

Biodiversity and Industry



Report of an electronic conference, October 2008



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Preface

Research on biodiversity is essential to help the European Union and EU Member States to implement the Convention on Biological Diversity as well as reach the target of halting the loss of biodiversity in Europe by 2010.

The need for co-ordination between researchers, the policy-makers that need research results and the organisations that fund research is reflected in the aims of the “European Platform for Biodiversity Research Strategy” (EPBRS), a forum of scientists and policy makers representing the EU countries, whose aims are to promote discussion of EU biodiversity research strategies and priorities, to exchange information on national biodiversity activities and to disseminate current best practices and information regarding the scientific understanding of biodiversity conservation.

This is a report of the E-Conference entitled “Biodiversity and Industry” preceding the EPBRS meeting to be held under the French EU presidency in Paris, France, from the 17th to the 21st of November 2008.

Introduction

Jacques Weber

The Millennium Ecosystem Assessment (MEA) observed in 2005 that: "Many businesses will experience an array of direct and indirect impacts immediately because ecosystem degradation is changing public policy, consumer preferences, supplier relationships, stockholder expectations, and competitor strategies (...)" The MEA also noticed that things are rapidly changing: "For companies in the investment portfolios of leading fund managers and other institutional investors, it is increasingly common to be assessed for company risk on a whole range of issues, including biodiversity management and other ecosystem services."

The Economics of Ecosystems and Biodiversity (TEEB) group, chaired by Pavan Sukhdev, produced a draft report on the cost of policy inaction, showing that Industry is to lose some 1300 billion Euros each year in 2050. Many institutions have understood that the time for action has come. The CBD Business and Biodiversity Initiative, and the TEEB report, are among a growing number of initiatives aiming at a more careful approach to the interactions between industrial activities and the living world, i.e. biodiversity.

Industry relies on biodiversity for a large part of its raw materials, and its technologies ("issued from life"), notably fermentations and medicines. Even fossil energy is a leg from biodiversity of the past.

This e-conference is important in order to prepare for two events to be held on November the 17th-21st:

1. The EPBRS meeting in Paris under the French Presidency of the EU
2. A symposium to be held on November the 18th: "Biodiversity and Industry: Scientists and Managers debate".

This e-conference lasts is organized into 3 sessions:

- Session I: Biodiversity and Industry: Impact evaluation and compensation mechanisms. Chaired by Sarah Hernandez, Economist, from the French Ministry of Environment (MEEDDAT)
- Session II: Biodiversity and Industry: What ecological engineering is needed? Chaired by Nathalie Frascaria, Ecologist, Professor at the University of Paris-Orsay

- Session III: Biodiversity and Industry: How to integrate biodiversity in company strategies; experiences and best practices. Chaired by Joel Houdet, Biodiversity advisor at Orée – Entreprises, Territoires et Environnement

The e-conference welcomes scientists and people from industry and NGOs. We hope to get a broad and deep exchange between different cultures and backgrounds on a question which is of importance for the whole of society.

Summary of contributions

Session I: Impact assessments and compensation mechanisms

Fiona Grant and Allan Watt

In his introduction to the EPBRS e-conference, Jacques Weber set out the main aims of the e-conference, namely to have a broad discussion between scientists and people from industry and NGOs on the need for a more careful approach to the interactions between industrial activities and the living world. This first week of the e-conference focussed on the session entitled 'Impact evaluation and compensation mechanisms'.

Sarah Hernandez introduced this session by encouraging discussion on the use of compensation mechanisms to offset transforming ecosystems into a more human-made environment. She also highlighted the need to remember that the complexity of biodiversity issues goes beyond ecological considerations. In response to this introduction, Cornelia Nauen outlined the need to consider resource externalities that affect biodiversity, ecosystems and habitats. She also called for a targeted effort to be made to make the content of occurrence records, collections and past publications systematically available in order to avoid the shifting baseline syndrome.

The development of methodological tools in order to aid our understanding of ecosystem services and functions was raised by Pauline Teillac-Deschamps and Denis Couvet. They argued that in order to gain a better understanding of these processes it was necessary to develop more robust compensation schemes. They also outlined the use of a Biodiversity Observation Network as a useful tool to help with the quantification of ecosystem functions. Another methodological tool was reviewed by Ece Ozdemiroglu who discussed the use of resource equivalency methods in enabling assessment of environmental impacts and remediation options.

