

How far are biodiversity loss and climate change similar as policy issues?

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Abstract Climate change and biodiversity loss have a central position in policy debate about global environmental change; however, of the two, climate change has a higher profile. This paper explores the similarities and difference between the two issues. Climate change is better defined and better understood as a policy issue, it is underpinned by a strong scientific consensus and practical units of measurement (CO₂ and financial impacts), and mitigation involves a key economic sector in energy. Biodiversity loss is less easily understood, more diffuse and less tangible, and policy responses do not engage major economic sectors. We argue that these differences contribute to the higher public and policy profile of climate change and can inform attempts to enhance responses to the problem of biodiversity loss.

Keywords Climate change · Biodiversity loss · Environmental discourse · Policy storyline · Global environmental change

1 Introduction

In the two decades since the UN Conference on Environment and Development (the Rio Conference) in 1992, two issues have been at the center of debate about the global environment: climate change and biodiversity loss. These were the subject of the two

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international agreements negotiated at Rio, the Convention on Biological Diversity (CBD), and the Framework Convention on Climate Change (UNFCCC).¹

The existence of these two conventions has had significant and perverse effects on debate about human activities and the global sustainability by narrowing the range of issues discussed. Scientists see a wide and interlinked set of global environmental problems (Millennium Ecosystem Assessment 2005; Vitousek et al. (1997). Thus, Rockström et al. (2009a, b) identify nine “planetary boundaries,” of which climate change and biodiversity loss are just two. Yet, the attention paid to these conventions has channeled concern about global environmental problems into these two issues of climate change and biodiversity loss. Furthermore, these two issues have not been given equal weight.

The year 2010 was designated the “International Year of Biodiversity.” The tenth meeting of the Conference of the Parties to the CBD, held in Nagoya, Japan, in October 2010, saw unprecedented attention in the international print and broadcast media and on line to the problem of biodiversity loss (Herkenrath and Harrison 2011). A number of commentators made the explicit link with Copenhagen, cheering the success of Nagoya as a relative sign of hope compared to the former. Yet, in the period since Rio, greater priority has been given to climate change in international politics and policy than biodiversity loss. The Copenhagen Conference on Climate in 2009 attracted as many heads of state as the Rio Conference, far more than have attended other international meetings on sustainable development since 1992 (Zaccai 2010). Even after the relative lack of results of these last years’ international conferences on climate change, the name “Kyoto,” referring to the key UNFCCC Conference of the Parties held in that city in 1997, still has wider international recognition in the public than “Rio” when referring to the global sustainable development thematic.

The head of the European Environmental Agency states that: “In the recent past the scientific and environment community has had to work hard to raise awareness and understanding about the reality of biodiversity loss and the dangers of climate change. Today, as the enormity of the challenge we face sinks in, climate change is seldom out of the headlines (...) By contrast, biodiversity—which sets the living conditions for humanity—does not yet have the same political impetus as climate change” (McGlade 2009). The UK *Independent* newspaper noted that “public concern about climate change has rather eclipsed concerns about biodiversity loss in recent years” (Independent 2010). Vaughan (2010) points out a stark lack of media coverage of biodiversity issues compared to climate change in the UK: the *Guardian* newspaper Web site tagged 428 biodiversity articles in the *Guardian*, compared to 9,647 on climate change.

In this paper, we compare climate change (hereafter CC) and biodiversity loss (hereafter BL) as issues of public, social, economic, and policy concern. We discuss why CC has acquired a more prominent position as a policy issue than BL, and explore the implications of this for attempts to raise the issue of BL in international policy by emulating policy frames developed to draw attention to the problem of climate change, or to attach BL to CC policy frames.

2 Policy storylines about climate and biodiversity

The question of how issues come to policy attention is complex. Policy making is incremental, and policies change arises from interactions and negotiations among diverse actors

¹ A third post-Rio agreement, the Convention to Combat Desertification, was agreed in 1996. Its provisions are not closely integrated to the CBD and UNFCCC.

