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Session 2: Biodiversity and Development

Gifts of marine biodiversity by Gilles Boeuf, University Pierre & Marie Curie / CNRS, Laboratoire Arago, Banyuls-sur-mer, and Muséum national d'Histoire naturelle, Paris, France

Oceans and seas today make up the largest volume offered to life, covering almost 71 % of the Earth surface. Roughly 275 000 species have been described as coming from marine environments, yet this only represents some 13 % of all currently known species, specific diversity. However marine biomass can be enormous: marine bacteria represent more than 10 % of all organic carbon on the planet. Life appeared in the ancestral ocean 3 800 million years ago and various key evolutionary events have occurred there: the emergence of the nuclear membrane and cell nucleus; "*pluricellularity*"; capture of bacteria and their further transformation into organelles; and sexuality. Among the 35 animal *phyla* existing today on Earth, 14 appeared in sea, have never left the ocean and live exclusively in marine environments.

From such a biodiversity, humans exploit 160 million metric tons (Mt, data 2006) a year for food: 93 Mt fisheries and 67 Mt aquaculture. However humans also take advantage of marine biodiversity for other reasons: ancestral characters and organisational and behavioural patterns make marine organisms an excellent reservoir for identifying and extracting pharmaceuticals (> 15 000 today: anti-cancers, antibiotics, antivirals, anti-fungi, immunostimulators, immunosuppressives, growth factors, bone regenerators, *etc...*), molecular tools (polymerases, fluorescent proteins, *etc...*) and cosmetic molecules as well as offering pertinent "models" for basic and applied research. A few marine species used as "models" set the base for major advances in life sciences as recognized by several Nobel Laureates: discovery of phagocytosis; anaphylactic shock; nervous influx transmission; memory molecular mechanisms, cdc/cyclins and cancer mechanisms; eye organisation; neurotransmitter membrane receptors; origin of the specific immune system, *etc...* Marine models are very useful to understand the origin and functioning of important life mechanisms, including in humans and to develop new applications for efficient disease treatments. Relationships between the ocean and public health are physical, chemical, biological and physiological. The oceans supply mankind with renewable living resources, threatened today. Marine organisms, ecosystems and biodiversity deserve more study and protection, and much better management is required for sustainable exploitation of marine resources.

The TEEB Report: Findings and Implications by Dr Salman Hussain, Scottish Agricultural College, Edinburgh, TEEB D2 European coordinator

The Economics of Ecosystems and Biodiversity [TEEB] is a major international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward. Building upon the frameworks developed in the Millennium Ecosystem Assessment, it aims to stimulate policy change by providing (i) a state-of-the-art assessment of economic methodologies that measure impacts and (ii) case studies applications of best practice that demonstrate the potential for win-win outcomes, wherein conservation and meeting wider development goals need not be in conflict. TEEB is intended as a source of inspiration for change.

This presentation sets out (i) the structure and framework of the TEEB reports, (ii) some preliminary outcomes and (iii) a case-study application of the Ecosystem Approach which was carried out for the UK Marine and Coastal Access Bill, providing an evidence base for establishment of a network of marine protected areas.

Biodiversity, the World Food Crisis and True Food Security by Emile Frison, Director, Bioersivity International

This paper will consider the impact of biodiversity, specifically agricultural biodiversity, on aspects of development. It is clear from a wide range of studies that improvements in agriculture offer higher returns on investment than almost anything else, especially in the least developed countries. These studies have tended to focus on the improvement of crop varieties and livestock breeds based on the use of existing biodiversity in a programme of scientific breeding. This approach will clearly continue to be needed; however, there are other ways in which agricultural biodiversity can forestall future food crises and improve food security. Dietary diversity is an essential component of better nutrition and could play a much more widespread role in alleviating the hidden hunger that currently afflicts more than 2 billion people worldwide, mostly women and young children. Addressing malnutrition with agricultural biodiversity will deliver considerable other benefits too. Adapting to climate change will also require a much more nuanced use of agricultural biodiversity, combining informatics and genebank accessions to deliver diversity pre-adapted to predicted climates. It will also target scarce resources to the highest priority areas for the conservation of crop wild relatives, also essential for the future of the global food supply.

