

# The Economics of the Global Loss of Biological Diversity

## International Experts Workshop

5-6 March 2008, Brussels, Belgium

### Proceedings

**The workshop on the Review of the Economics of the Global Loss of Biological Diversity, organised by the European Commission DG Environment, and the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)<sup>1</sup>, brought together more than 80 experts in economics and ecology from more than 20 countries to explore approaches for estimating the economic significance of the loss of biodiversity and related ecosystem services. The workshop developed recommendations on the way forward for the Review. The Review will be conducted in two phases, with a preparatory phase running up to the Ninth Conference of the Parties of the Convention on Biological Diversity (CBD COP9) in May 2008, and a more substantial phase until 2009, under the responsibility of the recently appointed Review leader, Pavan Sukhdev.**

## Session 1

### Welcome and Introduction

#### Opening by

Elsa Nickel, deputy Director General, BMU and Ladislav Miko, Director, DG Environment of the European Commission

**Ladislav Miko (Director, DG Environment, European Commission)** opened the workshop, noting that the launch of a review of the economics of biodiversity loss took place at Potsdam at the G8+5 meeting of environment ministers and has the support of German Minister Gabriel and of Commissioner Dimas.

He underlined the complexity of the problem, from both an ecological and economic perspective, and said that it is essential to

combine inputs from these two disciplines. It is important that we try to better understand the links between biodiversity, ecosystems, and the benefits we derive from them. He stressed that cost-benefit analysis has a role to play, but we need to be realistic that this is not the only approach to be used. There should be a strong focus on risks, as well as on ethics, including intergenerational equity. We also need to bear in mind the links to policy – not just nature conservation, but also to other sector policies, and assess policy costs. He underlined the vital benefits of forests and of marine ecosystems.

**Elsa Nickel (deputy Director General, BMU, German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)** recalled that biodiversity is dwindling at an unprecedented rate; many species are becoming extinct without scientists being able to study them, or to ascertain how they might be used by humans. They "*take their secrets to the grave*". She underlined that we need to show respect to nature, and to attach a value to it; economic value is part of that value. She added that economic valuation should not be a substitute to ethical considerations, but one component, one that is essential and convincing.

She underlined that COP9 is the next milestone in the international process regarding the conservation of nature. A slot in the high-level political segment in the last 2 days has been reserved and the ambition is to present some first results from the current work. They will be presented to ministers by Commissioner Dimas, Minister Gabriel, and Pavan Sukhdev, the newly assigned *Study Leader*, whom she introduced to the workshop. Pavan Sukhdev is an economist with a long experience in the commercial sector (14 years at the Deutsche Bank), and also a founding member and chairman of GIST (Green Indian States Trust), India, working, *inter alia*, on green accounts for Indian States.

As regards the Review work, she expressed the hope that the results will contribute to future arguments to protect biodiversity. She

<sup>1</sup> With support from FEEM, Ecologic, IEEP, GHK, IVM & UFZ. All presentations can be downloaded at: <http://www.ecologic-events.de/eco-loss-biodiv/index.htm>

underlined that a lesson learnt from the Stern Review was that economic arguments can be a good foundation for policy action. She also noted that economics is not enough, and quoted the German Philosopher, Immanuel Kant.

*In the kingdom of ends everything either has a price or a dignity. What has a price can be replaced by something else as its equivalent; what on the other hand is raised above all price and therefore admits no equivalent has a dignity... That which constitutes the condition under which alone something can be an end in itself has not merely a relative worth, that is a price, but an inner worth, that is, a dignity."*

Immanuel Kant

Nature has no equivalent and does not have a price. Nature and biodiversity have dignity, ethical and moral value, which are beyond economic aspects. However, economic arguments can be a strong support.

Elsa Nickel finished by underlining that it is essential to look for global collaboration, as the issue is a global one, and thanked the European Commission for taking leadership.

**Mogens Peter Carl, (Director General, DG Environment, European Commission)** noted that warnings on biodiversity loss made over many years have often fallen on deaf ears and that there is a big gulf between grand discourse and action on the ground. This is perhaps understandable in a world where population is predicted to rise to 9 billion within the next 25 years and where land and natural resources are being consumed at increasingly high rates. He stressed that three quarters of humanity live under conditions that are very different from those in Europe, and that the developed world has a large share of responsibility in wiping out much of biodiversity.

Peter Carl underlined the importance of the Millennium Ecosystem Assessment (MA) – noting the large impact that this initiative has had in changing the way we look at the relationship between human populations and their environment. It provides a conceptual framework for examining the goods and services provided by the natural environment. And it focuses attention on their economic value. The challenge now is to build on the foundations of the MA and refine and strengthen our methodology, in particular to forge better links between ecology and economics.

He noted that, day after day, despite growing awareness and major efforts, little by little, we have been losing the battle to halt biodiversity loss. The argument that we should be driven by higher moral or ethical purposes and that humanity has a duty to protect the environment is fine in principle, but for many reasons it is

necessary to also use economics. In societies where economic considerations are paramount, we need to demonstrate the economic importance of biodiversity and associated ecosystem services and to explore how to ensure that they are duly taken into account in decision-making.

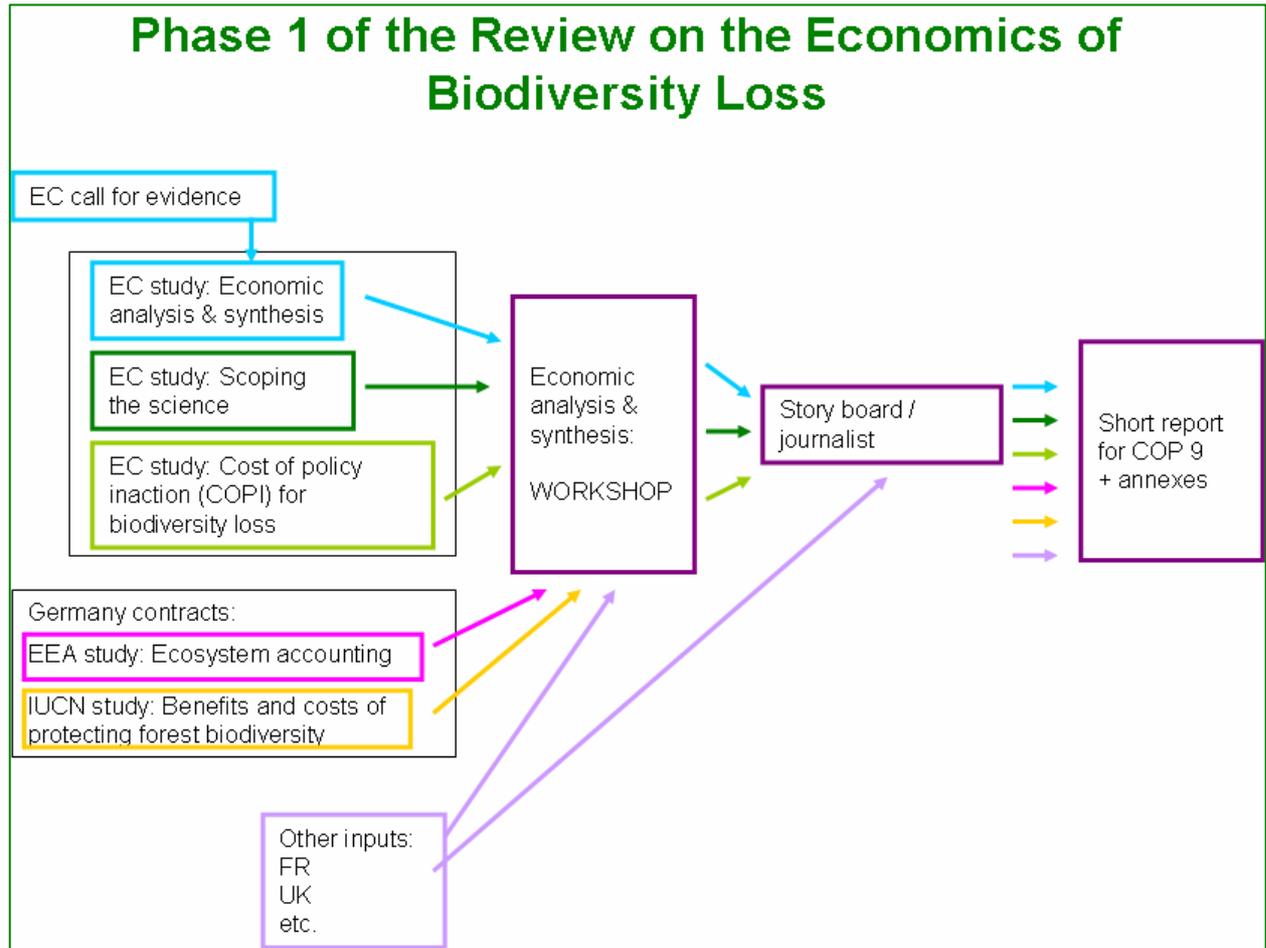
The economic arguments need to be credible, and need to be free from green spectacles. The biodiversity work is still more challenging than the climate change work.

**Pavan Sukhdev (appointed Review Study Leader, Deutsche Bank and Chairman of GIST, Green Indian States Trust)** presented his vision and purpose of the review. As regards the vision, he noted that society must urgently replace its defective economic compass if it is to preserve biodiversity; it is not only possible, but necessary to change metrics and this should be enacted at the state level, population level, corporate level and individual level. On the purpose of the Review, he sees biodiversity evaluation not as an end in itself, but as preparing a valuation toolkit, tailored for successful end use, to help engage end users, with the end goal of achieving biodiversity conservation. He cited an example of the end users - the Supreme Court of India. Their call for evidence led to "floor values" being integrated into law for use in development decisions. This led to a fund created for the purpose of reforestation.

**Patrick Murphy (Head of Unit, DG Environment, European Commission)** gave a brief overview of the call for evidence organised by the European Commission at the end of 2007 and the other ongoing reports feeding into Phase I of the review (see Figure 1). He underlined that the aim of the call for evidence and the workshop was not just to create a literature review and a good debate, but to help tackle the challenge together. The outputs will be an input to a 50-60 page report that goes to COP9. This will cover ecology and economics and be accessible to policy makers. Phase II will last 2 years and go to COP10. The short term objective is COP9.

**Heidi Wittmer (UFZ)** canvassed participants' backgrounds and expectations for the workshop, including their key hopes and fears. As regards attendance, she noted with satisfaction the global reach of the workshop.

**Paulo Nunes (Professor, FEEM)** introduced the structure of the two days, the approach and speakers. He also thanked all those who contributed to the call for evidence for the review.



## **Sessions 2 to 4**

*This involved three parallel sessions (A1 to A3) from 11:00-12:30; a further three (B1 to B3) from 14:00 to 15:30; and presentations back to the plenary in the afternoon. These are presented in turn below.*

## **Session 2: 11:00 to 12:30**

**A1 Setting the scene: from biodiversity to human welfare - what do we know about the links and what are the priorities for future research in ecological science?**

**Session Leader: Kerry Turner (UEA)**

**Session Participants:** Diego Azqueta, Giovanni Bearzi, Pierluigi Bozzi, Leon Braat, Mike Christie, Roberto M. Constantino, Martin Dieterich, Yogesh Gokhale, Maryanne Grieg-Gran, Haripriya Gundimeda, John Hanks, Salman Hussain, Marianne Kettunen, Anil Markandya, Emily McKenzie, Shaun Mowat, Karachepone Ninan, Matt Rayment, Ana Rodrigues, Melinda Smale, Isabel Sousa Pinto, Ridhima Sud, Patrick ten Brink, Rob Tinch, Kerry Turner, Bernard Vaissiere, Wouter van Reeth, Matt Walpole, John Ward, Frank Wätzold, Ada Wossink.

**A2 What types of biodiversity benefits should be prioritised in an economic assessment?**

**Session Leader: Pushpam Kumar (University of Liverpool)**

**Session Participants:** Stefan Baumgärtner, Aline Chiabai, Zoe Cokeliss, Denis Couvet, Pierre Devillers, Anantha Duraiappah, Katia Karousakis, Anil Kumar, Pushpam Kumar, Markus Lehmann, Alistair McVittie, Bedrich Moldan, Paul Morling, Katrina Mullan, Stale Navrud, Patrizia Poggi, Rosimeiry Portela, Alice Ruhweza, Guillaume Sainteny, Daan Wensing, Bulat Yessekin.

**A3 Integrated socio-economic scenarios of environmental change to highlight and compare alternative, future development trajectories.**

**Session Leader: Ben ten Brink (MNP)**

**Session Participants:** Joshua Bishop, Pascal Blanquet, Leon Braat, Ingo Bräuer, Laura Dietzsch, Gustavo Fonseca, Roy H. Haines-Young, Mark Hayden, Nick King, Sigrid Lüber, Christoph Schröter-Schlaack, Ben ten Brink, Francis Turkelboom, Sybille van den Hove, Carlos Young.

**A1 Setting the scene: from biodiversity to human welfare - what do we know about the links and what are the priorities for future research in ecological science?**

**Session Leader: Kerry Turner (UEA)**

**Session Moderator: Patrick ten Brink (IEEP)**

**Session Note taker: Matt Rayment (GHK)**

**Session issues:** *an assessment of the economic significance of biodiversity loss requires an understanding of how changes in biodiversity affect the provision of ecosystem goods and services. Some of these links are well understood, many others much less so. This session should explore the links between biodiversity and human welfare, addressing for various types of benefits, what the state of ecological knowledge is, where the main research gaps are, and what the priorities for future work in the timeframe of the Review could be.*

**Kerry Turner**<sup>2</sup> gave the introductory presentation, noting that to value the benefits provided by biodiversity, we need a classification system linking biodiversity to ecosystem services and changes in human welfare. This needs to distinguish between “intermediate” services and “final” services that provide benefits to people (see Figure 1).

