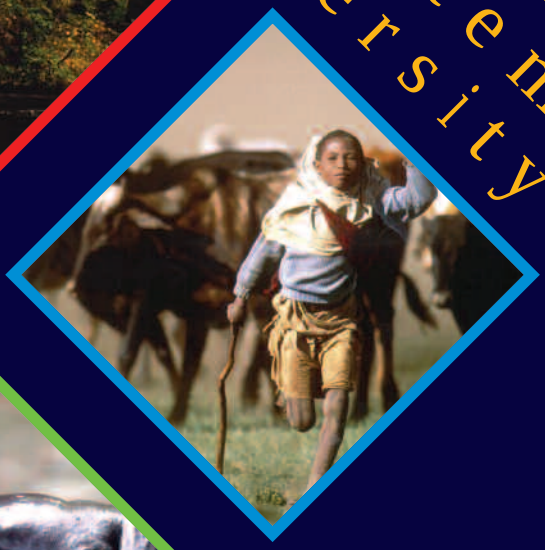
The economics of ecosystems & biodiversity



An interim report

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FOREWORD

Biological diversity represents the natural wealth of the Earth, and provides the basis for life and prosperity for the whole of mankind. However, biodiversity is currently vanishing at an alarming rate, all over the world. We are, so to speak, erasing nature's hard drive without even knowing what data it contains. The aim of the Convention on Biological Diversity (CBD) and its 190 Contracting Parties is to significantly reduce the loss of biodiversity by 2010. This is an ambitious goal which can only be achieved through the concerted efforts and combined strength of all sections of society. We therefore need both national and international alliances between policy makers, science, the public and business.

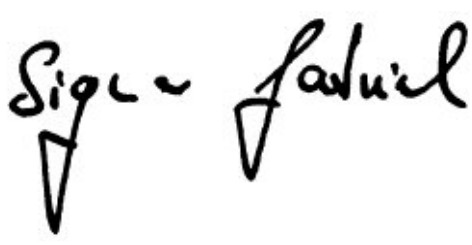
Arising out of a discussion at the meeting of G8+5 environment ministers which took place in Potsdam in May 2007, we decided to launch a joint initiative to draw attention to the global economic benefits of biodiversity and the costs of biodiversity loss and ecosystem degradation.

The success of this joint initiative was always going to be highly dependent on the quality of the leadership and for this reason we have been particularly pleased that Pavan Sukhdev, a Managing Director in the Global Markets division at Deutsche Bank, and founder-Director of a "green accounting" project for India, has accepted to take on the role of Study Leader.

Pavan Sukhdev and his team have had an extremely challenging task to bring together a lot of information in such a short time. Fortunately, they have benefited from the support and contribution of many international organizations as well as prominent experts.

The results from Phase I of the initiative we launched in Potsdam a year ago will be presented at the high-level segment of CBD COP9. We invite and encourage CBD Member Countries and international organizations to contribute actively to Phase II of this work which will begin immediately after COP9.

Stavros Dimas
Commissioner for Environment
European Commission



Sigmar Gabriel
Federal Environment Minister
Germany

PREFACE

Pavan Sukhdev, Study Leader

Not all that is very useful commands high value (water, for example) and not everything that has a high value is very useful (such as a diamond).

This example expresses not one but two major learning challenges that society faces today. Firstly, we are still learning the "nature of value", as we broaden our concept of "capital" to encompass human capital, social capital and natural capital. By recognizing and by seeking to grow or conserve these other "capitals" we are working our way towards sustainability.

Secondly, we are still struggling to find the "value of nature". Nature is the source of much value to us every day, and yet it mostly bypasses markets, escapes pricing and defies valuation. This lack of valuation is, we are discovering, an underlying cause for the observed degradation of ecosystems and the loss of biodiversity.

Our project on "The Economics of Ecosystems and Biodiversity" is about addressing this second challenge, and making a comprehensive and compelling economic case for conservation of ecosystems and biodiversity.

A DEFECTIVE ECONOMIC COMPASS?

Some readers may be surprised to learn that the example above is as old as economics. It is from Adam Smith's great classic of 1776. So perhaps a third and smaller challenge is for us to understand why it took mankind over 200 years to really come to grips with the first two challenges!

