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# FAULTY SCHOLARSHIP: LOMBORG AND EARTH'S LIVING SYSTEMS\*

Allen Hammond<sup>†</sup> and Emily Matthews<sup>‡</sup>

## INTRODUCTION

Extraordinary claims demand an extraordinary level of documentation and supporting analysis on the part of those who put them forward, and warrant healthy skepticism on the part of those who would review or pronounce judgment on those claims. Both are missing from Bjørn Lomborg's book, *The Skeptical Environmentalist*,<sup>1</sup> and from the largely laudatory outpouring of media attention it has generated.<sup>2</sup>

Lomborg's extraordinary claims are that environmental quality is improving around the world, and that the environmental community is not telling the truth about such trends for its own cynical reasons.<sup>3</sup> His book purports to document these claims by reviewing the scientific literature and official statistics, backed up by more than 3000 footnotes and citations. In fact, Lomborg's use of statistics is frequently flawed, and his review of the literature and use of citations is often misleading. In a formal review, the Danish Research Agency recently concluded that the book displays "systematic one-sidedness" to the point of constituting scientific dishonesty. Even more important, however, is Lomborg's central message. We suggest that most of his major conclusions are either irrelevant to today's global environmental policy issues or are demonstrably wrong.

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\* Portions of this article have appeared previously in on-line publications of the authors.

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<sup>1</sup> BJØRN LOMBORG, *THE SKEPTICAL ENVIRONMENTALIST: MEASURING THE REAL STATE OF THE WORLD* (Cambridge University Press 2001) (1998).

<sup>2</sup> See, e.g., *Doomsday Postponed*, *THE ECONOMIST*, Sept. 8, 2001, at 89, 89 ("This is one of the most valuable books on public policy – not merely on environmental policy – to have been written for the intelligent general reader in the past ten years. . . . [The book] is a triumph.").

<sup>3</sup> See LOMBORG, *supra* note 1, at 4, 12.

To be sure, Lomborg does get some things right. In particular, he strikes a nerve with his claim that environmental advocates are sometimes too prone to look on the pessimistic side of things or to convey their concerns using overly dramatic language. And he is correct in pointing out that some past environmental ideas turned out to be wrong. The irrelevancy comes from the fact that it has been two or in some cases three decades since the mistaken ideas Lomborg describes had any currency – which he neglects to point out – and that they play no significant role in the critical environmental issues of the 21<sup>st</sup> century.

Indeed, perhaps the most troubling aspect of Lomborg's book is that it is strikingly uninformed, not just about the real state of the environment, but also about the issues that engage most major environmental organizations today. Readers will find no hint in *The Skeptical Environmentalist* of the extraordinary degree of cooperation between environmental organizations and many major global corporations;<sup>4</sup> of the profound shift now underway from old-fashioned environmental regulation and to a new focus on transparency and voluntary action;<sup>5</sup> or of the proliferation of market-based strategies to reduce pollution and protect natural resources.<sup>6</sup>

To give an example of the lack of an informed and scientifically-grounded perspective that pervades the book, let us choose Lomborg's perspective concerning preservation of Earth's living systems. Lomborg criticizes estimates of species extinction<sup>7</sup> (inaccurately, as it turns out), but says nothing about the shift within the environmental community from a concern with the loss of individual species to the more critical underlying problem of the degradation of ecosystems and the services they provide – services that not only include preservation of species diversity, but also encompass soil fertility, nutrient recycling, maintenance of atmospheric oxygen levels, flood control, recreational opportunities, and other economically and biologically

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<sup>4</sup> See William L. Thomas, *Rio's Unfinished Business: American Enterprise and the Journey Toward Environmentally Sustainable Globalization*, 32 ENVTL. L. REP. 10,873, 10,873 (2002) ("For much of [the last three decades], business was on the defensive, struggling to hold back a tide of law and regulation that from its perspective threatened to undermine profitability and competitiveness. Gradually, U.S. companies began to take more advanced, pragmatic positions seeking to become an element of solutions to, rather than the source of, environmental and natural resource problems.").

<sup>5</sup> See *id.* at 10,894 ("[S]ome U.S. companies can point to significant progress toward sustainability, especially in areas such as eco-efficiency, EMS, communications with stakeholders, and transparency.").