Session 3: Conservation Biogeography: Integrating Biogeography and Conservation Science in a Changing World

Conservation biogeography: assessment and prospect by Robert J. Whittaker, Biodiversity Research Group, Oxford University Centre for the Environment, South Parks Road, Oxford, OX1 3QY, UK and Centre for Macroecology and Evolution, Department of Biology, University of Copenhagen, Copenhagen, Denmark

Conservation biogeography is the application of biogeographical principles, theories, and analyses to problems concerning the conservation of biodiversity. Being concerned largely with describing and predicting pattern and process over large extents of space (and time), it is a field of direct relevance to strategic conservation decisions, such as how protected area networks are designed in a rapidly-changing world. As society has many different ways of valuing biodiversity, conservation biogeographers need to provide numerous alternative ways of prioritising areas, communities or species for conservation rather than a single map of threatened nature. This effort depends on an adequate knowledge of the natural units we wish to assess (e.g. species, communities, ecoregions, or areas of endemism), and understanding of the factors controlling their distributions. This research

agenda presents substantive challenges, yet, as other presentations will detail, biogeographical analyses demonstrate both persistent structure in the natural world, and conversely, the inherent dynamism and impermanence of ecological assemblages, and can provide key insights into how biodiversity may respond to processes such as global climate change, biotic mixing, and habitat fragmentation. I will briefly outline some key “knowns and unknowns” in respect of one important global change driver: habitat loss at the regional–landscape scale.

Rewilding by C. Josh Donlan, Advanced Conservation Strategies, USA

Biodiversity loss continues at an alarming rate. Human economics, politics, demographics, and pollution pervade every ecosystem; even the largest parks require management to prevent extinction. Over the past decades, biodiversity conservation has conveyed a gloom and doom message to the public, with an overarching goal of merely slowing the rate of extinction and ecosystem degradation. New, positive paradigms have surfaced as a result, including payment for ecosystem services, which strives to connect biological diversity with human welfare. The rewilding movement, which emerged over a decade ago, has increasingly captivated the public and conservation practitioners. Contrary to welfare, rewilding appeals to human emotions—it is biological in design but inspirational in nature. While its definition is dynamic and elusive, rewilding focuses on ecosystem function, evolutionary potential, and proactive restoration action. Ecological history is also playing an increasingly important role. Complementary to other conservation strategies, rewilding fits into many initiatives under the auspices of the United Nations, the Convention of Biological Diversity, and the Global Environment Facility. Rewilding provides a flexible platform for biodiversity conservation that is science-based but grounded in proactive action that counters the prevailing gloom and doom message of nature conservation. Recent results from rewilding programs around the globe suggest a vista with widespread policy implications.

Conservation biogeography: the view from the sea, Dr Sara A. Lourie, Research Associate, Redpath Museum, McGill University, Canada

The marine realm differs from the terrestrial in a number of ways that impact both biogeography and conservation planning. In particular, the high density of water, ubiquitous currents, and phytoplankton-based primary productivity result in a highly dynamic and three-dimensional system. Connectivity between regions is high, and boundaries of biogeographic zones are fluid over a range of spatial and temporal scales. The challenges associated with the study of the oceans are formidable, and consequently our biogeographical understanding is much less than that on land. However, marine conservation needs are urgent as ecosystems worldwide are collapsing. Conservation planning approaches at a global scale are reviewed, including hotspots, representation, ecosystem-based projects, and seascapes. To date less than one percent of the entire ocean surface is protected, and less than one tenth of that is fully no-take. An understanding of marine biogeography can provide data for conservation priority-setting, further our understanding of ecological and evolutionary processes, strengthen the conservation voice in political discourse, and inspire the public to become engaged in marine issues. The nature of the sea and the political structures that govern it demand creative cooperative solutions, and a sea-change in the way that people think about, and interact with the oceans.

Global assessments of plant species richness and endemism: Implications for conservation in a changing world by Wilhelm Barthlott,

Gerold Kier, Holger Kreft, Wolfgang Küper, Jens Mutke, Daud Rafiqpoor, Jan Henning Sommer; Nees Institute of Biodiversity of Plants, Germany

For the conservation, management, and use of biodiversity, it is essential to understand its distribution on Earth. Plants are in this context of special relevance as primary producers and dominating elements in terrestrial ecosystems. In addition, our knowledge about plant biodiversity is comparatively good, documented by thousands of floras on a global scale. This is in contrast to the situation for many invertebrate animals and microbes. We illustrate our knowledge on global plant diversity by several maps of species richness and endemism (rarity) of all major groups of land plants (www.nees.uni-bonn.de/biomaps). The special role of islands as centres of rare elements of biological diversity becomes obvious. Using Africa as a model, we demonstrate the implications of the uneven distribution of biodiversity for conservation planning – taking into account possible consequences of global climate change.

