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Fourteenth meeting
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Item 3.4 of the provisional agenda*

AD HOC OPEN-ENDED WORKING GROUP ON REVIEW OF IMPLEMENTATION OF THE CONVENTION
Third meeting
Nairobi, 24-28 May 2010

ADVANCING THE BIODIVERSITY AGENDA: - A UN SYSTEM-WIDE CONTRIBUTION

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice, and the third meeting of the Open-ended Working group on Review of Implementation of the Convention, documentation on the contribution of the United Nations system to the post-2010 biodiversity targets, coordinated by the Environment Management Group.

2. Documentation consists of and Information Note by the Executive Director of the United Nations Environment Programme and Chair of the Environment Management Group followed by the preliminary working draft report prepared by representatives from 18 United Nations entities who have participated in the process.

3. The Information Note and working draft report are circulated in the form and language in which they were received by the Secretariat of the Convention on Biological Diversity.

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* UNEP/CBD/SBSTTA/14/1.

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The Environment Management Group Secretariat, UNEP

5 May 2010

Progress Report on the Preparation of the Report: *"Advancing the biodiversity agenda: - A UN system-wide contribution"*

Information Note by the Executive Director of UNEP and Chair of the Environment Management Group

1. The review by the Convention on Biological Diversity (CBD) of progress made towards the achievement of the strategic plan and the 2010 biodiversity targets and the subsequent revision of the strategic plan and the targets has been designed as an inclusive process.

2. The Presidency of the Conference of the Parties to the Convention together with the Executive Secretary to the Convention and the and Executive Director of UNEP in his capacity as Chair of the Group invited in late 2008 the Environmental Management Group (EMG) to contribute to this review process (UNEP 2008). Following a dialogue with the members of the EMG it was agreed to initiate a forward looking process to solicit the inputs from the UN system to the process.

3. An Issue Management Group with representatives from 18 UN entities developed the process for preparing the input in the form of a report. The process included the development of a questionnaire and the establishment of a writing team consisting of members of the group which is preparing the report.

4. Attached to the current information note to the Subsidiary Body on Scientific Technical and Technological Advice (SBSTTA 14) and the third meeting of the Ad-hoc Open Ended Working Group on Review of the Implementation of the Convention (WGRI 3) is a preliminary working draft of the report titled: *"Advancing the biodiversity agenda: - A UN system-wide contribution"*.

5. The report has been informed by document UNEP/CBD/SP/PREP/1/REV1: Revision and Updating of the CBD Strategic Plan: Synthesis and Analysis of Views and document UNEP/CBD/SP/PREP/2: Revision and Updating of the CBD Strategic Plan: Possible Outline and Elements of the new Strategic Plan.

6. The process on the preparation of the report is designed to interface with the intergovernmental strategic and target setting process under the Convention. The aim of the report is firstly to inform the strategy and target setting process under the Convention of how policy sectors of the UN system interacts with biodiversity. Secondly, the initiative aims to create awareness in the UN system about the Convention process and identifying how collaboration in the UN system can be furthered in support of the advancement of the biodiversity agenda.

7. The first section of the EMG report explains why biodiversity matters to development. It also explains to why mainstreaming of biodiversity into social and economic sectors are important for halting the loss of biodiversity and how the UN system can help in this respect.

8. The second section presents the perspectives of selected policy sector areas on the following key questions:

(a) How does each policy sector depend on biodiversity and ecosystem services?

(b) How does each policy sector affect biodiversity and ecosystem services?

(c) How could each policy sector contribute to meeting biodiversity targets individually or collectively?

(d) What actions by other policy sectors could complement the policy sectors efforts in addressing adverse effects on biodiversity?

(e) What kinds of biodiversity targets might contribute to meeting the policy sector's own objectives?

9. The third section presents opportunities for synergies and collaboration among agencies funds and programmes for helping halt the loss of biodiversity. Areas considered include the provision of knowledge, implementation of biodiversity related agreements, integration of biodiversity concerns into the development framework at national level and review of effectiveness in implementation. The report finally will present some conclusions and outlook for further work.

10. Following SBSTTA 14 and WGRI 3, the final report will be concluded by the EMG in time for the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity, in October 2010. It is anticipated that the key findings of the report will be made available to the high=level segment on biodiversity at the United Nations general Assembly in September 2010.

11. Governments are invited to convey their views on the preliminary working draft report to members of the EMG and the EMG secretariat present at the SBSTTA and WGRI meetings. Views and any further queries can also be submitted to the EMG secretariat at <emg@unep.org>.

05/05/2010

Advancing the biodiversity agenda: A UN system-wide contribution

Preliminary Working Draft – Do not quote or cite

Issued without formal editing

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PREFACE

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EXECUTIVE SUMMARY

The Earth is a living system, made habitable for humans entirely thanks to the activities of different organisms creating a breathable atmosphere, providing food, recycling waste products and helping to regulate climate. In this sense, biodiversity - the variety of life on Earth – is the foundation upon which human civilization has developed and continues to depend.