Several definitions and classification systems for ecosystem services (ES) exist. Among these, the Millennium Ecosystem Assessment (MA) is widely acknowledged and cited, in particular in the context of international and EU policy-making. However, the MA typology is not ideally suited to valuation because it includes intermediate services as well as others which directly provide end-user benefits. This may lead to a double counting problem. Ultimately, we are interested in the value of biodiversity to society; the production function is needed only to understand what the benefits are.

Biodiversity is multifaceted and we need to understand which aspects (e.g. biomass, species diversity) are important for provision of services to people. There may be aspects of the system that are redundant from a human welfare perspective.

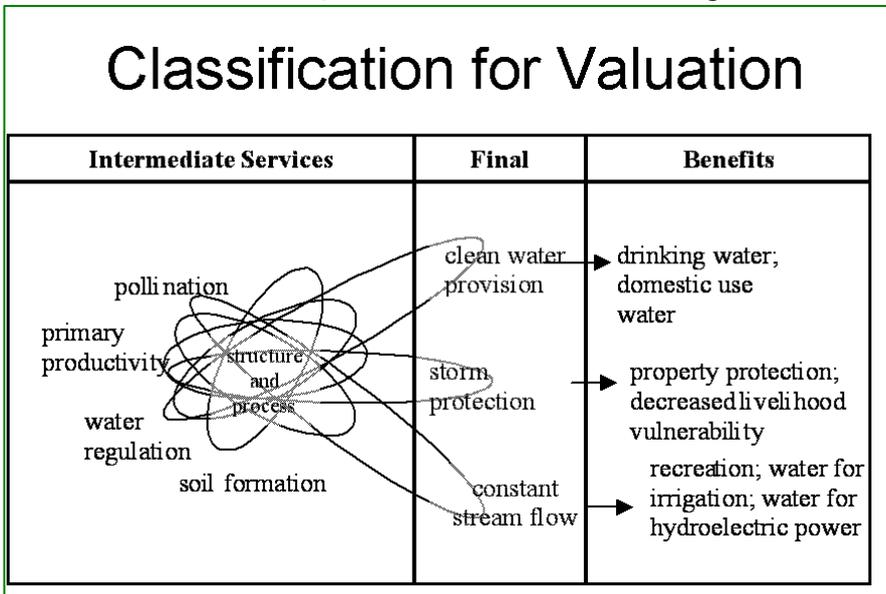
<sup>2</sup> Kerry Turner is Professor at the University of East Anglia’s School of Environmental Sciences, and director for CSERGE.

Economists deal with marginal changes. It is pointless to seek to assess the total value of the services provided by biodiversity and ecosystems – it can be argued that it is infinite as we could not exist without them.

Thus MA is a very useful assessment framework but we need to adapt it for the purpose of economic valuation.

**Key points from the discussion:**

- There was agreement that the MA provides excellent platform to take forward interdisciplinary dialogue on links between biodiversity change, ecosystem services and human welfare.
- It was agreed that the MA could be adapted and re-oriented to focus more on the requirements of economic valuation:
  - we need a classification system distinguishing “intermediate/core” services from “final” or “beneficial” services which are directly providing benefits (i.e. are components of human welfare)
  - we can adapt the MA with little loss of functionality and mitigate the problem of double counting
- The approach should encompass the concept of a production function with inputs and outputs. The information used should be valid, functional and legitimate.



Multidisciplinary approaches are required to achieve this.

- The focus should be on the information requirements of this approach:
  - At the front end, what are the implications of biodiversity loss for ecosystem services? We need to systematically review the existing

science base and think more about which aspects of biodiversity loss (diversity and/or amounts) influence service delivery.

- Scale was thought to be a crucial issue
  - Local contexts – indigenous knowledge, symbolic and cultural values
  - Global scale – tipping points
- Non linearity and threshold effects – what is the current state of knowledge, how to take forward a precautionary approach?
- At the benefit end of the production function, we need to:
  - be aware of the limitations of economic valuation
  - consider the intrinsic value of biodiversity
  - recognise that total ecosystem value is larger than marginal economic value.
- While there was some debate about intrinsic values, it was recognised that evidence of impacts of biodiversity on human welfare may be more influential with finance ministries and other decision makers. However, it was also agreed that there are limitations on what we can value.
- There is also a need to consider the costs of action. Much of the attention following the Stern report was on relatively low costs of action. Given the difficulties to value notably the non-market benefits, demonstrating that there are areas where costs are low could be influential.
- There are significant gaps in scientific knowledge and these are greater for some taxa (e.g. invertebrates, marine organisms) than others (vertebrates, flowering plants). To a large extent we do not yet know what is there, let alone the consequences of losing it. This calls for adopting an ecosystem approach and applying the precautionary principle. Protecting flagship species can have a role if it conserves their wider habitats, but should not be the only approach.
- There are key scientific questions about the implications of biodiversity loss for ecosystem services. We need to consider what we know, what gaps there are, what questions we may be able to answer in the short to medium term and which ones we will never answer. The “scoping the science” work is important to identify the framework and gaps and should underpin the economic analysis. However, we do not need to know everything about ecosystems and biodiversity to understand the benefits they provide and begin to value them.
- We are losing key services which are economically important but not fully understood. In Africa key issues are

disruption of water cycles including loss of tree cover, soil genesis and erosion, and pollination services. We also risk loss of important marine services but there are big gaps in knowledge about these.

### Main recommendations for the Review

#### Short-term priorities (Phase I and COP9 report)

- Summarise what we know about the value of ecosystem services and about the contribution of biodiversity to these, basing the assessment on the MA.
- Set an agenda for taking forward an assessment of the economic value of biodiversity in the second phase of the Review, building on and adapting the MA for valuation purposes.

#### Priorities for 2008-2009: Phase II of the Review

- Adapt and take forward the MA to facilitate the valuation of ecosystem services and the role of biodiversity, to provide the tools for decision-makers to make arguments for conservation.
- The scope for additional pure research is limited – we need to use what we have – a multidisciplinary, systematic review of existing evidence is needed. We can develop existing valuation databases and combine them with scientific evidence and the development of appropriate analytical tools.
- Recognise that there are huge uncertainties and that the answer is unlikely to be a single big number.
- Examine the costs as well as the benefits of biodiversity conservation, to understand the full picture while recognizing the difficulties in valuing benefits.

## A2 What types of biodiversity benefits should be prioritised in an economic assessment?

**Session Leader: Pushpam Kumar**

**Session Moderator: Paulo Nunes (FEEM)**

**Session Note taker: Aline Chiabai (FEEM)**

**Session issues:** *the different types of benefits derived from biodiversity (e.g. food, water, recreation, non-use values) vary in their economic importance. What is the relative importance of these benefits and, in particular, which are likely to make a large difference to the quantitative assessment of the economics of biodiversity loss? What are typical ranges of values from available estimates? Given the potential and limits of economic valuation tools to assess the importance of biodiversity to people, what are the main types of benefits on which work could be focused in the timeframe of the Review, and what could be priorities for future research?*

**Pushpam Kumar**<sup>3</sup> pointed out the importance of economic assessment to help decision-makers facing trade-offs and choices. Every economic valuation exercise has to be associated with scenario building, including a business-as-usual (BAU) scenario.

Approaches to valuation can be based on:

- biodiversity, or
- ecosystem functions

Economic valuation will influence human actions (intervention), which will in turn influence ecosystems /resilience. Hence it can be argued that it is preferable to focus on ecological functions.

In principle, each assessment would need a detailed analysis of full costs and risks. Nevertheless, the different benefits associated with biodiversity conservation are more or less difficult to capture - like spiritual and religious values for example. Thus it should be decided which ones it is essential to try to capture.

### Taxonomy of valuation methods

Useful approaches to valuation are the following:

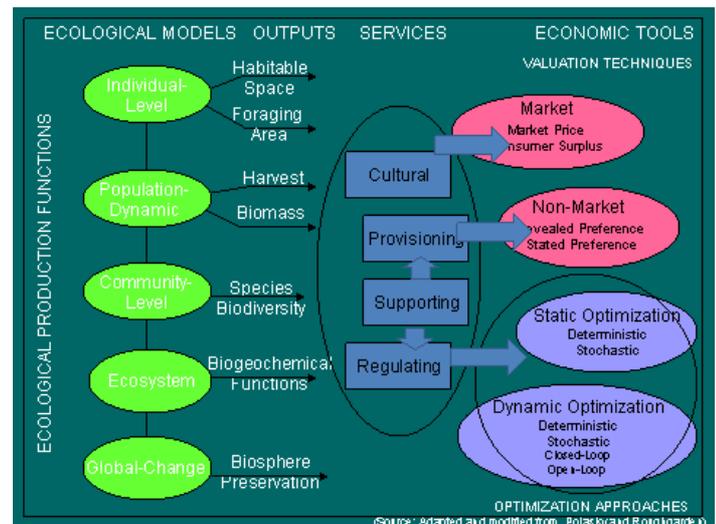
- Consumptive benefits should be valued based on consumer's preference, demand and location.
- Productive benefits can be valued by following a maintenance-cost approach/ restoration-cost approach / replacement-cost approach / cost-of-shadow-project approach.

Whichever approach is used, the integration of

ecology and economics is essential. The output from ecological models can be analysed in terms of provision of the four main categories of ES used in the MA. Mr Kumar presented an example of valuation of ES following a maintenance-cost approach in the Green Accounting Framework of SEEA, 2003.

**Key messages** for valuation exercises:

- Valuation has to be context-specific.
- Focus should be on marginal changes rather than the total value of biodiversity
- It has to be made explicit which assumptions about ecosystem conditions have been taken.
- Sensitivity analysis is important for policy-makers because of uncertainty.



### Key points from the Discussion:

- There are elements, which are easy to value and other ones which are difficult. For the latter, it is important to determine how important the gaps are.
- Why should policy-makers care? Most developing countries have other priorities.
- One challenge is to demonstrate the link between biodiversity and ES. How does biodiversity contribute to resilience? Regulating services have not been sufficiently addressed by research, although they are essential.
- Biodiversity indicators could be very useful. Five indicators of ES are suggested, from local to national scales. These indicators represent how ecologists and economists can meet on common ground. But it is the economists who will value ES. Indicators and criteria are good, but they should be used to know what is happening. Indicators give the possibility of comparing regions. Indicators of biodiversity / ES can be used to describe how the provision of ecosystem goods and services changes over time/space. Indicators are good in the first part of the assessment (the biophysical one).

<sup>3</sup> Pushpam Kumar is Lecturer at the University of Liverpool's Department of Geography

- Valuation of ES on a global scale is useful, but it is also important to address specific regional issues. Different levels of assessment (global to local scale) are needed.
- ES valuation can help to answer the following questions: what ecosystems should we save for global sustainability? How to prioritise conservation? What type of biodiversity should we focus on? Need for common objectives for the CBD.
- It was recommended not to use replacement costs as a general methodology since they can be different from the value for society (as measured by willingness-to-pay).
- For the setting of priorities it is important to capture some services, such as regulating services (unfortunately there is still no consensus.)
- It is important to value services from a welfare perspective. For this reason, we anchor the valuation in an incremental perspective.
- There is no amortisation of natural capital. It is not a measure of total value, but a flow; the cost that should be reinvested in the system in order to maintain life. Economic valuation has to be careful about its objectives. Focus should be on flows and changes.
- Convention concerned with restoration (CMS). Focus on ES valuation. Here, the guide should be replaceability, i.e. which values are easier to replace. This then brings the question: what is easy to evaluate and what is replaceable?
- Valuation cannot address all relevant issues, because it cannot capture resilience, for instance. How much do we need to maintain to preserve resilience?
- Global economy and human life depend on biodiversity. It should be addressed in a global political summit, not only at the COPs. Not only an economic assessment is important, but also a physical one (because of the limitations of economic tools).
- It is important to focus on beneficiaries, not only on ES themselves. Cultural services, regulating services are sometimes global, sometimes local, etc. For setting priorities, need to look at who are the beneficiaries at the different scales (to give a matrix for a general picture).
- Understanding the relationship between biodiversity and ES is difficult. There is a new approach which links functional biodiversity to functional groups.
- Analysis of forest biodiversity case studies shows a wide variation in values that does not only reflect different locations and forest types, but maybe also different methodological approaches. It is necessary to check if marginal changes have been

- measured or the value of existing stocks.
- Similar ES across the world are often valued in different ways. We should find some criteria, provide some guidance for valuation – a valuation protocol is needed.
- Once we have an agreement on a valuation protocol, for both primary and value transfer exercises, we will have to use all the studies that have been done to scale up the valuation exercise, also for areas where there is a lack of original studies.
- Regarding benefit transfer, it would be useful to have a common guidance to transfer values from boreal forests to tropical forests, for example. COPI is addressing this point on how to value in a systematic way.
- Another question is how to translate values per hectare into net values. This will require information on the sector under question, including margins of profit.

#### **Final conclusion:**

We have too much information, fragmented studies, and data. There is an urgent need for guidance on how to set up valuation studies for each ES, for each ecosystem (biome), and different beneficiaries (local and global).

#### **Main recommendations for the Review**

##### **Short term priorities (Phase I and COP9 report)**

- Valuation of ES rather than biodiversity should be the preferred approach
- Valuation of provisioning services (food, fibre, etc) is easily doable and a number of studies and the necessary data exist. Efforts should focus more on regulating and cultural services.
- Economic valuation of biodiversity / ES must be done with a purpose - CBA, Accounting, Payment, Evaluation of action /inaction, etc.
- Valuation of ecosystem services must be associated with the condition / state (BAU / Alternate Scenario).

##### **Priorities for 2008-2010: Phase II of the Review**

- Develop evidence base for relationship of ecosystem and ecosystem services (localised SGAs).
- How much biodiversity do we need to maintain ecosystem services?
- Designing criteria and guidance for transfer of estimates for ecosystem services (e. g. per ha value of carbon, bioprospecting and water-flow).
- Greater attention to regulating services.
- Identifying the thresholds, point of non linearity and resilience for a variety of ecosystems.