(state, civil society, and business organizations). Policy outcomes reflect the knowledge and power embedded in expertise and exercised in the processes of decision making (Keeley and Scoones 2003). Discourse (the “specific ensemble of ideas, concepts, and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities,” Hajer 1995, p. 44) is central to the formulation and evolution of policy. Policy is therefore what Foucault (1975) called a “political technology”: ideas, concepts, and categorizations are the expressions of knowledge and the power of different interests and actors. The way problems are expressed involves embedded assumptions, and these frame and constrain the way people understand the need for and possibility of policy action (Roe 2004). Dryzek (1997) suggests that policy may be analyzed in terms of the idea of “storylines,” the policy positions around which “discourse coalitions” (groups of actors) are grouped. “Storylines” provide a common narrative that unites a variety of actors under a shared understanding of a problem and a shared appreciation of the action necessary to tackle it.

A methodological point deserves attention here. In our paper, we compare storylines about climate change on the one hand and for biodiversity loss on the other. We derive these storylines from an extensive engagement with academic and popular writing and media representations of these topics. We have not conducted a formal discourse analysis. We do not wish to argue that for each topic, there exists such thing as a single unified storyline. On the contrary, storylines are typically based on a multiplicity of strands. The power of the resulting storylines derives from a range of arguments and conditions, and it is these that we try to enumerate in this paper. For the purpose of comparison, we consider two sets of discourses associated with each of the two themes and we use the term storylines in the text to describe these.

The storylines associated with the issues of climate change and biodiversity loss are similar in a number of ways. The conventional storyline about climate change identifies drivers of rapid climate change in terms of the accumulation of greenhouse gases in the atmosphere and particularly the rising level of CO₂. This, in turn, is linked to the over-consumption of fossil fuels that are too cheap and are therefore burned in excessive quantities. This carbon economy is related through to the issues of production, consumption, settlement, and transport (Newell and Paterson 2010). The impacts of anthropogenic climate change are widely held to have already started, although the greatest effects are expected in the future.

The ultimate drivers of biodiversity loss are the same patterns of resource exploitation, industrial production, consumer consumption, settlement, and transport that drive climate change. Threats to biodiversity are manifold and continuing to change rapidly (Butchart et al. 2010, Sutherland et al. 2011). While areas of relatively undisturbed ecosystems exist (Caro et al. 2011), they are increasingly fragmented, islands in a sea of agriculture urban and industrial land uses (SCBD 2010). Unsustainable and illegal timber harvesting is a key driver of biodiversity loss in many countries, particularly in the tropics (Ravenel and Granoff 2004). Over-harvesting is a critical problem in both commercial and subsistence fisheries (Allsopp et al. 2009), and ocean acidification is an increasing threat (Kleypas and Yates 2009). The expansion of agriculture onto newly cleared land, increased demand for irrigation water, and demand for commodities such as edible oils and biofuels is leading to the loss of biodiverse habitat (Green et al. 2005; Royal Society 2009). Fears about population growth (Bloom 2011), and rising demand and prices for food, has triggered concern about future agricultural production that is driving renewed intensification and expansion of agriculture (Beddington et al. 2011). Global demand is leading to rapid expansion in palm oil plantations in former tropical moist forest (Danielsen et al. 2009). Climate change

also has, and will have, a significant impact on biodiversity (Butchart et al. 2010). Continued anthropogenic climate change will demand that conservation operates in “trriage” mode “making tough decisions about the probability of species’ survival, the effectiveness of habitat management and the allocation of scarce resources (Barnard and Thuiller 2008, p. 1).”

These two storylines have thus the following features in common:

- global changes
- some of these changes are potentially very harmful to people and their way of life
- changes are accelerating
- impacts have been identified by various categories of people
- both storylines are supported by powerful images
- both storylines are supported by science (by scientific findings, and by scientists as active advocates of policy change)
- mobilizations of networks of actors have been numerous, e.g., leading to major international agreements
- market-based solutions and economic strategies and incentives are proposed for both problems
- the drivers of change are powerful and difficult to change (economic growth, population growth, industrialization...)
- there is no solution in sight at the scale of the challenges

At the same time, the dominant storylines of CC and BL differ in various ways. We identify differences between them in nine categories:

1. Impact on individuals
2. Sectors impacted
3. Level of public understanding
4. Images conveyed
5. Indicators used
6. Nature of scientific institutions
7. Scale of policy response
8. Centrality of economic valuation
9. Scope for individual action

These categories are dependent on one another. A huge scale of impact would lead to a search for better ways of representing the phenomenon and more efficient responses to it. Involvement of many actors through initiatives aimed at solving problems would also generate additional vectors for representing them and vice versa.

