

The Economics
& of Ecosystems
of Biodiversity



THE TEEB REPORTS

All TEEB reports are available online at www.teebweb.org

TEEB (2008) *The Economics of Ecosystems and Biodiversity: An Interim Report*. European Commission, Brussels.

TEEB (2009) *The Economics of Ecosystems and Biodiversity: Climate Issues Update*.

TEEB (2010) *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

In addition to being available via the TEEB website, TEEB Foundations, TEEB for Business, TEEB for National Policy and TEEB for Local Policy, will also be published by Earthscan in an extended version under the following titles:

TEEB Foundations (2010) *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*. Edited by Pushpam Kumar. Earthscan, London.

TEEB in Business (2011) *The Economics of Ecosystems and Biodiversity in Business*. Edited by Joshua Bishop. Earthscan, London.

TEEB in National Policy (2011) *The Economics of Ecosystems and Biodiversity in National and International Policy Making*. Edited by Patrick ten Brink. Earthscan, London.

TEEB in Local Policy (2011) *The Economics of Ecosystems and Biodiversity in Local and Regional Policy and Management*. Edited by Heidi Wittmer and Haripriya Gundimeda. Earthscan, London.

TEEB is hosted by the United Nations Environment Programme and supported by the European Commission, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the UK government's Department for the Environment, Food and Rural Affairs, and Department for International Development, Norway's Ministry for Foreign Affairs, Sweden's Ministry for the Environment, The Netherlands' Ministry of Housing, Spatial Planning and the Environment and Japan's Ministry of the Environment.



TEEB Interim Report (May 2008)

In May 2008, at the 9th Conference of the Parties of the United Nations Convention on Biological Diversity (CBD) in Bonn, Germany, the TEEB Interim Report was launched.



The Interim Report provides a preliminary assessment of the economic impacts associated with losing natural capital.

The report outlines the cost of policy inaction and finds that under a 'business as usual' scenario a year's natural capital loss would lead to a loss of ecosystem services worth in the order of US\$ 2.0-4.5 trillion over a 50 year period (calculated as net present values using a 4% and 1% real discount rate). The report also describes in economic terms the deep links between eliminating poverty and conserving biodiversity and ecosystems. It highlights the importance of looking at ecosystem services not merely as a percentage of national GDP, but also as a percentage of the 'GDP' of poor rural and forest-dwelling communities who depend on forests for their livelihood.

The report draws attention to the ethical and intergenerational equity issues especially underlying the choice of discount rates to evaluate the benefits of nature for human welfare.

The report prepared the ground for future TEEB reports by providing a preliminary policy analysis based on existing economic evidence and by highlighting the importance of focusing on specific end-user groups (e.g. national policy makers, local administrators, businesses and consumers).

TEEB Climate Issues Update (September 2009)

The TEEB Climate Issues Update presents a series of early conclusions from the TEEB studies related to climate change. The following four issues at the interface of ecosystems, biodiversity, and climate change are discussed in detail.



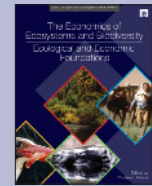
Coral Reef Emergency – The imminent loss of coral reefs due to CO₂ emissions has serious ecological, social, and economic consequences. An estimated 500 million people live close to coral waters and directly depend on coral reefs for their food and livelihoods. Scientific consensus is emerging that tipping points, beyond which reef recovery would not be feasible due to increasing ocean acidification, are being reached. Whilst the economic values of these reefs are high (estimates are in the range US\$ 30 billion to US\$ 170 billion per annum), this has not stimulated the policy changes required, such as accelerated CO₂ reductions.

Tropical Forest Carbon Mitigation – REDD-Plus is potentially the first global mechanism to value tropical forest carbon, and as such, presents an important opportunity to not only mitigate climate change, but also to create an operating model for the development of related financial mechanisms that would reward services provided in forests and other ecosystems (e.g. wetlands, coral reefs, etc).

