THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY
CHALLENGES AND RESPONSES

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1. UFZ is designated lead of scientific coordination for the TEEB initiative (www.ufz.de/teeb).

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY ("TEEB"): CHALLENGES AND RESPONSES

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SUMMARY

The TEEB initiative seeks to draw attention to the invisibility of nature in the economic choices we make across the domains of international, national, and local policy-making, public administration, and business. TEEB sees this invisibility as a key driver of the ongoing depletion of ecosystems and biodiversity.

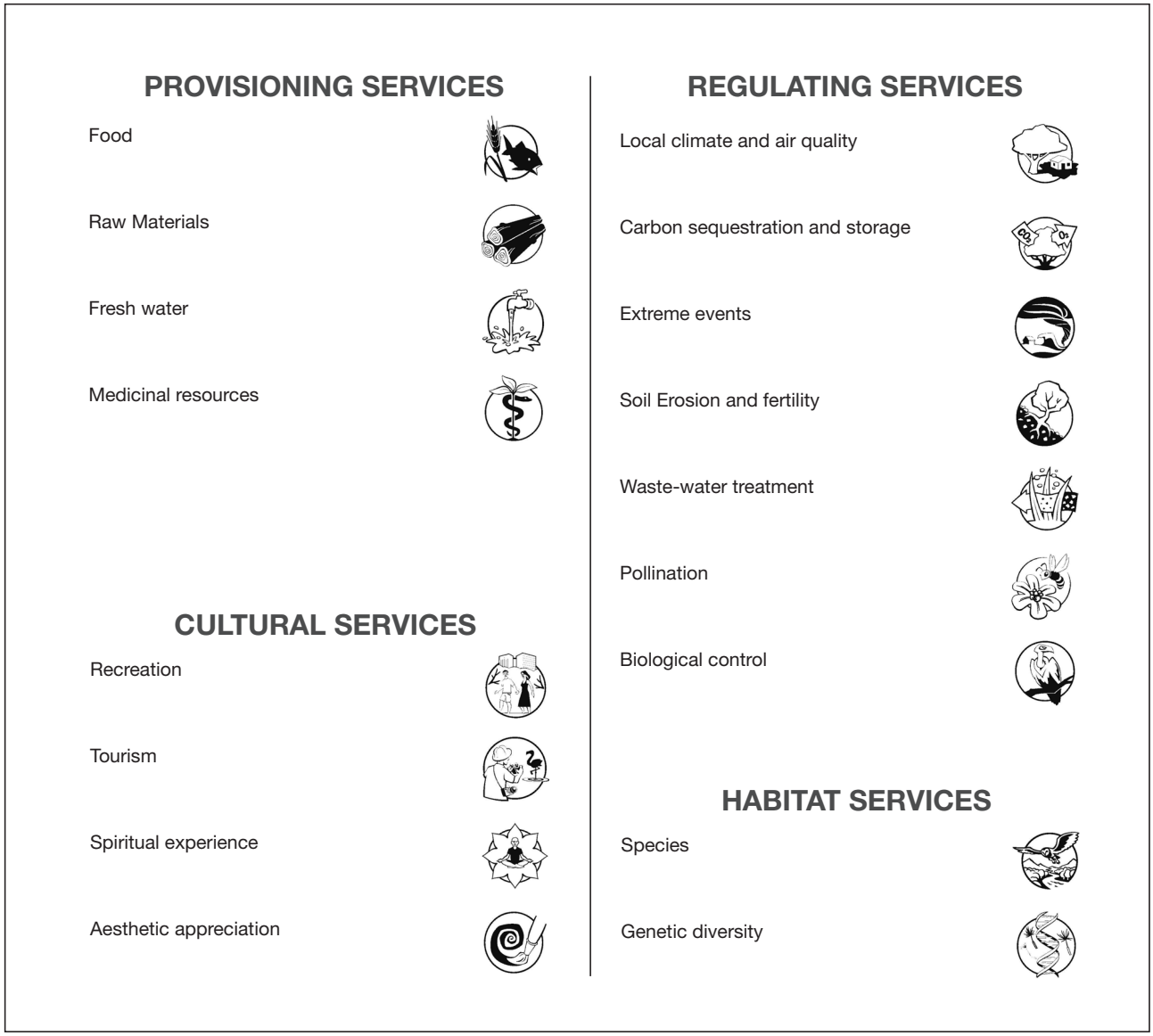
1. TEEB sees *valuation*, in its diverse social contexts and its many forms, as an important *human institution* that has a major role to play in stemming the rising tide of degradation of ecosystems and the loss of biodiversity.
2. TEEB has been associated with several challenges and pitfalls that relate to valuation, such as issues of subjectivity, incommensurability, and ecological and economic uncertainty. These legitimate concerns are each specifically addressed by TEEB through its layered approach to valuation, in order to recognize, demonstrate and capture nature's values in appropriate social and ecological contexts.
3. TEEB has also wrongly been associated with the ideas of "putting a price on Nature" or of commodifying or privatizing the global commons. However, TEEB is anything but a cost–benefit based stewardship model for the Earth and its living fabric of ecosystems and biodiversity.
4. TEEB recognizes that values are a product of different worldviews and perceptions on the relationship of humans and nature, and treats them as legitimate and valid in their respective socio-cultural contexts.
5. TEEB argues that the most ethical response for us in the face of risk and uncertainty is not to sit idly until we have perfect information to act, but rather risk to err on the side of precaution and conservation.
6. TEEB argues that, in the absence of valuation, essential and declining ecosystem services are already being 'traded' as commodities, sometimes for an implicit price of zero.
7. A whole range of policy responses is required to solve the largely public goods problems underlying biodiversity loss and ecosystem service degradation - such as changes in land use planning, regulation, community access rights, and schemes for payments for ecosystem services.
8. In the business context, TEEB and 'Corporation 2020' both argue that corporate impacts and dependencies on biodiversity and ecosystem services should be measured and valued as an integral part of management practise and of statutory reporting and disclosure.
9. The TEEB 'community' today represents a wide and strong support base of several hundred economists, ecologists, social scientists, policymakers, administrators, and business professionals, and growing rapidly.
10. The process of identifying nature's values is not to be taken as an end in itself. It should be treated as a means to better communicate and take account of nature's importance in policy- and decision-making, with particular respect to human well-being and to the conservation of natural commons for reasons of inter- and intra-generational equity.