These nine categories can also be seen as refining three broad clusters:

- (a) Universality of impacts (affecting individuals or sectors; items 1–2 above)
- (b) Power of representation (level of public understanding, force of images, indicators, and scientific institutions; items 3–6 above)
- (c) Multiplicity of responses (sector-based response, economic valuation, and individual action; items 7–9 above)

As noted above, both Vitousek et al. (1997) and Rockström et al. (2009b) list CC and BL as only two among a larger set of issues. The major global scale environmental issues discussed by Vitousek et al. (1997)² are the modification of atmospheric composition, loss

² We use the terms of the papers, but have changed their order for the purpose of our comparison.

of biodiversity, land use, diminution of water resources, alteration of nitrogen cycle, and threat to fisheries. Rockström et al. (2009b) identify climate change, biodiversity loss, land-use change, freshwater use, global P and N cycles, ocean acidification, atmospheric aerosol loading, and chemical pollution. None of these issues matches CC or BL in terms of (a) the universality of impacts, (b) the level of representation which popularized and scientifically extensive, or (c) the diversity of responses.

3 A comparison of climate change and biodiversity loss as policy issues

3.1 Impact on individuals

Everyone experiences a climatic regime in their daily life, and at some level, everyone is concerned by the prospect of changing daily weather conditions. Therefore, the notion of climate is central to every human life. For this reason, climate change storylines are easily (even automatically) linked in a direct way to the issues of human welfare, both in the present day (those suffering extreme events such as droughts or floods or storms, even if the links to climate change are tenuous or erroneous), or in the future (e.g., the phenomenon of “environmental refugees”). The risk posed by CC conveys a simple and direct message that relates directly to the questions of human welfare and the nature of social, political, and economic policy. It is not surprising that surveys show that for a very significant part of the population of European countries, CC *is* of big concern.³

As for biodiversity, not only is it a concept not widely recognized and understood (see below), but biodiversity loss is not directly perceived by ordinary people. More than half the world’s population is now urban by residence and has no direct daily engagement with nature. Biodiversity is already lost in urban environments, so further loss in some remote location is beyond direct experience for most people and the storyline such loses its immediacy. Many people (perhaps especially influential business and government decision makers) do not depend on species, habitats, or ecosystems in any direct way for their daily lives. Food and commodity chains are long, and global supply systems quickly shift from depleted to new regions when global markets need it to be so.

3.2 Sectors impacted

Even if there is a range of different ideas about it (Hulme 2009), the standard policy narrative about climate change is that it will deeply hurt economic development, and therefore the future economic and welfare interests of humankind (an argument much buttressed by the Stern Review 2007). This puts climate change at the heart of debates about development and socioeconomic futures.

Proposals to mitigate climate change by reductions in carbon-based fuel use affect central parts of industrial economies. They involve important industrial sectors, such as energy supply, petroleum, the car industry, and the planning of major infrastructure. The centrality of the energy sector in turn means that all sectors consuming energy are concerned, including manufacturing, chemicals, retail, and transport. The structure of these industries is dominated by large transnational corporations. Debates about climate change

³ Surveys among the European population in August–September 2009 found CC to be the second “most serious problem faced by the world today” cited, after “poverty, the lack of food and drinking water” (European Commission 2009, p. 5). This was confirmed in June 2011 (European Commission 2011, p. 5).

are therefore of direct importance to some of the world's largest corporations, with highly developed technical and financial planning and executive capacity.

On the other hand, the impact of biodiversity loss on industrial sectors is less immediately significant and more diffuse. There are numerous large global corporations that derive their profits more or less directly from ecosystems, notably in the agro-food sector (e.g., cereals, meat, fish, edible oils, and brewing), or industries supplying agriculture or aquaculture (chemicals and fertilisers), from forestry, or from enterprises involved in organic commodity supply chains (transport and retail). Yet, few of these depend on natural or near-natural ecosystems and where they do—for example in fishing—farmed products are rapidly replacing those obtained from the wild (disappearing due to unsustainable harvests). Although there are numerous initiatives promoting “sustainable” production of, for example, palm oil, timber, or fish, global production from farms, forests, and seas is a major cause of biodiversity loss, and therefore these industries have little incentive to take into account the concerns about biodiversity loss beyond the requirements of corporate social responsibility, “green” markets or the demands of environmentalists. Concerns about biodiversity loss therefore do not wake deep responses from corporate interests. One potential exception to this is nature-based tourism (Spenceley 2010), where the state of biodiversity, and the natural beauty and local lifestyles it sustains, is central to tourist businesses. However, while this industry is significant to the economies of some developing countries (e.g., Kenya and Thailand), nature-based tourism globally is a small element of the travel and leisure industry, most of which is far less dependent on biodiversity (and, in its reliance on long-distance air travel and provision of luxury, itself a significant source of CO₂ and unsustainable consumption).