National Accounting for Forest Carbon – A reliable system of measuring and accounting for carbon storage and sequestration is required for the successful implementation of a forest carbon agreement. Several transnational initiatives are under way to make national accounting more comprehensive, but there is an urgent need for global accounting standards to reflect forest carbon values in national accounts. A tangible step in this direction would be the rapid upgrade of the UN's System of Economic Environmental Accounting (SEEA) manual from 2003 to include forest carbon values.

Ecosystem investment for climate adaptation – There is considerable potential and a compelling cost-benefit case to be made for increasing public investment in ecological infrastructure (e.g. restoring and conserving forests, mangroves, river basins, wetlands, etc.) as a means of climate change adaptation. Moreover, significant social returns on such investments have been seen in a sample of restoration projects.

TEEB – Ecological and Economic Foundations (October 2010)



Economic valuation of ecosystems and biodiversity is a complex undertaking given the current state of knowledge about ecological processes and functions, and the need to draw from and integrate data from various disciplines, such as ecology and economics. TEEB – Ecological and Economic Foundations synthesizes state-of-the-art knowledge on the main concepts, methods and tools for valuation, provides recommendations on their application and identifies some critical needs in research and data collection.

The report begins by summarizing recent developments in the concept of ecosystem services, and proposes a classification of 22 ecosystem services based on the typology established by the Millennium Ecosystem Assessment. The report argues that valuation of ecosystem services is most useful for assessing change – whether in policy or management – rather than for estimating the total value of ecosystems. Moreover, it is noted that valuation should rely on firm ecological data taking into account that values are location and context-specific.

The report reviews the current state of knowledge on the relationships between biodiversity, ecosystems and ecosystem services. Although significant gaps in knowledge remain, there is clear and growing evidence of biodiversity's central role in the delivery of several ecosystem services. Moreover, there is emerging scientific consensus on the need to sustain biological diversity to maintain functioning ecosystems capable of delivering multiple services. The report provides a review of existing biophysical measures and indicators, assessing their relative strengths and weaknesses for different uses. It finds that existing measures and indicators are principally limited to food and fiber production and that urgent efforts are needed to enhance the measurement and understanding of biodiversity's role in supporting the full range of benefits.

The importance of the social and cultural context of biodiversity and ecosystem services in a valuation framework is also discussed in the report. While valuation imposes a way of thinking and reflects particular perceived realities, worldviews, and belief systems, it can also serve as a tool for self-reflection and as a feedback mechanism which helps people rethink their relation to the natural environment. The report provides a detailed discussion of various monetary valuation techniques available, the numerous challenges associated with their application to ecosystem services and biodiversity, and importantly, guidance for dealing with these challenges. Challenges discussed include different types of uncertainties e.g. due to non-linear ecosystem dynamics and tipping points and how to assess insurance values for ecosystem resilience. Finally, the report explores the ethical issues surrounding economic valuation, and in particular, the use and selection of discount rates when faced with ecological uncertainties and distributional and intergenerational equity objectives.

The report concludes by summarizing the key lessons learned from the analysis, discusses their policy relevance, and identifies remaining gaps in knowledge as a means of stimulating a future research agenda.

Chapter overview

Chapter 1	Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation
Chapter 2	Biodiversity, ecosystems and ecosystem services
Chapter 3	Measuring biophysical quantities and the use of indicators
Chapter 4	Socio-cultural context of ecosystem and biodiversity valuation
Chapter 5	The economics of valuing ecosystem services and biodiversity
Chapter 6	Discounting, ethics and options for maintaining biodiversity and ecosystem integrity
Chapter 7	Key messages and linkages with national and local policies

TEEB for National and International Policy Makers (November 2009)



International agreements and national policies reflect, and to a certain extent guide, how biodiversity and the associated flow of ecosystem services is valued.

The TEEB report for National and International Policy Makers provides a toolkit and a way forward for responding to the value of nature in political decision making. The report calls for more balanced and accountable approaches to policymaking; one based on the value of nature and the equitable distribution of its benefits. The report also presents best practices from around the world in achieving this objective.