1. THE ECONOMIC CASE FOR BIODIVERSITY

If economic arguments could make such a strong case for early action and policy change to address the threat of climate change, then could the same be possible for biodiversity loss? This was in essence the question put forth by a group of G8 + 5 environment ministers in Potsdam, Germany, in 2007, referring to the recently published 'Stern Review of the Economics of Climate Change' (Stern et al., 2006). To explore this question further, an initiative known as 'The Economics of Ecosystems and Biodiversity'[1] was launched by Germany and the European Commission. Half a decade after its genesis, this chapter describes the life of TEEB to date, progress made towards its goal of mainstreaming the economics of nature, the main challenges facing TEEB as it begins a phase of implementation, and the responses of the 'TEEB community' to these challenges.

The causes of ecosystem degradation and biodiversity loss were well documented in the Millennium Ecosystem Assessment (MA, 2005), which also listed the many kinds of values delivered to society and the economy by nature. The TEEB reports, which

1. <www.teebweb.org>.



Adapted from the Millennium Ecosystem Assessment's (2005) classification of ecosystem services, the TEEB reports use a number of icons to represent the wide range of services provided by ecosystems and biodiversity.

followed the MA's ecosystem service classification, compiled the available evidence and highlighted how these values often go unrecognized by decision-makers across society, be they policymakers, administrators, businesses, or citizens. **Because nature is often invisible in the economic choices we make, we have steadily been drawing down our natural capital—without understanding either what it really costs to replace services provided for free by nature, or that man-made alternative solutions are sometimes far too expensive for these services to be replaced or substituted.** Exacerbating the problems associated with economic invisibility of nature and its services in most policy discourse and in policy trade-offs is the inadequacy of today's economic compass—comprising GDP and related indicators at the macro level, and financial profitability or 'shareholder value' at the micro level. These indicators are old, incomplete, and no longer capable of providing good answers in modern society, in a world where natural resource scarcity affects a diverse range of public and private goods and services.

TEEB is an initiative to compile the evidence on these problems in their biophysical and spatial contexts and their socioeconomic contexts, and also to address metrics for their evaluation and redressal. The purpose of the 'Interim Report' of TEEB (2008) was to size in economic terms the problem of ecosystem degradation and biodiversity loss. It was presented at the High-Level Segment of the ninth Conference of

the Parties to the Convention on Biological Diversity (CBD COP-9) in Bonn, Germany, in May 2008, and sparked international demand for a deeper analysis of the economics of ecosystems and biodiversity. Responding to this call, the TEEB initiative embarked on compiling a series of reports focused on different groups of decision-makers. At CBD COP-10 in Nagoya, Japan, in October 2010, the last of five reports was presented: the first publication, 'TEEB Ecological and Economic Foundations', provided a comprehensive assessment of the fundamental ecological and economic principles of measuring and valuing ecosystem services and biodiversity. Aimed at policy-makers, the second report, 'TEEB in National and International Policy Making', and the third, 'TEEB for Local and Regional Policy Makers', offered targeted guidance on how investment in natural capital could deliver a wide range of social and economic benefits, and practical insight into which policy options exist to better manage these changes. The fourth report in the series, 'TEEB in Business and Enterprise', described how biodiversity loss and ecosystem decline present both risks and opportunities to businesses, and examined how businesses can align their actions with conservation goals by better recognizing and responding to their dependencies and impacts on ecosystem services. The final report provided a synthesis of the approach, conclusions, and recommendations of the initiative.

The TEEB suite of reports has quickly gained credibility as a leading, up-to-date source of knowledge in the discipline of ecosystem and biodiversity valuation. Despite its wealth of data on tools and methodologies, a conscious decision was made not to produce any aggregate number for quantifying either a single global value for nature's services or the global economic damage due to lost biodiversity[2], as will be explained later in this chapter. Several factors have influenced this choice, such as the difficulty of establishing the meaning or relevance of any such value given that we have no alternatives to Earth's biosphere; the plurality of ethical perspectives for valuation, its purposes, and its contexts; and, conversely, the actionability and human relevance of working at scales such as biomes, countries, regions, and communities.

Instead, with 'mainstreaming' as its avowed principal objective, TEEB intends to help decision-makers recognize the wide range of benefits of ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, suggest how to capture those values in decision-making.