<sup>6</sup> See Dennis A. Rondonelli, *A New Generation of Environmental Policy: Government Business Collaboration in Environmental Management*, 31 ENVTL. L. REP. 10,891, 10,902 (2001) (discussing states experimenting with market-based strategies to improve the environment).

<sup>7</sup> LOMBORG, *supra* note 1, at 249 ("assertions of massive extinction of species . . . simply do not equate with the available evidence").

significant services. Regardless of current estimates of the number of species already lost or at risk of extinction, it is clear that continued degradation of the ecosystems that provide habitats for species will eventually lead to loss of species and of the many other services on which all life depends.<sup>8</sup>

Before using Lomborg's treatment of the risks to Earth's living systems as a lens to examine his work and illustrate the problems with it, let us first briefly put Lomborg's major claims in perspective.

### I. AN ENVIRONMENTAL LITANY?

Lomborg describes an environmentalist "litany" that he says is not backed up by evidence. The litany as described by Lomborg in the book and in the pages of *The Economist* has four verses and a refrain: 1) natural resources are running out; 2) the population is growing, leaving less and less to eat; 3) species are becoming extinct in vast numbers, forests are disappearing, and fish stocks are collapsing; and 4) air and water pollution are increasing.<sup>9</sup> These verses lead to the supposed refrain that things are getting worse and worse, ecologically speaking.

Issues 1 and 2 are ancient history. The Club of Rome got it wrong, and no major environmental organization now argues that we are running out of natural resources of the type Lomborg describes – essentially non-renewable, subsoil minerals<sup>10</sup> – although some did 30 years ago. And while the global population is growing, albeit more slowly than foreseen several decades ago, there is now a broad consensus that malnutrition, rather than famine, is the major concern for the future, and that poverty, rather than the world's ability to grow enough food, is the primary threat.<sup>11</sup> Lomborg has picked up Julian Simon's old arguments and repeated them, almost verbatim, apparently not realizing that the battlefield has changed and the world has moved on.<sup>12</sup>

Lomborg gets issue 3 demonstrably wrong, as we hope to show in some detail in the balance of this article. There *is* strong scientific evidence that species and the habitats they depend on are disappear-

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<sup>8</sup> See *id.* at 252 (noting one study suggests 40,000 species become extinct every year).

<sup>9</sup> Bjørn Lomborg, *The Truth About the Environment*, THE ECONOMIST, Aug. 4, 2001, at 63. See also LOMBORG, *supra* note 1, at 4.

<sup>10</sup> See WORLD RESOURCES 1994-1995 3-26 (1995); see also John P. Holdren, *Energy: Asking the Wrong Question*, SCIENTIFIC AMERICA, Jan. 2002, at 65 ("What environmentalists mainly say on this topic is . . . we are running out of environment – that is, running out of capacity of air, water, soil . . . without intolerable consequences for human well-being, the effects of energy extraction, transport, transformation and use.").

<sup>11</sup> See NICOLE BALLENGER ET AL., WHO WILL BE FED IN THE 21ST CENTURY: CHALLENGES FOR SCIENCE AND POLICY (2001).

<sup>12</sup> See LOMBORG, *supra* note 1, at 354 n.19, 358 n.255, 360 nn.301-02, 378 nn. 870-82, & 382 n.1002.

ing at a very rapid, ecologically significant rate; that ecologically-significant old growth forests, especially tropical forests, are rapidly being converted to other uses and are being logged, often illegally, at an even faster rate; and that many important fish stocks have already collapsed, and a majority of the major ocean fisheries are severely over-fished and at risk.

Issue 4 is a mixture of irrelevance and inaccuracy. Pollution levels have generally declined in industrial countries, not because we have become more wealthy – as Lomborg (and other in this symposium) suggests – but because of improved and often hard-won environmental policies that were strongly contested by the sources of pollution. This trend has been underway for decades and is hardly news – another of Lomborg's anachronisms. However, pollution of many kinds (air, water, toxic chemicals, nutrient run-off) is at levels critical to human health or damaging to ecosystems in much of the developing world, and the trend is toward higher levels of pollution, as anyone who has traveled in developing countries can testify and as official statistics confirm. Lomborg largely discounts these problems, suggesting that conditions will improve as incomes rise.<sup>13</sup> But as a description of the state of the environment, that is disingenuous, not to say inaccurate, and little comfort for the hundreds of millions of people who now lack access to safe water or must breathe air that is hazardous to their lungs.