There was much discussion on the topic of valuing ecosystem goods and services. Mac Callaway outlined the need to distinguish between different types of values and the appropriate related modalities of valuation. This point was emphasised further by Katharine Farrell, who highlighted the difficulties involved in generating empirically correct estimates due to the heterogeneity of ecosystems. Martin Sharman outlined the complexity involved when valuing biodiversity and ecosystem services that are not directly used in trade. In response, Mac Callaway argued that it is also difficult to

value ecosystem services used directly in trade, due to the difficulty of characterizing the physical transformations that these goods undergo before they affect the market.

Riccardo Simoncini called for commodities and non-commodities to be valued in both monetary terms and in some sort of unit of energy. He argued that this double pricing system of ecosystem goods and services might also help provide more evidence for the observed links between climate change and biodiversity loss. Joël Houdet agreed with Riccardo Simoncini that there is a need for more than just monetary indicators to assess the ecosystemic performance of organisations, goods and services, but argued that we shouldn't then adopt another arbitrary reductionist proxy to replace this with as biodiversity refers to the dynamics of interactions between organisms in changing environments, as Katharine Farrell had previously mentioned. Controversially Rasmus Ejrnaes argued for scientists to stop relying on the need to communicate the notion of ecosystem benefits and services to decision makers, but instead proposed that we remind politicians of the importance and value of the apparent uselessness of biodiversity.

Christian Béranger's contribution provided an insight into industry initiatives, in particular the quarry industry, to implement biodiversity studies in order to help minimise the impact of industry on biodiversity loss. He also outlined a multidisciplinary programme that has been instigated in order to help identify ecosystem services and their economic value. This programme will provide an estimate of the limitations of economic tools currently available, and the need for improvement or re-allocation of tools towards a new eco-taxation.

Jan Jansen discussed his experience of businesses and biodiversity working together in two different environmental planning areas: urban and Natura 2000. He referred to Sonae Sierra as an example of a business working together with biodiversity in an urban environment. He went on to describe his own experience of advising on a planning project set in Natura 2000 areas and the potential benefits that business involvement can have on restoring habitats and biodiversity.

Stanislav Shmelev discussed the role of social indicators. He summarized the role of multi-criteria decision aid tools in the evaluation of biodiversity to enable simultaneous consideration of a wide spectrum of different dimensions of sustainability.

Voluntary offsets were discussed by Stefan van der Esch. He argued for the need to incorporate current offset initiatives into a production chain perspective to account for environmental pressures that cross borders due to international trade and in order for global benefits of conservation efforts to be obtained. He went on to illustrate practical approaches to highlight the many factors which need to be taken into account when assessing offsets. Similarly Cornelia Nauen concentrated her contribution at the global level, highlighting the difficulties involved in implementing environmental impact assessments for global companies. She emphasized the problems incurred due to the financial power of these multinational companies.

The issue of compensation for biodiversity loss was also raised by Cornelia Nauen. She questioned whether or not it was possible for biodiversity loss to ever be compensated and mentioned the UNEP experience of trying to instigate a penal law for pollution misconduct, as so many effects of pollution are irreversible and not subject to compensation.

Session II: What ecological engineering is needed?

Nathalie Frascaria-Lacoste, Fiona Grant and Allan Watt

The second session of the e-conference focussed on ‘What ecological engineering is needed?’ This session was introduced by Nathalie Frascaria-Lacoste, who stated that ecological engineering is a new field with its roots in the science of ecology. It can be viewed as designing or restoring ecosystems according to ecological principles. She set out the main aims of this session, namely to encourage discussion around two key questions:

- What future is there for ecological engineering in the context of biodiversity and industry?
- How can we combine research and practices within societal constraints?

This session began with some discussion on the role of ecological engineering and environmental management. Patricia Genet highlighted the fact that ecological engineering is a young discipline that can play an important role in designing sustainable environmental management practices. Alain Bédécarrats’s contribution argued that future developments will need investments in fundamental and applied research, in education of skilled professionals, in knowledge transfers and in organization of professional networks. He argued that the task is huge and expensive. In addition, something that could be called “a value of nature” is emerging from implementation processes of these strategies. Indeed, because society’s environmental

awareness is increasing, taking care of nature becomes a competitive factor for firms. Moreover, taking part in the management of biodiversity at a territorial scale also requires contributing to the management of nature as a public good for the benefit of the territory. From an economic prospect, some kind of specific wealth is certainly created.