HUMAN ACTIVITIES ARE DRIVING AN UNPRECEDENTED RATE OF LOSS OF BIODIVERSITY WHICH HAS POTENTIALLY SEVERE CONSEQUENCES FOR HUMAN WELL-BEING, ESPECIALLY FOR THE POOR AND VULNERABLE GROUPS IN SOCIETY

The current rate of loss of land, freshwater and marine biodiversity is more rapid than at any time in human history and shows no indication of slowing. The loss is part of a wider wave of environmental change driven by ever expanding human activities, touching on virtually every component of our biosphere and the global climate system, which are taking place in an increasingly globalized, industrialized and interconnected world, fuelled by expanding flows of goods, services, capital, people, technologies, information, ideas and labour. Despite gains in human well-being the world is still facing widespread poverty. Poor people bear most of the burden from environmental degradation but are not responsible for most environmental change.

Loss of biodiversity leads to degradation of ecosystem services which has potentially severe consequences for human well-being, especially for the poor and vulnerable groups in society. Loss of biodiversity can reduce, for instance, the resilience of food production, carbon storage in forests and wetlands, the supply of clean and sufficient freshwater, and the opportunities for recreation and tourism. Of those ecosystem services that have been assessed, about 60 per cent are already used unsustainably or degraded. A first, very coarse estimate indicates that biodiversity loss could account for around 7% of the Gross World Product (GWP) by 2050. Conservation, sustainable use and fair and equitable sharing of benefits related to the use of biodiversity are all important for the attainment of the Millennium Development Goals.

The scale and complexity of interactions between humans and the environment are a major reason why it has proved so hard for the international community and nations to halt biodiversity loss. A better understanding of this interaction can help society in mainstreaming the management of risks – such as climate change and degradation of ecosystem services – and opportunities – such as use of ecosystem services – into economic and social processes.

OPPORTUNITIES FOR MAINSTREAMING CAN BE BETTER MANAGED, SUCH AS THROUGH A SHIFT TOWARD A GREEN ECONOMY

Inadequate mainstreaming of biodiversity into sectoral policies and strategies has hampered progress in addressing the underlying drivers of biodiversity loss. Lack of mainstreaming is due to the inherent inertia towards cooperation across the institutional silos of a sectoralised society, the complexity and fragmentation of environmental institutions, the failure of markets to reflect the value of ecosystem services, and the demanding trade-offs between different interests and concerns in society.

New opportunities for mainstreaming are emerging. Cooperation across sectors is increasingly taking place. The "one UN" initiative is but one example in this respect. The fragmentation of the environmental institutional landscape is also being addressed. Furthermore, developments in the area of information and communication technologies and biological science, monitoring, modeling and forecasting are improving the ability of society at all levels to identify risks of biodiversity loss and opportunities provided by ecosystem services.

Efforts to address loss of biodiversity involve trade-offs between different intra- and inter-generational aspects of human well-being which are sustained by ecosystem services. Economics assists public and private decision-makers in making such trade-offs. Ongoing efforts to improve the understanding of the value of biodiversity and the services it provides can enable society to more fully appreciate the opportunities forgone by biodiversity loss and help identify win-win situations across sectors.

A shift toward a green economy through investments in sustainable and equitable use and conservation of biodiversity can generate economic wealth and job-creation. The environmental institutional pillar of sustainable development is through the efforts of supporting such a shift striving towards a mainstreaming of economic and social considerations into its own policies and programmes.

THE POST 2010 BIODIVERSITY AGENDA MAY BENEFIT FROM A NEW PARADIGM FOR COOPERATION IN THE UN SYSTEM

Developing cross-cutting and sector-specific targets – such as those under consideration for biodiversity after 2010 – can be an effective way of mainstreaming biodiversity concerns into sectoral policies and plans. This is particularly so if the target-setting process actively involves the sector in question and follow due process.

The policy sector perspectives from the UN system are intended to inform the target-setting process with respect to the following key questions:

1. How does each policy sector depend on biodiversity and ecosystem services?
2. How does each policy sector affect biodiversity and ecosystem services?
3. How could each policy sector contribute to meeting biodiversity targets individually or collectively?
4. What actions by other policy sectors could complement the policy sector's efforts in addressing adverse effects on biodiversity?
5. What kinds of biodiversity targets might contribute to meeting the policy sector's own objectives?

The EMG – as an interagency body – can help informing the process of advancing the biodiversity agenda and facilitating the involvement of relevant policy sectors at the interagency level in the implementation of the agenda**.** Commitments by its members to new targets at an intergovernmental level, however, will need processes that go beyond the mandate of EMG. The involvement of sectors at intergovernmental level rests at the purview of Government representatives in the target-setting process.