3.3 Level of public understanding

Climate change is clearer as a policy issue than biodiversity loss for several reasons. The basic anthropogenic climate change storyline is widely recognized (even by climate skeptics who disbelieve it or challenge some part of it). Although some confusion persists, for example in the use of the expression “global warming” as a popular shorthand for anthropogenic influences on climate change, and to many people, an increase in average temperature of two degrees for instance may not seem to make such a big difference, people know, and care about, what climate is. It can be argued that there is a lack of knowledge appropriation of climate change in society (Ryghaug 2011); however, public sensitization to climate underpins the awareness of climate change.

On the other hand, the term “biodiversity” is not widely understood, even in countries with a well-developed conservation movement, an issue much discussed in association with the “International year of Biodiversity” in 2010 (Vaughan 2010). In the UK, only 12 % of people were aware of what the CBD COP was and only 3 % understood what it was about. In Europe (27 countries) in 2007, 35 % had never heard the term “biodiversity” while 30% had heard it but did not know what it meant (European Commission 2007). Moreover, alternative terms exist. Conservationists and the mainstream media often prefer traditional alternative terms such as “nature” or “wildlife,” while the concept of “ecosystem services” has received increasing attention in policy circles following publication of the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005), despite issues relating to the utilitarian anthropocentrism of the concept, and the way it transforms debates about the loss of species and habitats (Vira and Adams 2009; Redford and Adams 2009). The relationships between these different concepts are far from straightforward, and they are often confusingly used together in debates.

3.4 Images conveyed

Climate change storylines draw on the images of changing landscapes, droughts, floods, storms and hurricanes, and melting glaciers, icecaps and sea ice, heat waves, and forest fires. Images of this kind have a universal resonance: it is not necessary to explain why such changes offer potential threats to human welfare and risk. Stories (in scientific reports such as those of the IPCC) or in the media of rising temperatures record “hottest” years or unprecedented melting of polar ice are easy to illustrate in eye-catching and dramatic ways, and to tie to the human stories of those suffering natural disaster, or exposed to new risks.

In addition, there have been innumerable awareness campaigns drawing links between ordinary life behaviors and their effects on climate change. Even if precise knowledge about the effects of such or such practice is not widely distributed (Bartiaux 2007), the general idea of a causal link between individual behaviors and climate change is fairly present in industrial countries, and therefore fuels interest for CC. CC storylines predict changes that are directly linked to consumption and technology, providing a powerful moral coda.

Biodiversity loss storylines are different. The very diversity of life and its complex interactions (millions of species in diverse arrangements, let alone the complexities at genetic level) makes the concept of biodiversity loss inherently hard to conceptualize, except in the obviously inadequate surrogate of rare, beautiful, large, or otherwise notable species. The storylines typically draw on sumptuous images of endangered “flagship species” (great apes, panda, tiger, forests birds, frogs or insects) and threatened wilderness (rainforests or protected areas with clear brand recognition such as Serengeti in Tanzania). The image of orangutans wandering lost in logged forests is shocking, but it most readily evokes direct sympathy for the animal’s plight rather than providing a logical link to the purchase of hardwood chipboard or products made from palm oil. The drivers of biodiversity loss are complex (Vaughan 2010), and the chains of consumption and causation are long. Even when explained, the story illustrated by the pictures of threatened creatures is easily confused with other issues; for example, the extinction of species with the welfare of individual animals. The problem of biodiversity loss is therefore readily seen as something that involves picturesque or obscure species in a land far away. Storylines about biodiversity loss present it as something to be shocked, angry, or sad about, but not as something that affects the viewer’s personal welfare or prospects. It links to charitable giving for tropical sanctuaries, but not to actions that address the divers of biodiversity loss directly.

