



SUMMARY OF THE INTERNATIONAL CONFERENCE "BIODIVERSITY: SCIENCE AND GOVERNANCE": 24-28 JANUARY 2005

The International Conference "Biodiversity: Science and Governance" (Paris Conference) met from 24-28 January 2005 at the headquarters of the United Nations Educational, Scientific and Cultural Organization (UNESCO), in Paris, France.

The Conference, organized by the French Government and sponsored by UNESCO, was attended by over 1000 participants representing governments, inter-governmental organizations and non-governmental organizations, as well as academia and the private sector.

The Conference, held independently from any intergovernmental negotiations, was part of the ongoing global effort to reverse the current rate of biodiversity loss by 2010, and ensure the long-term conservation and sustainable use of biodiversity, as well as the fair and equitable sharing of the benefits arising from genetic resources. The Conference was convened to assess the current knowledge in, and needs for, research and scientific expertise in biodiversity, as well as examine public and private approaches to biodiversity conservation and management, and the interactions between science and governance.

The Conference produced two documents: the Paris Declaration on Biodiversity, an appeal by scientists on biodiversity; and a Conference Statement, which recalls governments' commitments to the 2010 target and supports the launch of an international multi-stakeholder consultative process to assess scientific information and policy options for decision making.

A BRIEF INSTITUTIONAL HISTORY OF BIODIVERSITY, SCIENCE AND GOVERNANCE

Biodiversity is the variety of all life on Earth, encompassing genetic, species and ecosystem diversity. Today's biodiversity is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. To date, about two million species have been identified. While many scientists think that there are about 13 million species on Earth, other estimates

range from 3 to 100 million. Biodiversity supplies a large number of goods and services that sustain human life, including: the provision of food, fuel and building materials; purification of air and water; stabilization and moderation of the Earth's climate; moderation of floods, droughts, temperature extremes and wind forces; generation and renewal of soil fertility; maintenance of genetic resources as inputs to crop varieties and livestock breeds, medicines, and other products; and cultural, recreational and aesthetic benefits.

Over the past few hundred years, biodiversity has faced major challenges, including a growing demand for biological resources caused by population growth and increased consumption. This increased exploitation of biological resources has resulted in the loss of species at levels currently estimated to be 100 times faster than the natural rate of loss prior to significant human intervention. Recognition of this problem is hardly new, and scientists and policy makers have worked to develop mechanisms to document, conserve and sustainably use biodiversity. The following is a brief account of the international institutional history of efforts to protect biodiversity, which provides the context for the Paris Conference's focus on biodiversity, science and governance.

UNCHE AND UNEP: The United Nations Conference on the Human Environment (UNCHE, 5-16 June 1972, Stockholm, Sweden) led to the adoption of a number of regional and international agreements, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). UNCHE also resolved to establish the UN Environment Programme (UNEP), which was codified by UN General Assembly

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resolution 2997 (XXVII) of 1972. UNEP administers a number of international instruments related to biodiversity, including the Convention on Biological Diversity (CBD), CITES, the Convention on Migratory Species, and the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.

BRUNDTLAND REPORT: In 1987, the World Commission on Environment and Development (also named the Brundtland Commission, after its Chair, Norwegian Prime Minister Gro Harlem Brundtland) concluded that economic development must become less ecologically destructive. In its landmark report, "Our Common Future," the Commission noted that "humanity has the ability to make development sustainable -- to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." It also called for "a new era of environmentally sound economic development."

EARTH SUMMIT: At the 1992 UN Conference on Environment and Development (UNCED), also known as the "Earth Summit" (3-14 June 1992, Rio de Janeiro, Brazil), world leaders adopted three key international instruments: the CBD; the UN Framework Convention on Climate Change; the UN Convention to Combat Desertification; and the Forest Principles, a non-binding authoritative statement on the management, conservation and sustainable development of forests. The Rio Declaration, adopted at UNCED, sets out 27 principles on environment and sustainable development, including the precautionary approach, the polluter-pays principle, and Agenda 21.

THE CBD AND THE BIOSAFETY PROTOCOL: The CBD came into force in 1994 and currently has 188 Parties. The Convention sets out three main objectives: the conservation of biological diversity; the sustainable use of its components; and the fair and equitable sharing of the benefits arising from the use of genetic resources. The CBD's Conference of the Parties (COP) has developed a series of work programmes to address ecosystem biodiversity (e.g. forests, inland waters, drylands, agriculture, marine and coastal areas), and work programmes and activities on cross-cutting themes, including invasive alien species, incentive measures, access to genetic resources and benefit sharing, traditional knowledge, technology transfer, education and public awareness, and protected areas.

The Cartagena Protocol on Biosafety, adopted by Parties to the CBD on 29 January 2000, entered into force on 11 September 2003. There are currently 111 Parties to the Protocol. The Protocol addresses the safe transfer, handling and use of living modified organisms that may have an adverse effect on biodiversity, taking into account human health, with a specific focus on transboundary movements.

MILLENNIUM SUMMIT: The UN Millennium Summit (6-8 September 2000, New York, US) adopted the Millennium Development Goals (MDGs) -- eight goals comprising 18 targets

and 48 indicators regarding, *inter alia*, the eradication of extreme poverty and hunger, universal primary education, gender equality, the reduction of child mortality, environmental sustainability and combating disease. The MDGs are universally accepted as a framework for measuring progress in development. In 2002, the UN launched the Millennium Project to devise a plan of implementation for enabling developing countries to meet the MDGs by 2015, and to assess progress towards their achievement by 2005.

2010 BIODIVERSITY TARGET: In decision VI/26, the sixth meeting of the CBD COP (COP-6, 7-19 April 2002, The Hague, The Netherlands) adopted the Strategic Plan for the CBD. In its mission statement, Parties committed themselves to a more effective and coherent implementation of the three objectives of the Convention and to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national levels as a contribution to poverty alleviation and to the benefit of all life on Earth. COP-6 also adopted a Ministerial Declaration, which recognizes the need for timetables and to review mechanisms and targets, including a 2010 target to adopt measures to halt biodiversity loss.

WSSD: The World Summit on Sustainable Development (WSSD, 26 August - 4 September 2002, Johannesburg, South Africa) adopted the Johannesburg Plan of Implementation and the Johannesburg Declaration. Key commitments relevant to biodiversity include: achieving a significant reduction in the current rate of biodiversity loss by 2010; negotiating, within the CBD framework, an international regime for the fair and equitable sharing of benefits arising from the utilization of genetic resources; and establishing by 2004 a regular process for global reporting on, and assessment of, the state of the marine environment. The Plan also calls for building greater capacity in science and technology for sustainable development.

CBD COP-7: With decision VII/30, the seventh meeting of the CBD COP (COP-7, 9-20 February 2004, Kuala Lumpur, Malaysia) adopted a framework to: facilitate and communicate an assessment of progress towards the 2010 target; promote coherence among the Convention's programmes of work; and provide a flexible framework, within which national and regional targets may be set and indicators identified. COP-7 specified indicators for assessing progress towards the 2010 target at the global level, goals and sub-targets for seven focal areas, as well as a general approach for integrating these into the CBD's work programmes.

G-8 SUMMIT: At the Group of Eight (G-8) Summit in 2003 (2 June 2003, Evian, France) governments agreed to take action to enhance sustainable development, with a focus on the implementation of the MDGs and the Johannesburg Plan of Implementation. During the Summit, French President Jacques Chirac noted France's commitment to contributing to these instruments, and announced that France would host a meeting on



issues related to biodiversity. This declaration served as the impetus for convening the Paris Conference.

REPORT OF THE PARIS CONFERENCE

OPENING

François d'Aubert, French Minister Delegate for Research, opened the Paris Conference on Monday, 24 January, welcoming a broad range of participants.

Noting the outcomes of the World Conference on Disaster Reduction, held in Kobe, Japan, prior to the Conference, Koichiro Matsuura, Director-General of the UNESCO, highlighted the potential of healthy ecosystems for disaster reduction, and called for improved Earth observation systems. Supporting an ongoing dialogue between scientists and decision makers, he called for: additional research; involvement of the private sector and civil society, including local and indigenous communities; capacity building; and conflict prevention.

Klaus Töpfer, Executive Director of UNEP, said preserving healthy ecosystems is crucial for achieving the MDGs. He stressed the interlinkages between climate change, desertification and biodiversity loss, and called for investments in capacity building and in coherent, coordinated and policy-relevant science.