MAINSTREAM BIODIVERSITY IN KEY POLICY SECTOR PERSPECTIVES OF THE UN SYSTEM

ENVIRONMENT: CLIMATE CHANGE, LAND MANAGEMENT AND WATER

<to be developed>

PRIMARY PRODUCTION: - AGRICULTURE, FORESTRY AND FISHERIES

<to be developed>

SOCIAL SERVICES: HEALTH, KNOWLEDGE AND CULTURE

<to be developed>

PRODUCTION AND SERVICE: INDUSTRY, ENERGY, TRANSPORT AND TOURISM *<to be completed>*

Biodiversity and tourism are closely inter-connected. Biodiversity is a major basic resource for tourism, a sector which, if sustainably developed and well managed, can generate important economic benefits and can play a critical role in preserving biodiversity. On the other hand, unsustainable tourism can threaten biodiversity and ecosystem services. Biodiversity friendly tourism, which is included within the UNWTO's strategic objective of tourism sustainability, could contribute, among others: to maintain the quality of ecosystems through nature based sustainable tourism products, to generate income for ecosystem conservation and for local populations, to the security of tourists and populations by constituting protection against natural disasters (e.g. mangrove barriers) and to adaptation to climate change in vulnerable and exposed areas.

UNWTO is committed to providing a coherent response to the current biodiversity challenges, including MDG seven on environmental sustainability, and has taken up various actions within the framework of targets for biodiversity, such as the implementation of biodiversity based tourism projects to showcase how to mainstream biodiversity issues into tourism master and management plans. Furthermore, the United Nations through its various agencies- UNWTO, UNEP, CBD, Ramsar Convention Secretariat, , etc. - are working together sharing expertise and resources to address tourism and biodiversity challenges, enhance cooperation and raise awareness on the interrelationship between tourism and biodiversity

FINANCE AND TRADE

<to be developed>

HUMANITARIAN AFFAIRS AND PEACE KEEPING
<to be developed>

OPPORTUNITIES FOR COHERENT AND COLLABORATIVE IMPLEMENTATION OF THE POST 2010 BIODIVERSITY AGENDA

Cooperation in the UN system regarding mainstreaming can benefit from a structured approach along key institutional functions with a clear understanding of the contributions and expectations from each institution. The process for strengthening international environmental governance has identified several key functions of which the following four are of particular relevance for cooperation on mainstreaming:

STRENGTHENING THE SCIENCE POLICY INTERFACE

Understanding the interactions between society and biodiversity requires data, expertise and knowledge from many walks of life, something the UN system with its broad technical expertise base is well placed to contribute to. Albeit extremely difficult, there is a need to forecast biodiversity changes, including the time lags and possible tipping points in both natural and social systems associated with such change. Science and policy communities need to mutually inform each other through formal and informal processes and this dialogue can be helped through a well-structured science-policy interface.

The acquisition of environmental knowledge and information is done through research, monitoring and observations. Modeling of environmental change, especially climate change and the development of scenarios have become increasingly important tools. Advances in remote sensing and geographical information systems are leading to improved global observations. The Global Earth Observation System of Systems (GEOSS) now has a biodiversity component which may serve as a hub for further enhanced cooperation among the UN system for biodiversity-related monitoring and observations.

The biodiversity assessment landscape is crowded. Further cooperation within the UN system would probably be most valuable if it is linked to particular intergovernmental assessment processes such as the potential marine assessment or the proposed intergovernmental science-policy platform on biodiversity and ecosystem services (IPBES), both of which are currently under discussion.

The world has over the last decades witnessed developments in information and communication technologies which have revolutionised the exchange of information. Web-based information platforms of up-to-date, coherent and quality-assured priority data and information, indicators, early warning and alert services draw information from information networks, research, monitoring and observations. The area of biodiversity information exchange is potentially an area where the UN system could join hands.

A number of multilateral environmental agreements such as the three Rio conventions and a number of the biodiversity related conventions have prominent intergovernmental scientific and technical advisory bodies or processes. The UN system can contribute to their work, but their efficiency and cooperation ultimately depend on how they are governed by member states.

INTERLINKAGES AND SYNERGIES IN THE IMPLEMENTATION OF THE BIODIVERSITY RELATED CONVENTIONS
<to be developed>

OPPORTUNITIES FOR INTEGRATING THE BIODIVERSITY TARGETS INTO NATIONAL DEVELOPMENT COOPERATION
<to be developed>

REVIEW OF EFFECTIVESS IN IMPLEMENTATION OF THE TARGETS

UN entities can play a role in the review process through structured, reporting, self evaluations and indicators. As a central custodian of the post 2010 biodiversity target, the COP of the CBD may want to consider the modalities of such a review process building on its existing processes which in practical terms are facilitated by the Executive Secretary of the Convention and the Ad-hoc Working Group on Review of Implementation of the Convention.

A UN system wide partnership in support of strengthened review efforts could possibly serve as a foundation for a system, whereby a broader range of UN entities could take responsibility for or contribute to measurement of indicators in particular as they relate to indirect and direct drivers of biodiversity loss and degradation of ecosystem services. Many UN entities are well placed to provide data on indicators reflecting

the impact of biodiversity change on human well-being and support developing countries in their own sector-based review efforts.

INTRODUCTION

2010, the year proclaimed by the General Assembly as the International Year of Biodiversity, has seen a review by the Convention on Biological Diversity (CBD) of progress made towards the achievement of the strategic plan and the 2010 biodiversity targets under the Convention. Based on this review parties under the Convention embarked on an inclusive process for revision of the strategic plan and the biodiversity targets.