Biodiversity loss is presented as the result of diffuse causation (i.e., without specific villains). Unlike climate change storylines, those for BL typically link not to the actions of the Western consumer, but to the actions of those far away. Neither the causes nor the consequences of BL are easily portrayed as offering a direct threat to the Western consumer or citizen beyond regret at the loss of natural beauty and diversity.

3.5 Indicators used

CC is more easily measured than BL, and the metrics used are seen to relate directly to climate change because of the basic principles of atmospheric chemistry and physics.

The use of CO₂eq (meaning Greenhouse gas concentration (GHG) in the atmosphere) and weighs of CO₂ (tons, grams, as a measure of emission) as technical parameters to underpin the discussion of climate change is powerful. They provide a common metric for all actors (scientist, skeptic, government, citizen, or business leader). Moreover, they gain authority because they draw on the “hard sciences” (especially that most high-status and

abstruse of sciences, physics) and engineering. In industry, standards for energy management are pervasive, even if they are only partly related to CC. There are no standard industrial indicators for biodiversity: on the ISO Web site, “energy” is matched by 196 standards and “biodiversity” by none.⁴

CC storylines also have a universal relevance, because of the simple metric of accumulating atmospheric CO₂ and the global nature of the ocean–atmosphere circulation system. There is a “unity” to the global phenomenon of increasing GHG into the atmosphere, although local impacts vary to a great extent. Storylines present CC as a single common problem, and all variations on the CC storyline essentially therefore repeat the same arguments.

BL storylines are much more diffuse. There is no agreed list of species existing or of those going extinct. The complex Red List process creates lists of species facing different levels of threat, but while this generates media headlines and scientific research, it does not provide a single simple measure of biodiversity loss, let alone one that is related directly to threat: there is no equivalent for biodiversity of CO₂eq. The actors of policy conservation strive to find convenient integrated indicators of biodiversity loss (e.g., the Living Planet Report, WWF 2010). However, the diversity of species and ecosystems, threats and causes of decline are great. Faith (2005: 6) notes that “measuring and monitoring global biodiversity may require more than looking just at overall, global scale, summaries,” including the estimation of more localized marginal gains and losses that can be compatible with trade-offs and synergies in regional planning. Lack of simple metrics makes biodiversity loss an inherently less easy story to sell than climate change.

3.6 Nature of scientific institutions

There is a well-developed international system to coordinate scientific understanding of climate change to promote policy action by governments individually and through the UNFCCC. This climate change storyline draws heavily on the work of the Intergovernmental Panel on Climate Change (IPCC), which from 1988 has established a strong scientific consensus about the complexity of anthropogenic impacts of climate change, globally and regionally (Parry et al. 2007). Numerous popular scientific works and films (for example, *An Inconvenient Truth* and *The Age of Stupid*) have disseminated scientific conclusions to a broad and international public audience. Meetings of the Climate Change Convention, from Kyoto (1997) onwards, have been global media events, the focus of intensive lobbying, and debate by interested parties of all kinds, including both environmentalists and business leaders. Award of the Nobel Peace prize in 2007 to the IPCC and Al Gore both marked and promoted this high media visibility. The IPCC came under fire in 2010 because of the way some non-refereed papers have been included in reports (e.g., on shrinkage of Himalayan glaciers). Nonetheless, the science policy model of the IPCC seems still strong.

There are strenuous international attempts to replicate the IPCC for biodiversity loss. In 2010, the UN took the first steps to establish the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) to “operate much like the Intergovernmental Panel on Climate Change” (Jowitt 2010b). This initiative may prove effective, but the task is considerable (Perrings et al. 2011). Efforts to coordinate scientific understanding of BL in a way that can inform global policy lie two decades behind those

⁴ International Standard Organisation, <http://www.iso.org>. Consulted October 12, 2011. “Climate” gives 11 standards.

for CC. Moreover, although international conventions (CBD and CITES) are well established, most biodiversity conservation action is national or local (notably in the creation of protected areas), and most science still primarily addresses problems of BL at localized or national and not global scales.

3.7 Scale of policy response

As observed under two above, action to address climate change involves industrial sectors that are more capital and technology intensive than biodiversity loss. For this reason, it involves both more important industries and government departments. In particular, the link with energy provision makes CC mitigation a strategic question for governments. The fresh renewal of attention on the future of nuclear energy, in the aftermath of Fukushima, involves also an importance given to CC, as one of the key elements in strategic decisions.