2. Although the TEEB studies refrain from producing an aggregate number, they do occasionally cite and base their findings on other pieces of work that have made such attempts—for example, Braat et al. (2008), which contains an economic assessment of the value of biodiversity loss in 2050 compared with 2000, according to a business-as-usual scenario. Although arriving at monetary results, it cites numerous caveats, making the results partial and tentative.

2. TEEB AND ECONOMIC VALUATION

Whilst inspired by the Stern Review, it was evident from TEEB's inception that the nature of the challenge being addressed by TEEB was different from climate change. Biological diversity, or biodiversity, refers to the entire living fabric of our planet—comprising its ecosystems, species, and genes[3], in all their quantity and quality dimensions. This formalistic definition from the CBD, together with the work of the Millennium Ecosystem Assessment, helps us recognize the many levels at which nature's living fabric nourishes and sustains human societies and economies. Any study of the costs of 'business as usual', or any attempt to value the benefits of nature's services, needs to work across these different layers of biodiversity; across different geo-political scales at which benefits flow (local, regional, global); across different value-articulating institutions (TEEB, 2010a) and their valuation perspectives; and across different institutional spaces in which responses to loss and degradation can be formulated by society, ranging from norms, regulations, policies, and economic mechanisms, to markets.

3. <www.cbd.int>.

All of these very different biodiversity layers, geo-political scales, value-articulating institutions, and diverse response strategies developed by decision-makers to address biodiversity losses together constitute the landscape of TEEB. Precisely because of the variances and vagaries of this landscape, **TEEB cannot and thus does not propose a one-size-fits-all, cost–benefit-based stewardship model for the whole Earth. Instead, TEEB sees valuation as an important human institution** (TEEB, 2010a). Douglass North defined 'institutions' as the basic rules of the game in an economy (North, 1990). These could either be formal systems, such as constitutions, laws, taxation, insurance, and market regulations, or informal norms of behaviour, such as habits, customs, and ideologies. In the same way, the institution of valuation can also be informal or formal, depending on its socio-cultural context. In other words, valuation is a 'constructed set of rules or typifications' (Vatn, 2000), emerging from our understanding of what they are and how they should be determined. Values, norms, beliefs, and conventions are part of culture, and they can show considerable diversity, which in turn affects valuations (TEEB, 2010a, p.161). For example, Judaeo-Christian

culture and beliefs see man as 'inheritor of Earth', as owner. However, such a view contrasts sharply with naturist or tribal views of humanity as part of the fabric of nature. TEEB argues that neither is incorrect nor invalid in their respective socio-cultural contexts, as values are always derived from worldviews and perceptions.

A basic premise of the TEEB (2010c) study is that the valuation of biodiversity and ecosystem services may be carried out in more or less explicit ways according to the situation at hand. The TEEB study follows a tiered approach in analysing and structuring valuation that involves (see Box 1) three different levels of action. Although not all are necessary for ensuring conservation and sustainable use, and indeed some require more attention than others depending on context, a holistic approach is strongly encouraged:

Box 1. TEEB Approach

1. *Recognizing value*: identifying the wide range of benefits in ecosystems, landscapes, species, and other aspects of biodiversity, such as provisioning, regulating, habitat/supporting, and cultural services;
2. *Demonstrating value*: using economic tools and methods to make nature's services economically visible in order to support decision-makers wishing to assess the full costs and benefits of land-use change; and
3. *Capturing value*: incorporating ecosystem and biodiversity benefits into decision-making through incentives and price signals. [4]

All of these levels of valuation help us to rethink our relationship with the natural environment and alert us to the impact of our choices and behaviour on distant places and people.

'Recognizing value' is a capability of all human societies and communities, and can easily influence societal norms and regulations, often without any recourse to monetization or even economics. One such example is the tribal communities of Himanchal Pradesh, India, who protect thousands of sacred groves due to strong spiritual beliefs. Other examples come in the form of legislation, such as declaration of protected areas for reasons of patrimony and heritage, thereby bequeathing unique areas for future generations to enjoy. Changes in land management and planning strategies in recognition of ecologically important areas are also examples of value recognition.

4. For a collection of nearly 100 case studies illustrating the TEEB approach, see the TEEB website: http://www.teebweb.org/resources/case-studies/

'Demonstrating value' in economic terms is critical for understanding the consequences of changes resulting from alternative land-use or land-management options, and can be an important aid in achieving more efficient use of natural resources. For example, an assessment in Kampala, Uganda compared the costs and benefits of conserving the ecosystem services provided by wetlands in treating human wastes and controlling floods against the costs and benefits of providing the same services by building water treatment facilities or concrete flood defences, and found the former to be considerably less expensive (Emerton et al., 1998). Demonstrating value can also highlight the costs of achieving environmental targets and help identify more efficient means of delivering ecosystem services. Valuation in these circumstances enables policy-makers to address trade-offs in a rational manner, correcting the bias typical of much decision-making today, which tends to favour private wealth and physical capital above public wealth and natural capital.

TEEB recognizes that values are a product of different world views and perceptions on the relationship of humans and nature, and treats them as legitimate and valid in their respective socio-cultural contexts.

'Capturing value' can be achieved through a variety of economic mechanisms, some of which can be market-based (e.g. eco-labelling, eco-certification, and 'payments for ecosystem services' (PES)), whereas others are embedded in policy decisions. Legislation or liability rules can also work to incorporate values into the private and public sphere of decision-making.