Juxtaposed to the supposed environmental litany, Lomborg offers a counter-litany: that things are getting better and better.<sup>14</sup> The reality is more complex. Some things are better, and are widely recognized as such; other things are in fact worse; and there are important issues about which the available evidence is not conclusive, but the expert consensus suggests a serious response. We think a fair reading of *The Skeptical Environmentalist* is that it is simplistic, vulnerable to many of the claims of distortion that Lomborg levies against the environmental movement, and vastly uninformed about the real state of the environment and of the environmental agenda.

## II. EARTH'S LIVING SYSTEMS

In *The Skeptical Environmentalist*, Bjørn Lomborg writes that "Basically, however, our forests are not under threat."<sup>15</sup> A charitable reader could attribute this flawed conclusion to errors of omission and ignorance; perhaps the author simply does not know the sources well

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<sup>13</sup> LOMBORG, *supra* note 1, at 176 (arguing "developing countries . . . will get even better environment for a given amount of wealth").

<sup>14</sup> *See id.* at 4 ("Mankind's lot has actually improved in terms of practically every measurable indicator.").

<sup>15</sup> *Id.* at 117.

enough to interpret them properly. Less charitably, one might reasonably conclude that Lomborg intentionally selects his data and citations to distort or even reverse the truth. His interpretation of data on global forest cover and Indonesian forest fires aptly illustrate both failings.<sup>16</sup>

For example, Lomborg scorns an analysis by the World Wildlife Fund (WWF) that found that nearly two-thirds of the world's original forests, dating to the pre-agricultural period (defined as 6000 BC), have at one time been cut. He challenges it by stating that most estimates are about "20 percent."<sup>17</sup> Whatever the merits of the WWF's claim, Lomborg confusingly contrasts net loss of forest cover (that is, his figure of loss of natural forest offset by regrowth and new plantations) with loss of original forest (WWF's figure).<sup>18</sup>

Moreover, the sources Lomborg cites in the relevant footnote do not support his proposition. The first, a 1993 college textbook by Andrew Goudie,<sup>19</sup> indeed gives a figure of 20% net loss in forest cover since pre-agricultural times.<sup>20</sup> However, its author provides no reference or authority for this number. The second source, by Michael Williams, is stated in the footnote as giving the (amazingly) low figure of 7.5% loss,<sup>21</sup> but a review of the source itself reveals that Lomborg has misread 7.5 million square kilometers as though it were a percentage.<sup>22</sup>

The last two sources mentioned in the footnote, which give figures of 19% and 20%, are for recent 300- and 140-year periods only.<sup>23</sup> They do not purport to measure forest loss during the entire 8,000-year period for which Lomborg cites them. On the contrary, these two sources cover only tiny fractions (less than 4% and 2% respectively) of the relevant time period, and even so each registers roughly a 20% loss of forest.

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<sup>16</sup> Lomborg responds on his website (<http://www.Lomborg.com>) to many of the criticisms raised below. However, his responses do not answer the fundamental issues raised and simply confuse the discussion. For example, despite extensive discussion of our forest critique, he never responds directly to evidence that tropical forests are being logged and converted to other uses at a rapid rate (8.7% loss during the 1990s, double his estimate) or acknowledges that such evidence might contradict his fundamental assertion that forests are "basically not under threat." His responses also introduce new factual errors, such as his assertion that most cutting of original forests happened in the past three hundred years (not true) or that "marine productivity" has increased 60% since 1970 (total catch has increased but not productivity).

<sup>17</sup> *Id.* at 112.

<sup>18</sup> *See id.* at 376 n.788.

<sup>19</sup> ANDREW GOUDIE, *THE HUMAN IMPACT ON THE NATURAL ENVIRONMENT* (1993).

<sup>20</sup> *Id.* at 43 (stating that "since preagricultural times world forests have declined approximately one fifth, from five to four billion hectares").

<sup>21</sup> LOMBORG, *supra* note 1, at 376 n.788.

<sup>22</sup> MICHAEL WILLIAMS, *Forests and Tree Cover*, in *CHANGES IN LAND USE AND LAND COVER: A GLOBAL PERSPECTIVE* 97-124 (William B. Meyer & B.L. Turner II eds., 1994).

<sup>23</sup> LOMBORG, *supra* note 1, at 376 n.788.