While each country will have its own priorities and experiences, this report outlines a common set of achievable actions and practical tools to help policy makers to better reflect the value of nature, including:

- Creating better measurement and monitoring systems – from biodiversity and ecosystem services indicators to natural capital accounts and more comprehensive national income accounts;
- Developing a culture of assessment – taking wider ecosystem values over longer time periods into account, as well as the range of costs and benefits across affected parties;
- Adjusting incentives – rewarding benefits through price payments, premiums, and markets, reforming environmentally harmful subsidies and applying the ‘polluter pays principle’ to addressing losses;
- Greening markets and supply chains – developing and regulating markets, setting standards, supporting labelling and promoting green public procurement;
- Using regulation and good governance to raise national legislative standards and move towards policy coherence that integrates the values of nature;
- Improving the implementation and enforcement of legal frameworks
- Investing in ecological infrastructure – improving protected areas, restoring natural assets, increasing connectivity and supporting climate change adaptation and other policy objectives cost-effectively
- Increasing understanding and awareness, e.g. through new information tools, to demonstrate the value of nature for policy makers, business, communities and citizens.

The report concludes by noting that the steps outlined above are all critical in transforming the current approach to natural capital and responding to the value of nature.

Chapter overview:

Part I: The need for action

- Chapter 1 The global biodiversity crisis and related policy challenge
Chapter 2 Framework and guiding principles for policy response

Part II: Measuring what we manage: information tools for decision makers

- Chapter 3 Strengthening indicators and accounting systems for natural capital
Chapter 4 Integrating ecosystem and biodiversity values into policy assessment

Part III: Available solutions: instruments for better stewardship of natural capital

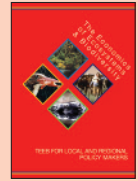
- Chapter 5 Rewarding benefits through payments and markets
Chapter 6 Reforming subsidies
Chapter 7 Addressing losses through regulation and pricing
Chapter 8 Recognising the value of protected areas
Chapter 9 Investing in ecological infrastructure

Part IV: The road ahead

- Chapter 10 Responding to the value of nature

TEEB for Local and Regional Policy Makers (September 2010)

The TEEB for Local and Regional Policy Makers report outlines the value of nature for local well-being and regional development and suggests means of drawing on such insights to support policy making.



It is at the regional and local level that most decisions are taken which directly affect natural capital. The report notes that the importance of maintaining and enhancing functioning natural systems is often ignored despite its importance, for example to the local economy, food or energy security, and environmental sustainability. When local and regional strategies have included measures to protect functioning natural systems or investments to enhance them, these have frequently been found to deliver robust and cost-effective solutions. For instance, protected upstream watersheds can secure the provision of drinking water to metropolitan areas; functioning wetlands and natural flooding areas can save costs on waste water treatment plants and avoid damage from floods; healthy mangroves or dune belts can provide effective coastal protection; and maintenance of quality urban green spaces can improve public health, quality of life, real estate values, as well as lowering sewage and energy costs.

More specifically, the report explores how considering ecosystem services can help:

- fine-tune by-laws and regulations for the effective management of natural resources, agriculture, fisheries, forestry, tourism and disaster mitigation and adaptation to climate change;
- improve performance in public management, spatial planning and environmental assessments, and to save costs in municipal service delivery;
- identify who is affected by environmental change and how they are affected (e.g. bringing local livelihoods to the centre of policy discussions);
- better coordinate conservation efforts with local development aspirations; and
- design and apply market-based instruments, such as payments for ecosystem services (PES), conservation banking, certification and labelling.

The report draws on examples from across the globe to provide a source of inspiration for explicitly considering biodiversity and ecosystem services in policy development and public management. It further gives an overview of options for appraising ecosystem services and a how-to-guide to apply such options in local policy settings, including a needs-oriented approach to appraisal. It is complemented by a collection of case examples from across the globe that illustrate how ecosystem services have been taken into account in local and regional policy, available at teebweb.org.