5. See 'Scaling Up Biodiversity Finance: Co-chairs' Summary' (2012), Dialogue seminar, Quito, Ecuador (available at <http://www.dialogueseminars.net/resources/Quito/Report/Quitoreport-8-April.pdf>).

It is observed that, in the majority of PES schemes, both payers and receivers are government entities[5], and this further highlights that value capture takes place in a much wider solution space, and is not the same as 'marketization' of the natural commons.

'Market' solutions assume commodification, many buyers and sellers, and the existence of private claims to buy and sell. However, most ecosystem services that are being degraded and most biodiversity that is being lost is categorized as public goods and services, for which markets are far from ideal vehicles of management.

3. RESPONDING TO THE CHALLENGES

There are four widespread and legitimate concerns about economic valuation of nature's services, each of which has been addressed by TEEB in the design of its own approach to undertaking valuation.

First, valuation of nature necessarily involves a certain degree of subjectivity (Prior, 1998; Lockwood, 1999; Balmford et al., 2011). Values, as well as norms, beliefs, and conventions, are derived from worldviews and perceptions of a society that try to understand and delineate what is right or wrong or, more appropriately, what is invaluable, valuable, or valueless (TEEB, 2010a, p. 161). **Because of this multi-dimensional and socio-cultural embeddedness of 'value', any exercise of valuation is purely a reflection of how certain people perceive their natural environment, and their relationship to it, at a certain point in time** (TEEB, 2010a, p.151). This subjectivity is indeed recognized, and forms an important part of TEEB's approach to decision-making. While economic valuation can be a powerful means for decision-making and feedback, it is only one particular tool based on a rational management approach (TEEB, 2010a, p. 157). In situations where cultural consensus on values is strong, and the science is clear, valuation can contribute to more holistic economic accounting and planning, with an inclusive view of nature and its benefits. However, in complex situations involving multiple ecosystems and services, and/or plurality of ethical or cultural convictions, valuation data may be unreliable or unsuitable. In such cases a differentiated discussion of what choices society has regarding our relationship with nature and what risks these involve is all the more important. In general, **TEEB advocates providing the best available estimates of value for a given context and purpose, and seeking ways to internalize that value in decision-making.**

The second concern is derived from the view that values are generally incommensurable, in that they cannot be measured in the same units (Faucheux and O'Connor, 1998; Funtowicz and Ravetz, 1994; Martínez-Alier et al., 1998; Martinez-Alier and O'Connor, 1999; Sagoff, 1998). The very idea of valuation, however, exists on the dangerous premise that nature can be reduced to a single (usually monetary) metric, and is thus commensurable. This is akin to equating something like a human rights infraction or loss of life with financial compensation, and fails to take into account that certain values simply cannot be measured, such as intrinsic or existence values of nature (Gatzweiler, 2008, cited in TEEB 2010a, p. 162; Sagoff, 2011). This is indeed a serious concern, and any estimate of total economic value runs the risk of leaving out important aspects. **It is therefore essential to communicate monetary values with diligence, making clear which dimensions they do and do not cover, and communicating them as lower boundary, not as 'true value'.** TEEB itself goes beyond valuation and attempts to place nature's values in their appropriate context. TEEB acknowledges that economic trade-offs form an important part of policy-making, and that monetary valuation may be helpful in providing economic incentives to sustainably manage ecosystems (Costanza, 2006), or at the very least, trigger the much needed societal debate about the value of nature and its services beyond the conservation of birds and butterflies, considered by many as a luxury of the rich.

Third, there is a strong fear of adding economic uncertainty to ecological uncertainty, as TEEB presumes to operate in a space of scientific uncertainty about ecosystem services, and exacerbates risks by adding a layer of economic analysis to this uncertainty (Chee, 2004; Johnson et al., 2012). There is no doubt that there is a high level of uncertainty about the supply of natural resources and ecosystem services, especially into the future, and this makes economic valuation difficult if not contentious. Moreover, there is still a large (albeit narrowing) knowledge gap regarding the consequences of ecological and anthropogenic processes for the health and functioning of biodiversity and ecosystem services. Risks and uncertainty are innate to our modern world of complex and interrelated problems.

For instance, one of the biggest uncertainties facing economic analyses of biodiversity and ecosystems is the characterization of the responsibility of the present generation for the well-being of future generations. Selecting an appropriate discounting rate[6] is the outcome of explicit or implicit ethical choices and, much like the Stern Review's economic analysis of climate change, the loss of biodiversity and ecosystems has properties that make it difficult to apply standard welfare analysis, including discounting the future:

1. It is a phenomenon having global, regional, as well as local consequences.
2. Its impacts are long-term and irreversible.
4. Pure uncertainty is pervasive.
4. Changes can be non-marginal and non-linear.
5. Questions of both inter- and intra-generational equity are central.

TEEB approaches this dilemma by presenting a range of discounting choices linked to different ethical standpoints, thereby enabling end-users to make their own conscious choices. The use of positive rates is supported by the view that goods or services delivered later are relatively less valuable when incomes are expected to grow, even though this will typically lead to the long-term degradation of ecosystems and biodiversity; a discount rate of zero translates into a more ethical approach that typically sees our grandchildren valuing nature similarly to our generation, and deserving as much as we do; even the use of negative rates can be applied under the assumption that future generations will be poorer in environmental terms than those living today. Generally speaking, TEEB advocates that a variety of discount rates be considered depending on the time period involved, the degree of uncertainty, ethical responsibilities to the world's poorest as well as future generations, and the scope and nature of the project or policy being evaluated.