In late 2008 the President of the Conference of the Parties to the Convention together with the Convention's Executive Secretary and the Executive Director of UNEP in his capacity as Chair of the Group invited the Environmental Management Group (EMG)[1] to contribute to this review process (UNEP 2008). Following a dialogue with the members of the EMG it was agreed to initiate a forward looking process to solicit inputs from the UN system to the post 2010 biodiversity agenda.

An Issue Management Group with representatives from 18 UN entities developed the process for preparing the input in the form of a report. The process included the development of a questionnaire and the establishment of a writing team consisting of members of the group who is preparing the report.

The report has been informed by document UNEP/CBD/SP/PREP/1/REV1: *Revision and Updating of the CBD Strategic Plan: Synthesis and Analysis of Views* and document UNEP/CBD/SP/PREP/2: *Revision and Updating of the CBD Strategic Plan: Possible Outline and Elements of the new Strategic Plan*.

The initiative under EMG is designed to interface with the intergovernmental strategic and target setting process under the Convention. The aim of the report is firstly to inform the strategy and target setting process under the Convention how policy sectors of the UN system interact with biodiversity. Secondly, the initiative aims to create awareness in the UN system of the Convention process and identify how collaboration in the UN system can be furthered in support of the implementation of the biodiversity agenda.

The first section of the report sets out why biodiversity matters to development, why mainstreaming of biodiversity into social and economic sectors is important for halting the loss of biodiversity, and how the UN system can help to do this.

The second section presents the perspectives of selected policy sector areas on the following key questions:

1. How does each policy sector depend on biodiversity and ecosystem services?
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The third section presents opportunities for synergies and collaboration among agencies, funds and programmes for helping halt the loss of biodiversity. Areas considered include the provision of knowledge, implementation of biodiversity related agreements, integration of biodiversity concerns into the development framework at international and national level and review of effectiveness in implementation. The report will finally present some conclusions and outlook for further work.

[1] The EMG is an interagency cooperation body on environment in the UN system that includes members from the specialized agencies, funds and programmes of the UN, the secretariats of the multilateral environmental agreements and the Bretton Woods institutions and the World Trade Oragnisation. The group is chaired by the Executive Director of UNEP and UNEP provides the secretariat to the group (see also www.unemg.org).

SECTION I. BIODIVERSITY FOR HUMAN WELL-BEING AND DEVELOPMENT

CHAPTER 1: MAINSTREAMING BIODIVERSITY FOR SUSTAINABLE DEVELOPMENT

A. HUMAN CIVILIZATION AND LIFE ON EARTH

The Earth is a living system, made habitable for humans entirely thanks to the activities of different organisms creating a breathable atmosphere, providing food, recycling waste products and helping to regulate climate. In this sense, biodiversity - the variety of life on Earth – is the foundation upon which human civilization has developed and continues to depend.

Biodiversity contributes directly to many aspects of people's livelihoods and well-being, providing products, such as food, fuel and fibers, whose values are widely recognized. It also underpins a much wider range of services, many of which are currently undervalued. The bacteria and microbes that transform waste into usable products, insects that pollinate crops and flowers, coral reefs and mangroves that protect coastlines, and the biologically-rich landscapes and seascapes that provide enjoyment are only a few. Functioning ecosystems are also crucial as buffers against extreme climate events, as carbon sinks, and as filters for waterborne and airborne pollutants.

The richer the diversity of life, the greater the opportunity for coping with unexpected changes: medical discoveries, economic development, and adaptive responses to challenges such as climate change. Although much more remains to be understood about the relationships between biodiversity, ecosystem services, national economies and human well-being (see box 1), it is well established that if the products and services that are provided by biodiversity are not managed effectively, future options will become ever more restricted, for rich and poor people alike (UNEP 2007).

BOX 1 BIODIVERSITY, ECOSYSTEM SERVICES, NATIONAL ECONOMIES AND HUMAN WELL-BEING

Human well-being *is broadly defined as people's freedoms of choice and actions, or capabilities, to achieve security, basic material needs, good health, and good social relations. The capabilities are determined by demographic, social (including institutional), material, and environmental factors. The expansion of such capabilities equals development, while their deprivation leads to vulnerability and poverty.*

Environmental factors *determining human well-being include ecosystem services, a-biotic natural resources and stresses such as diseases, pests and natural hazards. Ecosystem services is often categorized as provisioning (such as food, fuel, or fiber), regulating (such as pollination, and regulation of climate and water levels), cultural (such as aesthetic and spiritual benefits) and supporting (such as soil formation and microorganisms cycling nutrients).*

The contributions of ecosystem services *to human well-being and national economies are substantial. Examples of such values include:*

- *Annual world fish catch – US $ 58 billion (provisioning service);*
- *Anti-cancer agents from marine organisms – up to US $ I billion per year (provisioning service);*
- *Global herbal market – roughly US$ 43 billion in 2001 (provisioning service);*
- *Honeybees as pollinators for agriculture crops – US$ 2 – 8 billion/year (regulating service); and*
- *Coral reefs for fisheries and tourism – US$ 30 billion a year (provisioning and cultural service).*