Another claim by Lomborg – that global forest cover has remained remarkably stable over the past 50 years<sup>24</sup> – is based on two acts of statistical conjuring. First, he expresses changes in forest cover as a percentage of the total land area of the world, a technique that reduces changes of millions of hectares to fractions of 1%.<sup>25</sup> Second, he cobbles together a variety of different data sources compiled using different definitions of forest and different methodologies.<sup>26</sup> These different data sets cannot be strung together to form a consistent time series. The United Nation's Food and Agriculture Organization (FAO), the "official source" on which Lomborg proudly claims to rely,<sup>27</sup> does not attempt to construct such a time series. Yet the first graph in Lomborg's chapter on forests prominently features an FAO data series of forest cover that was generated for agricultural purposes and discontinued by FAO precisely because it considered the data unreliable for assessing forests.

FAO forestry data can be difficult to understand, as Lomborg's notes make amusingly clear. In Note 767, he defines closed forest as 20% of forest cover rather than forest where the tree canopy covers 20% or more of the ground.<sup>28</sup> More seriously, he appears to believe that the U.N. carried out two global forest surveys in 1995 and 1997.<sup>29</sup> In fact, the U.N. surveys forests only once per decade. The 1990 survey was updated with a mathematical model to the year 1995 and these results were published in the 1997 *State of the Forest* report.

Are the world's forest, as Lomborg claims, "basically however, . . . not under threat."<sup>30</sup> Lomborg quotes the FAO's most recent survey, the *Forest Resources Assessment 2000 (FRA 2000)*, which states that "tropical forests are being deforested . . . at an annual rate of 0.46 percent."<sup>31</sup> Lomborg claims this figure is "much below the feared 1.5-4.6 percent"<sup>32</sup> rate, although he provides no clue as to who feared such extraordinary rates. But there is a serious error here: Lomborg is quoting the FAO's figure for *global* deforestation, not tropical deforestation. The vast majority of forest clearance is occurring in the tropics – forest area is actually expanding in most of the temperate zone – so this error grossly distorts the rate of tropical deforestation.

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<sup>24</sup> *Id.* at 110.

<sup>25</sup> *Id.* at 111, 375 n.767.

<sup>26</sup> *See id.*

<sup>27</sup> *Id.* at 375 n.770.

<sup>28</sup> *Id.* 375 n.767.

<sup>29</sup> *See id.* at 111 ("The UN carried out two global forest surveys in 1995 and 1997.").

<sup>30</sup> *Id.* at 117.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

According to the *FRA 2000*, about 161 million hectares of natural forest were lost during the 1990s, of which 152 million hectares (about 94%) was in the tropical world. The 2000 report puts total global forest cover at about 3.9 billion hectares, 95% of which is "natural forest," meaning that there are about 3.7 billion hectares of natural forest. Of this, 47%, or 1.74 billion hectares, is in the tropics.<sup>33</sup> Thus if 152 million hectares of natural tropical forests were lost during the 1990s, from a total natural tropical forest area of 1.74 billion hectares, then tropical forests shrank by 8.7% over the decade – an annual average rate of 0.87%.

Lomborg devotes an entire page to Indonesia's fires of 1997-1998,<sup>34</sup> acknowledging that they were serious but also claiming that they were not out of the ordinary. He criticizes the WWF for estimating that 2 million hectares burned and contrasts this claim with the "official Indonesian estimate" of 165 thousand to 219 thousand hectares. He notes that the WWF estimate included both forest and non-forestland, but does not point out that the official Indonesian estimate he quotes was for forestland only.<sup>35</sup> He then claims, citing a 1999 United Nations Environment Programme (UNEP) report, that subsequent "satellite-aided counting" indicated that upwards of 1.3 million hectares of forest and timberlands may have burned.<sup>36</sup>

The official Indonesian estimate of 520 thousand burned hectares of forest and non-forest land was based on reports by plantation owners – who were responsible for much of the deliberate fire-setting and had no incentive to report accurately. This estimate was quickly challenged by the German-supported Integrated Forest Fires Management Project, which, using satellite data and ground checks, produced convincing evidence that fires had actually burned some 5.2 million hectares in 1998 alone – 10 times the Indonesian government's estimate.<sup>37</sup> Informed of this data gap, the Indonesian Ministry of Forestry and Estate Crops effectively instructed the governor of East Kalimantan (the province that suffered the worst fires) not to allow the new data to be made public, citing the need "to protect national stability."<sup>38</sup> Despite strong official protests from the German government,

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<sup>33</sup> FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2000 (2000), available at <http://www.fao.org/DOCREP/004/Y1997E/Y1997E00.HTM> (last visited Nov. 21, 2002).