Climate change is widely discussed in the context of business opportunities (Newell and Paterson 2010); for example, in the idea of a “Green New Deal” (Elliott et al. 2008), or in debates about “green growth,” “green stimulus packages” or “smart growth,” all formulas that have been developed in recent years for economic activities that are profitable and less climate-damaging (for example, in renewable energy).

From a North–South perspective, some of the most serious impacts of climate change will be in poor developing countries, particularly agricultural regions (e.g., coastal or semi-arid environments). This means that climate change is widely seen as having particularly serious impacts on the poor. It is therefore on the agenda of anti-poverty and development NGOs. If the international engagements made at the Copenhagen and Cancun UNFCC conferences are honored, the range of adaptation funds for developing countries will soon become a major channel to be combined with official development aid (UNFCC 2011, §95; §98). This evolution will strengthen the importance of climate change policy in development aid. On the mitigation side also, since the seminal work of Agarwal and Narain (1991), there are powerful arguments to justify an increasing use of energy in the South while it is reduced in the North. Coalition agendas between sustainable development and climate change mitigation have been elaborated (Prins et al. 2010) as possibly more pragmatic avenues than advocating for large direct cuts in emissions.

On the other hand, debates about biodiversity loss address businesses that are both less capital intensive and more widely scattered, in agriculture, fisheries, and forestry. Solutions to BL are therefore necessarily demand action by multiple stakeholders, typically along poorly defined but extended supply chains that cross different political jurisdictions. Proposed changes to address BL are rarely simply technological or business orientated, but involve issues of land and ecosystem management, resource tenure and rights.

The link between biodiversity loss and development and poverty is less straightforward than for climate change. Globally, biodiversity (like carbon storage in vegetation) is concentrated in the tropical countries of the South. Here, there is increasing policy attention on the relationships between biodiversity conservation and poverty (Adams et al. 2004). The links are not straightforward. While BL has impacts on the poor (e.g., loss of ecosystem services), some conservation strategies have negative impacts on poor rural people; for example, through population displacement from protected areas (Roe and Elliott 2010). Therefore, while combating CC is readily portrayed as vital for the future of developing countries, the impact of the prevention of BL on the poor is more mixed and can be negative.

3.8 Centrality of economic valuation

The extent to which it is possible to translate ecological values into economic terms is widely held to be critical to success in promoting sustainable development policies. It draws attention to hidden costs and facilitates the use of market-based instruments to achieve environmental outcomes (Carter 2007). In the context of climate change, the UK Government's "Stern Review" (Stern 2007) and many other studies have strongly used economic valuation in ways that have motivated policy change. Moreover, the UNFCC negotiations are pervaded by the language of economics. In real economic fluxes, there are "combinations" of CO₂ and money: taxes on energy (sometimes referred to CO₂ rates), and even "equivalences" as in the system of CO₂ quotas in the EU and elsewhere (Brohé et al. 2009).

Actors addressing biodiversity loss have emulated this economic approach, notably by developing the ecosystem services approach, and through the "The Economics of Ecosystems and Biodiversity" project (TEEB 2010). Thus, the UK Environment Secretary said in 2010 that "TEEB can have the same impact for biodiversity as Stern had for climate change" (Jowitt 2010a). Bold claims are made for the TEEB process. A Web site dedicated to green business warns "The threat to businesses arising from unchecked biodiversity loss is larger and more immediate than that presented by climate change".⁵ The director of the EEA suggests "Continuing to lose our biodiversity and ecosystem integrity will affect us all, and the very framework within which our economies operate. The higher operating costs or reduced operating flexibility through diminished or degraded ecosystems will have an impact on a par with the current financial crisis." (McGlade 2009). However, for the moment, the influence on policy of these works seems to be weaker than for the case of CC, and the reductionism implicit in economic valuation of biodiversity is contested (McCauley 2006), as are the numbers themselves because of ongoing uncertainties about measurement (Mace et al. 2011). Certainly, the economic dimensions of the BL storyline are less well developed (and may prove harder to demonstrate) than that for CC.