Citizen Science and Conservation Biogeography by Vincent Devictor, CNRS, France

Global land-use and climate changes have lead scientists and policy-makers to address conservation issues at large temporal and spatial scales. In this respect, datasets collected by the general public, so-called citizen science programmes, offer highly valuable tools in many aspects. Citizen science can provide scientists with considerable amounts of data collected over large spatial and/or temporal extents. These datasets can thus be used to investigate several causes and consequences of global change impacts on biodiversity (changes in species' ranges, impacts of landscape degradation, protected-area efficiency, trends in various indicators...). These programmes are also particularly valuable in developing the preventative and educational component of conservation biogeography. In fact, citizen-science is a good opportunity to go beyond the measurement of biodiversity loss to look at the values and visions that people hold for their own landscape. The development of citizen science programmes should be encouraged as they can both be highly valuable for conservation biogeography and promote the reconnection between people and nature and a more meaningful partnership between scientists, policy-makers and the general public.

Session 4 : The biodiversity knowledge base: Taxonomy today and tomorrow for environmental sustainability and human well-being

New ways to accelerate the discovery and application of taxonomic knowledge:

A new generation of taxonomic tools by Dr André Lévesque, Agriculture and Agri-Food Canada

The sequencing of DNA, the blueprint of life, created a revolution in taxonomy. It provided the ability to analyse the specific codes of the genes that are the direct result of selection and speciation events. Molecular biology tools are now routinely used by scientists to study taxonomy and biodiversity and by many other users who need rapid, routine and accurate identification of organisms. If a comprehensive DNA sequence database exists for a group of organisms, there are many tools that can be utilised for rapid diagnostics, detection or identification. These tools range in cost, technological sophistication, and in their ability to deal with single species or a broad range of biodiversity (e.g. soil samples). Robotics, microfluidics, microfabrication, nanotechnology, bioinformatics and computer science all contribute to the development of new tools. These technologies are developing rapidly but the basic principle is the same: the assays characterise sequence similarity. No matter how sophisticated the analysis technology is, DNA sequence similarity remains at the core of these new tools and identification through molecular tools is only as good as the taxonomy, DNA sequence databases and the biological collections from which the data and assays were developed.

Taxonomy for human well-being and ecosystem services by Paul Smith, Millennium Seed Bank, Royal Botanic Gardens Kew, United Kingdom

Biodiversity is an essential component of ecosystems, interacting with abiotic factors to deliver services to people and ensuring continued human well-being. Plant diversity is increasingly under threat and this, in turn, has a negative impact on human well being, affecting food and water availability, our health and our financial security. Against a background of diminishing diversity, food insecurity, increasing population and climate change, humanity will need to adapt if it is to survive. The huge diversity of plants on this planet provides us with opportunities to do this by managing what we have more efficiently, restoring habitats and, where necessary, developing new food crops, drugs and other products. This paper gives examples of how taxonomy, by providing a stable framework for information exchange on plant diversity, enables humanity to tackle the environmental challenges it faces.

Perspectives on the value of taxonomy for biodiversity conservation and climate change responses by Gideon F. Smith, Office of the Chief Director: Biosystematics and Biodiversity Collections, South African National Biodiversity Institute; Acocks Chair, H.G.W.J. Schweickerdt Herbarium, Department of Botany, University of Pretoria; Centre for Functional Ecology, Departamento de Botânica, Universidade de Coimbra, Portugal

In several respects the first decade of the 21st Century has been a proverbial Golden Age for systematics. However, no longer does 'Golden Age' simply refer to organism collectors gaining increasingly easy physical access to previously inaccessible localities where loads of species new to science will be discovered. Explicit in this statement is the much wider and stronger understanding of, and appreciation for, the value and services that can be derived from collections of preserved biological material and their associated data. This of course implies that herbaria and natural history museums must be appropriately staffed and the collections actively researched and curated. The renewed understanding of the value of collections that manifested over the past few years coincided with the establishment of a variety of country-level thrusts, including for example the development of National Biodiversity Strategies and Action Plans (NBSAPs) and the implementation of the Global Strategy for Plant Conservation (GSPC). Further to these organized activities, the acceptance of human-accelerated climate change and the early detection and eradication of alien invasive organisms, have also significantly enhanced the scientific and public understanding of the importance of systematics. These and other aspects of current collections-based and -driven activities are explored and discussed.