### **A3 Integrated socio-economic scenarios of environmental change to highlight and compare alternative, future development trajectories.**

**Session Leader: Ben ten Brink (MNP)**

**Session Moderator: Leon Braat (Alterra)**

**Session Note taker: Christoph Schröter-Schlaack (UFZ)**

**Session issues:** *scenarios are necessary for exploring future trends of biodiversity loss and changes in ecosystem services. They are used to analyse the effects of socio-economic trends on pressures on ecosystem functions (state), and the ability of ecosystems to sustain the above goods and services (impacts). The possible feedbacks of changes in impacts on policies (drivers) will also be explored.*

**Ben ten Brink**<sup>4</sup> started his introductory presentation by giving an example of the continual loss of biodiversity – metaphorically speaking, humankind is fishing down the food web. The overall available biomass may stay the same, but species composition changes dramatically as big species are declining and the share of short-living and high productive species increases. This trend is reflected in a decline of the Mean Species Abundance (MSA)-indicator, which is frequently used in modelling approaches. As humans strive for maximising the output of some specific ecosystem services, this intensification of specific uses comes along with high pressure on natural systems and MSA decreases accordingly. Ben ten Brink identified some drivers of biodiversity loss and stressed the thread that societies might plunge into lose-lose situations between degrading ecosystems and increasing social vulnerability. This prediction holds for prosperous societies, too.

Ben ten Brink then presented some results of the GLOBIO-modelling approach (developed in cooperation with UNEP-WCMC), by showing possible scenarios of population, income and energy consumption growth between 2000 and 2050. As the economy might grow by four times over that period, MSA might drop from currently 70% to 63% in 2050. Although this seems to be a moderate decline, this amount corresponds to taking the whole United States of America from natural state to asphalt. Overall, the main argument holds that the higher economic growth is, the higher the loss in MSA. Taking a look back at economic development from 1700 on, biodiversity loss accelerates over time and especially richer (and more valuable) ecosystems face the highest levels of of

degradation. The lesser loss in poorer ecosystems has just to be seen as a time lag, these marginal ecosystems were solely taken into use by humankind more recently, but will soon face a corresponding threat.

Illustrations were shown of the on-going loss of biodiversity as measured by MSA. The combination of the GLOBIO-model with Google Earth maps allows zooming from global to national, regional and local scales.

#### **Key points from the discussion:**

- It was discussed what kind of information is fed into models such as IMAGE-GLOBIO. Current models assume an infinite resource base and do not include feedback loops between loss of biodiversity / natural ecosystems and GDP. This is quite unrealistic, particularly over the long term, and undermines the credibility of the results of modelling exercises. The necessity was stressed to find ways of including such feedbacks between ecosystem service supply and economic growth in the modelling. However, this task is challenging. The “beyond GDP” movement was seen as a stimulating discussion in that respect.
- The question was raised whether there are successful cases of decoupling economic growth from ecosystem degradation. Some examples were mentioned for air quality and land use. However, they have to be handled with caution, e.g. even the successful case of Costa Rica’s increase in MSA in recent years comes along with some higher losses in nearby regions (Nicaragua). In biodiversity conservation, there is the threat of focussing efforts on the last percentages of biodiversity in developed countries, whereas at the same time much more is lost in the developing world.
- How to integrate already fragmented (and near to extinction) species in the modelling? It may be difficult to demonstrate their economic value.
- There was substantial discussion on whether MSA is the right measure, especially for the provision of ecosystem services. With regard to a possible win-lose relationship between MSA and GDP (i.e. trade-offs), is there a stable path involving low MSA accompanied by a growing GDP? Are there turning points? How robust are predictions (sensitivity analysis)?
- As GDP is a dynamic concept, a map of conservation per dollars spent should be used for distribution of conservation efforts. Furthermore, it is important to consider what social stratum is touched by a redistribution of GDP. In the Indian case – 70% of the people make up around 20% of

<sup>4</sup> Ben ten Brink is Project Leader at MNP

GDP – even marginal changes may have huge impacts on this group. The traditional definition of GDP needs to be challenged for these reasons; the growth paradigm must be questioned.

- Focussing on the global level tends to underestimate impacts; some regions will lose 40-50% of ecosystem services by 2050.
- Modelling raises awareness – but should we put more energy into deciding how to change development, because when there is no escape mechanism, society has to evolve a solution? Energy analysis seems to be promising in this regard, as every solution for substituting ecosystem services so far was accompanied by an increase in energy consumption.
- To avoid intensification of natural resource use and degradation of ecosystems in developing countries, developed countries have to pay for part of the foregone opportunities.

### Priorities for 2008-2009: Phase II of the Review

- Measure and model all CBD-indicators, including goods and services
- Run scenarios on sustainable ecosystem use (major & minor users)
- The absence of feedback loops between loss of biodiversity / ecosystems and economic growth in models is unrealistic and undermines the credibility of results. Need to find ways of including feedbacks between supply of natural resources and economic growth in the modelling.
- Develop maps of best conservation opportunities
- Address the role of the Red List indicator in the Total Economic Value framework
- Pay particular attention to quantifying trade-offs between provisioning and regulating services.

### Main recommendations for the Review

#### Short term priorities (Phase I and COP9 report)

- Raise awareness and demonstrate the urgency of the problem (and assess alternatives).
- Consider feasible (technically and politically) solutions (factor 10 club; global compensation mechanism safeguarding biodiversity?). However, even with development of market solutions, governmental regulation will remain necessary (to address social dilemma).
- To limit the maximum conversion of ecosystems is a political choice, but insights into the contribution of ecosystem services to economic value can help.
- Need for a new economic paradigm based on carrying capacity of ecological systems (a new type of GDP).

### **Session 3: 14:00 to 15:30**

#### **B1 Measuring benefits from ecosystem services in monetary terms – using market and non-market based methods**

**Session Leader: Alistair McVittie**

**Session Participants:** Aline Chiabai, Zoe Cokeliss, Deighton Conder, Roberto M. Constantino, Martin Dieterich, Anantha Duraiappah, Maryanne Grieg-Gran, Haripriya Gundimeda, Mark Hayden, Salman Hussain, Alistair McVittie, Paul Morling, Shaun Mowat, Ana Rodrigues, Alice Ruhweza, Christoph Schröter-Schlaack, Melinda Smale, Ridhima Sud, Kerry Turner, Bernard Vaissiere, Wouter van Reeth, Daan Wensing.

#### **B2 Measuring benefits from ecosystem services – integrating monetary and non-monetary estimates**

**Session Leader: Patrick ten Brink (IEEP)**

**Session Participants:** Stefan Baumgärtner, Pascal Blanquet, Pierluigi Bozzi, Mike Christie, Denis Couvet, Pierre De Villers, Laura Dietzsch, Yogesh Gokhale, Roy H. Haines-Young, John Hanks, Nick King, Pushpam Kumar, Berta Martin-Lopez, Bedrich Moldan, Stale Navrud, Karachepone Ninan, Rosimeiry Portela, Matt Rayment, Isabel Sousa Pinto, Patrick ten Brink, Sybille van den Hove, Matt Walpole, Ada Wossink.

#### **B3 The aggregation challenge: how to go from small changes and individual case studies to the big picture**

**Session Leader: Ståle Navrud (Norwegian University of Life Sciences)**

**Session Participants:** Diego Azqueta, Giovanni Bearzi, Joshua Bishop, Leon Braat, Ingo Bräuer, Gustavo Fonseca, Katia Karousakis, Marianne Kettunen, Anil Kumar, Marius Lazdinis, Markus Lehmann, Sigrid Lüber, Emily McKenzie, Katrina Mullan, Elsa Nickel, Guillaume Sainteny, Ben ten Brink, Rob Tinch, Francis Turkelboom, Hans Vos, John Ward, Frank Wätzold, Jean-Louis Weber, Bulat Yessekin, Carlos Young.

**B1 Measuring benefits from ecosystem services in monetary terms – using market and non-market based methods**

**Session Leader: Alistair McVittie**

**Session Moderator: Paulo Nunes (FEEM)**

**Session Note taker: Aline Chiabai (FEEM)**

**Session issues:** *this session should include an evaluation of economic techniques for assessing the importance of biodiversity to people. What is common practice and what are promising developments? This session will also explore the potential use of quantitative socio-economic models in combination with case study based approaches to evaluate the welfare changes associated with different scenarios. What are the methodological challenges ahead in making an efficient, policy relevant evaluation of ecosystem goods and services?*

**Alistair McVittie**<sup>5</sup> presented an evaluation of economic techniques for assessing the importance of biodiversity to people. Evaluation is generally based on the Total Economic Value framework, exploring both the magnitude and the degree of confidence of each value estimate.

Information on opportunity costs can provide a first benchmark. Next to cost figures, direct use values with market-based information have a high confidence. Indirect uses are more difficult to estimate but for climate change, the shadow price of carbon and carbon trading can be used.

To facilitate economic valuation studies, several databases have been set up, e.g. EVRI. The EVRI database provides a dataset on both market and non-market valuation studies. The categories and the structure of this dataset do not correspond to the MA categories. Nor is it very heavily populated, especially with regard to marine studies.

It was explored how the use of quantitative socio-economic models could be combined with case study based approaches, in order to evaluate the welfare changes associated with different scenarios.

The lack of production functions was stressed: there is a need for substantial work in this area. In the context of marine ecosystems, several

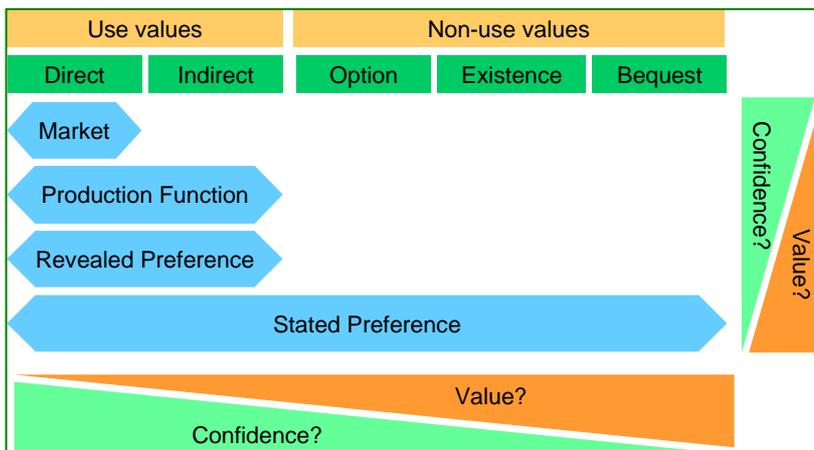
questions were raised. What is the link between the areas conserved and fish productivity? What is the link between resilience and resistance?

It is important to have an agreement on the mapping of the ecosystem goods and services as a result of a nature production function. The nature production function is dependent on the ecosystem conditions, including both the state of biodiversity quality and the range and complexity of natural processes involved. However, there is currently limited knowledge of production functional forms linking ecological and economic scales, processes and values.

**Key points from the discussion:**

The MA and other ecosystem goods and services approaches have focused on processes, functions and services. Ecosystem services, or more generally biodiversity benefits, are recognised by economists as being a platform for welfare changes.

All in all, knowledge from economic valuation studies remains fragmented. Some datasets, such as EVRI, aim at providing a compilation of worldwide valuation studies. There is an urgent need to merge this dataset with other ones



(including those from Scandinavian countries, from the Wageningen University, and from the school of Bob Costanza) into a single one, thus forming a meta-data basis.

Having reached that stage, one would have a more complete picture of the existing work on case study based economic valuation. Then it would be possible to proceed with a more efficient up-scaling. Furthermore, the up-scaling may be followed by additional primary valuation studies where needed – the meta-data basis will signal where additional investments are necessary.

When planning to invest in additional valuation studies (primary valuation), one should explore the potential for wider levels of analysis,

<sup>5</sup> Alistair McVittie is researcher at the Scottish Agricultural College.

including the role of participatory approaches, recognising cultural sensitivities, and ways of embedding the structure of preferences of the local, rural communities, NGOs, and other stakeholders in the valuation exercise.

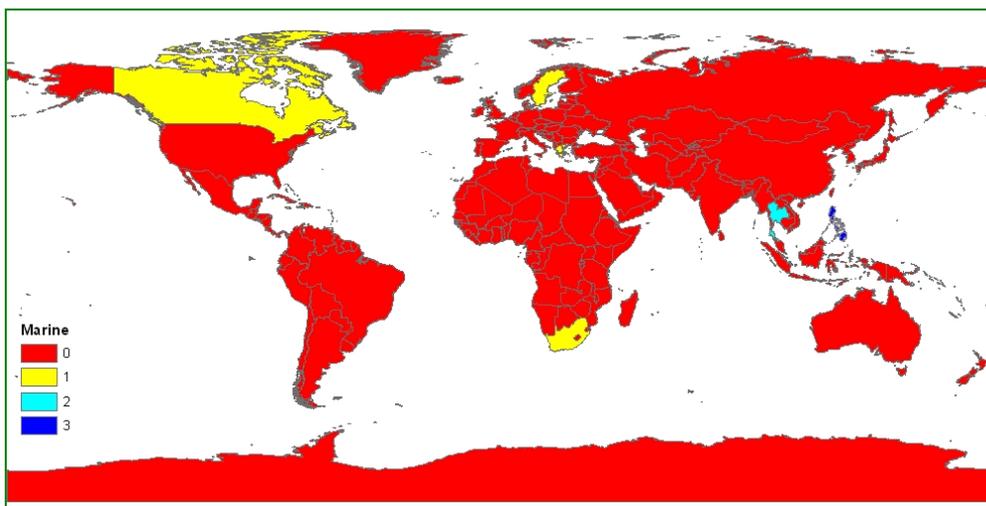
Areas with rich biodiversity, the so-called hot spots, are often inadequately covered by valuation studies. The studies generally take place in areas for which researchers have received financial support, which are not necessarily the most relevant ones from a biodiversity protection perspective.

Additional efforts are needed to map and evaluate option or insurance values (which can be interpreted as an insurance premium to avoid disruption to the flow of ES).

Finally, it was discussed whether targeting policy-makers on the issue of biodiversity loss is the only way to proceed in terms of creating instruments for conservation policy. Would it be more efficient to explore the idea that protection of biodiversity could provide some significant business opportunities for the private sector?