3.9 Scope for individual action

It is easier for people in the North to conceive and (to some extent) to undertake individual actions in response to CC than in response to BL. Action is therefore a driver in popularizing concern about CC. The task of slowing anthropogenic CC focuses on single point of action, reducing the rate of emission of greenhouse gases. Citizens in the North concerned about CC can respond directly, by switching off electrical appliances, forgoing air travel, insulating houses, or making a range of different purchasing choices. There are numerous practical guides to sustainable energy (e.g., McKay 2009). Moreover, to some extent, progress in responses can be measured. Popular metrics include the ecological footprint, the space needed to provide food, textile, and urban commodities, based on space consumption. In practice, the ecological footprint is in major part a carbon footprint and much advice provided to those who experiment with the measurement of their footprint relate to direct energy consumption (although meat eating is a major exception to this pattern). It can be questioned whether consumers do really have the power to make a significant difference in their impact (Zaccai 2007); however, the diversity of messages, scattered by a web of information and tools adapted to many categories of people and

⁵ <http://www.businessgreen.com/business-green/news/2266348/un-warns-biodiversity-loss>.

practice, helps disseminate the message that CC is an important problem that can actually be tackled at the level of individual action.

It is much harder to trace the links between personal action or lifestyle and biodiversity loss. There is no single focus for action to address BL. Those supporting conservation often feel sympathy for some specific cause (e.g., the threat of extinction to a particular animal species, often far away, for example the orangutan), but cannot easily make a link between that concern and any particular act of consumption, although campaigns linking palm oil and the plight of orangutans seek to do just that.⁶ While large numbers of citizens may be involved in non-governmental organizations to promote the protection of nature or manage areas of land (e.g., the English and Welsh National Trust, with 3 m members), the proportion of citizens involved in such activities remain small (<6% of the UK population in the case of the National Trust). Whereas responses to CC have been partially integrated into mass consumption habits, and this in turn has helped popularize concern about CC, the protection of biodiversity is of concern to a more limited number of concerned and informed people and for a smaller and less valuable range of products.

4 Conclusions

BL and CC have common features that sustain the importance attached to them compared to other environmental problems, but there are profound differences between them. These differences are summarized in Table 1. CC is better defined as a policy issue and as a subject of daily concern for the lay person in the developed world: everyone lives in a certain climate, while the majority of the population, being urban, is widely disconnected from the natural world. CC has a relative unity in its cause, while BL is more diffuse and diverse. CC science is supported by very practical measurement units (CO₂ and USD/Euros), drawing on the sciences, particularly physics, and economics. CC is connected to a strategic matter for all countries: Energy. Mitigation against it involves key sectors in the economy, while adaptation to it could deal with dozens of billion dollars.

BL is a very different kind of problem. No large business interests are directly involved in BL policies. On the contrary, the most significant policies to address BL focus on the conservation of a limited number of protected areas, effectively removing them from the mainstream economy. In the South, climate change mitigation is justified for its importance in leaving the poor space for development and to protect them for severe impacts. For BL, no simple reconciliation agenda has been found, and many conservationists do not see actions to slow or stop biodiversity loss as necessarily forming part of a sustainable development agenda.

In conclusion, we believe that the factors listed above contribute to explaining the smaller impact of BL to date in mobilizing people and generating policy. Moreover, even if some of the promising tools and approaches used for CC are applied to the problem of BL (e.g., better global scientific coordination, development of common indicators, valuation, increased involvement by different actors, and popularizing the issue), the factors discussed in this paper (Table 1) above are likely to limit the potential of these developments.

There are of course limits to the comparison we have tried to sketch in this paper and to the conclusion we have drawn. We would like to stress three of them in the following and concluding points. First, we recognize that the very purpose of comparing two environmental issues has its limits. A comparison of such broad concepts must always endure the

⁶ <http://orangehairya.com/ape/>.