The Taxonomic Black Box: Relevance of the Small and Unknown to Ecosystem Functioning and Services by Simon Tillier, Muséum national d'histoire naturelle, France

Ecosystem services depend on ecosystem functioning for their quality and quantity. It is now recognized that ecosystem ecology will only progress as a science if it takes into account biodiversity, i.e. the identity, number, properties and dynamics of the species which occur in the ecosystem (Loreau, 2010). The recently discovered numerical importance of small, unnoticed, and unstudied species is of direct consequence upon our understanding of ecosystem functioning, as shown by our results on molluscs in coral reef ecosystems. The reason why this very large part of biodiversity is not yet recognized as relevant for ecosystem services is probably that it is not visibly provisioning services or cultural benefits of biodiversity. However, small to tiny organisms are most probably of fundamental importance for regulating and supporting services which cannot be measured directly, and as such are of critical importance for human well-being. Classical methods of taxonomy are unable to fulfil the need for more and better knowledge of this biodiversity, which calls urgently for the development and

implementation of new methods and techniques which will allow us to grasp it before massive and unseen extinction leads to drastic losses in biodiversity benefits.

Class Communications! Innovations in Communicating Taxonomy by Harriet Nimmo, CEO, Wildscreen

How can we effectively communicate the importance of taxonomy? What lessons can be learned from successful communications in this field? In this presentation we will explore examples from TV, the Internet, the classroom and museums. In an age when 40% of British school children cannot tell a bee from a wasp, we will examine the key to engaging and inspiring the next generation of taxonomists.

Taxonomy and bioinformatics for all ages: Engaging and Educating the Next Generation of Taxonomists as a Foundation for Sustainable Habitation of Planet Earth - Challenges and Opportunities by R. R. Thaman, Professor of Pacific Islands Biogeography, School of Islands and Oceans, The University of the South Pacific, Suva, Fiji Islands.

Taxonomy and bioinformatics are among our most ancient areas of expertise. For millennia, they have formed the basis for human understanding of biodiversity as a foundation for sustainable habitation of Planet Earth. They are, however, just like biodiversity itself, highly threatened, creating a parallel “ethnobiodiversity” extinction crisis. Solving this crisis, part of which has been referred to as the “taxonomic impediment”, is, however, not just about training taxonomists to catalogue unidentified biodiversity and provide information to conservationists. It is also about training armies of parataxonomists; making sure children know the names of plants and animals and the ways ecosystems function. It is about supporting indigenous taxonomists and traditional biodiversity users to record, preserve, disseminate, and use their own taxonomies and “stories” as vital links between “our” and “their” taxonomies and bioinformatics as bases for the conservation and sustainable use of biodiversity. To do so, we must use innovative and culturally inclusive approaches to protect, teach and enrich taxonomy and bioinformatics for people of all ages; for all ages, past and present; and for all places, both natural and cultural. Some examples are provided. Only, thus, can we simultaneously address the current biodiversity and ethnobiodiversity extinction crises and the taxonomic impediment.

Session 5: Priority-setting in biodiversity conservation: Strengthening site-scale approaches

Important areas for freshwater biodiversity by Dr William Darwall, UCN – The International Union for Conservation of Nature

While freshwater habitats cover less than 1% of the world’s surface, they provide a home for 7% (126,000 species) of the estimated 1.8 million described species, including a quarter of the estimated 60,000 vertebrates. Despite their clear values to people through provision of many services, freshwater systems and the species they support are often ranked as being the most threatened of all systems worldwide. A globally standardised approach is therefore required to identify those sites and river or lake basins of most importance for the conservation of global freshwater biodiversity. This presentation outlines the progress made by IUCN and partners toward development of such an approach for identification of what have now been termed freshwater Key Biodiversity Areas (KBAs). This requires: a) evaluation of the localities, habitats, threats, and conservation responses for freshwater species to identify where: i) site-level and ii) river or lake basin-level actions are necessary to safeguard the species; b) aggregation of these data to identify where multiple species require site-

level actions in the same places; and then c) KBA boundary rationalisation and management recommendations through regional stakeholder review with respect to other pre-existing conservation areas. The process is illustrated with examples from Africa.