However, it must be mentioned that, in situations characterized by non-marginal change, radical uncertainty, or ignorance about potential tipping points, economic valuation tends to be less useful. In such circumstances, prudent policy should invoke complementary approaches such as the 'safe minimum standard' or the 'precautionary principle'. **TEEB argues that the most ethical response for us in the face of risk and uncertainty is not to sit idly until we have perfect information to act.** As a society, we are confronted with a moral choice of whether or not to act. TEEB considers the economic perspective as complementary to all others and, after compiling all of the evidence, sees risks and uncertainty in the context of the equally if not more serious risks and uncertainties of proceeding along a 'business as usual' path, despite all available evidence that nature's losses are palpable, serious, harmful, and potentially disastrous for human survival in the biosphere. Given the choice between the increasing present and future costs of inaction or the long-term benefits of imperfectly informed action, the preference of the TEEB community is to err on the side of caution and conservation.

Lastly, there exists a concern that we are 'selling the rights of Mother Earth'[7]—in other words, that the 'financialization' (Spash and Aslaksen, 2012; Arsel and Büscher, 2012; Sullivan, 2013) of nature and its services will ultimately lead to its commodification and marketization (Khor, 2011; McAfee, 1999; McCauley, 2006). More specifically, this **criticism suggests that nature, once its values are identified and expressed in monetary terms, will become a market commodity and, like any other, subject to free trade.** Moreover, it is argued that, in becoming privatized, previously public ecosystem goods and services will become accessible to the very same private interests responsible for our planet's degradation (Monbiot, 2012). Though these are valid concerns, we would, however, argue that essential ecosystem services are already being 'traded' in precisely this manner, sometimes for an implicit price of zero (Costanza et al., 2012). Land concessions granted for mining or logging usually do not account for the ecosystem services lost through subsequent land-use change. Ocean commons continue to be open access and free. If nothing else, valuation in combination with liability regulations makes destructive extraction less attractive by adding (usually quite significant) financial costs. **Placing a value on nature's ecosystem services should not be misconstrued as 'putting a price on nature'.** Economic policy utilizes several instruments – some market-based and some not – to reflect the value of nature's services[8]. TEEB does not suggest placing blind faith in the ability of markets to optimize social welfare by privatizing the ecological commons and letting markets discover prices for them. What TEEB offers is both a model for communicating to decision-makers in their own language, dominated by economics, as well as a toolkit for evaluating and integrating good stewardship into their decisions.

6. For a detailed discussion of discounting the future in an ecosystems and biodiversity context, see TEEB (2010a), 'Chapter 6: Discounting, Ethics and Options for Maintaining Biodiversity and Ecosystem Integrity'.

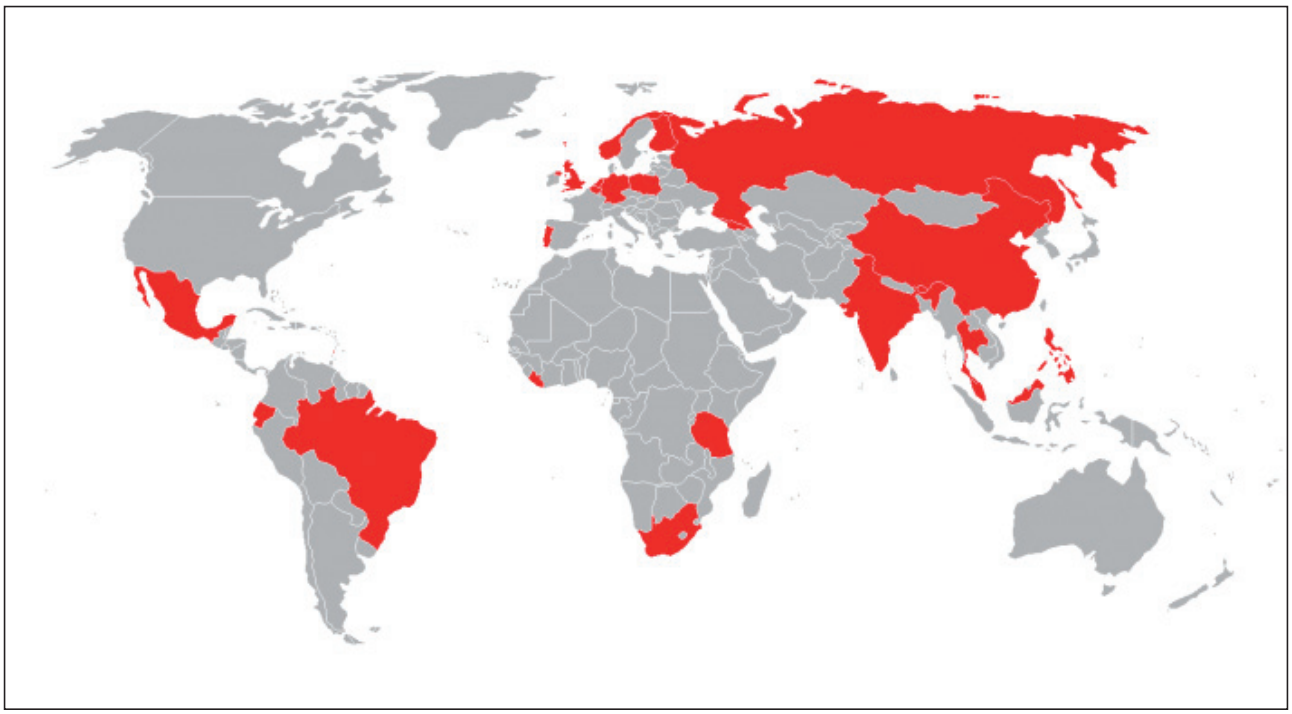
7. This fear is most typically voiced by members of ALBA countries. ALBA, or The Bolivarian Alliance for the Peoples of Our America (Spanish: Alianza Bolivariana para los Pueblos de Nuestra América), is an international cooperation organization for the social, political, and economic integration of the countries of Latin America and the Caribbean. Member nations include Antigua and Barbuda, Bolivia, Cuba, Dominica, Ecuador, Nicaragua, Saint Vincent and the Grenadines and Venezuela. These views are reflected in an Open Letter to the CBD, available at <http://www.wrm.org.uy/countries/Ecuador/Open_Letter_Global_Dialogue_Seminar.html>.
8. For example, subsidies, regulation, investment in public goods/ecological infrastructure, distributional impacts, and poverty eradication incentives.