Table 1 Similarities and differences between climate change and biodiversity loss as policy issues

	Climate change	Biodiversity loss
In common	<p>Global changes</p> <p>Some of these changes are potentially very harmful to people and their way of life</p> <p>Changes are accelerating</p> <p>Impacts have been identified by various categories of people</p> <p>Both storylines are supported by powerful images</p> <p>Both storylines are supported by science (by scientific findings and by scientists as active advocates of policy change)</p> <p>Mobilizations of networks of actors have been numerous, e.g., leading to major international agreements</p> <p>Market-based solutions and economic strategies and incentives are proposed for both problems</p> <p>The drivers of change are powerful and difficult to change (economic growth, population growth, industrialization...)</p> <p>There is no solution in sight at the scale of the challenges</p>	
(1) Impact on individuals	Potentially directly linked to the welfare of every individual. Impacts might be severe	Impacts perceived as weak for a great part of individuals who not directly depend on species and natural ecosystems
(2) Sectors impacted	Huge estimations of impacts in a number of important sectors: coastal zones, habitat, cities, agriculture...	Potentially important at long term, with some phenomena more acute
(3) Level of public understanding	Broad level of public understanding unified notion	Less well defined competing notions
(4) Images conveyed	<p>Connected to daily life.</p> <p>Directly linked to human welfare and choice of technology and lifestyle</p> <p>Easy to connect to human futures</p> <p>Measurement easier (CO₂), clearer and draws on physics and engineering needs also field survey</p> <p>Facilitates standard schemes of measurements and management</p>	<p>Connected to “distant others”</p> <p>Images of a threatened natural world, not easily linked to the viewer’s behavior, and easily confused with other issues</p> <p>Narratives of lost relations to nature, as the result of diffuse causation (i.e., no villains). Inherently less easy to connect to human futures</p>
(5) Indicators used		Measurement less clear, drawing on ecology and field survey
(6) Nature of scientific institutions	International collaborative scientific institutions (IPCC) established and strong	International collaborative scientific institutions newer and less widely recognized
(7) Scale of policy response	<p>Action to address climate change involves capital and technology intensive sectors, important industries and government departments. Energy provision is a strategic question for governments</p> <p>More economic value from mitigation/adaptation</p> <p>Business opportunities</p> <p>Caring for climate change and protection of the poor seen as converging agendas</p>	<p>Action to address biodiversity loss concerns weak ministries of forests, wildlife, tourism, environment, and weak economic sectors (except tourism in some countries)</p> <p>Less economic value from mitigation/adaptation</p> <p>The action from the North on the South is less evident, and no major funding is foreseen at the moment</p> <p>Biodiversity protection and poverty reduction seen as a potentially conflicting agendas</p>
(8) Centrality of economic valuation	More strongly developed economic logics and measurement (even if future interests are weak compared to present)	Economic arguments developing but less widely accepted in policy and more speculative in research

Table 1 continued

	Climate change	Biodiversity loss
(9) Scope for individual action	Individual action available for Northern citizens. Driver for popularizing this issue	Individual action by Northern citizens not relevant to global losses: de-motivating

risk of being superficial. In addition, BL and CC are interrelated, both in the physical world, and in the social world where human impacts originate, in terms of both causation and responses. Future climate change will cause extinctions, and the loss of habitats like forests will reduce carbon storage, so issues such as forest loss and efforts to reduce it (for example through provisions for REDD) combine both issues. However, we see that in the realm of politics, advocacy, and agenda settings, prioritizations frequently occur, which draw on such simple direct comparisons. Therefore, we feel that looking somehow deeper into the determinants of the issues, determinants that influence their resolution and evolution, can be justified.

Second, we acknowledge that our ambition could have been enriched by a more precise analysis of actors involved in both issues. We have pointed out the role of business, NGOs, institutions, citizens, but not in a systematic way. We suggest that an analysis to refine and draw more light on the comparison we have undertaken here would be worthwhile. It could also better explain the difficulties of performing better toward the targets of CC, for the strong points that we have underlined in this paper should not in any way suggest that the issue has been tackled at the moment. In our age, CC and BL seem both to be the stories of delusion and dark predictions.

Finally, while we have suggested ways in which the search for biodiversity protection might receive some inspiration from the concern for climate change, the reverse may also be true. There are several features of biodiversity conservation that might be the sources of reflection with respect to responses to anthropogenic climate change. One is locality dependence, and the experience of conservation with essentially localized strategies based on protected areas. This issue will come more to the forefront when the attention given to the adaptation pillar of CC grows. The way in which a general environmental concern splits and metamorphoses itself into a range of different problems at the local scale is more familiar problem to those developing strategies to address BL. A second issue is perhaps that the sense of wonder at the living planet, which serves as such a powerful driver of support for biodiversity conservation in many countries, might also be relevant to debates about responses to climate change, if it appears that approaches to mitigation that are only economical and instrumental fail to inspire sufficient support.

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