Hamdallah Zedan, Executive Secretary of the CBD, highlighted the challenges faced by the international community to achieve the 2010 target to significantly reduce the current rate of biodiversity loss, and called for stronger international cooperation and effective communication regarding biodiversity loss and its effects.

Mohammed Valli Moosa, President of IUCN -- the World Conservation Union, highlighted direct links between biodiversity loss and human activities. He suggested developing a framework to put biodiversity at the center stage of human activities on the basis of four key elements: human resources from all around the world; science; regulations and laws at all geographic levels; and market forces.

Bertrand Collomb, Chairman of the World Business Council for Sustainable Development, said the business sector has recognized the importance of sustainability and nature conservation and that biodiversity-related projects can improve a company's public image. He stressed the need for partnerships, political will and consistency of actions, and said governments should set appropriate frameworks for action.

Noting that good politics should be based on good science, Stavros Dimas, European Commissioner for the Environment, said the European Union (EU) will continue to work on integrating environmental concerns into its policies and support funding for environment programmes. He stressed the need to accelerate action to achieve the 2010 target, prioritize activities and mobilize support, as well as to build scientific capacity and better communicate scientific issues regarding biodiversity.

Nicolas Hulot, President of the Nicolas Hulot Foundation, said the primary aim of the Conference should be to ensure coherence among policies and actions rather than raise awareness. He noted that there is no conflict between various interests involved in biodiversity, and stressed the need for cooperation and new forms of solidarity.

Matsuura, on behalf of UN Secretary-General Kofi Annan, stressed that biodiversity is essential to life, and called upon countries which have not already done so, to ratify the CBD. He said biodiversity conservation is not only the responsibility of governments, but also of non-governmental organizations, the private sector and all the Earth's inhabitants.

Edward Wilson, Harvard University, said there is overwhelming scientific evidence of human activities' impact on biodiversity, much of which is still unknown to science. He called for fact-based and ethical decision making, and stressed that poverty inhibits conservation.

Wangari Maathai, Assistant Minister for Environment and Natural Resources of Kenya and 2004 Nobel Peace Prize Laureate, reviewed lessons learned from two mountain ecosystems in Kenya with regard to biodiversity loss and the consequences for local communities, and said political will is the key to taking effective actions to conserve biodiversity.

Noting the importance of balancing economic development and conservation of natural resources, Abdullah Badawi, Prime Minister of Malaysia, highlighted aspects crucial to biodiversity conservation, including: capacity building; discussions on biodiversity governance; negotiation of an access and benefit-sharing regime under the CBD; intellectual property rights; and implementation of the Cartagena Protocol on Biosafety.

Marc Ravalomanana, President of the Republic of Madagascar, highlighted the importance of the Conference's topics to his country, noting its biodiversity wealth. Arguing that sustainable development, the protection of nature and good governance are interlinked, President Ravalomanana stressed the need to reconcile the needs of rapid economic growth with those of preserving outstanding biological wealth.

Jacques Chirac, President of the French Republic, stressed that the fate of humanity is bound to that of other species, and proposed creating an intergovernmental panel to assess trends in biodiversity and developing a worldwide network of experts. President Chirac noted that France has incorporated an Environment Charter into its Constitution, highlighted France's biodiversity-related policies and proposed hosting in Paris a high-level seminar on intellectual property rights as they relate to biodiversity. President Chirac stressed the need for urgent measures to achieve the 2010 target.

During the week, Plenary convened on Monday, Tuesday and Wednesday morning to address:

- the challenges of biodiversity, science and governance;
- status and trends of the world's biodiversity;



- social and ecological benefits of biodiversity; and
- biodiversity and the management of living resources.

On Wednesday afternoon and Thursday, workshops were held on:

- biodiversity governance;
- agriculture and biodiversity -- policies, institutions and practices;
- environmental education and communication for biodiversity;
- strategies and infrastructures for documenting biodiversity;
- challenges to achieving the 2010 target -- funding research for biodiversity and conservation;
- integrative approaches to biodiversity;
- biodiversity and urban areas;
- biodiversity and health;
- microbial diversity and society;
- challenges for fisheries management;
- biodiversity -- the new frontier of innovation;
- biodiversity indicators and the 2010 target -- scientific challenges;
- sustaining biological and cultural diversity -- local knowledge, practices and worldviews;
- appropriation regimes and management systems for biodiversity; and
- sustainable management of tropical and subtropical biodiversity -- islands and forests.

The following report summarizes the Plenary and workshop discussions, organized by topic.

Editor's note: in depth coverage of the workshops was limited to those selected by the Conference organizers, and where relevant, a link to the expanded coverage is provided. Summary of the other workshops is based on reports delivered to the final plenary session.

PLENARY

CHALLENGES OF BIODIVERSITY, SCIENCE AND GOVERNANCE: On Monday, Peter Raven, Missouri Botanical Garden, introduced the session on challenges of biodiversity, science and governance, which included four presentations and a roundtable.

Presentations: Jacques Blondel, French National Centre for Scientific Research (CNRS), spoke on the creation and maintenance of biodiversity on Earth. He stressed that preserving biodiversity today will guarantee its evolutionary potential, and that biodiversity loss is irreversible. Noting that the Earth is currently experiencing a period of mass extinction of species, he said the challenge lies in determining how this affects ecosystems, and in predicting how ecosystem functioning and services will be impacted by future extinctions. Noting that some irreversible thresholds have already been crossed, he expressed hope that these predictions will positively influence decision making.

Michel Loreau, Chair of the Scientific Committee of the Conference, outlined challenges related to science and governance. He said scientific challenges include assessing: how much biodiversity there is on Earth; how and why biodiversity is changing; the ecological consequences of changes in biodiversity; and how humankind can best manage and protect biodiversity. Regarding challenges for governance, he highlighted: recognizing biodiversity as a global environmental issue; educating and informing citizens; developing coordinated research; using available knowledge to take immediate action; integrating biodiversity conservation and sustainable use into social and economic development; and establishing an intergovernmental mechanism to coordinate scientific knowledge.

Claude Martin, Director-General of the World Wide Fund for Nature International (WWF), spoke about the globalization of the economy and current biodiversity changes. He quoted a WWF report based on the Living Planet Index and humanity's ecological footprint over the past 40 years to demonstrate that globalization has tremendous impacts on biodiversity. He said in order to address this challenge, governments need to establish long-term goals integrating environmental concerns into the development process. Addressing genetically modified organisms (GMOs), he said while they might increase food production, they often pose risks to biodiversity, especially if no international standards are established.

Cristián Samper, Smithsonian Institution, discussed bridging the gap between science, policy and the public. He recognized the challenge of using scientific knowledge on biodiversity's response to change as a means to recover species from the brink of extinction and prevent further degradation of ecosystems. He advocated increased attention to: coherence between global and national policies; effective monitoring and indicators; implementation and compliance; and access and benefit sharing. Regarding a proposed intergovernmental expert panel on biodiversity, Samper suggested other ways to integrate scientific input into the decision-making process, including: building bridges within the scientific community; seeking interlinkages with other topics; building national and regional capacity; investing in basic and policy-relevant science; and strengthening existing mechanisms, such as the Millennium Ecosystem Assessment (MA).

Roundtable: Robert Watson, World Bank, chaired the roundtable. He invited panelists to consider: the greatest challenge to the sustainable use of biodiversity; how to reconcile biodiversity conservation with rapid economic growth; and reasons for discrepancies between civil society's concern for nature and its destruction. Jean-François Dehecq, President of Sanofi-Aventis, outlined steps and issues in discovering and exploiting natural compounds for developing drugs, noting that therapeutic progress may be undermined by uncertainty regarding international rules on patenting of biodiversity. Wangari Maathai, Assistant Minister



for Environment and Natural Resources of Kenya and 2004 Nobel Peace Prize Laureate, said the greatest challenge is to convince decision makers and society that biodiversity is a priority, and recalled that the consequences of current destruction will be experienced by future generations. Russell Mittermeier, President of Conservation International, said megadiverse countries and biodiversity hotspots should be priorities for action to achieve the 2010 target, and stressed the role of protected areas in conserving biodiversity. Harison Randriarimanana, Minister of Agriculture, Livestock and Fisheries of Madagascar, stated that it is possible to reconcile biodiversity conservation with rapid economic growth and poverty alleviation in countries like Madagascar. However, Minister Randriarimanana said this will not happen unless the poor, decision makers and scientists are brought together to take action. Edward Wilson, Harvard University, stressed the role of education in bridging the gap between science, policy and the public, and said the lack of an ethical code and moral standards for human activities is one of the reasons why human actions tend to compromise nature.