#### Priorities for 2008-2009: Phase II of the Review

- Carry out a compilation of datasets from worldwide valuation studies in order to form a meta-data basis.
- Explore the potential for broadening the approach of valuation studies, including the role of participatory approaches, cultural sensitivities and ways of embedding the structure of preferences of local communities.
- Make additional efforts to map and evaluate option (insurance) values.



Would the private sector deliver biodiversity protection in a more efficient way? One could explore leaving some protection effort to the private sector, with a complementary effort by policy-makers, mainly on the provision of the public benefits of biodiversity.

#### Main recommendations for the Review

##### Short-term priorities (Phase I and COP9 report)

- Use existing data bases.
- Try to demonstrate that protection of biodiversity could also provide significant business opportunities for the private sector.
- Stress the importance of insurance values even though more work will be needed to assess them properly.

## B2 Measuring benefits from ecosystem services – integrating monetary and non-monetary estimates

**Session Leader: Patrick ten Brink (IEEP)**

**Session Moderator: Matt Rayment (GHK)**

**Session Note taker: Onno Kuik (IVM)**

**Session issues:** *in practice it is often the case that only part of the services provided by ecosystems can be assessed in monetary terms, while for some other services only measures in biophysical terms are available. This session should evaluate the economic and non-economic techniques for assessing the importance of biodiversity benefits and how to combine information in biophysical terms with monetary estimates.*

Patrick ten Brink<sup>6</sup> presented the different levels at which the benefits from ecosystem services can be presented – the monetary, quantitative and qualitative levels – using the schematic of the benefits pyramid to underline that fewer facts can be represented at the monetary level than at the quantitative or qualitative level (see figure).

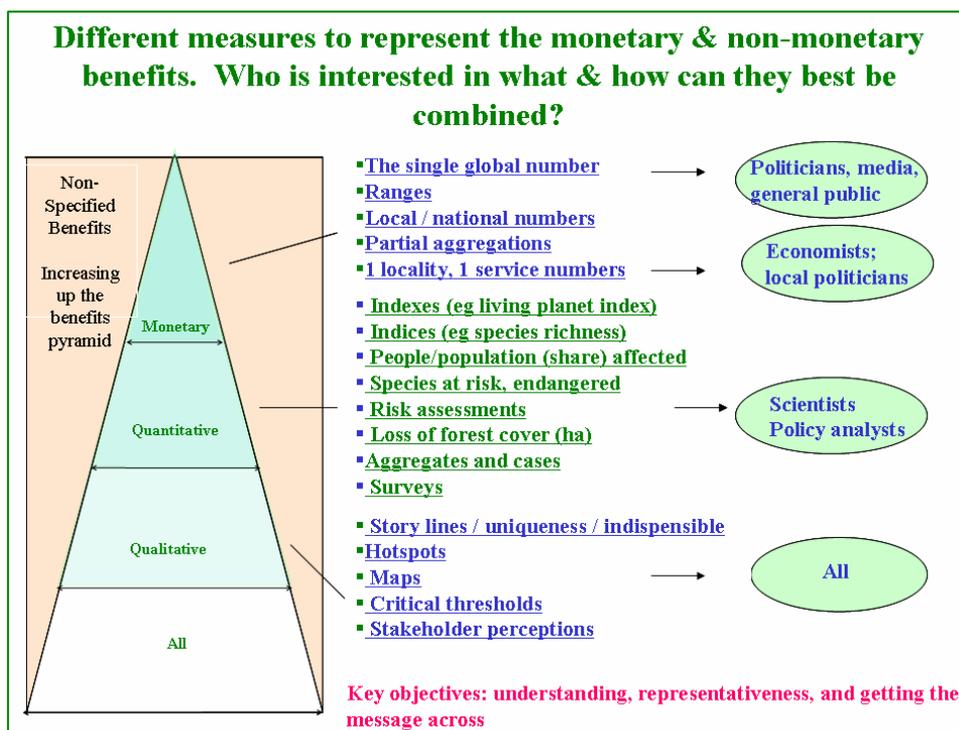
Information pyramid: from the full range of ecosystem services, we can qualitatively assess a part, quantitatively assess a smaller part, and assess in monetary terms an even smaller part. The monetary values we have are not likely to be representative of the full range of services, nor are they likely to be representative from a geographical point of view.

There is a disconnection between supply of information (mostly quantitative / qualitative) and demand for information (most interest in monetary assessment). There is therefore a tension between the level of interest and the data availability – many people are interested in the “single global number for the value of biodiversity”, for which there is less information, while there is generally less interest at the non-monetary levels, where

there is more information.

We need to integrate monetary assessments (from local to global) with other information/assessment such as indices, storylines, etc. For communication of biodiversity loss to COP9/10 we need to find an appropriate balance of information.

Patrick ten Brink underlined that the challenge for the 50-60 page report for COP9, the wider review and the general question of the cost of policy inaction (equivalent to the loss value of ecosystem services, from loss of biodiversity) is to present an honest and representative picture, that gets the messages across in a form that reaches the range of interested parties – politicians, media, economists, scientists, policy analysts and general public. He underlined that a mixture of the different levels will be important – monetary numbers are useful, essential even for certain audiences; quantitative facts of areas lost, or share of populations affected will work for others; and headlines, maps, insights on hotspots will be important for others.



### Key points from the discussion:

- Even where a single number is obtained it will never be fully representative of the full value of biodiversity loss.
- Bio-physical issues and monetary measures are in some cases two very different things, in other cases monetary estimates can represent bio-physical reality.

<sup>6</sup> Patrick ten Brink is Senior Fellow and Head of the Brussels Office of the Institute for European Environmental Policy (IEEP). [ptenbrink@ieep.eu](mailto:ptenbrink@ieep.eu)

- There are some issues of non-commensurability and non-substitutability – e.g. one cannot always substitute one service or one benefit with another.
- There was agreement that we need both quantitative/monetary to ensure a representative picture.
- It was recommended to use a number of different indicators (about three to four) to convey the message. It is also important to make the link between biodiversity and cultural and social assets.
- A range of measures are needed to get the messages across to different parties
- Need to understand what information “sticks” to different audiences (including business), and is useful for different decision making tools
- New measures (in addition to those in the figure) are worth considering in order to reach certain audiences including the ecological footprint (EF), HANNP et al.
- The EF, while supported by some, was cautioned by others, noting that EF has disadvantages – it can be distracting from ecological services per se, potentially confrontational in North-South debate.
- There was also some debate on the role of happiness indicators (some participants recommended indices as Happy Planet Index), as biodiversity does lead to wellbeing and hence need appropriate indicators. Some thought that this would be distracting, others thought helpful.
- This led to the question as to whether the indices should be more focussed on biodiversity. Measures raised that could help with communication as potentially highly visible were “fun per ton” and “happiness per hectare.
- Other measures are valuable – e.g. uniqueness
- There was disagreement about the relative merits of energy analysis/thermodynamics in valuation. It was not recommended to try this before COP10.
- Other tools thought useful included “vulnerability assessments”.
- When selecting the indicators, it was underlined that it is important to ensure that different stakeholder interests / attention to indicators are factored in – we need to check what information is needed to get the message across.
- Remember the different communication power of different measures – e.g. power of maps, national hotspots.
- To be useful to policy makers, the information of biodiversity loss needs to be repackaged to the national level. Especially for African countries, national information is key – global information is less relevant.
- Indices should convey a sense of urgency.

- There was a question on how non-monetary indices should be aggregated; the use of geographical maps was recommended as a good heuristic device.

### Main recommendations for the Review

#### Short-term priorities (Phase I and COP9)

- Use a mix of qualitative, quantitative, and monetary indices in the report – be careful about the balance between them to ensure that the main issues are represented and the messages are communicated effectively.
- Include country-level information.
- Make use of maps.
- Look to build on existing indicators and initiatives as far as possible

#### Priorities for 2008-2009: Phase II of the Review

- For Phase II, the recommendations are similar as for Phase I, but also look at decision-making processes, evaluation tools and information needs to check what information is needed to get the message into processes that have impacts. Keep in mind the end-game of getting practical changes.

### B3 The aggregation challenge: how to go from small changes and individual case studies to the big picture

**Session Leader: Ståle Navrud (Norwegian University of Life Sciences)**

**Session Moderator: Ingo Bräuer (Ecologic)**

**Session Note taker: Aude Neuville (DGENV)**

**Session issues:** *how to use values from case studies for large scale assessments? An efficient use of the benefit transfer tool is a great challenge for natural scientists and economists so as to deliver value estimates of policy relevance. The difficulties include not only how to transfer values which are site-specific but also how to take into account the cumulative effects of small changes in ecosystems when estimating the consequences of large changes, and how economic values can vary accordingly. What are the informational and methodological needs to deliver such estimates?*

**Ståle Navrud**<sup>7</sup> introduced the session by explaining that BT involves transferring an economic value of a public good estimated from a study site (primary valuation study) to a policy site; both benefits and costs can be transferred ("value transfer"). Increased use of cost-benefit analysis (CBA) and lack of time and money to do new primary studies justify the use of BT. Case studies can be drawn from a number of international and national databases of valuation case studies. The web-based database EVRI ([www.evri.ca](http://www.evri.ca)) is the most comprehensive one and is continually updated and extended.

However, BT implies increased errors. How can we limit them? Quality assessment of primary valuation studies is important. BT methods include unit value transfer (naïve or with adjustments) and function transfer (benefit functions and meta-analyses). Criteria for BT include scientific soundness, relevance, and richness in detail. Protocols can be defined. What transfer errors are acceptable? It depends on policy use (e.g. higher accuracy needed if directly used for compensation payment). Studies suggest that willingness-to-pay (WTP) does not always vary with the size of ecosystem area, therefore transfers and aggregation using value per hectare may be biased.

General question for discussion: what are the difficulties/ challenges in benefit transfer of

<sup>7</sup> Dr Ståle Navrud, Department of Economics and Resource Management, Norwegian University of Life Sciences, Ås, Norway.

biodiversity values, from an ecological and economic point of view?

#### Specific issues for discussion:

- requirements for benefit transfer, especially access to EVRI database and coverage of EVRI for biodiversity studies;
- level of valuation/transfer: species, habitats, ecosystem services and functions;
- use vs. non-use values;
- reliability of use and non-use values (hypothetical vs. actual WTP, e.g. Veisten & Navrud 2006);
- site-specific values: different baseline conditions?
- transfer methods: unit transfer, function transfer, meta analysis;
- BT protocol for biodiversity;
- double counting issues (e.g. different methods estimate partly overlapping value components);
- how to deal with uncertainty and risks;
- what are acceptable transfer errors for which purpose;
- aggregation issues (aggregating over areas, species, habitats, affected households, etc.)
- cumulative effects;
- for BT, only new primary valuation studies using state-of-the art methodology should be used;
- new primary studies should be constructed and reported already with BT in mind;
- there is a need for a protocol for new primary valuation studies for biodiversity.

#### Key points from the discussion:

- For the purpose of the Review, there is a need for both transfer and aggregation.

#### How to implement benefit transfer?

Basic requirements for valid BT are:

- (i) access to valuation databases
- (ii) best practice criteria for assessing quality of valuation studies, and
- (iii) best practice criteria for benefit transfer techniques (unit value transfer, benefit function transfer and meta analysis)

(i) The accessibility of databases, in particular of EVRI, should be improved. Many studies are unpublished / unavailable on databases. The distribution of valuation studies per type of ecosystem is uneven (e.g. abundance of forest studies) as well as geographical coverage. In EVRI there is still a large representation of North American studies, although many studies have been added over recent years.

(ii) The quality of studies is quite heterogeneous; there has been significant progress since the 1990s. The methodology is

often not reported in enough detail in databases. There is a need for common criteria for quality assessment.

(iii) At case study level, transfer is defensible (review suggests average errors of 25 to 40% in national and international transfers; also for ecosystem goods and services)

Try to take into account the quality of the resource and the relative scarcity (if not, higher uncertainty).

#### How to undertake aggregation?

- Aggregation is a huge challenge: uncertainties increase with higher level of aggregation - and so does distrust in valuation! There is no easy solution.
- The units of valuation needed for policy making (ha of ecosystem) are not the same as those directly meaningful to ecologists or the public: e.g. some services are available whatever the size of the ecosystem, while for others a minimum size is needed. The units are not the same either as those actually used in valuation studies, which reflect how people think about biodiversity and ecosystem services. It is a challenge to use per ha values. There is a need to refer to the population concerned and to take into account how WTP changes with distance from the resource (depends on the ecosystem service).
- The acceptable size of transfer and aggregation error depends on policy use: higher level of accuracy required for cost-benefit analysis (CBA) vs. Green National Accounting (order of magnitude may be acceptable) vs. Externality valuation vs. Natural Resource Damage Assessment (NRDA)).

#### Research agenda

- Test validity and reliability of transfer and aggregation within and between (developed and developing) countries, by conducting similar valuation studies in multiple countries.
- Develop studies and methods to reduce uncertainty of economic valuation of biodiversity when aggregated on a larger scale (which is needed to move from CBA of preservation projects - case studies - to assess e.g. EU-wide and worldwide policies).
- Further develop valuation methods for biodiversity; including contributions from deliberative methods to address the heterogeneity in preferences
- Research needed on temporal transfer – New studies on how economic values of biodiversity change over time

- Research needed on non-monetary units, e.g. NRDA techniques of habitat equivalence analysis (HEA)

### **Main recommendations for the Review**

#### **Short-term priorities (Phase I and COP9)**

- Aim for valuation of biodiversity / ecosystem service rather than of single species as people have more well-defined and stable preferences for ecosystems.
- GDP per capita adjustments of economic values (i.e. unit transfer with income correction) can be used as a first approach in international transfers to overcome lack of studies in some parts of the world.
- Communicating some good case studies can already be influential.
- Need to take into account the appropriate scale for policy relevance.
- Need to recognise limits to transfer and in particular to aggregation: valuation studies typically value discrete changes, which are converted to marginal values and then scaled up, not taking into account non-linearities, thresholds/critical limits, changes in economic conditions etc.). Avoid a new Costanza et al. exercise.
- Draw from a continuum of case studies (from small to large scale)

#### **Priorities for 2008-2009: Phase II of the Review**

- More work needed in Phase II to determine how far we can go in aggregation without undermining credibility.
- It is preferable to use several assessment approaches (not only CBA); however, even with assessment in non monetary terms, the problem is to determine the weightings.
- Convey the need for more primary valuation studies constructed for transfer and aggregation.
- EU and other countries should subscribe to EVRI database and populate the database with existing primary valuation studies on biodiversity.
- Best practice guidelines for benefit transfer exist, but should be adapted to biodiversity valuation.