Site-scale targets as investment priorities: the example of the Caucasus by Dr. Karen Manvelyan, WWF-Armenia

The Caucasus is among the planet's 34 most diverse and endangered hotspots, identified by CI and one of WWF's Global 200 Ecoregions, identified as globally outstanding for biodiversity.

More than 150 experts from 6 Caucasian countries identified key biodiversity areas (KBA) and corridors for the Caucasus Hotspot (Ecosystem Profile, 2004). As a result, 205 KBAs were identified in the Caucasus and 10 conservation corridors.

The identified KBA and corridors serve as the basis for setting site-scale targets and investment priorities in Armenia. The following site-scale targets and investment priorities were set up: Awareness raising among key stakeholders, development of alternative livelihood for communities, enforcement of existing Protected Areas, enforcement of biodiversity protection in the corridors, establishment of new Protected Areas in the KBAs.

Implementation of site scale conservation, communication and alternative livelihood projects in partnership with the state agencies, communities, NGOs, mass-media resulted in enforcement of biodiversity protection in the southern corridor, strengthening of existing protected areas (PAs), establishing of 2 new PAs in the KBA in southern Armenia (Arevik National Park –34,401.8 ha and Zangezour Sanctuary - 17,368 ha covering 1,7% of Armenia's territory).

Important Plant Areas East Europe by Elizabeth A Radford¹,

Natalija Angelova², Ljupcho Melvoski², Vlado Matevski², Toni Nikolić³, Baudewijn Odé⁴, DMITAR PEEV⁵, Antoaneta Petrova⁶, Danka Petrović⁷; 1Plantlife International, 2Macedonian Ecological Society, 3The Faculty of Science of the University of Zagreb, 4Stichting FLORON, 5Institute of Botany, Bulgaria Academy of Sciences, 6Sofia Botanic Garden, Bulgarian Academy of Sciences, 7Green Forest Society.

291 Important Plant Areas (IPAs) were identified in Bulgaria (125), Croatia (97), Macedonia FYR (42) and Montenegro (27), using the standard IPA methodology based on the presence of threatened species, threatened habitat and species richness. The quantity, quality and availability of data varied across the four countries, necessitating a flexible approach to identifying sites. Significant new site based data were recorded within the publicly accessible IPA web database. These data include distribution and location on species and habitats present on each IPA, as well as protection status, threats and land use. The full national IPA inventories provide valuable information for targeting and encouraging conservation actions at local, national and regional level.

IPAs in south east Europe contain diverse mosaics of habitats, with forest and grassland habitats being the most frequent and dominant. Across all IPAs 152 habitats officially recognised as threatened in Europe are found and 378 regionally threatened plant and fungus species, from official lists. IPAs also contain a wealth of other plant diversity, unique to the Balkan region. Some of these endemic Balkan plant taxa are threatened at European level, but not currently recognised by existing European legislation.

South East European IPAs are largely intact compared to those in western Europe, however they are subject to a number of threats that are growing in intensity, including tourism and infrastructure development (affecting 51% of IPAs), poor forestry practices (43%), land abandonment (34%) and climate change. The latter remains difficult to quantify. 59% of these IPAs remain unprotected at

national level, though many (up to 90% in some countries) should qualify for protection through EU legislation if this legislation is fully implemented by those countries when they accede to the EU.

The policy framework already exists to safeguard the diversity of IPAs in South East Europe, through nature conservation legislation and sectoral policy. However these policies are not being implemented and enforced on the ground. IPAs in South East Europe have been used to engage and inspire local communities to act positively for conservation. Short term, plant focussed, very low budget pilot projects, have succeeded in reaching out to many audiences. These are small but tangible steps forward in engaging both botanical partners and civil society in conservation action on the ground, led by the value people place on plants and plant resources.

