thus disputed, inter alia by the researchers who have expressed their opinions in Scientific American at the request of the editors concerned.

However, it is not DCSD's remit to decide who is right in a contentious professional issue, but merely whether a complaint about scientific dishonesty is justified.

This task is laid down in Danish Executive Order No. 933 of 15 December 1998:

Section 2. The Danish Committees on Scientific Dishonesty are mandated to consider cases of scientific dishonesty lodged with the Committees in the form of a complaint

Section 3. Scientific dishonesty includes actions or omissions in research which give rise to falsification or distortion of the scientific message or gross misrepresentation of a person's involvement in the research, and includes:

1. Fabrication and construction of data.
2. Selective and surreptitious discarding of undesirable results.
3. Substitution with fictitious data.
4. Deliberately misleading use of statistical methods.
5. Deliberately distorted interpretation of results and distortion of conclusions.
6. Plagiarization of others' results or publications.
7. Consciously distorted reproduction of others' results.

8. Inappropriate credit as the author or authors.
9. Applications containing incorrect information.

Subs. 2. In order to label a conduct as scientific dishonesty, it must be possible to document that the person in question has acted deliberately or exercised gross negligence in connection with the activities under consideration.

Section 3, subs. 1 stipulates the objective fundamental condition governing scientific dishonesty, namely that there has been falsification or distortion of a scientific message, enumerating a non-exhaustive list of examples of such actions. Subs. 2 of the provision lays down the subjective requirements that must always have been met for an action to be able to be characterized as scientifically dishonest.

The thing which is special about scientific assertions is the process implemented by scientists prior to presenting the result. In simplified terms, the process consists of formulating a hypothesis, an outline of a method which lends itself to falsifying or proving the probability of the correctness of the hypothesis, completing the investigation described and publishing the result following a thorough review process.

Those who conduct such scientific investigations are usually researchers who already command an in-depth knowledge of the specialist area within which the investigation is to be done. Within the field of the health and life sciences, especially, it is currently very common for research to be conducted by several individuals jointly, so that together they cover the different academic and specialist fields involved.

One problem peculiar to all research is that of avoiding a situation in which the prior advancement of a hypothesis by the scientist results in that scientist, in his or her work on the material under investigation, eliciting the very data and facts capable of supporting the hypothesis and omitting to admit those considerations and observations that fail to support the hypothesis. If this is done intentionally or as a result of gross negligence, the outcome is scientific dishonesty. As DCSD's cases show, such a thing is very seldom documented. On the other hand, in the scientific process there is always reason to be highly alert to the potential risk of a scientist admitting data to corroborate a hypothesis more subconsciously than data militating against it. The fear of such a bias is at the root, for example, of the widespread use by the health sciences of double-blind studies, in which the researcher him/herself is kept in the dark about the desirability or undesirability of a result in relation to the hypothesis in the particular instance at hand. However, a research technique of this kind does call for particularly randomized trial material normally unavailable in other branches of science such as the social sciences.

With the volume of data present in this day and age in virtually all fields, any research process will typically involve the need to make a selection too. This, coupled with the risk of bias just mentioned, makes it particularly imperative to be aware of and describe the criteria on the basis of which the underlying material has been chosen, and for the researcher not to be blinkered in his or

her selection, but precisely to bear in mind that the scientific process is based on a critical approach, in which the aim is to investigate whether or not the hypothesis put forward can be supported by data.

Moreover, it should be noted that there are quite specific difficulties associated with the elaboration of cost-benefit analyses aimed at serving to elucidate where the application of resources provides best value for money. Such an analysis consists of converting all goods into a financial amount. Such conversion often reflects a particularly discretionary choice on the part of the analyst.

In the context of the present case, DCSD has been sensitive to the World Bank's World Development Report 2003: "Sustainable Development in a Dynamic World" and the UN's summary of the publication: "Providing Global Public Goods, Managing Globalization", published in 2002. In the latter publication, reference is made to an attempt to draw up a cost-benefit analysis that illustrates the annual cost of providing certain global public goods (including a reduction in comprehensive illness burdens and climate change) as compared with the cost of remaining passive. It is mentioned that making such cost-benefit analyses requires considerable effort and in-depth analyses of concept, measurement method and data. Yet a provisional attempt at such an analysis indicates that passivity is particularly costly and that the cost of doing nothing exceeds the cost of any initiative taken. This is mentioned only to highlight the caution that needs to be exercised in connection with such cost-benefit analyses.

As reproduced above under item 3, Scientific American has asked leading experts to assess Bjørn Lomborg's treatment of the fields in which they have special scientific insight.

DCSD did consider whether a better basis for evaluating the cases under review would be obtained by itself forming ad hoc committees with accredited experts in the respective fields. A number of members voiced the view that sourcing new expert evaluations might possibly create scope to establish whether the defendant has not only—as the experts at Scientific American claim—used selective data, but whether he has done so wilfully in order to delude the public, and hence enable DCSD to ascertain the presence or absence of the subjective conditions required to uphold scientific dishonesty.

DCSD, however, has reached the conclusion that new experts would scarcely be able to add new dimensions to the case. In this process of deliberation, a crucial role has also been played by the fact that even on the existing basis there is agreement at DCSD in adjudging the defendant's conduct to be contrary to good scientific practice, as expressed below.

8. DCSD's position

On the basis of the material adduced by the complainants, and particularly the assessment in Scientific American, DCSD deems it to have been adequately

substantiated that the defendant, who has himself insisted on presenting his publication in scientific form and not allowing the book to assume the appearance of a provocative debate-generating paper, based on customary scientific standards and in light of his systematic onesidedness in the choice of data and line of argument, has clearly acted at variance with good scientific practice.

Subject to the proviso that the book is to be evaluated as science, there has been such perversion of the scientific message in the form of systematically biased representation that the objective criteria for upholding scientific dishonesty-cf. Danish Order No. 533 of 15 December 1998-have been met. In consideration of the extraordinarily wide-ranging scientific topics dealt with by the defendant without having any special scientific expertise, however, DCSD has not found-or felt able to procure-sufficient grounds to deem that the defendant has misled his readers *deliberately* or with *gross negligence*.

In accordance herewith and subject to the proviso that the book under review is to be evaluated as science, DCSD has arrived at the following

Ruling:

Objectively speaking, the publication of the work under consideration is deemed to fall within the concept of scientific dishonesty.

In view of the subjective requirements made in terms of intent or gross negligence, however, Bjørn Lomborg's publication cannot fall within the bounds of this characterization. Conversely, the publication is deemed clearly contrary to the standards of good scientific practice.

For and on behalf of the Committees

Hans Henrik Brydesholt

Chairman of DCSD