## Session 4

### Reporting back to the Plenary

*The 6 speakers reported back to the plenary (key points as in above sections<sup>8</sup>), with subsequent discussions. Points from the plenary discussion include:*

#### A1: Kerry Turner

**Kerry Turner** suggested an ecosystem services classification, such as the one in Turner 2008 (and in Scoping the Science), in which a production function is employed solely for the benefits production. The non-linearity and threshold effects need to be studied further. It is important that one does not try to oversell economic valuation.

#### A2: Pushpam Kumar

**Pushpam Kumar** emphasised the relationship between ecosystems and ecosystem services. The benefits of biodiversity should be measured at a variety of ecosystem service levels. A priority is to design criteria and guidance for benefit transfer of estimates for ecosystem services. Greater attention should be given to regulating services. Furthermore it is necessary to identify thresholds, points of non-linearity and resilience of ecosystem. Furthermore he stressed the point that any economic valuation of biodiversity and ecosystem services should be done with a purpose- CBA, Accounting, Payment, Evaluation of action /inaction etc. Valuation of ecosystem services must be associated with the condition /state (BAU / Alternate Scenario).

#### A3: Ben ten Brink

**Ben ten Brink** outlined what the priorities for 2008-2010 are. Scenarios on sustainable ecosystem use must be run, distinguishing between major & minor factors. Maps of best conservation opportunities must be developed. The importance of incorporating the red list species in the Total Economic Value framework was stressed. Another priority is developing strategies on how to block human escapes to overcome ecosystem depletion (tunneling through). The trade-off between direct land use (goods) and regulating services must be quantified.

## Discussion A1 to A3

- There is a risk of losing sight of the relationship to biodiversity, when focusing valuation on ecosystem services only. The main function of biodiversity is to keep the adaptability of ecosystems in the short and long terms – a fact that did not show up in the valuation. There is a high complexity in the relationship between biodiversity, ecosystem functions and ecosystem goods.
- Ecosystem services are not the same as biodiversity: services are replaceable and could be bought. The concept of ecosystem services is a useful tool, especially for the review on the economic consequences of biodiversity loss. Losing biodiversity means losing welfare. Ecosystem services can be seen as an intermediate. Hence the CBD suggests that the sustainable use of components of biodiversity, such as genes, species and ecosystems, can be a bridge for an introduction of the ecosystem service-term.
- The framework of the first group was specifically to illustrate the relationship between biodiversity, ecosystem services and benefits – scaling up knowledge about resilience from plot-scale to real-world scales, at the very front-end.
- It is necessary to look at a wide range of different groups in society, which makes it plain that the relationship between ecosystem services and biodiversity is inescapable.
- Umbrella / flagship species can be used as a tool to see the relationship between biodiversity and ecosystem services.
- The costs of quasi-extinction, such as species recovery plans, must be considered. In the case where only a few remnants of a species are left, ecosystem services evaluations make less sense. There is no value in it from the beginning - except for the intrinsic value.
- An economic valuation should be assisted by physical valuations and the incorporation of possible enforcement mechanisms. Cost Benefit Analysis is not the answer to the policy question; it is a framework that should be used inclusively and not exclusively.
- Goods production is the very cause of deterioration for ecosystems.
- Stern's strategic masterpiece was to present climate change not as an environmental, but as a development issue. The benefit of this is that one can

<sup>8</sup> See also the reporting back slides on <http://www.ecologic-events.de/eco-loss-biodiv/index.htm>

use the momentum brought up by the Millennium Assessment and bring in the issue of equity, especially in scenario usage with poverty levels and other equity indicators.

### **B1: Alistair McVittie**

**Alistair McVittie** focused on the need to scale up from existing studies, but also emphasised the difficulties in getting reliable data. New studies need to focus where biodiversity is policy relevant and make valuation more robust. In addition, it would be beneficial to explore the potential for wider analysis:

- the role of participatory approaches
- cultural sensitivities
- ways of embedding the structure of preferences of local communities.

Furthermore, the option, or insurance, value should be estimated. It needs to be determined what the area, especially floor level, of valuation should be: the object is to avoid any interruption of the service flow. Policy makers are only one of many target groups. Also local communities, NGOs, civil stakeholders and politicians should be considered.

### **B2: Patrick ten Brink**

**Patrick ten Brink** explained how the overall aim of a presentation is to be representative of the facts and engage the interest of a range of key audiences. There is a pyramid of information available in all categories – qualitative, quantitative and monetary. The pyramid can be seen as a large toolkit with different groups being interested at different stages of the pyramid. One should look at the information or function provided by different measures. The global number is a tool, but it has to be used in a very sensitive manner. There is agreement that both quantitative and qualitative measures are needed to ensure a representative picture. Another possible tool is vulnerability assessments. As to the type of stakeholder that one aims to reach, each should be tackled with their specific information or data requirements. The second phase should be to look at the decision making process and information needs, and check what information is needed, in order to get the message into those processes that have an impact.

### **B3: Ståle Navrud**

**Ståle Navrud** said that benefit transfer is necessary but asked the question whether benefit transfer at case study level is defensible, with average errors being between 25 and 40%. In addition he pointed out that the discussion ended with the recommendation to be careful with an upscaling exercise. The reason for this is

that the units of valuation needed for policy-making (e.g. ha of ecosystem to be conserved) are not the same as those that can be considered to be ecologically meaningful or useful for valuation. The basic requirements for a valid benefit transfer is access to the valuation database and a set of best practice criteria for assessing the quality of primary valuation studies and the benefit transfer techniques, in order to minimise transfer errors. GDP per capita adjustments can be used in calculating willingness-to-pay for benefit transfers. Nevertheless there are limitations of upscaling: More primary valuation studies are needed as well as best practice guidelines for benefit transfer. The validity and reliability of transfer and aggregation must be tested (i.e. by conducting similar studies in different regions).

### **Discussion B1 to B3**

- There are a number of case studies in the database EVRI that are relevant to biodiversity – although not written specifically on that issue. There are many case studies on valuation of land uses, even if these do not involve the term ecosystem services. The difficulty of finding these is increased by the complicated structure of the database.
- One should be aware that the database is not comprehensive, and many studies are not included for different reason (e.g. not published, etc.). In addition it is very Europe focused. There are publications for Africa in the grey literature.
- There is a limited amount of studies from developing countries (approximately 200 studies of the overall 2000) – and these studies are not accessible for policymakers in developing countries.
- There is unease with regard to the acceptability of different valuation methods, especially with transfer benefits methods.
- Transfer seems to work better than we could ever have hoped for. But it has to be kept in mind there is a lot of uncertainty in primary studies also, e.g. difference in hypothetical and real WTP.
- The costs of conservation are much easier to determine than the benefits. Empirical data shows that costs are very low and that should be a strong political argument.
- It is possible to adopt various angles – i.e. reactive vs. proactive approach, reactive being far more costly.
- A priority list of ecosystems should be used. COPI study considers this by looking at different biomes. Grassland is facing the heaviest impacts. There are many

available conservation priority systems and they are not coherent. In addition they are totally blind to the economics side – not taking into account costs and benefits. For most of the affected ecosystems, there have not yet been developed valuation studies.

- The marine environment should be considered as a priority for additional primary studies, since the discrepancy between importance and available knowledge is high.

## **Session 5**

### **Costs of biodiversity loss - contributions / case studies**

*This session included the following presentations, with key points presented in order thereafter. Each is a useful input to the biodiversity review process.*

- **Ecosystem accounting applied to wetland case studies by EEA**

**Jean-Louis Weber**

- **Forest study by IUCN**

**Katrina Mullan**

- **Marine Bill valuation study made for DEFRA**

**Salman Hussain**

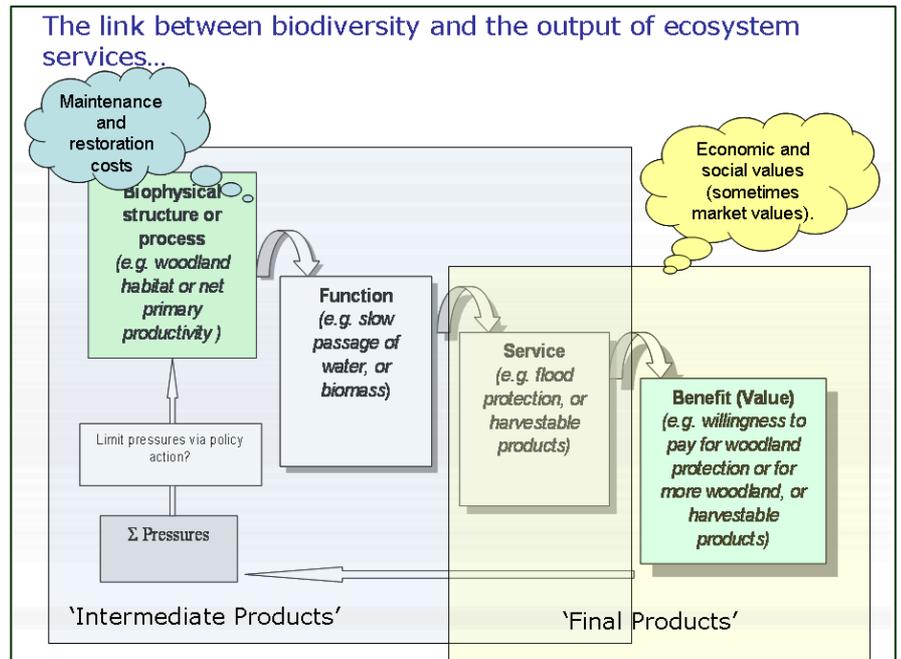
**EEA – Jean-Louis Weber**  
**Ecological truth and market prices in GDP**

**Jean-Louis Weber**<sup>9</sup> started by noting that the unsustainable use of living natural capital is ignored, that no allowance is made for maintaining ecosystems and their functions and services in economic accounting (natural capital is not amortised), that ecosystem degradation in the production of a product are not included in the price, that the actual value for people of free ecosystem services is not accounted, and that GDP does not directly reflect the value of ecosystem services.

He talked of the work of the EEA on ecosystem accounting (part A of the presentation) and also of the case study on Mediterranean wetlands (part B).

He noted that ecosystem accounting is a useful tool that helps allow a systematic look at the link between biodiversity and the output of ecosystem services (see Figure for links from biophysical structure to function to service and benefit).

Ecosystem assets, services (some market products, others not); also ecosystem maintenance and restoration costs are all part of ecosystem accounting (see slide), and the accounts contain both physical units such as on

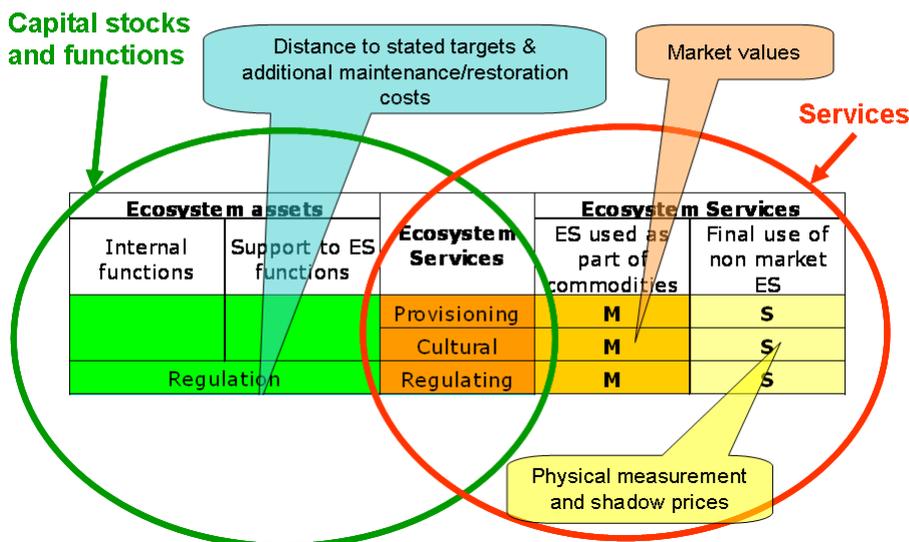


ecosystem assets integrity (stocks, flows, resilience) and monetary units, e.g. for maintenance costs and for ecosystem services. He underlined that there are different levels of services from different land uses – in some areas they are very significant, in others marginal, and in others non-existent (see slide).

On the Mediterranean wetlands work, which is one of the inputs to the report for COP9, Jean-Louis noted the value of a global mapping system that allows mapping wetland socio ecological systems. These build on land cover and change accounts and use the ecological potential concept. Data on land cover accounts are available on EEA website.

The work responds to the call for action and needs as noted in the high level international conference **Beyond GDP**<sup>10</sup>, held last November in the European Parliament, the next Millennium Ecosystem Assessment (MA2) in 2015, and COP10.

**Benefits from biodiversity: accounting for ecosystem services value and sustainability**



<sup>9</sup> Jean-Louis Weber is project manager at the European Environment Agency.