Biodiversity *includes diversity at the genetic level, such as that between individuals in a population or between plant varieties, the diversity of species, and the diversity of ecosystems and habitats. Biodiversity encompasses more than just variation in appearance and composition. It includes diversity in abundance (such as number of genes, individuals, populations or habitats in a particular location), distribution (across locations and through time) and in behaviour, including interactions, such as between predators or prey. The supply of ecosystem services depends on many such attributes of biodiversity that vary between services.*

Source UNEP 2007

B. GLOBAL CHANGE AND BIODIVERSITY LOSS

Humans, like every other species, have evolved in interaction with their environment. This interaction, which has continuously shaped human history has now grown to global proportions (see figure 1). The interaction is driven by ever expanding human activities, touching on virtually every component of our biosphere and the global climate system. These activities are taking place in an increasingly globalized, industrialized and interconnected world, fuelled by expanding flows of goods, services, capital, people, technologies, information, ideas and labour. Consequently, the planet is witnessing levels of environmental change at all scales which are unprecedented in human history (UNEP 2007b).

The current rate of loss of land, freshwater and marine biodiversity is more rapid than at any time in human history and if anything is projected to increase. Ecosystems may be approaching tipping points, beyond which

there are abrupt, accelerating or potentially irreversible changes. Ecosystem change is also often characterized by time-lags whereby a change such as an extinction of a pollinating species may happen a long time after the human impact which triggered the extinction took place.

Species extinction rates are as high as in the five "mass extinctions" of Earth history. This loss is together with loss of genetic diversity and degradation of ecosystems one among a series of unprecedented current and projected mutually reinforcing environmental changes which include global warming, degradation in air quality (in many locations of high population density), reductions in the stratospheric ozone layer (which however is projected to recover between 2060 and 2075 if current efforts to reduce ozone depleting substances is maintained), land degradation and declining availability of freshwater.

Fundamental social and economic processes in society are the key underlying drivers for biodiversity change and other forms of environmental change. Demographics, consumption and production patterns, scientific and technological innovation, economic demand, markets and trade, distribution patterns, institutional and social-political frameworks and value systems all play a part in determining the impact that humans have on their environment and the rest of the natural world. This impact is expressed through a number of direct drivers of biodiversity loss, the most important of which are: - land use change; - climate change; - invasive alien species; - overexploitation; and - pollution.

The relative importance of each of these varies greatly from place to place and in its impact on different components of biodiversity. Activities which act as drivers of biodiversity loss often also enhance human prosperity and people's capacity to cope with environmental stress such as droughts and floods and their ability to realize the opportunities ecosystem services provide. Moreover, different drivers often act together, multiplying each other's impacts and making it even harder to find simple solutions to biodiversity loss.