Putting species on the map: The Key Biodiversity Areas concept, criteria and coverage by Matt Foster, Conservation International

Key Biodiversity Areas (KBAs) are sites of global significance for biodiversity conservation, identified locally using globally standard criteria and thresholds, based on the occurrence of species requiring safeguard at the site scale. The KBA concept builds on over 20 years of practical experience by the BirdLife International partnership in identifying Important Bird Areas (IBAs), which form the avian subset of KBAs. The criteria have been defined so that they can be applied easily and consistently throughout all biogeographic regions and taxonomic groups. They are designed to be applied bottom-up through an iterative process at a national or regional level, and also involve local stakeholders in order to maximize their utility and the probability of their implementation. In this presentation, I will introduce the KBA concept and its role as a tool for biodiversity conservation practitioners, explain the two main criteria for KBA identification, and explore the coverage of KBAs around the world. Finally, I will introduce a few ideas of how KBA data can and are being utilized, including their use as a basis for predicting the ecosystem service values of biodiversity conservation, potential connections with international policy instruments, and linkages with the business community.

The Integrated Biodiversity Assessment Tool: Site-scale information for better development decisions by Mônica Barcellos Harris, Head of Programme – Business, Biodiversity and Ecosystem Services, UNEP-WCMC

Whether screening projects for investment, planning new operations or assessing the risks associated with sourcing practices, there is an essential need for companies, development banks and governments to be able to access accurate and reliable information on biodiversity and critical natural habitats at the finest scale possible – to answer the seemingly simple question “Where on earth is biodiversity?”. The Integrated Biodiversity Assessment Tool (IBAT), developed by the IBAT Alliance in partnership with leading institutions from the public and private sector, is a direct response to this challenge. This tool helps decision-makers to access critical information to inform risk assessment processes, national or regional development strategies and the practical implementation of environmental safeguard policies and industry best practice standards. A family of web-enabled decision support systems integrate and interpret the most critical biodiversity information available to key decision-makers ensuring its use at the earliest stages of project planning when alternatives and changes are most economically viable. The IBAT Alliance is currently formed of four globally-respected international conservation organisations - BirdLife International, Conservation International (CI), International Union for Conservation of Nature (IUCN) and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC).

Systematic conservation planning for prioritisation among sites by Robert J Smith¹, Enrico Di Minin¹, Cornelio P Ntumi² and Stephen D Holness³; ¹ Durrell Institute of Conservation and

Ecology (DICE), University of Kent, Canterbury, UK , 2 Departamento de Ciências Biológicas, Universidade Eduardo Mondlane, Maputo, Mozambique, 3 Park Planning and Development, Conservation Services, South African National Parks, RSA

Prioritising between conservation sites is difficult because valuing biodiversity is inherently subjective. Moreover, this problem is compounded in biodiversity-rich areas by a lack of accurate species distribution data. Therefore, the best way to ensure that prioritisation schemes are implemented is to build their legitimacy and this can be encouraged by; (i) ensuring that local conservation agencies lead the process; (ii) involving relevant stakeholders, and; (iii) using scientifically valid approaches that account for relevant factors. One widely used prioritisation approach is systematic conservation planning and here we illustrate its benefits with case studies from Mozambique, South Africa and Swaziland. We show how systematic conservation planning systems can be used to inform a range of conservation initiatives, such as efforts to expand the current range of black rhinoceros and plans to alter protected area boundaries to minimise impacts on biodiversity and human livelihoods. We also describe a recent site prioritisation project for the Maputaland-Pondoland-Albany hotspot, which identified a number of key areas for conservation. Finally, we argue that national agencies, NGOs and academics should work together on such projects. However, we show that most academic research fails to support such efforts and so suggest approaches for overcoming this problem.

Session 6: Mainstreaming biodiversity into decision-making: Towards a biodiversity science policy

Biodiversity science moving closer to decision making: experiences from international science programmes by Anne Larigauderie, Executive Director, DIVERSITAS and Harold A. Mooney, Department of Biology, Stanford University, Stanford, California, 94306, USA

Biodiversity science has changed drastically over the past 10 years, and become a more integrated part of the biodiversity science-policy interface, which is made of four interconnected spheres: research, observations, assessment and policy.