<sup>10</sup> See [www.beyond-gdp.eu](http://www.beyond-gdp.eu)

Ecosystem services, land use and well-being													
Services	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5
	Food	Materials	Forest trees-related	Plant-related	Physical support	Amenity	Identity	Didactic	Cycling	Sink	Prevention	Refugium	Breeding
<i>Land cover types</i>													
Artificial surfaces/ Urban	✖	✖			✖	✖	✖	✖		✖			
Arable land & permanent crops	✖	✖		✖	✖	✖	✖	✖	✖	✖		✖	✖
Grassland & mixed farmland	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Forests & woodland shrub	✖		✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Heathland, sclerophyllous veg.			✖	✖		✖	✖	✖	✖	✖	✖	✖	✖
Open space with little/ no vegetation		✖		✖		✖	✖	✖		✖		✖	✖
Wetlands	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Water bodies	✖	✖		✖		✖	✖	✖	✖	✖		✖	✖

are not very high in terms of \$ per hectare: the majority of values are much less than \$100/ha/year, many are less than \$10/ha/year. Around 40 studies reviewed.

*Direct use - Recreation and tourism values* –both from developing and developed countries: different visits – in developed countries day visits vs. several day visits in developing countries. In tropical countries: high variation on the values for visits. These values are difficult to transfer into per hectare values. In developed countries, when transferred to per hectare values, values are usually rather high.

*Developed world*

- \$5/visit or \$10 to \$62/person per year
  - Wide variation in per hectare values - e.g. \$7582/ha/year southern Appalachians (Kramer et al 2003)
  - Bateman et al, UK 2290\$/ha/year---
- Developing world*
- \$10-50/visit for foreign tourists, lower for domestic tourists

*Bioprospecting*

- Here we find a very high range (\$20 – \$9000/ha/year).

*Indirect use values*

- not so much related to biodiversity as such but rather to the existence of the forest ecosystem as a whole, some pollination examples etc.

*Non use values – temperate forests.* Mainly from developed countries, per hectare values differ – higher values when forest contain charismatic species

- e.g. \$1000/ha/year

*Tropical forests – fewer studies*

- Opportunity costs – sometimes using land prices, sometimes modelled land values, sometimes household surveys. Opportunity costs vary highly, often more than benefit estimates. They include external costs and management costs. See slides for values. There are fewer studies on management costs.

Values are very location-specific. Some issues are difficult to transfer – notably non-use or recreation values. An important question arose as to whether or how to use area-based values as aggregation / extrapolation can be difficult.

**Katrina Mullan, University of Cambridge**  
**Benefits and costs of protecting forest biodiversity – IUCN**

**Katrina Mullan**<sup>11</sup>, introduced the ongoing IUCN work (for the EEA), noting that they are looking at both the costs and the benefits and that they use the Total Economic Value (TEV) framework. The benefits covered by the study include: direct use values, some indirect use values, and non-use values. Option values are the main gap. There is a focus on biodiversity-related benefits.

Data is good on the use values, but she noted that option value data was weaker.

One issue that came up was whether to focus on the benefits from biodiversity, or benefits of biological assets – they chose to focus more on the diversity aspects and hence looked less at, for example, the timber value of plantation forests.

Their work was to find and collate existing studies. Some studies were found to give marginal values, others not. All are being assessed to see how these can be compared. Types of cost information available include opportunity costs and implementation costs.

Examples of benefit estimates include:

*Direct use values - non timber forest products (NTFPS).* Mostly in developing countries; values

<sup>11</sup> Katrina Mullan works at University of Cambridge’s Department of Land Economy

**Salman Hussain, SAC / University of Liverpool**  
**Marine nature conservation proposals**  
**– valuing the benefits**

**Salman Hussain**<sup>12</sup> noted that very little information exists on the value of the marine environment. There is the Costanza study that says that two thirds of global ecosystem service value comes from the marine environment, yet this is based on little evidence, and much more analysis on marine environments is needed.

- One problem faced is how to disaggregate values down to specific areas / services as these are often aggregates, and then re-aggregated for different landscapes and habitats. In practice this has been based on an expert scoring system for services (see slides).
- The work was an *ex ante* assessment: looking at the difference between a bottom line business-as-usual scenario and a scenario of where conservation efforts are put in place. Different values were used, including from the Beaumont study<sup>13</sup> - but for some values those were considered too high for realistic impact assessment (e.g. nutrient cycling)
- Benefits estimate is 2x as high as costs – underestimate as non-use values not included
- Present value between £2.2billion and £4.7billion. Mean annual undiscounted benefits between £0.9 billion and £1.9billion, twice the estimated costs.

**Plenary Discussion on the three presentations - key points:**

- There are successful national PES (payments for environmental services) systems around, e.g. in Costa Rica which can be regarded as a success case.
- Removing perverse incentives is a high priority – this is a political decision.
- Issues related to governance – highest amount of biodiversity is in countries with high poverty and lacking overall governance. How does / can our exercise help that?
- So, how to target the message to politicians is the key
- Note: politicians are hard to predict, thus targeting messages to them is not

maybe the one and only goal. Having a good and solid arguments is thus also of very high importance.

- Stern was in the end about ethical values and arguments, this should be the case here as well
- How about producers and consumers? What instruments do we have for them?
- It was questioned how to avoid the recommendation in the next COP to be “go and produce another report”. Could the recommendation be instead for example “focus on how to make PES work well”?
- There is a need to break down the group of policy makers. Different arguments may be needed for policymakers working on environment vs. development issues.
- Aid effectiveness as one entry point for the discussion in the future!
- GEF: international WTP for global biodiversity benefits. GEF projects provide a significant info source relevant for the Stern-like study.
- It was stressed that it should be the aim to make biodiversity “The Issue”, not as one issue to be addressed in the context of other issues (e.g. floods etc.). This is what Stern did for climate change.
- Key message should be to demonstrate the political power related to addressing biodiversity issues now.

<sup>12</sup> Salman Hussain is Ecological Economics Researcher at the Scottish Agricultural College.

<sup>13</sup> Beaumont N, Townsend M, Mangi M and Austen M C (2006) Marine Biodiversity: An economic valuation. Building the evidence base for the Marine Bill. Report for Defra, London

## Session 6

*This includes three further breakout sessions:*

### **C1 The costs of actions necessary for the conservation and sustainable use of biodiversity**

#### **Session Leader: Joshua Bishop**

**Session Participants:** Stefan Baumgärtner, Giovanni Bearzi, Joshua Bishop, Zoe Cokeliss, Deighton Conder, Laura Dietzsch, Maryanne Grieg-Gran, Haripriya Gundimeda, Salman Hussain, Katia Karousakis, Markus Lehmann, Paul Morling, Shaun Mowat, Katrina Mullan, Karachepone Ninan, Matt Rayment, Ana Rodrigues, Alice Ruhweza, Christoph Schröter-Schlaack, Isabel Sousa Pinto, Wouter van Reeth, Hans Vos, John Ward, Frank Wätzold, Jean-Louis Weber, Daan Wensing, Ada Wossink, Carlos Young

### **C2 Trade-offs across EGS**

#### **Session Leader: Anantha Duraiappah (UNEP)**

**Session Participants:** Denis Couvet, Rudolf de Groot, Yogesh Gokhale, Roy H. Haines-Young, Marianne Kettunen, Berta Martin-Lopez, Bedrich Moldan, Rosimeiry Portela, Guillaume Sainteny, Rob Tinch, Bernard Vaissiere, Matt Walpole

### **C3 Policy needs and science challenges**

#### **Session Leader: Anil Markandya**

**Session Participants:** Diego Azqueta, Pascal Blanquet, Pierluigi Bozzi, Leon Braat, Ingo Bräuer, Aline Chiabai, Mike Christie, Roberto M. Constantino, Pierre De Villens, Martin Dieterich, John Hanks, Mark Hayden, Nick King, Onno Kuik, Anil Kumar, Pushpam Kumar, Marius Lazdinis, Sigrid Lüber, Anil Markandya, Emily McKenzie, Alistair McVittie, Stale Navrud, Patrizia Poggi, Ridhima Sud, Patrick ten Brink, Francis Turkelboom, Kerry Turner, Sybille van den Hove, Bulat Yessekin

## C1 The costs of actions necessary for the conservation and sustainable use of biodiversity

**Session Leader: Joshua Bishop**

**Session Moderator: Matt Rayment**

**Session Note taker: Alexandra Vakrou**

**Session issues:** *what are the main drivers of biodiversity loss? What information do we have concerning the type of actions and their associated costs – including opportunity costs - which will be necessary to prevent the loss of ecosystem goods and services? What are the most promising attempts/examples for market creation?*

**Joshua Bishop**<sup>14</sup> (JB) introduced the topic by identifying 3 key issues to be addressed during the session; the drivers of biodiversity loss, the type and costs of actions needed to protect and conserve biodiversity and finally what have been the most promising attempts to use market based instruments to achieve that. While addressing the drivers that lead to losses like habitat changes and unsustainable use, it was mentioned that within the drivers recognised as suspects for the decline of biodiversity politicians and decision makers take wrong decisions that lead to biodiversity loss, simply because they are neglecting the internalisation of biodiversity externalities in the usual CBA they perform for most development projects. The participants supported this comment and it was concluded that cultural and political factors need to be taken into account too when addressing what drives biodiversity loss.

When introducing the type of actions needed to conserve biodiversity, JB identified commonly and widely used paradigms for this like the protected areas systems, but also actions that take place in productive sectors by private entities (farmers, companies, etc) that apply low-intensity activities, either through payments for Ecosystem Services (PES) or for building their social profile and avoiding pollution. On this point it was mentioned that there is a growing recognition of the relation between Climate Change and Biodiversity and there is a need to internalise the costs of biodiversity adaptation to Climate Change.

The costs of preservation have been addressed and there is a great diversity in the available studies; this relates largely to the level of ambition attached to the conservation objectives. It is not easy to say what is actually

<sup>14</sup> Joshua Bishop is Senior Advisor for Economics at the International Union for Conservation of Nature.

spent on conservation actions; data are very fragmented and frequently are reported together with other actions making hard to distinguish what is spent on biodiversity preservation and what can be attributed to other environmental goals (i.e. pollution abatement). Costs are also dependent on institutional arrangements made for the implementation of the actions (participants felt that in certain cases the transaction costs of implementing some conservation projects are too high and they result in low response and effectiveness). It was also mentioned that when demand and supply can interact (and thus markets to start be created) then the prices can start to vary and choices can be made.

With respect to market creation for biodiversity, the issue of profile has been raised; what markets, how, by whom? There is a variation in the definition of markets, which can be either narrow or broad, while there is also a need to see what will be the advantages of establishing markets. How will markets be developed? Facilitation, taxes, subsidies, or even trade have all been used for this. Corporate investment in biodiversity is increasing through for instance Habitat Banking in US.

The floor opened for discussion, along the following main questions that the participants have been asked to focus: (for time horizons COP-9 and COP-10):

- Do we know what we need to do in order to halt biodiversity loss?
- Do we know how much it costs / will cost? Who pays and how can markets help?

### Key points from the discussion:

#### **Do we know what we need to do to halt biodiversity loss?**

Sometimes we know about the values of biodiversity at **local level** and the benefits it brings, but we do not explore well the alternatives to destruction. Local values matter. It is different if we speak about biodiversity services that sustain livelihoods and life, vis-à-vis biodiversity services that can be seen as luxury or have only option values.

There is a need to define "biodiversity loss". Is it only the probability to lose some species? Or habitats only? There is a need to avoid extinction, by either protected areas or keeping IAS out, but also by controlling hunting and pollution. We need to **map these needs**, and tools exist for that (WWF hotspots, etc), but there is need to factor in the opportunity costs of preventing/preservation actions. And to do that effectively, we need to **set priorities**. If we

need to protect all biodiversity maybe we will be unsuccessful, but a lot of things can be covered quickly with not so many resources and there can be big benefits and positive impact.

The Australian example was presented which provides for auctioning of ecosystem services; it also uses absolute and relative costs. It is possible to use different metrics for absolute values; however the use of relative costs gives the opportunity to add more and to have a consistent metric. However, a variety of comments on this point stressed the need to go beyond the metrics and to define a matrix of actions (maybe different for marine / terrestrial ecosystems) for actions stopping the loss of biodiversity (don't put so much emphasis on market and absolute values). There are a lot of problems if we try to convert CBD to IPCC (and turn everything to metrics). There could be a cap of 1% of the CDM to support REDD and halt deforestation.

#### ***Do we know how much it costs?***

Land rent and the opportunity cost of land may distort the costs of biodiversity actions if we take this into account. Management costs are easy to grasp and there are published data as well as experience with management; what is very difficult to calculate and even allocate in a decision model is the opportunity costs that exist, which are also very variable. Some participants felt the need to make a survey of public expenditure and see what every country spends to protect its biodiversity. Some participants suggested that financing targets should possibly be set for all countries.

A consensus developed around the idea that there will be a window of opportunity of 2 years to build more on biodiversity and Climate Change and that there is an urgent need to do so, by bringing the delegates of the different countries to the CBD and IPCC together to discuss at national/regional level and define common lines. There is an additional opportunity from the IPCC land emissions and this could be used to design market instruments; additional channelling of any available resources can be made to priority biodiversity areas; however all these may not be enough to revert deforestation. But some caution has been expressed for REDD, as it is important as an action to reverse deforestation, however, can be effective only if the data, inventories and monitoring are there and effective. These add more costs to the operability of the scheme. At the moment many countries discuss about REDD implementation and try to calculate land values, however, there should be caution about the links as Climate Change tends to focus on increasing carbon sequestration in the forests and this

approach is not good for certain areas and ecosystems like (for example) savannas.

It has been highlighted that the issues are different by country. India has been mentioned as an example of serious forest degradation rather than deforestation, thus conservation actions need a different focus. There markets can work better, by permitting the preservation of forest resources and their qualities with view of medicinal use of plants, etc. Furthermore, it is felt that at the same time that conservation actions are advocated, there is a need to speak and understand how perverse subsidies impact negatively on biodiversity. Simply a switch of these subsidies, or building in triggers for protecting biodiversity can change the picture and can help to make cost savings and direct financing to its preservation.