A report of these presentations and roundtable is available online at <http://www.iisd.ca/sd/icb/sdvol100num1e.html>.

STATUS AND TRENDS OF THE WORLD'S

BIODIVERSITY: Mary Arroyo, University of Chile, chaired the session on status and trends of the world's biodiversity, which convened on Tuesday morning. The session heard three speakers and held a roundtable.

Presentations: Georgina Mace, Zoological Society of London, gave an overview of the current state of biodiversity and extinction of species, on the basis of the MA, the IUCN Global Species Assessment, and WWF Eco-regions. Noting that species diversity ranges from 5 to 30 million with only 2 million identified, she stressed that the estimated extinction rate of various species ranges from 1 to 12 species per million species per year, and that 12 to 52% of species within higher taxa are threatened with extinction. Mace further highlighted: significant gaps in knowledge, especially on certain key taxa such as invertebrates, plants and fungi; the need to assess biodiversity trends on the basis of comparable measures over time; a paucity of studies at the genetic level; more fragmented knowledge of marine and freshwater habitats than of terrestrial ones; and poor understanding of the impacts of biodiversity changes on ecosystem services.

Michael Donoghue, Yale University, presented challenges in documenting and classifying biodiversity. He described the role of human population growth in habitat destruction and biota homogenization, and drew attention to the lack of knowledge on the number of marine species, particularly marine bacterial organisms. He also noted the importance of extracting data from the world's 2.6 billion specimens found in museums. Regarding species identification, Donoghue highlighted a lack of human resources and the need for capacity building and laboratory infrastructure,

especially in developing countries. He called for increased funding and political commitment.

Expressing satisfaction with recent successes in biodiversity conservation, Achim Steiner, Director-General of IUCN, presented policy options for biodiversity conservation. He stressed the need to unify approaches and strategies in accordance with the ecosystem approach. Steiner said nature should not only be subject to economic cost-benefit analyses, and cautioned that the problem lies less in the development of basic evidence than in convincing society to change its behavior. Rather than a centralized information facility, he advocated improving the interface and connectivity among different existing information sources, especially in developing countries. Highlighting the power of the market place, Steiner said businesses can be a solution rather than a problem.

Roundtable: José Sarukhán, Mexican National Institute of Ecology, moderator of the roundtable, invited panelists to share their views on the role of researchers and amateur naturalists, and an international center of biodiversity expertise.

Peter Bridgewater, Secretary-General of the Ramsar Convention on Wetlands, stressed the need for: emphasis on the role of biodiversity in providing ecosystem services; improved synergies for scientific advice; adaptive management; and a precautionary approach.

Thomas Lovejoy, President of the Heinz Center, noted the need to identify ways to show linkages between biodiversity and other issues, including nature's response to climate change.

Catherine Day, European Commission (EC) Environment Director-General, highlighted the need for policy-relevant indicators, and said challenges include integrating biodiversity into other policies and convincing policy makers that biodiversity conservation measures are an investment for the future.

Bertrand Tramier, Executive Director of the Total Corporate Foundation, stressed the need to better understand links between business and biodiversity conservation, and highlighted Total's activities regarding biodiversity, including the creation of a foundation for biodiversity and the sea.

Mace, supported by Lovejoy, said protected areas are not the only answer to biodiversity loss, and humans need to learn how to live with nature in a sustainable way. She encouraged scientists to collaborate on large-scale projects in order to achieve the 2010 target.

In the ensuing discussion, participants noted the need for: open dialogues between business, governments, international organizations and scientists with regard to the use of certified timber; increased government support to local communities to use biodiversity sustainably; benefit sharing; partnerships between North and South for scientific research and training; and interdisciplinary approaches.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num2e.html>.



SOCIAL AND ECOLOGICAL BENEFITS OF

BIODIVERSITY: This plenary session, chaired by Jacques Weber, Director of the French Institute for Biodiversity (IFB), convened on Tuesday afternoon. The session considered four presentations and held a roundtable.

Presentations: David Tilman, University of Minnesota, spoke on biodiversity and ecosystem services. He presented scientific research results over the past decade demonstrating that biodiversity loss leads to a decrease in: plant productivity; efficiency of plant resource utilization; ecosystem stability and predictability; and carbon sequestration. He also presented research showing that biodiversity loss can lead to increased risks of invasion by alien species. He said ecosystem services include productivity, water quality, ecosystem stability and protection from invasive alien species.

Addressing the relationship between biodiversity and human health, Andrew Dobson, Princeton University, stated that many pathogens only threaten people when their natural environment has been disturbed. He described interactions among pathogens, people's immune systems, drug resistance, population density, livestock density, biodiversity and climate. He stressed that biodiversity is an important disease buffer, particularly against vector-transmitted diseases such as malaria, since such vectors tend to target humans when surrounding biodiversity is low. He concluded that describing food webs and ecosystems in mathematical terms constitutes the major scientific challenge for the 21st century.

Charles Perrings, University of York, presented on the economics and value of biodiversity and ecosystem services. He said the anthropocentric value of biodiversity and ecosystems is derived from the value of the goods and services they provide, which includes direct-use values, indirect-use values, and non-use or passive values. He observed that biodiversity supports ecosystem functioning and processes, which, in turn, support the production of marketed goods and services. Perrings said economics should be incorporated into conservation plans, and suggested identifying areas where ecosystem services are becoming scarce in order to target conservation efforts in those areas.

Christian Körner, University of Basel, spoke on climate change and biodiversity, focusing on the effects of carbon dioxide (CO₂) variations. He presented the findings of research on cold climates and mountain ecosystems, explaining indirect CO₂ effects on biodiversity through climate change. Regarding direct CO₂ effects on biodiversity, he described responses in specific taxa of flora and fauna. He said global warming leads to, *inter alia*: net changes in species frequency; the climate becoming dryer in certain parts of the globe; loss of taxa through drought; and forest loss due to increased fires.

Roundtable: Harold Mooney, Stanford University, moderated the roundtable. He said a new approach is needed to assess the potential benefits of ecosystems, and suggested using failures in biodiversity conservation to prod scientists rather than the public into action. Madeleine Tchunte, Minister for Scientific Research and Education of Cameroon, highlighted conservation initiatives and partnerships in the Congo Basin. Regarding globalization and biodiversity, Perrings said international markets have failed to deal with biodiversity loss, and suggested including scientific advice on potentially adverse environmental impacts of trade liberalization in the work of the World Trade Organization. Laurent Piermont, President of the French Société Forestière de la Caisse des Dépôts, elaborated on experiences regarding biodiversity funding through market mechanisms, and highlighted the importance of low-cost ecological engineering and rationalizing conservation objectives. Pierre Jacquet, Executive Director of the French Development Agency Group, said changes to social and political behaviors are key to biodiversity conservation, and suggested conducting more biodiversity-related economic and social analyses. Pierre Valette, EC Research Directorate-General, stressed the need for research that would help to establish thresholds for sustainability.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num2e.html>.

BIODIVERSITY AND THE MANAGEMENT OF LIVING RESOURCES: The plenary session on biodiversity and the management of living resources, chaired by Peter Schei, Chairman of BirdLife International, convened on Wednesday. The session heard four presentations and held a roundtable.

Presentations: Jeremy Jackson, Smithsonian Tropical Research Institute, spoke on marine biodiversity and sustainable fisheries. He said major factors contributing to marine degradation include: loss of large marine species; destruction of continental shelves; the spread of invasive alien species; ocean warming; contamination of the marine food web; and eutrophication. He concluded that one of the greatest challenges for sustainable fisheries is to make the shift from marine degradation to recovery worthwhile for people.

Emile Frison, Director of the International Plant Genetic Resources Institute, presented on the role of agriculture in achieving the MDGs, explaining how using biodiversity can help to alleviate poverty and hunger. He said increased productivity and a diverse diet require a better use of biodiversity. He recommended: focusing on neglected and under-used traditional crops; improving cultivation; diversifying products; and investing in agriculture.

David Kaimowitz, Director-General of the Centre for International Forestry Research (CIFOR), called for an emphasis on threatened livelihoods rather than only on threatened biodiversity, and presented examples of the importance of medicinal plants and bush meat to local people.

Madhav Gadgil, Indian Institute of Science, spoke on local peoples' ecological knowledge and conservation practices. He advocated for a register of biodiversity conservation practices to help design conservation and management plans, and underscored the importance of communication between scientists and local communities.