There was much discussion on integrating ecological engineering into firms and industries. Regis Maubrey argued that ecological engineering represents a shift in perspective (and thinking) regarding “engineering” itself, as well as regarding “landscapes” and management of territories. The main hypothesis here is that it may in fact be harder to bring about this shift within the public sector than in the private sector (referring still to “firms and industries”). Indeed, on this topic, thinking within a company can evolve faster than that of a community or town, because a company's culture generally will examine the economic advantage of different projects and activities, such as a greater dependence on ecological services.

However, as an answer, Manuel Blouin highlighted that it appears that not all activity sectors are equally amenable to ecological engineering. A major challenge in the development of ecological engineering in private enterprises is to define in which activity sector(s) a real potential exists. Technological aspects have to be taken into account: are science and techniques developed enough? Economic aspects would often be a useful argument, given the increasing price of non-renewable energy, but have to be precisely evaluated, with the integration of “externalities”. Social aspects are also important: are people ready to adopt a sustainable development attitude? In response to this, Joel Houdet questioned if it would be possible to use the diversity of living organisms and their interactions as an alternative to production models that rely on homogenous habitats. He continued to explore the possible implications of adopting this strategy.

Freddy Rey outlined a case study of the rehabilitation of eroded mountainous catchments in France. He argued that certain countries have significant financial means and are therefore able to implement optimal restoration actions. They are able to achieve true restoration, with the goal of recovering the original ecosystem that had been damaged. Other countries experience more restrictive situations and aim at financial and energy savings, seeking to minimize interventions: this is called minimal management. He argued that it is necessary for practitioners and ecological engineers to work together and share their expertise in order for rehabilitation to work. Similarly, Robbert Snep argued that the gap between theory and practice in ecological

engineering could be bridged as long as both parties are willing to be flexible and keep in mind each others' objectives.

Frédéric Gosselin discussed the idea that industries and the engineers working for them should be more considerate towards humanity and the living world. Furthermore, he mentioned that associated with the eco-responsibility of industries and engineers, there is a need for a firmer ethical grounding for ecological engineers, which could be included in their training.

In a very provocative contribution, Sebastien Barot considered whether greater biodiversity was always better. He questioned whether it always leads to higher sustainability, higher primary production or higher stability in ecosystems. He went on to highlight the potential profits to be gained from investigating the functional consequence of genetic diversity within populations and the use of this in ecological engineering to increase crop yield. In response to this contribution, Jari Lyytimaki provided an alternative perspective on the role of biodiversity as a producer of ecosystem disservices. He argued that ecological engineering should focus on biodiversity as both a provider of ecosystem services and disservices.

In conclusion, what clearly appeared in each contribution as a real challenge, is that in the future, ecologists, engineers, economists, social scientists, practitioners, and decision makers, all have to combine their efforts to communicate (i.e. use the same language) and to interact (i.e. link ecological research and applied research). This should allow the development of new technologies which will change our way of thinking and acting.

Session III: How to integrate biodiversity in company strategies; experiences and best practices

Joel Houdet, Fiona Grant and Allan Watt

The last week of the e-conference focussed on 'How to integrate biodiversity in company strategies; experiences and best practices.' This session was introduced by Joël Houdet who highlighted the international drive towards engaging business for biodiversity and ecosystem services as well as the wide variety of issues involved, ranging from impact mitigation to controversial emerging markets (agro-fuels). He raised the following questions:

- Through case studies and best practices, what can be learned for thorough integration of biodiversity into business strategies?

- What implications are there for decision-making, operations management and annual corporate social responsibility (CSR) reporting?
- What conceptual and practical tools should be developed, promoted and shared by all stakeholders?

Through the work undertaken to conserve biodiversity at the drinking water production site at Crépieux-Charmy (Grand Lyon), Mathieu Tolian underlined the importance of biodiversity for Veolia Environnement. The company depends on the living world to perform its business activities (using biological processes to treat polluted water or organic waste). In addition, these may have secondary impacts related to the residual pollution contained in discharge, so that the company needs to draw upon ecosystem functions and services as in the case of the Crépieux-Charmy catchment area. All of this leads to rethinking its strategies, reflecting on the evolution of their core business towards the integrated management of industrial facilities and the ecosystems of which they are a part. To this end, he stressed the need for expertise in terms of (a) ecosystem management and (b) ecosystem modelling.