Two and a quarter centuries ago, land was plentiful, energy was not a major factor of production, and the scarce input to production was financial capital. How times have changed. Adam Smith designed his thinking framework for economics in a world in which global capital and trade were measured in millions, not trillions, of dollars. Bill McKibben (2007) identifies the steam engine and "GDP growth" as the two most significant discoveries of the 18th century, both of which improved the well-being of a significant part of humanity. GDP growth created jobs, avoided recessions, and has thus become a preferred yardstick for progress. However, GDP growth does not capture many vital aspects of national wealth and well-being, such as changes in the quality of health, the extent of education, and changes in the quality and quantity of our natural resources.

It can be said that we are trying to navigate uncharted and turbulent waters today with an old and defective economic compass. And this is not just a national accounting problem – it is a problem of metrics which permeates all layers of society, from government to business to the individual, and affects our ability to forge a sustainable economy in harmony with nature.

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY – "TEEB"

In March 2007, the G8+5 environment ministers met in Potsdam. Inspired by the momentum for early action and policy change created by the *Stern Review of the Economics of Climate Change*, they expressed the need to explore a similar project on the economics of the loss of ecosystems and biodiversity. The Minister for the Environment in Germany, Sigmar Gabriel, with the support of the European Commissioner for the Environment, Stavros Dimas, took the lead and accepted the challenge of organizing this study.

The sheer complexity and size of the task was self-evident, and its urgency quite compelling, so I felt both deeply honoured and not a little worried when Commissioner Dimas and Minister Gabriel offered me the position of Study Leader for this task. The science of biodiversity and ecosystems is still evolving, their services to humanity only partially mapped and imperfectly understood, and the economics used to assign monetary values to these sometimes contentious. However, I believed in the vision driving this project, I felt it was crucial and timely that it be done, and so I accepted the assignment happily.

I was reminded of a similar trepidation I had felt when, four years ago, some friends and I launched an ambitious "green accounting" project for India and its states with the aim of providing a practical "sustainability" yardstick for their economies, adjusting classical GDP measures and reflecting large unaccounted externalities such as those involving ecosystems and biodiversity. Most of the results of this project are already published (Green Indian State Trust, 2004-2008), and some have already been used, a rewarding experience from which *inter alia* we learnt the importance of challenging people's expectations, including our own.

As Phase I of TEEB draws to a close, I would like to give due recognition to the overwhelming support and

engagement we have received from such a vast number of contributors from all over the world (see Acknowledgements, page 60).

Firstly, I wish to thank all the members of our "core team", who worked tirelessly and it seemed continuously for weeks on end, often taking time off their day jobs to pull together, evaluate, extract and summarize volumes of material that came to us, and who contributed to the writing of this interim report. I wish to thank all those who contributed knowledge and papers on various aspects of the subject; we received over 100 submissions in response to our calls for evidence in September 2007 and March 2008. Our key meeting (Brussels, March 2008) drew 90 participants from almost as many institutions, many of whom wrote in subsequently with information and advice. We outsourced much of the work in Phase I to a set of distinguished research institutions, all of whom delivered excellent meta-studies and papers in very short time, and for this we thank the teams at FEEM, IEEP, Alterra, GHK, ECOLOGIC and IVM. Furthermore, colleagues at EEA, IUCN and UFZ provided valuable support in writing and editing. I thank especially our distinguished Advisory Board, both for agreeing to be involved and for taking time off their very busy schedules to advise me on this project. And finally, our thanks to the governments and institutions that supported this project, the G8+5, UNEP, IUCN, EEA, and especially the teams at our hosts and sponsors the DG Environment, EU Commission and BMU, Germany.

HIGHLIGHTS OF PHASE I

There is a new model evolving here: it is collegiate, collaborative and global. We have every hope and expectation that this will continue into Phase II, and indeed, we intend to increase and broaden our base of contributors, contractors, partners and advisers.

There were five main deliverables from Phase I of TEEB, and short summaries of these are given in the Annex to this interim report. These meta-studies and papers have collectively given us a firm foundation of information and analysis from which to launch Phase II.

Here, I would like to highlight three important aspects of our preliminary work in Phase I and our direction for Phase II.