Roundtable: Roundtable Chair Mohan Munasinghe, Munasinghe Institute for Development of Sri Lanka, said the recent tsunami in Southeast Asia revealed that inefficient environmental management can decrease ecosystem resilience and make people vulnerable to natural catastrophes.

Giuseppe Ambrosio, Italian Ministry of Agricultural Policy and Forestry, cautioned against using GMOs in agriculture. Natarajan Ishwaran, UNESCO, said the decision by the Australian government to increase no-catch zones in the Great Barrier Reef exemplifies a clear interaction among science, governance and policy makers.

Jean-Luc Roux, Greenpeace International, stressed the importance of involving all stakeholders, particularly local and indigenous communities, in tackling illegal logging and fishing. Rosalía Arteaga Serrano, Secretary-General of the Amazon Cooperation Treaty Organization, noted that developed countries are largely responsible for the decline of the Amazon's biodiversity, as a result of their agricultural subsidies and purchase of illegally harvested timber and animals. Youth representatives expressed concern over the state of the world's biodiversity and urged government action.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num3e.html>.

WORKSHOPS

GOVERNANCE: The workshop on biodiversity governance met on Wednesday afternoon and Thursday at the National Museum of Natural History, and held four sessions on: efficiency of conservation and sustainable use measures; multi-level governance of biodiversity; global partnership for biological resources use; and expertise, information and policy decision making.

At the opening session of the workshop, Bertrand-Pierre Galey, Director-General of the French National Museum of Natural History (MNHN), highlighted the role of museums in education and information sharing. Hamdallah Zedan, Executive Secretary of the CBD, stressed the need for: coordination between biodiversity-related instruments; communication among national focal points of various international agreements; and involvement of local communities in national policy-making processes.

Efficiency of conservation and sustainable use measures: David Brackett, Environment Canada, chaired the session on efficiency of conservation and sustainable use measures. The session heard a keynote presentation on measuring the efficiency of biodiversity-related measures, by Joshua Bishop, IUCN, and held a

panel discussion with the participation of: Aldo Consentino, Italian Ministry of the Environment; Léon Rajaobelina, Executive Director of the Center for Biodiversity Conservation of Madagascar; Stefan Leiner, EC Environment Directorate-General; Bráulio Dias, Brazilian Ministry of the Environment; Jean-Marc Michel, French Ministry of the Environment; and Tom Dedeurwaerdere, Catholic University of Louvain.

Multi-level governance of biodiversity: The session on multi-level governance of biodiversity was chaired by Laurence Tubiana, Director of the Institute for Sustainable Development and International Relations (IDDRI). Participants heard presentations on the role of traditional knowledge for biodiversity conservation, by Anil Gupta, Indian Society for Research and Initiatives for Sustainable Technologies and Institutions, and on the social construction of biodiversity, by Chimère Diaw, CIFOR. The session also held a panel discussion with the following participants: María Espinosa, IUCN; Charles McNeil, UN Development Programme (UNDP); Grazia Borrini-Feyerabend, Switzerland; Bernard Roussel, MNHN; Joseluis Samaniego, UN Economic Commission for Latin America and the Caribbean; and Renaud Dutreil, French Minister for Civil Service and Administrative Reform.

Global partnership for biological resources use: The session on a global partnership for biological resources use was chaired by Carlos Rodríguez Echandi, Minister of Environment and Energy of Costa Rica. The session heard a keynote presentation on compensation of local people for biodiversity use, by Georges Massiot, Pierre Fabre. The session also held a panel discussion, with the participation of: Martha Chouchena-Rojas, IUCN; Nathalie Kosciusko-Morizet, French Parliament; Alberto Glender, Mexican Embassy in India; Brendan Tobin, UN University; Everton Vargas, Brazilian Ministry of Foreign Affairs; and Leonard Hirsch, Smithsonian National Museum of Natural History.

Expertise, information and policy decision making: The session on expertise, information and policy decision making was chaired by Elliot Morley, British Minister of Environment and Agro-Environment. The session heard a keynote presentation on structuring sustainable development strategies by Pierre Valette, EC Research Directorate-General. The session also held a panel discussion, with the participation of: Patrick Blandin, MNHN; Peter Bridgewater, Ramsar Convention; Gordon McInnes, European Environment Agency; Monique Barbut, UNEP; Sybille van den Hove, European Platform for Biodiversity Research Strategy; and CBD Executive Secretary Zedan.

On Friday in Plenary, Chouchena-Rojas presented the conclusions of the workshop. Regarding market mechanisms for biodiversity conservation and sustainable development, she said knowledge has increased but consensus for an organizational framework is still lacking. She said participants noted a need to design economic instruments for issues related to common public goods, including the high seas, and also for goods under national



sovereignty that have global benefits. She said the workshop recommended transforming benefits of biodiversity into actual payments and revising existing systems on intellectual property rights, and called for increased information on the benefits of biodiversity and the costs of conservation, as well as for better financial mechanisms, including incentives.

On multi-level governance, Chouchena-Rojas said the workshop concluded that biodiversity governance needs to be adapted to local conditions but aligned with global, regional and national frameworks, and called for: vertical linkages adapted to local conditions; subsidiarity of rights; responsibility and accountability at all levels; mutual supportiveness between different levels with minimal transaction costs; and horizontal supportiveness and further synergies between, *inter alia*, conservation and poverty eradication strategies. She noted the conclusion that conservation is possible only if biodiversity is mainstreamed within the different sectors of society according to sustainability principles. She highlighted the need to reconcile biodiversity conservation with urbanization, and said the workshop called on government systems to recognize land rights, traditional knowledge and customary laws.

Regarding knowledge and information, Chouchena-Rojas said the workshop concluded that, although more research is needed, existing information already highlights the need for action, which have to be more targeted, especially regarding marine ecosystems, to meet the 2010 target. She said workshop participants called for: increased work on prediction and not only on observation; accountability of governments through reporting systems, and of research institutions through disclosure of information; capacity building, including through South-South exchange of knowledge and information, and through development of technologies to use genetic resources; recognition of traditional knowledge; prior informed consent and benefit sharing; an international registry of traditional knowledge with appropriate confidentiality measures; and ethical guidelines for work with local communities.

Chouchena-Rojas stated that the workshop also discussed the role of the private sector, recommending a dialogue on existing governance systems. She said participants concluded that this process should: link to ongoing processes under the CBD; facilitate CBD implementation; build on existing institutions; promote synergies and connectivity; and build national-level capacity, especially in developing countries. She said participants supported establishing a new mechanism that better links economic and social aspects, and enhances the quality and policy relevance of public-private partnerships.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num3e.html> and <http://www.iisd.ca/sd/icb/sdvol100num4e.html>.

AGRICULTURE: Harison Randriarimanana, Minister of Agriculture, Farming and Fishing of Madagascar, chaired the

workshop on “Agriculture and biodiversity -- policies, institutions and practices,” which met on Wednesday and Thursday. Participants heard presentations on specific issues and case studies, and held a general debate.

On Wednesday, presentations were delivered on: biodiversity managers’ perspectives on agriculture, by Jeffrey McNeely, IUCN; the integration of biodiversity concerns into the reform of the EU Common Agriculture Policy, by Maria Fuentes, EC Agriculture Directorate-General; the historical relation between agriculture and biodiversity, by Jean-Claude Lefeuvre, MNHN; and the shift from agriculture to eco-agriculture, by Guy Riba, Institut National de la Recherche Agronomique (INRA). Participants heard presentations regarding case studies on: shrimp farming in Madagascar, by Minister Randriarimanana, and Virna Cedeño Escobar, University of Guayaquil; the management of the Brazilian Amazon by traditional and migrant populations, by Maria das Graça Pires Sablayrolles, Federal University of Pará, and Florence Pinto, French Research Institute for Development; and agriculture based on grassland ecosystems and microbial diversity in dairy-production systems in the northern Alps, by Agnès Hauwuy and Pierre Pocard, Scientific Interest Group Alpes-du-Nord.

On Thursday, participants heard presentations on case studies regarding: local agricultural systems in Indonesia, by Ahmad Kusworo, Indonesian Wildlife Conservation Society; diversified agro-forestry in Indonesia, by Geneviève Michon, French Research Institute for Development; cultural eutrophication in the Northern Gulf of Mexico, by Gregory McIsaac, University of Illinois; pastoral practices and dynamics of woody vegetation in the Sahel, by Alexandre Ickowitz, French Agricultural Research Centre for International Development, and Léonard-Elie Akpo, University of Dakar; and a recovery scheme for farmland birds in the United Kingdom, by Andy Evans, British Royal Society for the Protection of Birds, and David Smallshire, British Department for Food and Rural Affairs.