With respect to that latter point, Eeva Primmer drew attention to the competencies and resources that organizations (in the extractive sector) rely on to integrate biodiversity conservation into their daily operations (farming, forestry, fisheries, mining). Comparisons within and across industries have been carried out in Finland, especially for the forestry industry.

In the case of Séché Environment, Daniel Baumgarten underscored the importance of biodiversity for the company's corporate culture and strategy. On the ground, much work has been done to integrate its waste storage plants within the surrounding landscape: an overall master landscape plan ensures that important areas for biodiversity are conserved and/or restored. To that end, ecological engineering goes in hand with close cooperation with NGOs and research organisations for long-term biodiversity monitoring programmes, with a special focus on birds.

Nicolas Bertrand provided some clues to what is needed to go beyond individual examples:

1. The business case for biodiversity needs to be further promoted. It is often difficult for the business community to relate to the way the biodiversity challenge is framed. There is a need to “speak a common language”.

2. We must get small companies (SMEs) on board, since they make up the majority of businesses worldwide. Most of the business and biodiversity ‘toolkit’ is currently geared at larger companies.
3. Expanding the business and biodiversity landscape. The business and biodiversity community would benefit from inviting actors from sectors, markets and regions which have been typically underrepresented to join the discussions. In this regard, a far greater role could be envisaged from business schools and professional services firms.

Martin Sharman argued that it is not just about the integration of biodiversity into businesses, but it is of paramount importance for businesses to ‘do good’ to the living world, where ‘good’ is a rather complex and knotty concept. Joël Houdet then asked whether or not voluntary measures by businesses would be sufficient to ensure the viability of biodiversity. He argued that the crunch of the debate has to do with the way we measure the ecosystemic performance of organisations, goods and services. Volker Mauerhofer highlighted the need to split the business case for biodiversity into two distinct situations: ‘win-win’ situations, when companies directly depend on biodiversity, and ‘problematic’ situations, when there is a conflict of interest between the short-term economic gain of a business and the long-term interests of sustaining biodiversity.

Drawing upon his experiences in Russia, Vladimir Vershinin stressed the need for effective economic and administrative mechanisms to “push” business into the necessary channels for effective initiatives in the field of biodiversity conservation. Further contributions by Marina Pereira Silva and Isabel Sousa Pinto (Portugal), Peter Petrik (Czech Republic), Anna Budriene and Eduardas Budrys (Lithuania), Simona Mihailescu (Romania) and Viktor Gasso (Ukraine) provided insight into specific countries stances on the business and biodiversity initiative.

Claire Tutenuit proposed that biodiversity valuation be the next step to help companies integrate the diversity of life into decision-making. It could help companies to assess their return on their investments for efforts bearing on biodiversity. Using a common (monetary) indicator might give clearer information and help in defining priorities. But this is not an easy task and although a lot of work has already been done, research in this area still has to be fostered.

Dominique Proy stated that Claire Tutenuit’s contribution is particularly relevant to Eurostat, which tries to measure biodiversity by defining some quantitative indicators.

With respect to engaging SMEs, Vineta Goba, argued for improved technical assistance for project identification and preparation, the setting up of specific biodiversity-oriented funding facilities, the verification of biodiversity benefits of investment projects, as well as increased sharing of information and capacity building at all levels.

Improved technical assistance is also a major issue for Edouard Forestié. He highlighted the need for practical and easy-to-use tools for integrating biodiversity into farm management. Farmers depend on biodiversity for agricultural production and carry out various practices to favour biodiversity on their farms (e.g. restore hedges, contract bee keepers) and are very concerned with the evolution of agro-systems on which they depend, shape and belong.

Rik Kutsch Lojenga stressed the need for industry-wide tools, with a focus on the personal care and cosmetics industry. Driven by consumer interest in novel, natural, organic and fair trade products and cautious because of public scrutiny of cases of possible misappropriation of traditional knowledge or genetic resources, companies are actively turning towards ethical sourcing practices. He argued that businesses, at all stages of the production chain, will need to have a management system in place to take into account CBD provisions in their R&D activities and/or biodiversity considerations in their purchasing decisions. To that end, work is currently being undertaken by the Union for Ethical BioTrade. Joel Houdet agreed that addressing biodiversity issues throughout the supply chain is a major, but vital, challenge. From a similar perspective, Yann Maubras and H el ene Leriche presented ongoing work carried out to take into account the impact of food consumption on biodiversity. Their contribution outlines the idea of using an informative labelling system for food products, that is, eco-labelling with a “biodiversity foot-print”.