The first is that we find poverty and the loss of ecosystems and biodiversity to be inextricably intertwined. We explored who were the immediate beneficiaries of many of the services of ecosystems and biodiversity, and the answer is that it is mostly the poor. The livelihoods most affected are subsistence farming, animal husbandry, fishing and informal forestry – most of the world's poor are dependent on them. This realization (see Chapter 3, "GDP of the poor") needs further research for global substantiation and we intend to carry it out in Phase II. Annual natural capital losses are typically estimated at an unimpressive few percentage points of GDP. If, however, we re-express these in human terms, based on the principle of equity and our knowledge of where nature's benefits flow, then the argument for reducing such losses gains considerable strength.

This is about the right of the world's poor to livelihood flows from nature which comprise half of their welfare or more, and which they would find it impossible to replace. We shall also argue that most of the Millennium Development Goals today are in fact hostage to this very basic issue.

The second issue is of ethics – risks, uncertainty, and discounting the future, issues which have also been raised in the *Stern Review*. In most of the valuation studies we examined, discount rates used were in the range 3-5% and higher. Note that a 4% discount rate means that we value a natural service to our own grandchildren (50 years hence) at one-seventh the utility we derive from it, a difficult ethical standpoint to defend. In Phase II we shall address this issue by applying a discrete range of discount rates representing different ethical standpoints.

Finally, and most important perhaps, we are convinced that every aspect of the economics of ecosystems and biodiversity that we examine and represent here, and in Phase II, must be sharply focused on the end-user – be it the policy maker, the local administrator, the corporation or the citizen.

OUR AMBITIONS FOR PHASE II

Phase II of TEEB sets out to conclude our scoping and exploratory work during Phase I and achieve four important objectives. These are to:

- firm up and publish a "science and economics framework" which can help frame valuation exercises for most of Earth's ecosystems, including in its scope all material values across the most significant biomes;
- further evaluate and publish "recommended valuation methodology", including biomes (e.g. oceans) and some values (e.g. option values and bequest values) which have not been investigated in depth in Phase I;
- engage all key "end-users" of our valuation work, early and comprehensively, to ensure that our output is as focused as possible on their needs, and "user-friendly" in terms of its organization, accessibility, practicability and, overall, its usefulness.
- further evaluate and publish a policy toolkit for policy makers and administrators which supports policy reform and environmental impact assessment with the help of sound economics, in order to foster sustainable development and better conservation of ecosystems and biodiversity

I have been a banker and a markets professional for 25 years. Two tenets that I learnt early and which have always

stood me in good stead are that "the seeds of trouble are sown in good times", and that "you cannot manage what you do not measure". No matter how challenging, if we truly want to manage our ecological security, we must measure ecosystems and biodiversity – scientifically as well as economically. The economic compass that we use today was a success when it was created, but it needs to be improved or replaced. I invite you to look, once again, at the cover of this interim report: it is no coincidence that our title and the images are tilted. We need that new compass in place, urgently.

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EXECUTIVE SUMMARY

Nature provides human society with a vast diversity of benefits such as food, fibres, clean water, healthy soil and carbon capture and many more. Though our well-being is totally dependent upon the continued flow of these "ecosystem services", they are predominantly public goods with no markets and no prices, so are rarely detected by our current economic compass. As a result, biodiversity is declining, our ecosystems are being continuously degraded and we, in turn, are suffering the consequences.

Taking inspiration from ideas developed in the Millennium Ecosystem Assessment, our initiative, The Economics of Ecosystems and Biodiversity (TEEB), aims to promote a better understanding of the true economic value of ecosystem services and to offer economic tools that take proper account of this value. We are confident that the results of our work will contribute to more effective policies for biodiversity protection and for achieving the objectives of the Convention on Biological Diversity.

TEEB is in two phases and this interim report summarizes the results of Phase I. It demonstrates the huge significance of ecosystems and biodiversity and the threats to human welfare if no action is taken to reverse current damage and losses. Phase II will expand on this and show how to use this knowledge to design the right tools and policies.

PHASE I

The world has already lost much of its biodiversity. Recent pressure on commodity and food prices shows the consequences of this loss to society. Urgent remedial action is essential because species loss and ecosystem degradation are inextricably linked to human well-being. Economic growth and the conversion of natural ecosystems to agricultural production will, of course, continue. We cannot – and should not – put a brake on the legitimate aspirations of countries and individuals for economic development. However, it is essential to ensure that such development takes proper account of the real value of natural ecosystems. This is central to both economic and environmental management.