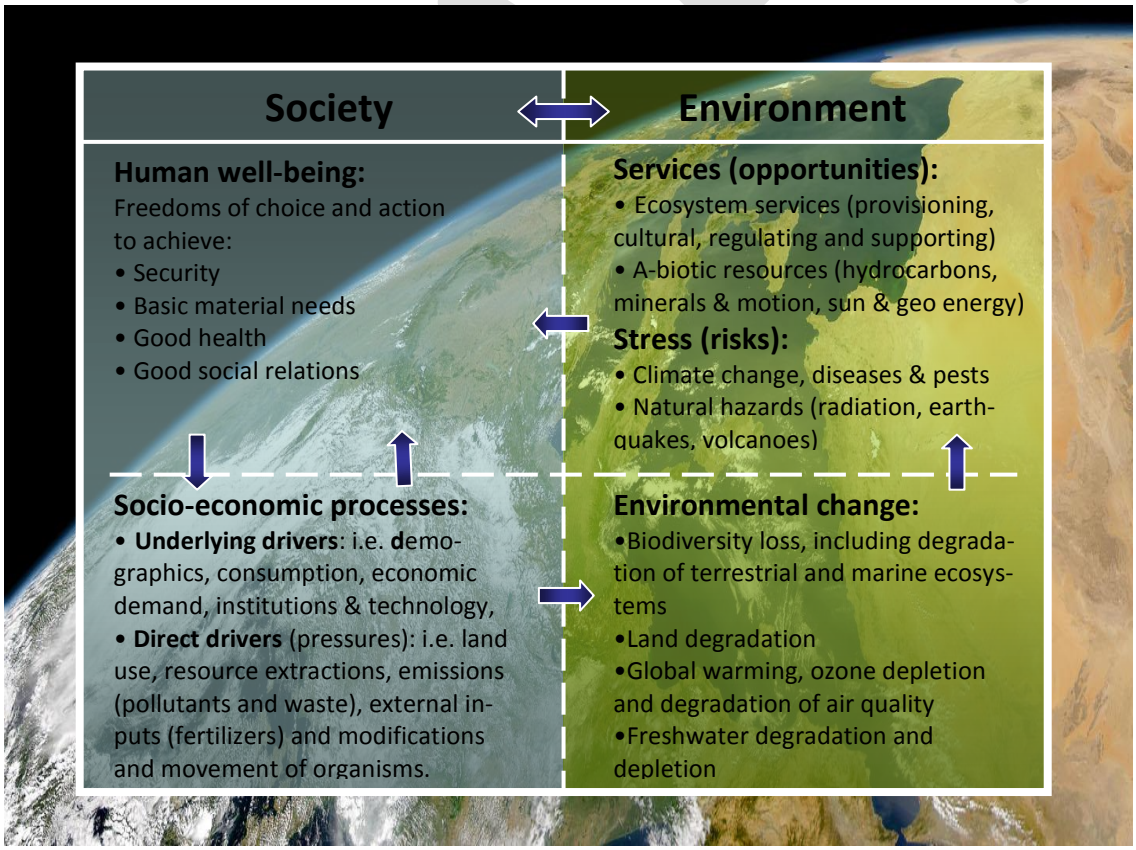


Figure 1 The interaction between society and environment: *A look at the Earth will reveal a planet with diverse forms of life including a species, Homo sapiens, whose interactions with the environment has put it on a path to rapid change. The future wellbeing of the individuals of this species rests on their collective ability to understand this interaction and manage the risks and opportunities therein. The elements presented in this figure are drawn from the conceptual framework of the fourth Global Environmental Outlook, GEO4 (UNEP 2007b).*

C. BIODIVERSITY SUSTAINS THE ATTAINMENT OF THE MILLENNIUM DEVELOPMENT GOALS

Despite gains in human well-being the world is still facing widespread poverty. The responsibility for environmental change is unevenly distributed among people on the planet but it leads to degradation of ecosystem services and exacerbation of environmental stress which have potentially severe consequences for human well-being, especially for the poor and vulnerable groups in society.

Loss of biodiversity has a direct impact on those goods and services provided by the natural world that humanity benefits from. Loss of biodiversity reduces, for instance, carbon storage in forests and wetlands, the supply of clean and sufficient freshwater, and the opportunities for recreation and tourism. Of those ecosystem services that have been assessed, about 60 per cent are already degraded or used unsustainably (MA 2005).

Projecting future losses of ecosystem services and placing a monetary value on them is extremely difficult, particularly in view of the great uncertainties, environmental, economic and political, that face us in the coming decades. A first, very coarse estimate indicates that biodiversity loss could account for around 7% of the Gross World Product (GWP) by 2050. (TEEB 2009). The burden of this is likely to be disproportionately met by the world's poor (UNEP 2007b). Conservation, sustainable use and fair and equitable sharing of benefits related to the use of biodiversity is therefore important for the attainment of the Millennium Development Goals (see Box2).

Box 2 Biodiversity and the Millennium Development Goals (MDGs)

1. Eradicate extreme poverty and hunger
Target for 2015: Halve the proportion of people living on less than a dollar a day and those who suffer from hunger. - More than a billion people still live on less than US$1 a day: sub-Saharan Africa, Latin America and the Caribbean, and parts of Europe and Central Asia are falling short of the poverty target.

2. Achieve universal primary education
Target for 2015: Ensure that all boys and girls complete primary school. - As many as 113 million children do not attend school, but the target is within reach. India, for example, should have 95 percent of its children in school by 2005.

3. Promote gender equality and empower women
Targets for 2005 and 2015: Eliminate gender disparities in primary and secondary education preferably by 2005, and at all levels by 2015. - Two-thirds of illiterates are women, and the rate of employment among women is two-thirds that of men. The proportion of seats in parliaments held by women is increasing, reaching about one third in Argentina, Mozambique and South Africa.

4. Reduce child mortality
Target for 2015: Reduce by two thirds the mortality rate among children under five - Every year nearly 11 million young children die before their fifth birthday, mainly from preventable illnesses, but that number is down from 15 million in 1980.

5. Improve maternal health
Target for 2015: Reduce by three-quarters the ratio of women dying in childbirth. - In the developing world, the risk of dying in childbirth is one in 48, but virtually all countries now have safe motherhood programmes.

6. Combat HIV/AIDS, malaria and other diseases
Target for 2015: Halt and begin to reverse the spread of HIV/AIDS and the incidence of malaria and other major diseases. - Forty million people are living with HIV, including five million newly infected in 2001. Countries like Brazil, Senegal, Thailand and Uganda have shown that the spread of HIV can be stemmed.

7. Ensure environmental sustainability
Targets:
• *Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.*
• *Achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth.*
• *By 2015, reduce by half the proportion of people without access to safe drinking water.*
• *By 2020 achieve significant improvement in the lives of at least 100 million slum dwellers.*
- More than one billion people lack access to safe drinking water and more than two billion lack sanitation. During the 1990s, however, nearly one billion people gained access to safe water and the same number to sanitation.

8. Develop a global partnership for development
Targets:
• *Develop further an open trading and financial system that includes a commitment to good governance, development and poverty reduction – nationally and internationally*
• *Address the least developed countries' special needs, and the special needs of landlocked and small island developing States*
• *Deal comprehensively with developing countries' debt problems*
• *Develop decent and productive work for youth*
• *In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries*
• *In cooperation with the private sector, make available the benefits of new technologies – especially information and communications technologies.*
- Many developing countries spend more on debt service than on social services. New aid commitments made in the first half of 2002 could mean an additional $12 billion per year by 2006.