A whole range of policy and legislative responses is required to solve the largely public goods problems underlying biodiversity loss and ecosystem service degradation across different countries and societies—such as changes in land-use planning, regulation changes, community access rights reforms, eco-labelling and eco-certification, valuations of protected areas' benefits, schemes for payments for ecosystem services, to name a few. Most importantly, as a society we have to reopen the debate on our relationship with nature, the choices that we are facing and the options that we have. **The fundamental problem of biodiversity loss can be addressed only if we find new ways of explicitly debating about value and importance.** In such a debate, valuations (understood in the broad sense explained by TEEB reports, rather than a narrow sense of 'marketization') can be very useful in providing substance and credibility to arguments for better conservation policy and practice. But the debate should by no means be limited to our current understanding of valuation, and should also explicitly address drawbacks and limitations as this will help achieve a much more encompassing debate, where economics is a means to the end of achieving human well-being.

4. TAKING TEEB FROM ANALYSIS TO ACTION

Capitalizing on the step-change in awareness created by the TEEB reports, TEEB has become increasingly recognized and explored as an essential toolkit for decision-makers in governments and business to integrate the economic value of biodiversity and ecosystem services into their accounting and reporting systems. Its ongoing phase of implementation is taking TEEB into a growing number of countries and into a very broad-based 'TEEB for Business Coalition', comprising several global business networks. Progress thus far is very much in line with TEEB's central objective of 'mainstreaming' the economics of ecosystems and biodiversity; however, these are early days and significant challenges lie ahead, not least the need to ensure that sufficient checks and balances and careful planning address inappropriate use of valuations.

The role of the TEEB initiative in this third phase is to support policymakers and the world of business in their efforts to undertake TEEB studies, and to better respond to ecosystem degradation and biodiversity loss through policy instruments and reforms. A TEEB study can be undertaken at the regional, national, or sub-national level, in both public- and private-sector contexts. It can cover different issues and ecosystems, incorporate different types of information, and should consider a wide range of stakeholder perspectives. **Therefore, there is (and should be) no single valuation process that can be applied to every situation. Instead, TEEB has analysed many cases and, from this analysis and the broader literature, summarized a stepwise approach consisting of six steps** (see Box 2) to help structure the process



TEEB and TEEB related studies and assessments (in red) are currently underway in several regions and countries.

Box 2. The TEEB stepwise approach to appraising nature's benefits

Step 1: Specify and agree on the problem

This is often a worthwhile effort because views can differ substantially. If key stakeholders share a common understanding of the problem, serious misunderstandings during the decision-making process and implementation can be avoided.

Step 2: Identify which ecosystem services are relevant

Ecosystem services are often interconnected. Identifying which ones are most important to your problem focuses the analysis. Going one by one through the list of services is a simple approach.

Step 3: Define the information needs and select appropriate methods

The better you can define your information needs beforehand, the easier it is to select the right analytical method and interpret the findings. Assessments differ in terms of which services are considered, the depth of detail required, timelines, spatial scope, monetization of the results and other factors. The study design determines what kind of information you get.

Step 4: Assess expected changes in availability and distribution of ecosystem services

If possible, use experts. Also, draw on field work and documented experience from analyses in comparable settings. Use common sense and consult with colleagues on possible changes and their consequences, starting with the most obvious ecosystem services.

Step 5: Identify and appraise policy options

Based on the analysis of expected changes in ecosystem services, identify potential responses. Appraise these in terms of their legal and political feasibility as well as their potential in reaching the targeted quality, quantity and combination of ecosystem services produced by natural capital.

Step 6: Assess distributional impacts of policy options

Changes in availability or distribution of ecosystem services affects people differently. This should be considered in social impact assessment, either as part of the analysis or as part of appraising policy options.

The relative importance of each step is determined by your situation and objectives. Taken together, adapted to specific needs, and incorporated into existed decision-making procedures, they offer guidance for considering natural capital in local policy. Other technical, legal, economic and social information also needs to be considered. The steps can also help design a monitoring system and thereby track the condition of natural capital.

Source: TEEB (2010b), p. 177

of explicitly assessing and incorporating ecosystem services into policy and management decisions. These steps should be integrated into and inform the usual processes in decision making and policy design established in different countries and are intended to complement not to replace these.