In Chapters 1 and 2 of this report we describe how, if we do not adopt the right policies, the current decline in biodiversity and the related loss of ecosystem services will continue and in some cases even accelerate – some ecosystems are likely to be damaged beyond repair. Findings on the cost of inaction suggest that, with a "business-as-usual" scenario, by 2050 we will be faced with serious consequences:

- 11% of the natural areas remaining in 2000 could be lost, chiefly as a result of conversion for agriculture, the expansion of infrastructure, and climate change;
- almost 40% of the land currently under low-impact forms of agriculture could be converted to intensive agricultural use, with further biodiversity losses;
- 60% of coral reefs could be lost – even by 2030 – through fishing, pollution, diseases, invasive alien species and coral bleaching due to climate change.

Current trends on land and in the oceans demonstrate the severe dangers that biodiversity loss poses to human health and welfare. Climate change is exacerbating this problem. And again, as with climate change, it is the world's poor who are most at risk from the continuing loss of biodiversity. They are the ones most reliant on the ecosystem services which are being undermined by flawed economic analysis and policy mistakes.

The ultimate aim of our work is to provide policy makers with the tools they need to incorporate the true value of ecosystem services into their decisions. So in Chapter 3 – since ecosystem economics is still a developing discipline – we describe the key challenges in developing and applying suitable methodologies. In particular, there are ethical choices to be made between present and future generations and between peoples in different parts of the world and at different stages of development. Without taking these aspects into account, the Millennium Development Goals cannot be achieved.

Some promising policies are already being tried out. In Chapter 4 we describe several that are already working in some countries and could be scaled up and/or replicated elsewhere. These examples come from many different fields, but they convey some common messages for developing the economics of ecosystems and biodiversity:

- rethink today's subsidies to reflect tomorrow's priorities;
- reward currently unrecognized ecosystem services and make sure that the costs of ecosystem damage are accounted for, by creating new markets and promoting appropriate policy instruments;
- share the benefits of conservation;
- measure the costs and benefits of ecosystem services.

PHASE II

The economic approach we will be working on in Phase II will be spatially specific and will build on our knowledge of how ecosystems function and deliver services. We will also examine how ecosystems and their associated services are likely to respond to particular policy actions. It will be essential to take account of the ethical issues and equity, and of the risks and uncertainty inherent in natural processes and human behaviour.

Most biodiversity and ecosystem benefits are public goods that have no price. There are different approaches for solving this problem. Notably, we can adopt policies that reward preservation of the flow of these public goods, or we can encourage "compliance markets" which attach tradable values to the supply or use of these services. One example is payments for ecosystem services (PES). These can create demand so as to correct the imbalances which harm biodiversity and impede sustainable development. Phase II will examine the investment case for PES, but also for other new and innovative instruments.

New markets are already forming which support and reward biodiversity and ecosystem services. To be successful, they need the appropriate institutional infrastructure, incentives, financing and governance: in short, investment and resources. In the past, the state was often considered solely responsible for managing ecosystems. Now it is clear that markets can also play their part – often without drawing on public money.

The fundamental requirement is to develop an economic yardstick that is more effective than GDP for assessing the performance of an economy. National accounting systems need to be more inclusive in order to measure the significant human welfare benefits that ecosystems and biodiversity provide. By no longer ignoring these benefits, such systems would help policy makers adopt the right measures and design appropriate financing mechanisms for conservation.

Countries, companies and individuals need to understand the real costs of using the Earth's natural capital and the consequences that policies and actions, individual or collective, have on the resilience and sustainability of natural ecosystems. We believe that policies which better reflect the true value of biodiversity and natural ecosystems will contribute to sustainable development by helping to secure the delivery of ecosystem goods and services, particularly food and water, in a transparent and socially equitable way. This will not only protect biodiversity, ecosystems and the associated ecosystem services, but will also improve the well-being of our present generation and the generations to come.

If we are to achieve our highly ambitious goals we will need to draw on the knowledge, skills, and talent of countries, international bodies, academia, business and civil society from around the world. We look forward to working together openly, flexibly and constructively and to seeing further substantive progress in 2009 and 2010.