Participants then held a general debate, touching on, *inter alia*: the reconceptualization of biodiversity as an integral part of agriculture rather than as an externality; biodiversity as a driver for intensification of agriculture in marginal areas; the need for local empowerment; the relation between market globalization and locally produced goods; farmers’ rights and responsibilities; and the need for strong political will, a paradigm shift, partnerships, research development and awareness raising.

On Friday, Watson presented the conclusions of the workshop to Plenary, highlighting the need to: recognize biodiversity as an integral part of agricultural systems; strengthen multi-stakeholder and multidisciplinary planning, research and implementation; reshape markets and institutions; and recognize the dependence of biodiversity conservation on agriculture.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num3e.html> and <http://www.iisd.ca/sd/icb/sdvol100num4e.html>.

ENVIRONMENTAL EDUCATION AND

COMMUNICATION: Nick King, Endangered Wildlife Trust, chaired the workshop on environmental education and communication for biodiversity. The workshop, which met on Wednesday afternoon, heard presentations on: wildfire education programmes; local science for biodiversity education in schools; a capacity-building programme linking ecosystem functioning with climate change; communities, communication and common goals; and lessons learned from the IUCN web-based education initiative.

On Friday, Chouchena-Rojas presented the workshop's conclusions to Plenary. She said participants called for: concrete examples of the benefits of biodiversity conservation; individual and societal responsibility, as well as critical thinking about the impacts of various choices; methodologies, materials and assessments with targeted monitoring schemes, based on participatory learning at all ages and levels; and mechanisms to enable individuals to transmit knowledge to a wider audience.

DOCUMENTING BIODIVERSITY: The workshop on "Documenting biodiversity: impediments, strategies and infrastructures," chaired by Gaston Achoundong, National Herbarium of Cameroon, and Philippe Bouchet, MNHN, met on Thursday. The workshop held three sessions.

Changing paradigms: Participants heard presentations on: the Global Biodiversity Information Facility; documenting biodiversity and the needs of the CBD; and the organization of research, intellectual property and scientific changes of paradigms.

Diversity of biodiversity infrastructures: Participants heard presentations on: the infrastructure for the study and conservation of plant biodiversity; bioinformatics; and a database for Arab biodiversity specimens in foreign natural history museums.

Documenting biodiversity and dealing with the biodiversity crisis: Participants heard presentations on: the importance of biological surveys to prioritize conservation actions -- an example from Madagascar; the quest for shared programmes, protocols and principles regarding discovering, documenting and defining species; biodiversity information and regulatory frameworks for genetic resources; and a census of marine life.

On Friday in Plenary, Jo Mulongoy, CBD, presented the conclusions of the workshop. He stressed the need to make existing biodiversity data and knowledge available to users worldwide, and to acquire knowledge by using new methods and linking major conservation and taxonomic institutions. Mulongoy said participants also called for closer collaboration among data collection, taxonomic information and biological resource centers, and for facilitated academic access to specimens and data, through a charter of good conduct or guidelines.

CHALLENGES IN ACHIEVING THE 2010 TARGET:

Watson chaired the workshop on "Challenges in achieving the 2010 target -- funding research," which convened on Thursday. Participants held roundtable discussions on the main issues regarding conservation-oriented research, whether current conservation research is satisfactory, and proposals to improve research and its funding. Participants in the discussions included: Natarajan Ishawaran, UNESCO; Jean-Yves Grosclaude, French Agency for Development; John Robinson, Vice-President of the World Conservation Society; Thomas Lovejoy, President of the Heinz Center; Pierre Mathy, EC Environment Directorate-General; and Peter Schei, Chair of BirdLife International.

Workshop chair Watson proposed draft conclusions, including the need for: capacity building for the scientific and policy communities; adequate research funding, particularly in developing countries; and an involvement of finance and other ministers. Participants also agreed that there is a need to: integrate natural and social sciences; establish multi- and interdisciplinary research teams; evaluate progress through baseline data; and develop a framework for research, monitoring and policy formulation.

On Friday, Mulongoy presented the conclusions of the workshop to Plenary, highlighting that biodiversity research should be interdisciplinary, which implies, *inter alia*, the integration of social sciences, traditional knowledge and innovations and practices related to the management of biodiversity. He said participants supported coordinated effort on a scale comparable to that of the human genome project, and noted that the management of the complex and dynamic nature of ecosystems makes substitution of all ecosystem services by technology difficult and costly.

A report of the discussions held during the second session of the workshop is available online at <http://www.iisd.ca/sd/icb/sdvol100num4e.html>.

INTEGRATED APPROACH TO BIODIVERSITY: The workshop on an integrated approach to biodiversity, chaired by Yvon Le Maho, French Academy of Sciences, met on Wednesday afternoon. It held two sessions.

Genes and functions: Participants heard presentations on: integrated biology; using "Hydra" as a model for animal evolution and regeneration; genetic changes underlying morphological changes in surface and cave populations of fish; and landscape genetics -- towards an integration of landscape ecology and population genetics.

Biology of adaptations: Presentations were delivered on adaptation of fish to the Antarctic environment, and on exploiting connectivity relationships and network architecture for therapeutic discoveries to measure metabolic fluxes in complex adaptive systems.

On Friday, Mulongoy reported to Plenary on the workshop's discussions, stressing that there is a need to: strengthen integrated approaches that protect cultural diversity; make use of diverse



technologies to respond to the complexity of issues; and address all forms of biodiversity, including soil and microbial organisms.

BIODIVERSITY AND URBAN AREAS: The workshop on biodiversity and urban areas, chaired by Jacques Weber, IFB, met on Thursday. Participants heard presentations on: challenges and opportunities for conserving biodiversity; a regional charter for biodiversity and natural environments; Paris and biodiversity; conservation and sustainable use of biodiversity in the São Paulo City Green Belt Biosphere Reserve; urbanization and green area management in Stockholm and the national urban park; Cape Town Biodiversity Strategy and the CUBES Urban Biosphere Reserve Group; from biodiversity to urban diversities – new challenges for multidisciplinary collaboration; and parks, gardens and biodiversity in the city.

On Friday, Watson presented the conclusions of the workshop to Plenary, noting a call for increased research and governance efforts regarding biodiversity and urban areas. He said participants advised national, regional and city authorities to take action in favor of biodiversity and focus on positive examples such as green belts and parks. Stressing the importance of raising awareness among urban citizens to mobilize action toward biodiversity conservation and reshaping consumption patterns, Watson said participants recommended the establishment of an international network of “Cities and Urban Areas for Biodiversity.”

BIODIVERSITY AND HEALTH: Jean-François Guégan, French Research Institute for Co-operative Development (IRD), coordinated the workshop on biodiversity and health, which met on Thursday, and held two sessions.

Global health concerns: Participants heard presentations on: the consequences of climate instability on health, by Paul Epstein, Harvard Medical School; global change and disease emergence, by Jonathan Patz, University of Wisconsin; biodiversity and disease risk, by Richard Ostfeld, Millbrook Institute of Ecosystem Studies; and ecosystemic epidemiology for sustainable management in forestry and agriculture, by Christian Lannou and Marie-Laure Desprez-Loustau, INRA.

Modern tools, methods and new ways of thinking: Presentations were made on: mechanisms underlying infectious disease dynamics, by Pejman Rohani, University of Georgia; macro-ecology of population dynamics of infectious diseases, by Guégan, IRD; and fundamentals and areas of disease emergence, by Jean-Paul Gonzalez, IRD.

In the ensuing discussion, participants highlighted the need for increased: intradisciplinary research on infectious diseases, particularly in urban ecology; sharing of benefits from pharmaceutical discoveries; recognition of the climate-biosphere interdependence; and diversification of food production systems.

On Friday, Watson reported to Plenary on the workshop’s discussions. Explaining the risks of monocultures, he said

participants called for re-establishing biodiversity in food supply systems to reduce crop and animal susceptibility to disease. He noted that participants stressed the importance of interactions between climate, landscape biodiversity and human health. He noted the observation by participants that emerging diseases are at the interface between changes in society and natural systems, and identified cases where biodiversity or undisturbed habitat can have a protective role in maintaining human health. Recognizing the importance of monitoring biodiversity of pathogens in detecting emerging risks, he said participants recommended establishing a joint UN scientific commission among the World Health Organization, the UN Food and Agriculture Organization (FAO), UNEP, UNESCO, the UN Children’s Fund (UNICEF) and the World Bank to bridge the required scientific assessments.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num4e.html>.