Biodiversity contributes to achieving the MDGs. Poor people depend on services provided by the ecosystems they live in. Ecosystem-management therefore represents development opportunities for local communities. It may help create a virtues circle of interaction between the community and its environment which in turn may bring people out of poverty. Biodiversity contributes to achieving the health related targets. The WHO suggests that in some Asian and African countries, 80% of the population depend on traditional medicine for primary health care. Environmental-related diseases (i.e. diarrhea, acute respiratory infections, and leukemia) are primary causes of child mortality. Payments for ecosystem services, restoration of ecosystems and development and application of new approaches to conservation and sustainable use may contribute to job creation and economic growth.

Efforts to achieve a significant reduction in the rate of loss of biodiversity need to address both the underlying drivers and the direct drivers. The sheer scale and complexity of interactions between humans and the environment is a major reason why it has proved so hard for the international community and nations to halt biodiversity loss and global warming, the two main dimensions of environmental change.

The solution for society is in principle to understand the dynamics of its interplay with the environment and internalise – or mainstream – the management of the risks and opportunities that arises out of this interplay into social and economic processes. It is the latter that has proven to be an Achilles heel for the efforts to date.

CHAPTER 2: TOWARDS A NEW PARADIGM FOR COOPERATION IN THE UN SYSTEM

A. BUILDING ON THE 2010 LESSONS LEARNED

Over the past few decades, the global community – of which the UN system is an important part – has grown increasingly aware of how human wellbeing in the long term depends on biodiversity and ecosystem services. Governments have concluded a number of agreements of relevance to biodiversity (see box 3). The Convention on Biological Diversity, aimed at stemming the loss of biodiversity, was agreed at the 1992 Earth Summit in Rio de Janeiro and came into force two years later. In 2002 the member States of the Convention agreed on an ambitious target, namely to " *achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth."*

This target - often referred to as the 2010 target - was subsequently endorsed by the World Summit on Sustainable Development and the United Nations General Assembly and, in 2007, was incorporated as a new target under the Millennium Development Goals.

BOX 3. BIODIVERSITY COMMITMENTS IN THE UN SYSTEM

The legal regime on biodiversity

Many international treaties have been established to safeguard the diversity of life on the planet starting with the Ramsar Convention on Wetlands in (1971, the Convention Concerning the Protection of World Cultural and Natural Heritage (the World Heritage Convention) in 1972 and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1973 and the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in 1979. They were followed by the Convention on Biological Diversity (CBD) in 1992. A supplementary agreement to the CBD - the Cartagena Protocol on Biosafety - seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. Recent developments include the negotiations of an international regime on access to genetic resources and benefit-sharing. The International Treaty on Plant Genetic Resources for Food and Agriculture (2004) approved by the FAO Conference in 2001 and administered by FAO is harmonized with the CBD. Of particular relevance to the custodian of of biodiversity is is the United Nations Framework Convention on Climate Change (UNFCCC United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) and the United Nations Convention on the Law of the Sea (UNCLOS). A number of regional treaties contributes to safeguarding biodiversity especially in the marine environment.

Financing the implementation of national commitments in the legal regime

The rapid development of international norms and commitments weigh heavy on countries and in particular developing ones. The Environment Fund established under UNEP to finance environmental activities in the UN system was the first multilateral source set up to fund environmental implementation in the UN. Its role was largely surpassed by that of the Global Environment Facility (GEF), initiated in 1991 as a partnership between the UN and the Breton Woods institutions, and entrusted with being the financial mechanism for the CBD and other main MEAs. Since 1991, GEF has as part of its biodiversity portfolio provided US$2.7billion in grants and leveraging US$7.4 billion in co-financing for over 965 projects in more than …countries[2]. The additional biodiversity investments by the World Bank in biodiversity amounts to US$.... Marked aggregated aid to biodiversity was in 2007 over $US3 billion, provided by 21 developed countries and the European Communities. Environmental non-governmental organizations likely raised more than US$3 billion for their activities, mostly directly related to biodiversity, from various sources in 2007.

Mounting evidence of the continuing decline in biodiversity demonstrates that the 2010 biodiversity target has not been met. 2010 – the International Year of Biodiversity – represents however an opportunity to take stock of progress made towards meeting the target and renew the efforts for halting biodiversity loss based on the lessons learned. The very existence of the target seems to have helped stimulate important action, including the development of national biodiversity plans, establishment of protected areas, and addressing direct drivers such as pollution and invasive species. The analysis of the first generation of national plans however show that they first and foremost focus on traditional protection measures while sustainable use and mainstreaming of biodiversity into broader policies and strategies is given less attention.

Inadequate mainstreaming of biodiversity into broader policies and strategies has however hampered progress in addressing the underlying drivers of biodiversity loss. Effective mainstreaming has proven difficult to achieve in practice due to many factors. Among them are the inherent inertia towards cooperation across the institutional silos of a sectoralised society, the complexity and fragmentation of environmental institutions, the

[2] Search the GEF database for project information and documents.

failure of markets to reflect the value of ecosystem services, and the demanding trade-offs between different interests and concerns in society.