The talk will illustrate with concrete examples the evolution of biodiversity science within DIVERSITAS, the international programme of biodiversity science under ICSU, UNESCO, SCOPE and IUBS, toward an interdisciplinary agenda of reducing biodiversity loss and manage biodiversity for enhanced or resilient ecosystem services.

It will show how scientists within this programme have been increasingly called upon to contribute to the three other spheres of the science-policy interface for biodiversity.

Examples will include the development of the GEO BON initiative, the Group on Earth Observations-Biodiversity Observation Network (observations); of the consultation on an IPBES, the Intergovernmental science-policy platform on Biodiversity and Ecosystem Services (assessment); and work performed for a policy process, the Convention on Biological Diversity (Global Biodiversity Outlook-3, and 2020 biodiversity targets).

Valuing Biodiversity from an Economic Perspective by Anastasios Xepapadeas, Professor of Economics, Athens University of Economics and Business, Department of International and European Economic Studies, Athens, Greece

The loss of biodiversity, which is primarily attributed to human activities over the past few hundred years, has a significant negative impact on a number of ecosystems characteristics, such as

productivity or resilience and the associated ecosystems services, such as supporting, provisioning, regulating and cultural services, which are of great importance for human well-being.

To understand the implications and the significance of biodiversity loss, first a link needs to be created between changes in biodiversity and the resulting changes in ecosystems services, and second the changes in ecosystem services should be valued. Connecting the changes in the value of ecosystems services with changes in biodiversity can provide a value-measure of biodiversity loss. This measure will be important in decision-making and the design of efficient policies to protect biodiversity.

The purpose of this note is to present a framework for valuation of biodiversity changes from an economic perspective. In particular, methods for valuing ecosystem services which are relevant for biodiversity valuation will be presented, along with some key issues which present important areas of current research for biodiversity valuation, such as the impact of thresholds and tipping points, uncertainty, or temporal and spatial scales.

Parallel Session: Communication, Education and Public Awareness for Biodiversity

Forest Editions Experience by Nimal De Silva and Jessy Berger, Forest Editions

Objectif : transmettre aux enfants et au jeune public une information scientifique accessible sur la biodiversité, leur permettre d'acquérir des connaissances simples et fiables sur les espèces végétales et animales menacées et de faire le lien avec les enjeux environnementaux actuels.

Vecteur : le vidéo-livre, un concept innovant qui allie le support papier traditionnel pour lire une histoire illustrée et un contenu multimédia accessible simultanément sur ordinateur via un stylet qui l'active à partir de vignettes placées sur le livre en papier.

Les apports du vidéo-livre sont multiples :

Le thème de la biodiversité est universel et les vidéo-livres s'adressent aux jeunes publics de tous les pays. Le texte écrit et le contenu audio sont réalisés en versions bilingues associant toujours l'anglais et la langue du pays. Des pré-maquettes sont déjà disponibles en japonais, arabe, danois, norvégien et néerlandais.

Des documentaires vidéo réalisés avec les images de la BBC Motion Gallery et les textes de Professeurs spécialisés en Sciences de l'Environnement du MNHN, du Collège de France et du CNRS, développent et enrichissent le contenu de l'histoire illustrée.

Les vidéo-livres sont actuellement diffusés en France et une négociation est en cours avec plusieurs éditeurs européens pour une diffusion dans d'autres pays. Vous trouverez toutes les informations complémentaires dans le dossier papier remis lors de cette conférence.

Un vidéo-livre en cours de réalisation, intitulé « Red book II, how to make it green » traite également de la biodiversité mais s'adresse au grand public quel que soit l'âge : il emmène le lecteur en balade à travers l'histoire de l'évolution de la planète et présente en détail 200 espèces végétales et animales dont une partie est en danger critique.

Dérivée du livre « Red book II, how to make it green », une exposition multimédia itinérante sera présentée dans les pays de l'Europe. Elle est intitulée « La planète aux dix millions de couleurs – Incroyable biodiversité ». Des éléments-clés sous forme de visuels et de vidéos donnent un aperçu de l'évolution de la biodiversité sur trois milliards d'années.

Forest Editions collabore avec Forest Pictures pour créer et produire des films d'animation Jeunesse destinés aux chaînes de télévision. Deux séries sont en préparation : « Une minute pour l'environnement » en 100 épisodes d'une minute, et « L'avant-dernier spectacle », une méditation sur la nature en 100 épisodes courts.