Chapter overview

Part I: The Opportunity

Chapter 1: The Value of Nature for Local Development

Part II: The Tools

Chapter 2: Conceptual Frameworks for Considering the Benefits of Nature

Chapter 3: Tools for Valuation and Appraisal of Ecosystem Services in Policy Making

Part III: The Practice

Chapter 4: Ecosystem Services in Cities and Public Management

Chapter 5: Ecosystem Services in Rural Areas and Natural Resource Management

Chapter 6: Spatial Planning and Environmental Assessments

Chapter 7: Ecosystem Services and Protected Areas

Chapter 8: Payments for Ecosystem Services and Conservation Banking

Chapter 9: Certification and Labelling

Part IV: Conclusion

Chapter 10: Making Your Natural Capital Work for Local Development

TEEB for Business (July 2010)



The TEEB for Business Report provides evidence of growing concern about biodiversity loss in business, and offers examples of how some leading companies are taking action to conserve biodiversity and to restore ecosystems.

The report reviews various indicators and drivers of biodiversity loss and ecosystem decline, and shows how these present both risks and opportunities to business. It examines the changing preferences of consumers for nature-friendly products and services, and offers examples of how companies are responding.

The report also describes recent initiatives to enable businesses to measure, value and report their impacts and dependencies on biodiversity and ecosystem services, and outlines priorities for further work in this area. A range of practical tools to manage biodiversity risks in business are reviewed, with examples of how some companies are using these tools to deliver business value.

The report further explores emerging business models that seek to deliver biodiversity benefits and ecosystem services on a commercial basis, the enabling frameworks needed to stimulate investment and entrepreneurship to realize such opportunities, and the obstacles that must be overcome.

TEEB for Business examines how business can align their actions in relation to biodiversity and ecosystem services with wider corporate social responsibility initiatives, including community engagement and poverty reduction.

The report concludes with a review of business and biodiversity initiatives and an agenda for action by business as well as other stakeholders. Key action points for business are as follows:

1. Identify the impacts and dependencies of business on biodiversity and ecosystem services;
2. Assess the business risks and opportunities associated with these impacts and dependencies;
3. Develop information systems on biodiversity and ecosystem services, set targets, measure and value performance, and report the results;
4. Take action to avoid, minimize and mitigate biodiversity and ecosystem service risks, using compensation ('offsets') where appropriate, based on the concept of Net Positive Impact;
5. Grasp new business opportunities linked to biodiversity and ecosystem services, such as increasing cost-efficiencies, new products and new markets;
6. Integrate actions on biodiversity and ecosystem services with wider Corporate Social Responsibility initiatives to ensure optimal social as well as environmental outcomes;
7. Engage with business peers and stakeholders in governments and civil society to improve guidance and policy on biodiversity and ecosystem services.

Chapter overview

Chapter 1	Business, biodiversity and ecosystem services
Chapter 2	Business impacts and dependence on biodiversity and ecosystem services
Chapter 3	Measuring and reporting biodiversity and ecosystem impacts and dependence
Chapter 4	Scaling down biodiversity and ecosystem risk to business
Chapter 5	Increasing biodiversity business opportunities
Chapter 6	Business, biodiversity and sustainable development
Chapter 7	A recipe for biodiversity and business growth

TEEB for Citizens (October 2010)

TEEB for Citizens is a multi-media effort to draw on information from the other TEEB reports and present them in a compelling and imaginative way for consumers and citizens. The effort, coined "TEEB4me", focuses on harnessing the power of the internet and social media to create awareness and understanding of the value of nature. Media tools such as Facebook, Twitter, and YouTube are all incorporated in TEEB4me to maximize outreach and create a global conversation with a large and growing network of people interested in reflecting the value of biodiversity in their daily lives and decisions. More information can be found on www.teeb4me.com.