Suggestion for the Study Leader: ***Put costs for protecting actions for biodiversity as a key issue to be addressed in the 2<sup>nd</sup> phase of the study.***

#### ***Who pays and how can markets help?***

Transaction costs are too high most of the time and PES are not working well when this happens (India). It was also mentioned that for some cases like religious forests in India, these areas are ready to enter a PES system and we could potentially see spiritual values acquire a market. It was felt that the opportunity and transaction costs need to be tackled further but still progress can be made on that. If the system develops along the same lines as carbon credits, the certification monitoring, and other transactions can "kill" it before it is launched. What needs to be done urgently for biodiversity is to build the political construct equivalent to the Climate change agenda that will move things forward (Brazil). A need to steer society has been expressed, so to have informed people and informed leaders that may bring biodiversity high in the agenda, as for Climate Change.

Also mentioned was the very great uncertainty associated with markets. For instance in many EU agri-environmental schemes for farmers, the support is paid as a cost/Ha, but in many cases this is not corresponding to the same value of services (frequently an overcompensation is provided).

It has also been mentioned that when designing PES it will be good to look to how much it will cost to society and economy not to provide Ecosystem Services. For example, a study on the services provided by forestation and re-vegetation has found that farmers and society will have multiple benefits (90% more services than before) if they re-vegetate some parts of their land. However, a scheme to achieve this

would have cost 1.9 Billion \$AU in the absence of a carbon market.

It has also been mentioned that it will be difficult to create a market for ecosystem services in the marine environment and another approach should be followed. It was pointed that the discussions have not focused much on genetic diversity (in particular agro-ecosystems). Biological/organic agriculture can capture benefits and bring opportunities for farmers, preserving not only the genes but the traditional knowledge too.

There is a need to think where we can apply market instruments. Wetland banking is very different from old-growth forest banking, and the same applies to marine species. There is also a need to establish not only where ES are produced, but also where they are consumed and appreciated. Then we can discuss who pays for enjoying these services and how compensation can be transferred between countries or even regions. GEF may offer a possible platform to do that. Furthermore, private donations can enter a pool of monies available for biodiversity actions globally.

All of the participants felt that there is an urgent need for action as early as possible. **There was consensus that the study should present at COP-9 whatever information is already available on costs of action to preserve biodiversity, alongside the presentation of the costs of policy inaction for biodiversity.** Scientific knowledge and experiences are available, even if not perfect, and there is no need to know what exactly is being lost. **There is a need to act now, so not to lose opportunities to conserve/preserve what we have.**

Participants expressed the need to generate demand for ES in the same manner as has been done for carbon. And this demand should be expressed at the global level. The CC debate brought the polluters up front, and the same needs to be done for biodiversity. The Stern-report said why the UK should pay for climate change combating measures. **This report should also say why and how much everyone should pay for biodiversity.**

## Main recommendations for the Review

### Short-term priorities (Phase I and COP9)

- We need to address the costs of actions urgently needed to halt biodiversity loss. It is possible to review conservation targets / indicators at different scales (spatial, temporal, etc). With good mapping, we can

identify needs and actions that can be first done quickly and provide for alleviation of a considerable amount of biodiversity loss.

- Identify cost-reducing conservation actions (e.g. fishing subsidy reform), with attention on how to overcome vested interests.
- Present an initial outline assessment of the costs of alternative scenarios of conservation actions – examining the distributional aspects, but also social, ecological and governance scales.

### Priorities for 2008-2009: Phase II of the Review

- There is a great need to explore and examine in depth the costs of conservation actions and present them for COP-10. Work in this area should advance in parallel with the costs of (biodiversity) policy inaction. This can be done by:
  - identifying categories of conservation actions, using a vulnerability / threat-based approach
  - compiling and analysing data on the cost-effectiveness of conservation actions.
- The policy framework, the instruments available and the institutional arrangements should be examined and efficient ways that will allow payments for ES (PES) at a global level should be examined.
- Explore further ways to attract private investment in conservation of biodiversity. Opportunities to do so in an institutionalised manner may exist under the currently post-Kyoto negotiated CC Mitigation efforts (REDD) and need to be explored as there are synergies emerging.

**C2: Trade-offs across EGS****Session Leader: Anantha Duraiappah (UNEP)****Session Moderator: Ingo Bräuer (Ecologic)****Session Note taker: Aude Neuville (DGENV)**

**Session issues:** *this session should explore how to make best use of the experience of the MA with particular attention on the mapping of the relationship between the production of ecosystem services and the beneficiaries. How can we deal with trade-offs across ecosystem goods and services, taking into account distributional effects?*

**Anantha Kumar Duraiappah**<sup>15</sup> introduced the session, focusing on the Millennium Ecosystem Assessment (MA). He noted that the MA has shown that: (i) although there have been substantial economic gains from ecosystem conversion, large groups of the population have not benefited, and (ii) ecosystem use has often been not sustainable, raising the issue of intergenerational equity.

The MA has analysed the links between ecosystem services (ES) and human well-being, but there are knowledge gaps on: interdependencies between ES, their role in contributing to different constituents of well-being, and what are the weightings of these constituents in people's preference functions. Trade-offs between ES and constituents of well-being differ across individuals – they are context specific – as well as between individuals and society. Trade-offs can take place across space and across time. The challenges are to measure the changes in well-being caused by changes in ES, and to establish governance structures which are responsive to these changes across different stakeholders, especially vulnerable and socially excluded groups. Part of the explanation for declining ES is the mismatch in the social, spatial and temporal scales at which the impacts of environmental change occur and at which decisions are made. Effective environmental governance implies that these scales are matched and that there are structures and feedback control mechanisms (prices, regulations, etc) that operate at the appropriate scale.

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<sup>15</sup> Dr Anantha Kumar Duraiappah, Chief Ecosystem Services, Economics Unit, UNEP, Nairobi has been a coordinating lead author of the Millennium Ecosystem Assessment (MA) and the co-chair of the Biodiversity and Human Well-Being synthesis report.

**Key points from the discussion:**

- There can be trade-offs between different categories of ES, but also among different regulating services, or provisioning services. Often trade-offs involve food production.
- We need to better understand the relative weight of the different components of welfare deriving from ES, and how much of each component is generated by each ES. In the economic literature on preference functions there have been few papers making the link with ES, in particular regulating and cultural services.
- The individual or groups who make trade-offs may not have sufficient knowledge of complex ES such as regulating services. Also in some cases people may not be willing to admit that they are making implicit trade-offs.
- The rapid increase in global environmental awareness in recent years (on climate change in particular) might be reflected in changes in the weightings in preference functions and how trade-offs are made. People want more information on environmental issues and trade-offs and more control.
- Ethical considerations are part of preference functions and they influence trade-offs. This applies both at individual and at societal level. The cultural background matters. Preference functions at societal level (e.g. the concept of national interest) include a variety of considerations, not only economic growth, poverty reduction and equity.
- The analysis of ES should be placed in the broader context of integrated systems where humans play a role. ES may be an input among other inputs.
- The relevant societal levels for trade-offs in ES include the global level (global environmental issues) and the community level (local goods); in particular in rural areas, communities are important. The management of common goods is different from that of public goods.
- There is frequent mismatch between the scales where the consequences of natural resource management are felt and those where decisions are made. Although the political systems already have multiple scales, often the interests and preferences of some groups are not taken into account, even in the most democratic countries.
- A multi-scale approach of institutions, either formal or informal, is needed to

manage the scales of: providers / managers of ES, beneficiaries, and those who bear the costs.

- Economic valuation can help to address the mismatch between scales, for example by providing critical information to design compensation mechanisms. The scale of valuation should be appropriate.
- It is important to have criteria for measuring the sustainability of the use of ES.
- Often there is not enough economic evaluation taken into account in the political debate on biodiversity. Need to develop appropriate evaluation to this effect.

structures necessary for effective environmental governance.

#### Research agenda

- Develop a common metric for evaluating changes in well-being.
- Further research on the values of ES and their role in preference functions
- Further research on the mismatch between ecological scales and governance levels.

#### **Main recommendations for the Review**

##### **Short-term priorities (Phase I and COP9)**

- Part of the explanation for declining ecosystem services is the mismatch in the social, spatial and temporal scales at which the impacts of environmental change occur and at which decisions are made – this should be made clear in the report.
- The analysis of ES should be placed in the broader context of integrated systems where humans play a role.
- Take into account the influence of ethical considerations and increasing global environmental awareness

##### **Priorities for 2008-2009: Phase II of the Review**

- Contribute to a better understanding of the matching between social, ecological and governance scales
- Contribute to a better understanding of the values of ES and trade-offs among them at different scales
- Develop criteria for measuring the sustainability of the use of ES
- Economic evaluation can provide critical information to design feedback control mechanisms – economic instruments, compensations schemes, regulations, access restrictions, harvest moratoria etc – that operate at the appropriate scale. Also provide information to help matching the different scales with appropriate institutional

### C3: Policy needs and science challenges

**Session Leader: Anil Markandya (FEEM)**

**Session Moderator: Onno Kuik (IVM)**

**Session Note taker: Paulo Nunes (FEEM)**

**Session issues:** *what are the different challenges for economic valuation so as to meet efficiently the questions raised by policy makers at different levels? Which kind of figures/analyses is appropriate with a view of incorporation in scenarios and policy design?*

**Anil Markandya**<sup>16</sup> introduced the session, starting by looking at the lessons that can be learnt from the Stern Review. Key points are:

The assessment of climate change policies was successful not because of accuracy of assessing benefits (avoided damage), nor of the assessment of the cost of mitigation. The assessment was successful because it made two convincing arguments:

- 1) benefits (including insurance against risks) are likely to exceed costs; and
- 2) there is a need for early action.

Other factors contributing to the policy attention for climate change are

- 1) the scientific work of IPCC,
- 2) experience with extreme weather-related events, and
- 3) clever publicity (Al Gore).

What can we learn from the climate change discourse?

- 1) Do not only report average damages / losses, but also report extremely high risks and confront these with moderate avoidance costs;
- 2) show likely impacts in physical terms;
- 3) make the case for early action.

#### Key points from the discussion:

- There was some disagreement about whether 'scare tactics' would work in the biodiversity debate. Some argued that they wouldn't (there might be some 'environmental fatigue' and an 'emotional' appeal would be more appropriate), while others seemed to support that at least some dramatic risks could be communicated (pointing at the share of wild animals/ plants in human diets to underline their

importance; pointing to the risk of the acidification of oceans, which has the potential for dramatic disruption of the food chain).

- One lesson from climate change policies is the power of 'mainstreaming' policy measures into development priority areas such as food and energy. Biodiversity should likewise be 'mainstreamed' and not remain an isolated 'environment' issue. Some promising policy initiatives were mentioned, in South Africa, Uganda and the UK.
- Important for the dynamics of the climate change discussion are the business (and job) opportunities in low or zero carbon technologies (e.g. wind and solar in Germany). It would be very helpful to identify such business opportunities for biodiversity conservation and engage these businesses.
- A key problem for biodiversity conservation is that the (effective) demand is in the North, while most of the assets are in the South. This would suggest a transfer problem. One way of dealing with this is to shift the onus onto the (Northern) consumer, by letting him or her pay for ecologically sound products. An interesting initiative is that by President Correa of Ecuador who suggested that if the international community can compensate the country with half of the forecasted lost revenues of oil extraction, Ecuador will leave the oil in Yasuni National Park undisturbed to protect the park's biodiversity and indigenous peoples living in voluntary isolation.
- One 'advantage' of biodiversity loss over climate change is that nobody doubts the causes and extent of biodiversity loss.
- Biodiversity policy and research need a proactive approach. At the moment, international negotiators live from meeting to meeting and there is no feedback to national audiences. Continuous research is hampered by the 3-year funding cycles of most international research donors (like the World Bank). In African countries, there are no national champions (like Al Gore) for biodiversity protection.
- A priority area for biodiversity conservation policy should be the removal of perverse subsidies to biodiversity-threatening activities like agriculture, fisheries and mining.
- Convey the message that even if we are wrong on the cost of the loss of biodiversity, the actual cost of preservation is modest and preservation generates important side-benefits.
- Broaden the climate change issue to a global change issue with climate, biodiversity and water.

<sup>16</sup> Anil Markandya works at the Fondazione Eni Enrico Mattei and is Professor at University of Bath's Department of Economics and International Development.

**Main recommendations for the Review****Short-term priorities (Phase I and COP9)**

- Select case studies of biodiversity loss and practical ways of dealing with it at the country level
- Try to identify business opportunities
- Link biodiversity to climate change

**Priorities for 2008-2009: Phase II of the Review**

- Select case studies of biodiversity loss and practical ways of dealing with it at the country level.
- One lesson from climate change policies is the power of 'mainstreaming' policy measures into development priority areas such as food and energy. Biodiversity should likewise not remain an isolated 'environment' issue.
- Engage businesses that see opportunities; engage consumers.
- Create something like 'biodiversity' IPCC?

## Session 7

### Report to the Plenary

The 3 speakers reported back to the plenary (key points as in above sections<sup>17</sup>), with subsequent discussions. Points from the plenary discussion include:

#### C1 : Josh Bishop

**Josh Bishop** strongly highlighted the importance of looking at the composition and structure of costs. We know what the drivers are, but the complexity of them requires a more systematic approach. Management costs are currently possible to grasp, but there are substantial knowledge gaps regarding opportunity costs and the costs of transaction which still present a challenge.

- A big proposition was presented: halting biodiversity loss can be done relatively rapidly with a not too demanding amount of resources.
- There is a failure to internalise costs. We have good models to internalise biodiversity costs – but distributional effects need to be taken onboard. Hence there is an urgent need to explore how a market demand for biodiversity can be created.
- In addition to looking at costs of action, it is imperative that perverse subsidies / incentives are removed, in order not to support counteractive behaviour.
- A further question of importance is: how can mechanisms that recognise and reward traditional knowledge be developed?
- In relation to COP10 it was stressed that it would be helpful mapping the situation and seeing what can be done quickly. In the context of COP10 and financing, could GEF be used for benefit transfer? How can PES and other arrangements be improved so that transaction costs are not too high. There is a need to clarify the role of REDD in bringing resources for biodiversity conservation.
- The development of a global, spatially aggregated assessment of conservation costs is seen as a high priority – not least in order to form a basis for future decision making.