MICROBIAL BIODIVERSITY: The workshop on microbial biodiversity and society, chaired by Kenneth Timmis, German Research Centre for Biotechnology, met on Thursday. Participants heard presentations on: the impact and potential of microbial diversity, by Timmis; assessing molecular diversity, by Erko Stackebrandt, German Collection of Microorganisms and Cell Cultures; exploring and exploiting the diversity of pollutant-degrading microbes, by Michail Yakimov, Italian Institute for Coastal Marine Environment; food microbes and gut functionality, by Willem de Vos, Wageningen Centre for Food Sciences; rhizosphere microbial diversity, by Jacques Balandreau, CNRS; animal microbes, by Angeli Kodjo, National Veterinary School of Lyon; and exploring the global biodegradative network, by Víctor de Lorenzo, Autonomous University of Madrid.

On Friday, Mulongoy presented the conclusions of the workshop to Plenary, including that microorganisms fulfill complex and vital ecological functions, but that much knowledge is lacking on their diversity and functionality. He said participants stressed the need for new methods to access and cultivate microorganisms, describe microbial pathogen ecology and characterize microbial genetic resources.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num4e.html>.

FISHERIES MANAGEMENT: Serge Garcia, FAO, chaired Thursday’s workshop on challenges for fisheries management. Presentations and discussions were held on: sustainable marine fisheries, biodiversity and ecosystems; past and present concerns in marine biodiversity; recent marine extinctions; from single-species to ecosystem-based management; climate change and fisheries management; fisheries and oceans management; fisheries and emblematic species; anthropogenic influences on the Baltic Sea; the French experience with marine fisheries policy; multiple-use management in Australia; recent management developments;



and current management tools and the ecosystem approach. The workshop ended with a general discussion.

On Friday, Watson reported to Plenary on the workshop's discussions. Noting the deplorable state of the world's fisheries, he said participants called for sustainable harvesting methods of marine resources. He said the workshop also noted that policies and governance in fisheries have failed globally, and recommended regulating access to marine resources and promoting sustainable exploitation methods. He also identified the participants' recommendation to develop observational tools to assess ecosystem management policies and an international multi-disciplinary expert group in marine ecosystems.

INNOVATION: Bana Bihari Jana, University of Kalyani, India, chaired the workshop on "Biodiversity – the new frontier of innovation," which was held on Wednesday afternoon and Thursday morning. The workshop held two sessions.

From basic knowledge to sources of innovation: Participants heard presentations on: the state of the art of ecological engineering, by Jana; biomimetic applications in modern technology, by Mark Ayre, European Space Agency; the valuation of natural products, by Renée Borges, Indian Institute of Science; wetland creation and restoration, by William Mitsch, Ohio State University; and biodiversity as a new tool for the mining industry, by Moses Mugabi, Kasese Cobalt Company.

Innovation for and from biodiversity: Presentations were given on: biotechnology, agriculture and environment, by Pierre-Henry Gouyon, Paris-Sud University; the impacts of GMOs on the environment and management perspectives, by Roger Zangré, National Agency for Valuation of Research of Burkina Faso; biodiversity and farmer innovation in the third world, by Marc Dufumier, French National Institute of Agronomy; and bioethics and biodiversity, by David Heyd, Hebrew University.

On Friday in Plenary, Watson reported on the workshop, noting that participants stressed the importance of: recognition of local populations' knowledge; inclusion of bioethics in training engineers, traders and decision makers; enhancement of the ethical and legal bases of biodiversity; and research on environmental management, pollution mitigation, adaptation to global changes, and the value of biodiversity for ecosystem functioning. He said participants recommended stimulating integrative research on GMOs to assess their social relevance and economic and environmental impacts, and proposed that patenting of GMOs should make companies legally responsible for possible damages from their use.

A report of these presentations and discussions is available online at <http://www.iisd.ca/sd/icb/sdvol100num3e.html> and <http://www.iisd.ca/sd/icb/sdvol100num4e.html>

INDICATORS AND THE 2010 TARGET: Jo Mulongoy, CBD, Denis Couvet, MNHN, and Dominique Richard, MNHN,

coordinated the workshop on indicators and the 2010 target. The workshop met on Wednesday afternoon and Thursday morning, and held three sessions.

Biodiversity goals and targets: Participants heard presentations on: scientific objectives behind biodiversity indicators, by Andrew Dobson, Princeton University; science and the MDGs, by Charles McNeil, UNDP; targets for protected areas, by David Sheppard, IUCN; and projection scenarios in support of policy decisions, by Jeffrey McNeely, IUCN.

Indicators for assessing progress towards goals and targets: Presentations were delivered on: tracking plant diversity across forest landscapes, by Don Waller, University of Wisconsin; multi-species indicators based on large-scale monitoring of common birds, by Romain Juilliard, MNHN; measuring trends in the threat status of biodiversity with the Red List Index, by Stuart Butchart, BirdLife International; tree species composition as an indicator of floristic diversity in forests, by Frédéric Gosselin, Cemagref; indicators of soil ecosystem services, by Patrick Lavelle, IRD; freshwater fish as bioindicators for water quality, by Sylvie Dufour, MNHN; agro-ecosystems and pollination services, by Alexandra-Maria Klein, University of Göttingen; assessing the importance of semi-natural areas as biodiversity sources, by Reija Hietala-Koivu, University of Helsinki; forest fragmentation as an indicator of ecosystem integrity, by Cristián Echeverría, University Austral of Chile; criteria and indicators for sustainable forest management, by Carol Colfer, CIFOR; and indicators of landscape changes under different scenarios of agricultural policy, by Eva Cudlínová, Czech Institute of Landscape Ecology.

Communication to decision makers and the wider public: Participants heard presentations on: opportunities and challenges for integrating global goals, targets and indicators into national strategies, policies and action plans, by Alfred Oteng-Yeboah, Ghana; communicating ecological indicators to decision makers and the public, by Virginia Dale, US; and information management strategies for delivering indicators at national, regional and international levels by Jerry Harrison, UNEP-the World Conservation Monitoring Centre.

On Friday in Plenary, Mulongoy presented the conclusions of the workshop, noting that participants stressed the need to: aggregate indicators; link monitoring to indicators and research; and frame a global research agenda, which would, *inter alia*, estimate costs for using monitoring indicators.

BIOLOGICAL AND CULTURAL DIVERSITY: On Thursday, Edvard Hviding, University of Bergen, chaired the workshop on "Biological and cultural diversity -- the challenge of local knowledge, practices and world views." Participants heard presentations on: managing biodiversity -- issues of knowledge and power; diversity in Saami terminology for reindeer and snow; the generation of knowledge in the central Peruvian Andes;



biodiversity, traditional management systems and livelihoods; an indigenous approach to community land use planning; and knowing and managing biodiversity in the Solomon Islands.

A roundtable was held on giving local value to local knowledge in France, with brief presentations on: biodiversity and the communities of French Guyana; local community -- mediator among different types of knowledge; local products, geographical indicators and health standards; the challenge of conservation and the pertinence of local knowledge; and sheep transhumance and shepherders' knowledge.

On Friday, Mulongoy presented the conclusions of the workshop, including the need to initiate or strengthen research programmes linking biodiversity and livelihoods. Noting that biodiversity conservation can contribute to poverty alleviation and vice versa, he stated that participants urged the integration of the 2010 target and the MDGs, taking into account local knowledge.

APPROPRIATION REGIMES AND MANAGEMENT SYSTEMS: The workshop on appropriation regimes and management systems, chaired by Arun Agrawal, University of Michigan, met on Wednesday afternoon. Participants heard presentations, followed by discussions, on: legitimating the governance of conservation; dilemmas in biodiversity management and governance; the relationship between poverty alleviation and biodiversity conservation; and the grassroot-level institutional context of technological innovations and knowledge systems.

On Friday, reporting to Plenary on the workshop's discussions, Watson highlighted that participants stressed the importance of: increasing understanding of the linkages between poverty and biodiversity; responding to the policy context and local specificities; and developing suitable incentives such as property rights and taxation policies in regimes addressing the appropriation, management, access and use of biodiversity. He said participants also stressed the importance of cross-sectoral integration and the spatial scale of biodiversity conservation and poverty alleviation. Martha Chouchena-Rojas, IUCN, added the importance of: functional linkages between biodiversity conservation and poverty eradication; new and innovative knowledge and effective conservation incentives; and project design, implementation and monitoring based on equity, efficiency and sustainability.