<sup>34</sup> LOMBORG, *supra* note 1, at 116.

<sup>35</sup> *Id.* at 377 n.833.

<sup>36</sup> *Id.* at 377 n.834.

<sup>37</sup> CHARLES VICTOR BARBER & JAMES SCHWEITHELM, TRIAL BY FIRE: FOREST FIRES AND FORESTRY POLICY IN INDONESIA'S ERA OF CRISIS AND REFORM (2002), available at <http://www.wri.org/pdf/trialbyfire.pdf>.

<sup>38</sup> See Emily Mathews, *Not Seeing the Forest for the Trees: On Bjørn Lomborg and Deforestation*, GRIST MAGAZINE, Dec. 12, 2001, at 10, at <http://www.gristmagazine.com/books/matthews121201.asp> (criticizing Lomborg's methodology and measurement of forest lost).

the Indonesians never retracted their original estimate or made the new data public.

Regarding estimates of how much forest actually burned, Lomborg cites a UNEP report,<sup>39</sup> which in turn refers to an analysis, "A Study of the 1997 Fires in Southeast Asia Using SPOT Quicklook Mosaics," that was based on 766 satellite images.<sup>40</sup> These images covered the islands of Kalimantan and Sumatra only, and for just August to December 1997. The study did not examine burn areas for 1998, nor did it take into account fires on other islands. The UNEP report states that this estimate represents "only a lower limit estimate of the area burned,"<sup>41</sup> although the qualification is not passed on to Lomborg's readers.

An analysis by the Singapore Centre of Remote Imaging, Sensing, and Processing using the same satellite images yielded a total burn area estimate for 1997 and 1998 of nearly 8 million hectares.<sup>42</sup> In 1999, a technical team funded by the Asian Development Bank and working through the Indonesian National Development Planning Agency aggregated and analyzed *all* available data sources and estimated that the land area burned during 1997-1998 totaled more than 9.7 million hectares, of which some 4.6 million hectares were forest.<sup>43</sup>

Thus, the most authoritative consensus estimate of the extent of forests burned during the Indonesian fires of 1997-1998 is more than twice the WWF estimate that is derided by Lomborg. Lomborg's interpretation of global forest cover and Indonesian forest fires are just two examples of the incomplete and superficial analysis that underpin too much of this book. In his introduction, the statistician tells us that his skills lie in "knowing how to handle international statistics."<sup>44</sup> A few paragraphs later, he confesses that "I am not myself an expert as regards environmental problems."<sup>45</sup> Unfortunately, statistical prowess by itself does not guarantee accuracy, insight, or understanding. A little more expert knowledge would have significantly diluted this book's glib optimism. Indeed, the book would probably never have been written.

Moving beyond forests, Lomborg claims that "marine food production has almost doubled since 1970"<sup>46</sup> – a surprising statement

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<sup>39</sup> LOMBORG, *supra* note 1, at 377 n.834.

<sup>40</sup> S.C Liew, *A Study of the 1997 Fires in South East Asia using SPOT Quicklock Mosaics*, Presented at the 1998 International Geoscience and Remote Sensing Symposium (July 6-10, 1998).

<sup>41</sup> J.S. LEVINE, ET AL., *WILDLAND FIRES AND THE ENVIRONMENT: A GLOBAL SYNTHESIS* (1998).

<sup>42</sup> *Id.*

<sup>43</sup> *Id.*

<sup>44</sup> LOMBORG, *supra* note 1, at xix-xx.

<sup>45</sup> *Id.* at xx.

<sup>46</sup> *Id.* at 17.

given the well-documented declines of many commercial fish stocks. What Lomborg actually means appears later in the book as a figure depicting an increase in total fish *catch*.<sup>47</sup> But what humans are *taking* from the oceans and what the oceans are *producing* are of course fundamentally different matters, and Lomborg's equating of the two exemplifies how his book is fundamentally misleading. By focusing on total catch Lomborg's graph conceals that stocks of swordfish, sardines, halibut, Atlantic Ocean perch, and many others have crashed.