These steps are integral to the operationalization of TEEB and have quickly been picked up by regional and national authorities in order to establish their own TEEB studies[9]. **National and local governments have an essential role to play in this process, whether by mainstreaming biodiversity and ecosystem services into policy-making, or by creating an enabling regulatory and fiscal environment for business.** Appreciating the responsibility that this entails for ensuring quality, TEEB's Advisory Board recently set up a process whereby country-level TEEB studies can undergo a structured peer-review process and, once reviewed by a Board committee of experts, can then be endorsed as a recognized 'TEEB Country Study'[10]. Moreover, in the international policymaking setting,

9. TEEB studies and assessments are currently under way in several regional (e.g. Association of South-East Nations, or ASEAN, European Union, and Nordic countries) and country-level contexts (e.g. Brazil, Georgia, Germany, India, Netherlands, Norway, South Africa, St Lucia, and Sweden), as well as in the context of European Commission pilot projects in Bhutan, Ecuador, Liberia, the Philippines and Tanzania.

10. A 'Guidance Manual for TEEB Country Studies', launched in May 2013, provides both technical and operational guidance on how countries may conduct a TEEB Country Study. It outlines the various steps that may be taken to initiate and implement a country study, communicate its findings, and implement the recommendations of the study (< http://www.teebweb.org/wp-content/uploads/2013/06/TEEB_GuidanceManual_2013_1.0.pdf >).

Companies that understand and manage risk presented by biodiversity loss and ecosystem decline, establish operational models that are flexible and resilient to these pressures, and move quickly to seize business opportunities, are considered more likely to thrive in future scenarios.

TEEB is featured prominently within intergovernmental strategies and processes on biodiversity and ecosystem service issues[11].

The private sector plays a crucial role in influencing biodiversity loss, although its responses are not generally commensurate with its impacts. Although many companies now report their greenhouse gas emissions and mitigation efforts, biodiversity and ecosystem services are usually treated superficially in company reports, and are rarely seen as relevant to financial reporting. However, the business case for biodiversity and ecosystem services is getting stronger as resources become scarce, and market opportunities shift towards green businesses. **Companies that understand and manage risks presented by biodiversity loss and ecosystem decline, establish operational models that are flexible and resilient to these pressures, and move quickly to seize business opportunities, are considered more likely to thrive in future scenarios.**

11. Examples include the CBD Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets (particularly 2, 3, and 11), EU Biodiversity Strategy to 2020, and the IUCN Programme for 2013–2016.

TEEB offers a number of reliable tools and methods for determining the economic value of nature's services, which can in turn be used, for and by business, to help make the link from ecological impacts and dependence to the business bottom line.

Corporate externalities—i.e. unaccounted costs to society of doing 'business as usual'—of just the top 3,000 listed companies amount to an estimated US $2.15 trillion, or 3.5 per cent of GDP, every year (UNEP-FI and PRI, 2010). Whilst the largest of these externalities is the damage impact of climate change, several large externalities (e.g. from freshwater extraction, waste generation, land and sea pollution) appear in the form of losses in public natural capital. The 'public goods' nature of this problem, and the absence of institutions or mechanisms to internalize these externalities, leads many to believe that reforms in micro-level policy might be the only way ahead. Indeed, here there is a growing body of opinion that we need nothing short of a redesign of corporations themselves, as the economy's main agents, if we are to successfully enable a transition to a 'Green Economy'. Among the many changes being sought—including different models of ownership for corporations and changes in finance, advertising, and taxation—an especially important change is that corporations must be responsible for discovering, measuring, and managing their negative externalities down to levels that are acceptable to stakeholders, not just shareholders.

'Corporation 20/20'[12], a recent campaign for corporate redesign, sees the process of redesign as an evolutionary one. It argues that corporations, rather like species, evolve by responding to changes in their environment. The operating environment of corporations consists of policies, prices, and institutions, and so the argument of Corporation 20/20 is that exogenous changes are needed in these areas in order to engineer an evolutionary but rapid transformation in the dominant cost-externalizing model that we see today. Corporation 20/20 recommends four agendas for time-bound change which it considers mission-critical for ensuring that economic direction and resource use does not get dangerously close to or rush past planetary boundaries (Rockström et al., 2009). These are: (i) measuring and disclosing externalities; (ii) making advertising more accountable; (iii) limiting leverage for 'too-big-to-fail' corporations; and (iv) replacing profits taxation with taxes on resource extraction and use. Of these four concurrent agendas, three—i.e., changes in the manner in which policies and institutions address externalities (especially those that relate to natural capital), advertising (in that it drives consumer demand and hence resource use), and resource taxation (to the extent that current low levels encourage natural resource extraction)—are relevant to reducing pressures on ecosystem services and biodiversity.

12. Launched by Pavan Sukhdev (<www.corp2020.com>).

The first and perhaps most over-arching change agenda is about measuring, disclosing, and managing down externalities. To take this forward, a 'TEEB for Business Coalition' has been established to bring together global stakeholders to study and standardize methods for natural capital accounting and enable its valuation and reporting in business[13]. This is an area of considerable complexity and challenge, especially the challenge of achieving cohesion across private sector initiatives at different levels, including road-tests and pilot projects by leading corporations, industry-wide initiatives to set guidelines and standards, and over-arching global initiatives such as carbon disclosure, water disclosure, and integrated reporting for corporations. Consistency and comparability of reporting and disclosure have to be achieved at three stages: discovery and quantification of life-cycle impacts on ecosystems for diverse industries and businesses; economic valuation of these impacts using a consistent framework and appropriate industry-wise valuation methodologies; and finally, integrated reporting of all significant impacts, ideally in the form of 'one report'. The many institutional partners of the Coalition, as well as its early movers, have a significant collaboration and coordination challenge ahead to evolve consensus around vision, strategy, and implementation plans.