SUSTAINABLE MANAGEMENT OF TROPICAL AND SUBTROPICAL BIODIVERSITY: The workshop on "Sustainable management of tropical and subtropical biodiversity -- islands and forests" convened on Wednesday and Thursday.

Forests: Participants in the forests session, chaired by Pekka Patosaari, Secretary-General of the UN Forum on Forests, heard presentations on: international negotiations and the French vision; the ecological impact of the international demand for tropical timber; the ecosystem approach and sustainable forest management; and the challenge of governance for managing tropical forest

biodiversity. A roundtable was held on better governance for tropical and subtropical forests.

Islands: Participants in the islands session, chaired by Daniel Simberloff, University of Tennessee, heard presentations on: island biodiversity, sustainable development and biological invasions; island nations and the 2010 target; biodiversity decline in the Mascarene Islands; managing island biodiversity in the Madeira Archipelago; protected areas in Madagascar as a new vision to fight poverty; strategies for global best practices for managing biodiversity, invasive species and development on islands; and using traditional knowledge to manage biodiversity in Oceania.

On Friday, Watson presented the conclusions of the workshop to Plenary. Regarding forests, he noted that tropical forests contain a major proportion of terrestrial biodiversity and are subject to social debates and intergovernmental negotiating processes. Watson said participants stressed the alarming rate of deforestation and proposed: recognizing forest biodiversity outside protected areas and the role of forests in poverty reduction; and integrating the ecosystem approach in forest policies. He said participants also called for research to improve forest governance tools at different levels and to learn from successes and failures regarding the conservation and sustainable use of forests.

Noting the special circumstances of islands, particularly as hotspots and areas rich in species endemism and vulnerable to exotic species, Watson said participants recommended mobilizing resources and developing regulations. Stressing the importance of networks to share governance practices and knowledge, he said the workshop session noted that research can anticipate the impacts of global changes on island biodiversity.

CLOSING SESSION

On Friday, Bernard Bachelier, French Ministry Delegate for Research, opened the final session and closing Plenary.

Following reports on the workshops' discussions by Jo Mulongoy, CBD, Robert Watson, World Bank, and Martha Chouchena-Rojas, IUCN, a roundtable was held. Charles Perrings, University of York, said the Paris Conference showed the need for a change in the way we do business to avoid future damages. He stressed the need to set a timeframe for action, and said the 2010 target is only the first step down a long road, which will require science to help evaluate policy changes and enhance policy-making capacity.

Robert Barbault, MNHN, underscored the importance of developing biodiversity-related knowledge and committing to the concept of sustainable development.

José Sarukhán, Mexican National Institute of Ecology, commended the Conference for bringing together a broad range of visions on biodiversity. He said although knowledge is still scarce, enough is known to take action now. He stressed placing biodiversity conservation at the top of the political agenda.



Laurence Tubiana, Director of IDDRI, said the Conference reinforced the fact that biodiversity is a global good at the interface of science and policy. She noted that the Conference also showed that multilateral instruments need to be improved and their integration increased, and that scientists are willing to provide decision makers with the necessary tools.

In the ensuing discussion, participants stressed the need to establish codes of best practices, as well as to define and undertake further research on indicators. One participant questioned how the scientific community can reach out to and communicate with decision makers. Sarukhan said that information provided should be problem-oriented. Perrings stressed the need to identify attractive biodiversity indicators. Tubiana said both decision makers and civil society need to be lobbied to act for biodiversity conservation.

In a closing statement, Xavier Darcos, French Minister Delegate for Cooperation and Development, noted that the Paris Conference had achieved its objectives in identifying research needs and enhancing public awareness. Acknowledging that severe poverty still exists in many biodiversity-rich countries, he stated that efforts to address environmental and poverty reduction challenges must be linked and that international solidarity is needed to achieve sustainable development. Minister Darcos stressed France's commitment to: contribute to building the capacity of developing countries; promote a dialogue between North and South, particularly regarding access and benefit sharing; integrate the protection of local knowledge into national legislation; and increase funds for the scientific community.

Michel Loreau, Chair of the Conference's Scientific Committee, presented the final version of the Paris Declaration on Biodiversity, an appeal by scientists regarding biodiversity.

Mark Collins, Chair of the Conference's Steering Committee, presented a statement on behalf of the Conference as a whole, based on its presentations and discussions, and on the Paris Declaration.

Eric Cornut, President of Novartis-France, commended the Conference's attempt to involve the business community. He said many businesses are already engaged and share the commitment to conserve biodiversity. He stressed the importance of the equitable sharing of benefits arising from the utilization of genetic resources, and recalled the partnership between the World Business Council on Sustainable Development and IUCN as a pragmatic approach to bringing together the business sector and the biodiversity community.

Recalling that UNESCO is the only scientific agency of the UN, Walter Erdelen, UNESCO, stressed the importance for UNESCO to consider the outcomes of, and participate in the follow-up to, the Paris Conference. Erdelen identified biodiversity-related scientific and monitoring initiatives and programmes where UNESCO is collaborating with other intergovernmental organizations. He also said UNESCO is willing to associate itself with the international expert panel on biodiversity.

Pierre Valette, EC Research Directorate-General, said there are many databases and programmes within the EU, which are open to all countries and can be used for biodiversity conservation. He expressed hope that the outcomes of the Conference will help feed information into biodiversity governance and decision-making processes.

Charles Rabotoarison, Minister for the Environment of Madagascar, said the Paris Declaration on Biodiversity reminds us of the challenges of biodiversity conservation as well as our responsibilities, noting that people from both the North and the South are responsible for the erosion of the Earth's natural capital. Minister Rabotoarison stressed the need to strengthen scientific expertise, particularly in the South, and to promote an international initiative for a better understanding of biodiversity conservation.

Carlos Rodríguez Echandi, Minister of the Environment and Energy of Costa Rica, underscored that the challenges faced in biodiversity conservation are not only scientific but also political. Noting the priority accorded to economic and defense concerns, he lamented the limited attention paid by decision makers to biodiversity and the environment, proposed developing the ecological yield concept, and called for a change in values.

Elliot Morley, British Minister for Environment and Agro-Environment, stressed the need to recognize the goods and services provided by biodiversity, as well as their link to human livelihoods and well-being. He said the challenge lies in conveying this message to all ministers, not just environmental ministers, and advocated: strengthening biodiversity science at all levels; building scientific capacity, especially in developing countries; coordinating scientific efforts; and improving government structures to support research.

Recalling the Conference's conclusions on the importance of biodiversity for human well-being, François d'Aubert, French Minister Delegate for Research, called for: improved interdisciplinary science to strengthen government policies and international negotiations; the development of market instruments and indicators; voluntary corporate involvement; capacity building, especially in developing countries; and international solidarity. Minister d'Aubert pledged France's commitment to achieving the 2010 target through intensified international cooperation.

Bernard Bachelier, French Ministry Delegate for Research, closed the meeting at 12:40 pm.

Paris Declaration on Biodiversity: The Declaration is composed of three sections and recommendations.

The first section states that biodiversity, as the natural heritage of and a vital resource for all humankind:

- is a source of aesthetic, spiritual, cultural and recreational values;
- provides goods that have direct use values, such as food, wood and pharmaceuticals;
- supports and enhances ecosystem services upon which human



societies depend indirectly, including the maintenance of water, air and soil quality, and ecosystem resilience to change; and

- provides opportunities for human societies to adapt to changing needs and circumstances, and to discover new products and technologies.

The second section recognizes that biodiversity is being destroyed irreversibly by human activities, noting that:

- humans are altering the environment at an unprecedented rate, affecting sustainable development and the quality of life;
- species are being lost at a rate that is about 100 times faster than the average natural rate;
- large-scale loss is irreversible; and
- the underlying causes of destruction are of a demographic, economic and institutional nature.

The third section states that a major effort is needed to discover, understand, conserve and use biodiversity sustainably, including:

- immediate strong actions to meet the MDGs and ensure food security, human health and quality of life;
- an international coordinated effort to mobilize scientists to expand the knowledge of biodiversity; and
- integration of conservation and sustainable use into social and economic development.

On this basis, governments, policy makers and citizens are urged to take necessary actions, including:

- ambitious interdisciplinary research programmes;
- integration of biodiversity into the criteria for all economic and policy decisions and environmental management;
- improved education and public awareness; and
- a major effort to build capacity, especially in developing countries.

The Declaration also calls for an international mechanism that includes intergovernmental and non-governmental elements, and builds on existing initiatives and institutions to provide information, identify priorities and inform relevant biodiversity-related conventions.