Lomborg's relatively short chapter on biodiversity claims that environmentalists and the media have greatly exaggerated the rate of species extinction.<sup>48</sup> He takes particular issue with an estimate by Norman Myers that as many as 40 thousand species may be going extinct each year.<sup>49</sup> Lomborg concedes, however, that species extinctions are likely occurring at 1,500 times natural rates.<sup>50</sup> When annual species extinction is calculated using this figure, using the number of living species Lomborg cites and the extinction-per-species ratios given by leading authorities in Lomborg's own footnotes,<sup>51</sup> the Myers estimate is confirmed as sitting at the lower, conservative, third of the range. Thus, his own analysis contradicts his conclusions.

One measure of the gap between Lomborg's claims about biologically-based environmental issues and the world's scientific and political consensus on these issues is that he nowhere mentions a major new international research effort, the Millennium Ecosystem Assessment, which was motivated precisely by a widely-shared concern that critical ecosystems around the world are being damaged or are disappearing.<sup>52</sup> Far from being a cause espoused by over-zealous activists, the new effort is being undertaken jointly by UN organizations, the World Bank, various government agencies (including the U.S., several E.U. countries, Japan, and China), and major scientific, academic, and environmental organizations. If major national governments, multilateral organizations, and scientific organizations all subscribe to the seriousness of the threats to Earth's living systems and have committed significant resources to defining and assessing that threat, then have they all been hoodwinked by environmentalists? Or is it more likely that Lomborg is simply so out of touch with the real state of the environment – and the current discussions of envi-

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<sup>47</sup> *Id.* at 107, fig.57.

<sup>48</sup> *Id.* at 249-57.

<sup>49</sup> *Id.* at 252.

<sup>50</sup> *Id.* at 255 (something which he notes is "not trivial").

<sup>51</sup> *Id.* at 255, 410 nn.2073-75 (comparing the cited experts extinction rate of species to Myers and others).

<sup>52</sup> See generally MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING, available at <http://www.millenniumassessment.org/en/about/brochure.english.pdf> (expressing concern that humans are altering the features of the planet more than ever before).

ronmental issues – that he simply cannot be regarded as a reliable source of information or even as an informed commentator?

### III. THE ENVIRONMENTAL ISSUES THAT LOMBORG MISSES

Concern for the environment, for itself and as a foundation for human well-being, has gained widespread support and become a potent political force in much of the developed world. The past 20 years and especially the past decade have witnessed a dramatic spread of environmental concerns into corporate boardrooms and international fora, to the extent that environmental topics now arise in policy issues as diverse as free trade, poverty alleviation, and the use of the Internet.

It is unlikely that this wide support and growing stature could be based on an environmental conspiracy – and we know of none. Rather, we suggest, something more fundamental is going on: the environmental movement has itself been transformed as it has broadened its base to include corporate executives, large numbers of scientists and analysts, international diplomats, and lots of ordinary people, from suburban consumers to impoverished forest-dwellers and residents of urban slums in developing countries. If the single-minded zealots depicted by Lomborg in his book and his speeches ever existed, they have been subsumed into a larger and more diverse whole. Environmental issues are increasingly viewed as part of a larger agenda for sustainable development that includes urgent social goals as well. And the interactions of human communities and economic processes with natural systems on a global scale are increasingly seen as part of an interdependent complex system. As a result, the environmental agenda has changed too.

The 21<sup>st</sup> century environmental agenda must still include efforts to document problems and understand their causes, such as the Millennium Assessment of Ecosystems mentioned above or on-going research on climate change. Much is still simply unknown. But the focus, increasingly, is on finding solutions. Moreover, because the context for environmental issues has changed, solutions are not just about imposing governmental regulation or opposing industrial activity. In a globalized world, a more diverse set of actors comes into play, making possible new kinds of alliances and novel approaches.

Consider the issue of protecting ecologically important old growth forests. The market for forest products is global, so solutions must be global too. Demand is rising, driven by such fundamental forces as expanding literacy (more newsprint) and rising population (more housing and furniture), so opposing logging per se makes no sense; indeed, more dedicated production forests will be needed if old

growth forests are to be spared. The industry is diverse – some companies practice sustainable forestry, others do not. Many consumers are supportive, but have no way of knowing where the wood they buy comes from. What might a solution look like?