13. The Coalition's activities focus on global stakeholder engagement, focused research, and development of methods for natural capital accounting. The Coalition's founding members have pioneered much of the science and business case for natural capital valuation and accounting, providing a credible platform to take the business application of this forward.

The TEEB 'community' today includes several hundred economists, ecologists, social scientists, policy-makers, administrators, and business professionals.

The TEEB 'community' today includes several hundred economists, ecologists, social scientists, policy-makers, administrators, and business professionals, among others. Quality, transparency, and inclusion have been guiding principles that united them in building this community, and the need for change has been their common driver. Agreeing on a vision and way forward across this community of experts and decision-makers has been perhaps an unstated success of the TEEB project, and one that the recently formed business community of the Coalition may also need to emulate for success in its challenging goal of a global system for measuring and reporting corporate externalities.

5. CONCLUDING REMARKS

Valuing nature's services in economic terms is not a political or corporate strategy accepted by everyone. Indeed, the TEEB reports detail both the theory and practice of diverse aspects of the human institution of valuation in different social and cultural contexts which are beyond economic considerations. However, it is usually either facile or incorrect to jump from seeking 'valuation' (which can be in the form of value recognition, value demonstration, or value capture supported by appropriate policies and practices) to seeking 'marketization'. **Economics is about much more than markets; it is about choices—about using incentives, policies, and regulations; about ensuring access to resources including necessities for healthy living such as clean air and safe water.**

A broad range of examples cited in the TEEB report suite have shown that successful solutions to biodiversity loss and ecosystem degradation can be devised using economic theory and practice, which are not 'market' solutions as such, although they may use economic argument.

The process of identifying nature's values is not to be taken as an end in itself. It should be treated as a means to better communicate and take account of nature's importance, with particular respect to human well-being. While this is neither necessary nor sufficient to stop all ecosystem degradation and biodiversity loss, it can prove extremely useful if placed in the appropriate context. Valuation can help us rethink our relationship with nature, alerting us to the true consequences of our behaviours and choices.

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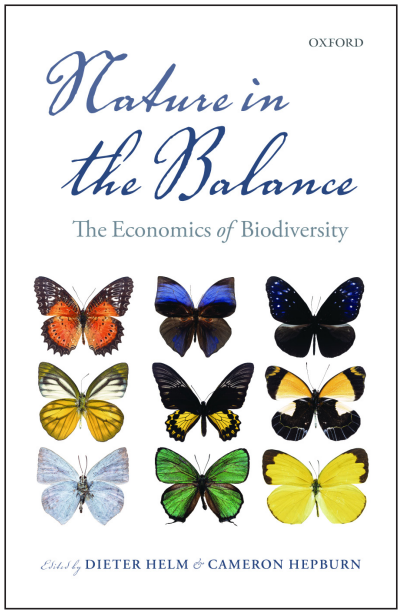
ABOUT THE BOOK

Nature in the Balance: The Economics of Biodiversity

Edited by Dieter Helm and Cameron Hepburn



This book sets out the building blocks of an economic approach to biodiversity, and in particular brings together conceptual and empirical work on valuation, international agreements, the policy instruments, and the institutions. The objective is to provide a comprehensive overview of the issues and evidence, and to suggest how this very urgent problem should be addressed. Whilst there has been an enormous growth and research focus on climate change, less attention has been paid to biodiversity. This collection of high-quality chapters addresses the economic issues involved in biodiversity protection.

This book focuses on the economics, but incorporates the underpinning science and philosophy, combining the application of a number of theoretical ideas with a series of policy cases. The authors are drawn from leading scholars in their specific areas of economics, philosophy, and conservation biology.

- Addresses the economic and policy issues involved in biodiversity protection
- Includes the best research in the field
- Offers substantial theoretical and policy developments
- Strong focus on policy solutions

Edited by Dieter Helm, Professor of Energy Policy and Fellow in Economics, New College, University of Oxford, and Cameron Hepburn, Professor of Environmental Economics at the Smith School of Enterprise and the Environment and at the Institute for New Economic Thinking at the Oxford Martin School, University of Oxford.

Essential for: Scholars and students of economics, as well as conservation biologists, environmentalists, and policymakers.

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‘The Economics of Ecosystems and Biodiversity’ (TEEB) is a global initiative that seeks to help decision makers recognise the wide range of benefits of nature, often demonstrate their values in economic terms and where appropriate capture those values in decision-making. Yet valuation of nature’s services in economic terms is not a universally accepted approach, putting TEEB on the receiving end of a number of criticisms. As TEEB shifts focus toward implementation, this chapter presents a timely opportunity for TEEB to respond to these concerns as they relate to key findings and recommendations. It is argued that economics is broader than markets and valuation is not an end in itself; it should be treated as a means to better communicate and take account of nature’s importance, with particular respect to human well-being. While neither necessary nor sufficient to stop all ecosystem degradation and biodiversity loss, valuation can help us rethink our relationship with nature, alerting us to the true consequences of our actions.

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