Conference Statement: The Statement recalls the commitment of governments to achieving the 2010 target as a condition for sustainable development, and recognizes that:

- biodiversity is a vital and poorly appreciated resource that underpins the MDGs;
- biodiversity is being irreversibly destroyed by humans at an unprecedented rate;
- unless the rate of biodiversity loss is significantly reduced, any effort to reduce poverty will be undermined; and
- although enough is known to justify immediate action, major efforts are still needed to fill knowledge gaps.

The Statement urges:

- governments to take all necessary actions needed to reach the 2010 target, including capacity building;

- civil society and the private sector to take actions in line with the 2010 target; and
- the scientific community to develop greater national and international coordination.

The statement also calls for:

- public and private resources for understanding and conserving biodiversity;
- communication between all stakeholders, including local and indigenous communities; and
- greater cooperation and synergies between Parties to, and secretariats of, multilateral environmental agreements.

Finally, the statement recommends, in response to the proposal made by French President Jacques Chirac, launching an international multi-stakeholder consultative process to assess the need for an international mechanism that would provide a scientific assessment of information and policy options required for decision making, building on existing bodies and activities.

UPCOMING MEETINGS

INTERNATIONAL CONFERENCE ON WATER FOR FOOD AND ECOSYSTEMS: This conference, organized by FAO and the Government of the Netherlands, will meet from 31 January - 5 February 2005, in The Hague, the Netherlands. It will provide a high-level platform to address the harmonization of food production and ecosystem management and will feed into the thirteenth session of the Commission on Sustainable Development (CSD-13) and into relevant work under the CBD, Ramsar Convention and the Johannesburg Plan of Implementation. For more information, contact: Mathieu Pinkers, Dutch Ministry of Agriculture, Nature and Food Quality; e-mail: m.j.h.p.pinkers@minlnv.nl; Internet: <http://www.fao.org/ag/wfe2005/>

RAMSAR STRP-12: The 12th meeting of the Scientific and Technical Review Panel (STRP) of the Ramsar Convention will convene from 1-4 February 2005, in Gland, Switzerland. For more information, contact: Ramsar Convention Secretariat; tel: +41-22-999-0170; fax: +41-22-999-0169; e-mail: ramsar@ramsar.org; Internet: <http://ramsar.org/w.n.strp-datechange.htm>

CBD SBSTTA-10: The 10th meeting of the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-10) will take place from 7-11 February 2005, in Bangkok, Thailand. SBSTTA-10's theme for in-depth discussion will be island biodiversity. For more information, contact: CBD Secretariat; tel: +1-514-288-2220; fax: +1-514-288-6588; e-mail: secretariat@biodiv.org; Internet: <http://www.biodiv.org/doc/meeting.aspx?mtg=SBSTTA-10>

THIRD MEETING OF THE AD HOC OPEN-ENDED WORKING GROUP ON ACCESS AND BENEFIT-SHARING: This meeting will be held back-to-back with SBSTTA-10 from 14-18 February 2005, in Bangkok, Thailand. The Working Group



will consider: the nature, scope and elements of an international regime on access and benefit-sharing; terms and definitions; and the possible use of international certificates of origin/source/legal provenance and supportive compliance measures related to prior informed consent and mutually agreed terms. For more information, contact: CBD Secretariat; tel: +1-514-288-2220; fax: +1-514-288-6588; e-mail: secretariat@biodiv.org; Internet:

<http://www.biodiv.org/doc/meeting.aspx?mtg=ABSWG-03>

THIRD INTERNATIONAL CONFERENCE:

BIODIVERSITY CONSERVATION AS A WAY OF LIFE: This Conference, which will be held from 21-26 February 2005, in Kota Kinabalu, Sabah, Malaysia, is organized by the Institute for Tropical Biology and Conservation. With an emphasis on increasing partnerships between policy makers and local communities, and integrating industry into biodiversity conservation, the meeting will address rules and regulations, conservation through partnerships, market mechanisms, and alternative and community models for the sustainable use of biodiversity. For more information, contact: Bornean Biodiversity and Ecosystem Conservation; fax: +60-088-320291; e-mail: bbec@sabah.gov.my; Internet:

<http://www.bbec.sabah.gov.my/overall/1stannouncement2005.htm>

NEW CURRENTS IN CONSERVING FRESHWATER SYSTEMS: A BIODIVERSITY SCIENCE SYMPOSIUM: This symposium, hosted by the American Museum of Natural History, will be held from 7-8 April 2005, in New York, US. The Symposium aims to highlight recent successful initiatives in freshwater conservation, discuss ideas and tools, and investigate how and where these innovations might be implemented on the ground. For more information, contact: Fiona Brady, American Museum of Natural History; tel: +1-212-496-3431; fax: +1-212-769-5292; e-mail: brady@amnh.org; Internet: <http://cbc.amnh.org/symposia/freshwater/>

CSD-13: The thirteenth session of the Commission on Sustainable Development will take place from 11-22 April 2005, at UN headquarters, in New York, US. CSD-13 will focus on water, sanitation and human settlements. For more information, contact: UN DSD; tel: +1-212-963-2803; fax: +1-212-963-4260; e-mail: dsd@un.org; Internet: <http://www.un.org/esa/sustdev/csd/>

UNFF-5: The fifth session of the UN Forum on Forests (UNFF) will be held from 16-27 May 2005, at UN headquarters in New York, US. This meeting will represent the conclusion of the UNFF's five year mandate and will discuss the future of the process. For more information, contact: Elisabeth Barsk-Rundquist, UNFF Secretariat; tel: +1-212-963-3262; fax: +1-917-367-3186; e-mail: barsk-rundquist@un.org; internet:

<http://www.un.org/esa/forests/session.html>

BIOSAFETY PROTOCOL COP/MOP-2: The second meeting of the Conference of the Parties to the CBD serving as the Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP-2) will be held from 30 May - 3 June

2005, in Montreal, Canada. The meeting will consider: notification requirements; risk assessment and management; liability and redress; socio-economic considerations; handling, transport, packaging and identification; matters related to the financial mechanism and resources; and cooperation with other organizations. For more information, contact: CBD Secretariat; tel: +1-514-288-2220; fax: +1-514-288-6588; e-mail: secretariat@biodiv.org; internet: <http://www.biodiv.org/doc/meeting.aspx?mtg=MOP-02>

MEETING OF THE AD HOC OPEN-ENDED WORKING GROUP ON PROTECTED AREAS: This CBD meeting will be held from 13-17 June 2005, in Montecatini, Italy. For more information, contact: CBD Secretariat; tel: +1-514-288-2220; fax: +1-514-288-6588; e-mail: secretariat@biodiv.org; Internet: <http://www.biodiv.org/meetings/default.aspx>

CONFERENCE ON HEALTH AND BIODIVERSITY 2005: This Conference, which will be held from 23-25 August 2005, in Galway, Ireland, aims to highlight the importance of biodiversity and ecosystem services to global and human health, further promote biodiversity as an essential component in achieving the MDGs, and highlight the risks which human impacts on ecosystems and biodiversity present to human health and welfare. For more information, contact: Elizabeth Dippie; tel: +353-9176-5640; fax: +353-9176-5641; e-mail: info@cohab2005.com; Internet: <http://www.cohab2005.com/summary.htm>

CCD COP-7: The seventh Conference of the Parties to the Convention to Combat Desertification (UNCCD) is scheduled to take place from 17-28 October 2005, in Bonn, Germany. For more information, contact: UNCCD Secretariat; tel: +49-228-815-2802; fax: +49-228-815-2898; e-mail: secretariat@unccd.int; Internet: <http://www.unccd.int/main.php>

RAMSAR COP-9: The 9th Conference of the Parties to the Ramsar Convention on Wetlands will convene from 7-15 November 2005, in Kampala, Uganda. For more information, contact: Dwight Peck, Communications Officer; tel: +41-22-999-0170; fax: +41-22-999-0169; e-mail: peck@ramsar.org; Internet: <http://www.ugandawetlands.org/Cop9/index.htm>

DIVERSITAS OPEN SCIENCE CONFERENCE: The first DIVERSITAS Open Science Conference will be held from 9-12 November 2005, in Oaxaca, Mexico. The Conference will be based on the theme "Integrating biodiversity science for human well-being." For more information, contact: DIVERSITAS Secretariat; tel: +33-1-45-25-95-25; fax: +33-1-42-88-94-31; e-mail: info@diversitas-osc1.org; Internet: <http://www.diversitas-osc1.org/>