Suppose a global network of research institutes and NGOs could track forest practices around the world, pairing satellite imagery with on-the-ground monitoring, matching logging activity with forest leases to identify illegal logging, and posting the results on the Internet. The result would be unprecedented transparency: a company-by-company and forest-by-forest database that certified responsible companies and exposed bad actors. Suppose further that most of the world's major retailers of forest products – companies like Home Depot, Lowes, and IKEA – decided to use that monitoring system to source their wood from properly-managed forests and to avoid buying from companies that logged illegally or cut old-growth forests. Suppose that the banks which finance logging operations, such as Europe's ABN Amro, used the monitoring system to decide which projects to back. The result would be powerful market incentives that, over time, could transform the industry. Think of it as the equivalent of a global commodity regulatory regime that is low-cost and market-based, operates outside of governmental or international bureaucracies, empowers consumers or their proxies (the retailers) by enforcing transparency, makes companies accountable for their actions, and, in effect, allows a complex system to take environmental values into account.

The example is far from hypothetical: Global Forest Watch exists, already operates in Cameroon, Indonesia, Russia, and half-a-dozen other countries, and is forming alliances with retailers, international institutions, banks that finance the logging industry, responsible forest product corporations, and developing country governments.<sup>53</sup> Although it is too early to call Global Forest Watch a success, we can speculate that similar approaches might work for other extractive industries, such as fisheries or agribusiness. In any event, it illustrates both the kind of novel, pragmatic solutions that may be possible and some of the approaches – the evolving toolkit – for achieving a 21<sup>st</sup> century environmental agenda.

A central element in the new agenda is a belief in transparency and accountability for corporations, for governments, and for environmental organizations themselves. Give people information and they'll make better decisions. Document institutional behavior and make it public, and institutions will behave better. A compelling example is the US experience with EPA's annual Toxic Release Inven-

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<sup>53</sup> See Global Forest Watch, *What is Global Forest Watch?*, at <http://www.globalforestwatch.org/english/about/index.htm> (last visited Nov. 6, 2002).

tory,<sup>54</sup> which has triggered far more massive, and voluntary, reductions of toxic emissions by the private sector than any regulation, as well as giving citizens information about what is happening in their own communities. Many large companies now publish annual environmental reports,<sup>55</sup> rating their own performance, and the World Business Council on Sustainable Development is working with literally hundreds of corporations to develop a consistent methodology for reporting greenhouse gas emissions. Likewise, most environmental groups are committed to being open about their goals, their methods, and the data on which they base their conclusions. Many groups maintain extensive web sites designed to make environmental information more accessible to the public.

The interest in transparency is both principled and pragmatic: it works. Shell Oil posts on its web site all comments received, no matter how extreme, in the belief that consumers can form sensible judgments on their own and that transparency provides the best long-term protection for its reputation.<sup>56</sup> Our organization's experience with Global Forest Watch is that even in countries that are initially reluctant to cooperate, the complete transparency of the physical, administrative, and economic data that are collected and the openness of the process (including extensive review of the data) make the utility of the approach irresistible. The governments of virtually all countries where Global Forest Watch operates have requested additional interaction, and in some cases a formal collaboration, in order to build their own capacity to monitor their forests.

Closely tied to transparency is a more science-based approach to environmental issues. Making information available aids real solutions only if it is accurate; likewise, being clear about the data gaps that impede informed decision-making is critical to focus research. As awareness of the complexity of our interaction with natural systems has grown, virtually the full range of scientific disciplines has become engaged in environmental issues, and the substance of the environmental agenda has changed accordingly.

The early successes of environmental improvement were often characterized by command-and-control regulatory solutions. More recent actions, especially in the United States, emphasize market-based approaches. Contrast, for example, the early US Clean Air Act

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<sup>54</sup> See U.S. Environmental Protection Agency, Toxics Release Inventory (TRI) Program, at <http://www.epa.gov/tri/> (last visited Nov. 6, 2002) (allowing for toxic chemical release searches on, *inter alia*, national, state, or county-level).

<sup>55</sup> See, e.g., B.P. p.l.c., *Environmental & Social Reports*, at <http://www.bp.com/environmental/index.html>; NEC Corporation, *NEC Annual Environmental Report 2001*, at [http://www.nec.co.jp/eco/en/annual\\_e/](http://www.nec.co.jp/eco/en/annual_e/).