Carsten Nesshover and the TEEB Scientific Coordination Team outlined the interim report of the Economics of Ecosystems and Biodiversity (TEEB) Initiative. The report raised the attention on the urgency of mainstreaming the economics of ecosystems and biodiversity to safeguard them and ensure their sustainable use. They also provided information regarding the end-user reports, targeting policy-makers, local administrators, businesses and consumers to be published in late 2009.

So to conclude, keynotes have demonstrated throughout this session how individual businesses throughout the world are making great efforts for biodiversity. The key challenge now is to put biodiversity on the agenda of every single business, big or

small. How can businesses go beyond marketing opportunities that arise from best practices with respect to biodiversity (because the resulting niche markets may not last)? Do we need industry-wide voluntary instruments or standards, new market mechanisms, new regulations or mandatory standards, “Biodiversity foot-print” labels on every product sold? Perhaps we need a mix of approaches.

In response to the global financial and economic crisis which is currently unfolding, we risk seeing a new “Bretton Woods” founded on (old) economic models that would further homogenise biodiversity, so that “economic” growth resumes. Though risk-free in the short-term for global finance, which can play with risk mitigation tools, the socio-ecological consequences will most likely be irreversible for future generations: i.e. the ones who will work, save money for their retirement and children, loan money to do business, and invest, all in close relationship with financial institutions.

We must make sure that this will not happen: this crisis is a major opportunity for the integration of the economy into biodiversity. During the EPBRS meeting in Paris in November let us put forward a clear message to business leaders and policy-makers.

Research priorities

Fiona Grant and Allan Watt

1. Research needed to improve impact evaluation

General:

- Make the content of occurrence records, collections and past publications systematically available
- Integrate in-situ and remote global observation systems
- Coordinate gathered data and the delivery of biodiversity change information
- Gather observations, models, assessments and forecasts
- Build robust and global indicators in order to gather all the information needed for assessment and creation of databases
- Integrate biodiversity values into different land use processes, such as agriculture and forestry
- Carry out impact assessments in a collective/network fashion, rather than site by site

International companies:

- Account for both environmental pressures exported across borders through international trade and for the global benefit of conservation efforts by using a production chain perspective

Aggregate extraction industry:

- Study the statutory framework in order for plans of the whole state to remain consistent, such as access to sites and protection of the surrounding land

2. Research needed to improve compensation mechanisms

General:

- Integrate ecosystem functions into compensation schemes
- Ascertain what level of compensation is appropriate for biodiversity evaluation schemes, taking into account that more compensation leads to weaker sustainability and less compensation leads to greater sustainability

Resource Equivalency Methods:

- Improve knowledge of baseline conditions (pre-damage) and how uncertainty about baselines can be incorporated into equivalency analysis
- Improve protocols on estimating recovery rates of a degraded resource
- Investigate the advantages and disadvantages of using different metrics in equivalency analysis
- Improve scientific understanding of damage and remediation and the use of economic value as a metric

3. Research needed to improve valuation of ecosystem services

- Distinguish between different types of value and appropriate related modalities of valuation of ecosystem services
- Analyse the 'process fund' and incorporate this into the general discussion of ecosystem services valuations
- Investigate methods to assess ecosystemic performance of organisations, goods and services without the exclusive use of monetary indicators, such as energy accounting
- Develop pluridisciplinary and interdisciplinary approaches to understand biological mechanisms underlying ecosystem services in order to accurately value these services
- Develop methods to value rare and endangered species and their environmental condition using 'wild values' to represent their scarcity value

4. Research needed to improve the use of ecological engineering:

General:

- Research functional consequences of genetic diversity within populations
- Increase knowledge of the functional importance of genetic diversity within and between functional groups
- Develop an integrative approach, using ecological engineering, to articulate companies' environmental strategies with ecosystem services and functioning at spatial and temporal scales
- Develop a common language to allow ecologists, engineers and economists to work together
- Identify how biodiversity can be a provider of both ecosystem services and disservices
- Research what ecological engineering can offer business sites to help them contribute to their neighbouring biodiversity and landscape value
- Integrate the concepts of adaptation and maladaptation into ecological engineering
- Set standards for methods and operational techniques, and their performance

Integration of ecological engineering into companies:

- Link ecological research and applied research
- Integrate ecological engineering into industry as a logistical tool to help companies reduce their impact on the environment
- Integrate ecological engineering into industry as an assessment tool, to evaluate the impact of human activity on the environment
- Integrate ecological engineering into consultation agencies

- Identify in which activity sectors there is a real potential for ecological engineering to be used
- Develop ways to make the integration of ecological engineering profitable for businesses
- Examine the hypothesis that private companies will support local biodiversity and ecological engineering more easily than public companies, with more multi-disciplinary research involving both laboratories working on natural systems as well as sociologists, economists and management experts working on private sector issues
- Include the identification of inventories in National Reviews such as those required for quality approaches, especially for environmental quality and performance certification

Rehabilitation of eroded mountainous catchments:

- Increase knowledge of the interactions between vegetation, erosion and sediment dynamics

5. Research needed to integrate biodiversity into businesses

General:

- Develop ecosystem models in order to aid companies to better understand ecosystem complexity and to anticipate the changes ecosystems will undergo as a result of their actions
- Research how to use biodiversity sustainably to make money, while not inadvertently running down other elements of biodiversity through an unintended side-effect
- Develop co-viability models of business and biodiversity, such as a bio-economic model which provides a dynamic and viable approach to ecosystem management
- Develop accounting and fiscal instruments suited to the viability constraints of businesses for promoting the viability of biodiversity
- Develop methods for valuing all biodiversity, not just protected species, in order for global ecosystems to exist efficiently
- Introduce control and funding mechanisms to regulate markets for (ecosystem) provisioning services in order to minimize the risk of squandering, excessive exploitation and over-investment
- Integrate the outcomes of long term monitoring into companies' management frameworks

Finance:

- Evaluate the costs and opportunity costs of conservation policies versus the

costs of 'business as usual' within an existing policy network that cause ongoing losses of ecosystems and biodiversity

Food:

- Create new indicators and/or adapt existing indicators which measure the impacts of food consumption and food chain activities on evolution and management of biodiversity
- Identify the ways in which citizens make their decisions regarding food choice
- Identify citizens' perception of biodiversity and efficient educational methods to communicate with them on issues related to biodiversity
- Create an informative labelling of proposed consumer goods giving the measure of their 'biodiversity foot-print' and its declination onto labels

SMEs:

- Integrate biodiversity conservation into SME strategies

Agriculture:

- Develop an easy to use indicator for farmers to estimate their impacts on biodiversity

Factors that need to be considered in order to carry out the research for these research priorities:

General:

- Strong communication between ecologists, engineers, economists, social scientists, practitioners and decision makers
- The ability to switch from theoretical concepts to real-life situations
- Increased public awareness of biodiversity and its implications
- Expand the business and biodiversity landscape by inviting actors from sectors, markets and regions which have been typically underrepresented to join in discussions
- Anticipation and long-term commitment as a key to maintaining a positive and sustainable impact on the natural environment
- Enterprises working closer within the more limited space of local, regional and national communities
- Impact assessments across national borders
- A national or European network to work on solutions for complex socio-economic, ecological, political and juridical problems, which will facilitate cooperation at a local scale delivering cost-effective 'made to measure' solutions to specific local variants of complex ecological problems
- Compensation schemes which span across national borders
- Address biodiversity issues throughout the supply chain of companies

Ecological engineering:

- Firmer ethical ground for ecological engineers, which could be included in

their training

- Pragmatic approaches and common sense for addressing knowledge in an engineering context
- Scientists and engineers working together
- Establish a task force made up of ecological engineers which is able to implement appropriate actions and operational solutions in support of biodiversity conservation
- Engage new operators to develop ecological engineering and multidisciplinary professionals to structure the profession