#### C2: Anantha Duraiappah

**Anantha Duraiappah's** summary points included:

<sup>17</sup> See also the reporting back slides on [www.ecologic.de](http://www.ecologic.de)

- Looking at an MA follow up, trade-offs and the magnitude of the interdependency between ecosystem services and the components of wellbeing need to be considered. There are different kinds of trade offs:

- between different services / groups of services
- between components of wellbeing, i.e. within preference functions
- between interlinkages.

It is also important understanding the main levels of trade off:

- Individual
- Community
- Societal

How do these work and how do they affect trade-offs?

- Governance structures and ecological systems mismatch. Hence there is a need to develop new approaches to set up institutions, e.g. one authority responsible for the whole Danube basin.
- For COP 10, there is an urgent research need for a better understanding of matching between social, ecological and governmental goals.

#### C3: Anil Markandya

**Anil Markandya's** summary points included:

- Stern highlighted not costs per se, but the fact that the elements of risk are very high and the importance of incorporating evaluations of equity issues. It would be helpful to adopt the same approach for biodiversity, i.e. incorporating the cost of risks of losses. In addition, the relative effects of loss on poor and vulnerable people should be emphasised – even if the monetary value is small, the importance is great.
- A challenge is overcoming environmental fatigue. In this, links between biodiversity and climate change should be emphasised. A move towards a framework of “global environmental issues” and away from separating biodiversity and climate change etc. should be attempted.
- In the end we want to see biodiversity as a development issue, not an environmental issue.

#### Discussion C1 to C3

- The problem was stressed that if one focuses too much on costs it might be that there will be no action at the end. An incorporation of benefit analysis is essential. Both sides of the coin need to be considered to make well funded decisions about investments in nature conservation.

- The costs perspective is a key in communication to COP. People will be referring to this information. So one should not shy away from the exercise.
- Cost-effectiveness-analyses are necessary (what do we get for a dollar spent) – but costs are an important term of the balance sheet.
- Main tools for conservation in Africa are protected area networks. For these the costs are constantly increasing. The figures will give an idea of the magnitude of necessary investments for conservation in Africa.
- It was also mentioned that from a cost efficiency perspective Africa is a clear candidate for action. But then burden sharing should also be considered, since most of the time, local benefits will not cover local costs. There is a need to compensate the global-level benefits at the local level which on the other hand could act as an added incentive for African governments in addressing the issues.
- It was mentioned that on the topic of underfunding, the crown jewels of biodiversity protection provide an illustration (national parks in Africa). A very good (or better bad) example of this comes from Angola, where the national parks are heavily underfunded. Much could be done without huge investments. So this is a good example of the low-hanging-fruits argument).
- The idea of biodiversity conservation should be put forward as a development issue. Trade-off analysis can be used as a tool here.
- In COP9 – biofuels will be the main issue there and this is clearly a trade-off issue. EC could address the relevant issues here.
- There are trade-offs not only between different ecosystem services and well-being factors, but also on the temporal scale and even in biodiversity underlying the ES. The costs of inaction are delay costs (the same action in the future will cause much higher costs than early action).
- It was stressed that it may not be advantageous to give an already cooked solution to policy makers. Rather, by delivering convincing arguments, let them come to the same conclusion.
- To deliver an idea of the size of the bill is essential (and it seems that it's not that huge).
  - It was stressed that Stern brought economics and ethics together – this is what the Biodiversity study should be doing too!

## Session 8

### Way forward & the policy messages from the studies supporting developments towards COP9

**Session Leader: Heidi Wittmer**

**Session Note taker: Patrick ten Brink (IEEP) / Ingo Bräuer (Ecologic)**

**Pavan Sukhdev** started the round table with his vision of the joint output of the different studies. He intends to present a 50-page report with highly relevant suggestions for politicians and decision-makers. Hence he asked the study leaders to present the policy-relevant messages from their studies. Afterwards he led the series of short conclusions, comments and ideas for roadmaps for the way forward. These included:

- Starting point should be GDP and other metrics to guide decision-making. There is still a healthy dialogue on this and a need to take this concept forward to help us have a more appropriate compass to steer our economies and societies.
- Welfare and wellbeing are a good main focus – particularly for the poor. I.e. the relative importance is high. For poorer countries, absolute terms of GDP correction seem not to be relevant; however, distribution of rearrangement is highly policy-relevant.
- PES examples are delightful – it is useful to have both a stick (law) and the carrot (financial payment) in order to get the results.
- Local values and local incentives should not be forgotten in the global review.
- He highlighted the need to engage the business world and build on the successes. As regards business and government partnerships, there are small success stories that have not been scaled yet, and hence an opportunity.
- Carbon storage and REDD are a potential tool for biodiversity (notably forest conservation) – the review work should try to elaborate this more.
- Finally, Pavan Sukhdev recalled the usefulness of the soft metrics as described in the benefit pyramid (session B2), and invited the group to think about new metrics as well as the already mentioned ones like fun per ton, happiness per hectare.

*Policy-relevant messages from the studies*

**COPI study - Leon Braat (Alterra)** presented some key points from the perspective of the Cost of Policy Inaction (COPI) on biodiversity

loss study (Partners: Alterra, IEEP, Ecologic, FEEM, MNP, GHK, W&B).

He explained that the work builds on the baseline scenario of the OECD, work which has been just released in Oslo.

- The study builds in scenarios of population growth and income growth, with due implications for food-demand and land-use changes. The world population is expected to be 9 billion people in 2050, with a global GDP of several times today's.
- This will put increasing pressure on the world's natural capital. It is not expected that productivity gains alone will address the growing needs. Significant areas of still pristine lands will be converted to agricultural land and to plantation forests to address climate change. Some of the converted lands will be marginal lands, and will require significant input (energy/fertiliser).
- The overall rate of species extinction will increase (in the COPI-setting) resulting in a loss of biodiversity respectively.
- Grassland and shrubland are most under pressure, in particular those in Africa and parts of Asia. Unfortunately these are also habitats where only very limited information on their economic benefits exist. Hence the team is asking for information on grey literature regarding these habitats.
- To assess the economic value of the losses (a focus in the COPI study), more information is needed on grasslands and on non-European countries, and also more information on marine ecosystems is needed.

#### IUCN message - Joshua Bishop

The case studies being collected and analysed allow for greater understanding, increasing spatial detail, location-specific insights, and improved reflection of institutional and demographic issues. Insights include:

- compelling evidence on the importance of forest ecosystem services for the poor,
- costs and values are location specific – reflecting a range of factors,
- improving governance can decrease conservation costs,
- guidance on priority setting and budget allocations can help.

#### Economics of Biodiversity Call and Synthesis study – Paulo Nunes

- Most of studies from the call for evidence refer to non-market biodiversity benefits; hence you have to deal with them in a different way than with other goods.
- Important to be aware of the risks and the benefits and importance of early action.

- Evidence is fragmented so far. While there are many studies on forest habitats, there is less information on marine systems - despite their importance – and this situation needs to be rectified.
- A double-dividend argument can usefully be underlined – halting biodiversity loss will be positive for both the environment and for low income groups. This should lead to a stakeholder involvement to endorse politics.
- Important to focus to engage beneficiaries – market-based instruments could be a useful tool here.

**Scoping the Science - Ana Rodrigues** – sees two key messages of the project

- *Message 1:* The conceptual framework presented is a proposal for the whole review as a tool/framework for comparing, at different spatial scales, the costs and benefits of maintaining biodiversity.
- It is spatially explicit, i.e. notes where are the losers and winners – which allows one to address the situation and issues of trade-offs and equity.
- Aggregated values have to be spatially underlined (distributed) – to map mismatches between costs and benefits of conservation (equity issue).
- It can also be a tool to set priorities by identifying the “low-hanging fruit” in conservation.
- *Message 2:* Review of ecological science “fit for purpose” – main message: we depend on biodiversity in so many ways that it is important to understand the range and complexity of the linkages between biodiversity and ecosystem-services and well-being.

**Ecosystem Accounting Study, EEA - Jock Martin** – focused on the benefits of an ecosystem accounting approach. This will have 7 kinds of benefits

- Allows us to talk the right language for some key stakeholders – e.g. speak the language of the finance minister.
- Enables us to relate to welfare and to measure external effects.
- Provides a practical application for addressing the “issue of scales” in a way that makes both up- and down-scaling possible.
- Frameworks are essential to deal with the two first mentioned points. The accounting may be a robust framework to help the political process. The aim of the ecosystem accounting should be to become an equivalent to the GHG-nomenclature. So far nature conservation can look back on 40

years of measuring, but the data is not suitable to assess whether policies have been successful or not.

- Finally, he noted the ecosystem health challenge - to employ private resources for protection.

**Marine Study - Salman Hussain** – key messages

- The temporal dimension can be measured in costs and benefits very well. This will help to decide whether a decision is beneficial and when it will reach its break-even point.
- Spill-over effects are important to bring benefits - conserving marine ecosystem helps to support food production and health of food support.

## Session 9

### Policy, synthesis and way forward to Bonn and beyond

**Session Leader: Heidi Wittmer**

**Session Note taker: Patrick ten Brink (IEEP)/ Ingo Bräuer (Ecologic)**

#### Contributions from the floor

A participant commented from his perspective as a potential end-user (politician) to the planned review and the workshop. According to his understanding the group should keep in mind that politicians at COP9 are friends – they are already persuaded, but they need arguments to convey to others in the government.

- In addition the public awareness of biodiversity issues is increasing. This political public awareness should be used, and we should try to follow the same way as for climate change.
- He is surprised that nobody present said anything about biodiversity indicators. To his opinion there is no reliable indicator so far to measure biodiversity – this is still a big challenge.
- The group should keep in mind how powerful good success stories are, as the example from PES in Costa Rica shows.

It was suggested from the floor that reference should be made to the World Charter for Nature – it gives an extremely clear formulation on how to value and how to look at it.

- There are inter- and intra-generation equity issues to be considered – and these can be considered!
- The term “trade offs” should be avoided, maybe instead talk about “trade ups” – try to sell the evidence as it were an overall gain for all (even if there is an “off” to someone).
- It should be kept in mind that values only have a guiding function. The policy process is the one that decides “the value” in the end. The presented value estimate can thus only function as a guideline – it will not be the final “value” decided by policy / society

Three comments looked into the future and raised specific questions on how to organise the next steps of the report.

- The first contribution demanded the need to flag the developing country positions, formulated at the end of the

Potsdam initiative. We should address these, e.g.

- ABS
- Benefit and technology transfer
- Capacity building
- There is a need for an IPCC for biodiversity. Hence we should try to link the review to the IMOSEB. Even though it is at the moment a little bit unorganised, it has potential.
- One suggested challenge for phase II is to look at the costs of biodiversity restoration and how these fit into the big picture. It would be beneficial to demonstrate that the loss of restoring is higher than conserving it in the first phase.

## Session 10:

### Lessons learnt from the workshop, closure & thanks

**Pavan Sukhdev** noted that at the time of the Stern Review, there were people questioning in the public arena whether climate change was happening. Unlike climate change, no-one questions that biodiversity loss is happening. From a biodiversity review perspective, this is an advantage. He also noted that ecosystems are already on the agenda of the financial world and others. That is also a benefit: we don't have to fully break the ice.

Pavan Sukhdev reminded the workshop that Lord Stern's Review focused not just on valuation but also on risk and on ethics. There was also a focus on policy. It is important that we create policy pathways and linkage between policies and biodiversity. Market based instruments have a role to play to help leverage action and to increase cost-effectiveness. Nevertheless markets do not address fairness. Furthermore it is important to focus on the end game – on what policy makers can play with.

Pavan also noted that he was in the process of constituting his advisory board, and noted that he aims to have a mix of advisors. Achim Steiner has confirmed that he has agreed to be on the advisory board. Similarly, it is expected that there be a good business representation.

Pavan noted that the call for evidence has been very helpful, and complemented this with a "call for help", asking various members of the audience to supply further information on particular points/experiences raised during the workshop that could be valuable for the 50page report to COP9 to integrate. This included requests on:

- Costa Rica (PES)
- Welfare and wellbeing and their relevance for conservation
- Business engagement and instruments to do so
- Insights on WTP & option values
- Examples from Africa
- The Earth Charter

He concluded that there is a need for a new economics, where the three different elements of capital (economic, social and environmental) are more equal than now. He also noted that there have been a range of efforts to create this new economics and indeed the new economics is

already there – as in the words of Arundhati Roy, in the God of Small Things<sup>18</sup>.

**Ladislav Miko** closed the workshop noting that biodiversity is one of the most complex issues we have, yet that a non complicated message to politicians is a necessity. He also noted that **inaction is no option**. He noted that valuation is one of the promising tools to help our cause. Some existing evidence already shows that **acting now is better than waiting** – and we need to show this more. We may also link biodiversity issue to other problems, and notably that of climate change, and together have a strong voice.

He also reminded the audience that politicians do not always chose the most cost effective solution; the decision also depends on who spends and who receives and the timescale as to when the costs arise and when the benefits. It is important, when considering the messages, and the information needs, that one thinks of the decision making processes and political powers.

Ladislav concluded that, despite different views and perspectives in the workshop, there is a good consensus on the general outcomes and that what is now needed is a streamlined message. The COP9 message needs to be linked to Potsdam ToR and to international level – it is important that it is not Europe-centric. We cannot yet deliver the big number of the value of biodiversity loss (that is for Phase II) – but with what we have, we can create something with appropriate value and impact at COP9.

#### Acknowledgements

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For the workshop programme and presentations, see

<sup>18</sup>Arundhati Roy, *The God of Small Things* (1997) Flamingo Pubs (UK)

<http://www.ecologic-events.de/eco-loss-biodiv/index.htm>

The call for evidence is officially closed but the following address is kept active for those still wishing to contribute. Please go to: CALL for EVIDENCE on the ECONOMICS OF BIODIVERSITY LOSS - [http://ec.europa.eu/environment/nature/call\\_evidence.htm](http://ec.europa.eu/environment/nature/call_evidence.htm)

**Annex – Participants**

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