<sup>56</sup> See Shell Oil, *Tell Shell*, at <http://www.euapps.shell.com/TellShell/> (last visited Nov. 6, 2002).

and the later amendments to it that established a cap-and-trade system – a market approach – for reducing sulfur emissions. The latter proved extremely effective and far less expensive. Several US states are experimenting with cap-and-trade systems to combat persistent water quality problems. Internationally, the Montreal Protocol had the effect of stimulating investment in alternatives to ozone-depleting chemicals.

A belief that, under the right conditions, markets can act to simultaneously improve quality of life, economic well-being, and environmental quality is central to the new environmental toolkit. A parallel belief is that sustainable solutions must involve the private sector. These convictions have led to an extraordinary degree of cooperation between environmental organizations and many global corporations – on recycling or supply chain strategies that reduce environmental footprints, on voluntary corporate environmental reporting, on policy initiatives from climate to biodiversity conservation, on efforts to create markets for green power and sustainably-harvested forest products.

Of course, conflict and confrontation have not disappeared. But the growing web of partnerships and alliances – with the private sector, with governments and international organizations, with the scientific community – and their success in finding solutions and fostering change suggest that engagement is becoming a standard part of the toolkit.

Moreover, private sector leaders are helping to define the 21<sup>st</sup> century environmental agenda. A growing number of companies are making voluntary reductions in energy use, pollution, and use of toxic materials, as well as investing in a new generation of “green” technologies, for pragmatic business reasons as well as from a sense of corporate responsibility. A few companies such as DuPont and Alcoa have gone well beyond what any regulator or environmental group would ask, committing themselves to zero waste and zero emissions of any pollutant.

The substance of the new environmental agenda also increasingly involves the private sector. Strategies for preserving the health of ecosystems, for example, are moving beyond an earlier focus on protected areas to include the whole landscape – an entire ecosystem or watershed, including productive areas such as farms and commercial forests. Such ecosystem-based strategies, whether aimed at providing biological corridors for wildlife or controlling run-off of fertilizers and other nutrients, necessarily involve a wide range of private landowners and other private sector actors. So do major industrial transformations – to an energy system comprised of more efficient energy technologies and renewable energy sources, as is likely to be

an essential part of any workable climate solution; or to a powerful and widespread digital infrastructure that can support a global economy based more on information and knowledge rather than on natural resources.

Ecosystem boundaries rarely map to political jurisdictions: river basins, biological corridors, and air pollution all span national borders. Often, the communities most affected by environmental change have no voice in the decisions that change their world. In a global economy, the choices of investors and consumers can have grave consequences for people and ecosystems half a world away. Trends toward decentralization of governmental responsibility, which are widespread in the developing world, bring with them challenges for the capacity and authority of local institutions to discharge their new responsibilities fairly and well.

A critical environmental challenge is to ensure that changes in environmental governance, i.e. the public and private processes by which decisions are made, keep pace with rapidly changing human and ecological needs. In particular, the new environmental agenda seeks to hold governments accountable for providing the public with information about the environment, a voice in decisions that affect the environment, and access to justice when their environmental rights are not respected. Equally, it seeks to establish workable international environmental governance mechanisms – through global treaties, market processes or other means – that can deal with the environmental stresses posed by a global economy and its ability to rapidly shift sourcing and production from one region to another.

#### CONCLUSION

Looking to the future, it is clear that the human condition will continue to face very significant challenges. High levels of pollution in developing regions threaten the health of more than 1 billion people who lack access to clean water or live with severe air pollution; declining fisheries threaten the nutritional base for nearly 1 billion people who depend on fish as their primary source of protein; soil degradation and climate change threaten the livelihoods of more than 1 billion people that depend on subsistence or small-holder farming. Yet world population is expected to grow by at least 2 billion people, primarily in the poorest regions of the world, in coming decades. We mention these facts not to be pessimistic, but to underscore the reality and complexity of the environmental challenges we face.

At the same time we believe that pragmatic solutions to these challenges can be found and that new alliances, adequate to the complexity of the changes that are needed, can arise to implement them. It is this solution-oriented thinking that dominates the environmental

agenda today and that many environmental organizations share. Such efforts are not advanced by an uninformed book focused on an inaccurate and largely irrelevant litany – a book purporting to deny that real environmental and social challenges remain. Only by building awareness and real understanding of global environmental challenges can we hope to solve them.