Annex - List of contributions

Session I: Impact assessment and compensation mechanisms

Title of contribution	Author(s)
Introduction to Session I: Impact assessments and compensation mechanisms	Sarah Hernandez
RE: Introduction to Session I	Cornelia Nauen
Ecosystem functions and compensation schemes	Pauline Teillac-Deschamps and Denis Couvet
RE: Ecosystem functions and compensation schemes	Mac Callaway
RE: Ecosystem functions and compensation schemes	Martin Sharman
RE: Ecosystem functions and compensation schemes	Katharine Farrell
RE: Ecosystem functions and compensation schemes	Riccardo Simoncini
RE: Ecosystem functions and compensation schemes	Rasmus Ejrnaes
RE: Ecosystem functions and compensation schemes	Joel Houdet
RE: Ecosystem functions and compensation schemes	Mac Callaway
Resources equivalency methods	Ece Ozdemiroglu
Impact assessments: case study, CEMEX	Christian Béranger
Voluntary offsets	Stefan van der Esch
Social economic dimensions in multi-criteria evaluation of biodiversity	Stanislav Shmelev
Business and biodiversity both in urban and Natura 2000 areas within a complex political, juridical, social and economic context	Jan Jansen
Impact evaluation and compensation mechanisms – some conclusions from the Biostrat National Report for Germany	Marcus Zisenis and Carsten Neßhöver
Biodiversity restoration in Russia: impact evaluation, compensation mechanisms and the business initiative	Vladimir Vershinin

Session II: What ecological engineering is needed?

Title of contribution	Author(s)
Introduction to Session II: What ecological engineering is needed?	Nathalie Frascaria-Lacoste
The emergence of ecological engineering	
RE: Introduction to Session II: What ecological	Dave Stanley

Title of contribution	Author(s)
engineering is needed?	
Ecological restoration and environmental management	Alain Bédécarrats
Ecological engineering and sustainable management of the environment	Patricia Genet
Integrating ecological engineering into the strategies of private enterprises	Manuel Blouin
RE: Integrating ecological engineering into the strategies of private enterprises	Joël Houdet
Ecological engineering, a multidisciplinary approach taking into account both socioeconomic and ecological interest: the case of rehabilitation of severely eroded mountainous catchments	Freddy Rey
The place of ecological engineering within firms and industries	Regis Maubray
Ecological engineering within industries, and industries within ecological engineering: ethics, design, impact and remediation	Frédéric Gosselin
Is greater biodiversity always better?	Sébastien Barot
RE: Is greater biodiversity always better?	Jari Lyytimäki
Biodiversity conservation at business sites: connecting theory with practice	Robbert Snep
Is ecological engineering ecological?	Ferdinando Boero
Ecological engineering – learning from the past	Felicita Scapini
Ecological engineering: a task force in favour of biodiversity	Patrice Valantin

Session III: How to integrate biodiversity in company strategies; experiences and best practices

Title of contribution	Author(s)
Introduction to Session III: How to integrate biodiversity in company strategies; experiences and best practices	Joël Houdet
Case study: Veolia Environment	Mathieu Tolian
The business and biodiversity initiative	Nicolas Bertrand
RE: The business and biodiversity initiative	Martin Sharman
RE: The business and biodiversity initiative The business and biodiversity initiative in Russia	Vladimir Vershinin

Title of contribution	Author(s)
RE: The business and biodiversity initiative	Joel Houdet
RE: The business and biodiversity initiative Business and biodiversity in the Czech Republic	Peter Petrik
RE: The business and biodiversity initiative Biodiversity and companies: regulations and experience in Lithuania	Anna Budriene and Eduardas Budrys
RE: The business and biodiversity initiative Biodiversity and companies – Portugal	Marina Pereira Silva and Isabel Sousa Pinto
RE: The business and biodiversity initiative	Volker Mauerhofer
RE: The business and biodiversity initiative	Joel Houdet
RE: The business and biodiversity initiative Industry development and Romania’s biodiversity and nature protection sector	Simona Mihailescu
RE: The business and biodiversity initiative Business and biodiversity in the Ukraine: feeble attempts to engage	Viktor Gasso
Biodiversity valuation: the next step to help companies integrate biodiversity into decision-making processes	Claire Tutenuit
RE: Biodiversity valuation: the next step to help companies integrate biodiversity into decision-making processes	Dominique Proy
Biodiversity integration in farming systems	Eduoard Forestié
An ecologist’s message at the heart of our corporate strategy	Daniel Baumgarten
Engaging business in biodiversity conservation	Rik Kutsch Lojenga
RE: Engaging business and biodiversity conservation	Joel Houdet
RE: Engaging business and biodiversity conservation	Rik Kutsch Lojenga
Organizational competencies as a measure of adaptation	Eeva Primmer
Management of biodiversity and food consumption	Yann Maubras and Helene Leriche
TEEB – The economics of ecosystems and biodiversity	Carsten Neßhöver and TEEB Scientific Coordination Team
RE: TEEB – The economics of ecosystems and biodiversity	Dave Stanley
Integrating biodiversity into SMEs	Vineta Goba
RE: Integrating biodiversity into SMEs	Martin Sharman