B. MANAGING OPPORTUNITIES

Environmental institutions can become more effective in facilitating the mainstreaming of biodiversity considerations into the social and economic pillars of sustainable development. UN's first environmental institution UNEP, established in 1972, was actually designed with this function in mind. It was mandated to guide, partly finance and co-ordinate environmental programmes across the entire UN system. The programmes were to keep the environment under review, set norms, support and finance implementation of national commitments and review the effectiveness of measures. These key functions are today integrated quite far into many parts of the UN system. However, the international environmental institutional architecture has become so complex and fragmented, that the coordination of these functions, which are so critical for effective mainstreaming, has become weakened (UNEP 2009b).

A key consideration by the EMG is that new opportunities for mainstreaming are emerging. Cooperation within the biodiversity sector (e.g. the Biodiversity Liaison Group) and across sectors is increasingly pursued. The "one UN" initiative is but one example in this respect. The fragmentation of the environmental institutional landscape is being addressed and can potentially enhance the complementarity and coherence among a diverse set of expertise and competencies.. Recent efforts in this regard include the process for strengthening international environmental governance under UNEP (UNEP 2010) and the preparation of the UN Conference on Sustainable development in Rio de Janeiro in 2012 which amongst others is scheduled to address the institutional architecture for sustainable development. Furthermore, developments in the area of biological science, monitoring, modeling and forecasting are improving the ability of society at all levels to identify risks of biodiversity loss and opportunities provided by ecosystem services. Rapidly advances in information and communication technologies can potentially ease the task of managing complex information such as that regarding biodiversity and facilitate the communication of such information to a broad range of users.

Finally, rather than being seen as question of a trade–off between environment and development arresting the loss of biodiversity is increasingly seen as a trade off between different intra- and inter-generational aspects of human well-being which are supported by ecosystem services. Economics is the currency of decision-making regarding trade-offs between these human well being aspects. Ongoing efforts to improve the understanding of the value of biodiversity and the services it provides may assist society in fully appreciating the opportunities forgone by biodiversity loss and identifying new win-win situations across sectors. The Economics of Ecosystems and Biodiversity (TEEB) report, for example, seeks to show that economics can be a powerful instrument in biodiversity policy (TEEB 2009). A shift toward a green economy (see box 4) through investments in sustainable use and conservation of biodiversity can generate economic wealth and job-creation which safeguard and enhance human well-being. The environmental institutional pillar of sustainable development is through the efforts of supporting such a shift striving towards a mainstreaming of economic and social considerations into its own policies and programmes.

Box 4. A green economy

A green economy is an economy responding to the need for society to mitigate and adapt to environmental change including loss of biodiversity. The concept is consistent with other economic characteristics and stages like: 1) an agrarian economy (an economy which relies on farming); 2) an industrial economy (an economy dominated by manufactured goods); 3) a service economy (an economy dominated by services rather than products); and 4) a knowledge economy (an economy based on the production, distribution, and use of knowledge). Similarly, a green economy is one driven by the demand for, and supply of, environmentally sound products and services, which generates economic wealth and job-creation and safeguard and enhance human well-being. (Sheng forthcoming).

C. ANCHORING THE POST 2010 BIODIVERSITY AGENDA IN THE UN SYSTEM

Developing cross-cutting and sector specific targets – such as those under consideration in the 2010 biodiversity target-setting process – can be an effective way of mainstreaming biodiversity concerns into sectoral policies and plans. This is particularly so if the target setting process involves the sector in question and follows due process and mandates. The UN system is comprised of many different entities representing different sectors in society (see figure 2) and is therefore well placed to contribute. A complex governance structure has an impact on what the UN system can deliver at interagency level.

Each entity in the UN is often governed by an intergovernmental body which can have an independent legal standing, such as that of a treaty and a specialised agency, or it can be a subsidiary body of the General Assembly, such as those of the UN programmes, funds and commissions. The bodies are served by secretariats sometimes supported by a fund or organised around the management of a fund. Many issues require cooperation across different entities and for this reason different coordination arrangement have been established. These arrangements vary in shape and form. Some of them, like the EMG, are coordination bodies at interagency secretariat level.

The EMG – as an interagency body – can express itself on behalf of the secretariats of its members at administrative level. Commitments by its members to new targets at an intergovernmental level, however, will need processes which go beyond the mandate of EMG. EMG can however be a partner in the 2010 target setting process to ensure sector involvement at the interagency level. The involvement of sectors at intergovernmental level needs to be ensured by representatives of Governments in the target-setting process.

Sector institutions such as those of the UN system relate to biodiversity in different ways. While all sectors ultimately depend on well functioning ecosystems, some are more directly dependent on ecosystem services than others. While the latter can be used to determine their proximity to biodiversity they all play a role in safeguarding biodiversity through measures such as addressing the drivers of biodiversity loss (see box 5).

Section two of the report presents the perspectives of selected policy sector areas on the following key questions:

1. How does each policy sector depend on biodiversity and ecosystem services?
2. How does each policy sector affect biodiversity and ecosystem services?
3. How could each policy sector contribute to meeting biodiversity targets individually or collectively?
4. What actions by other policy sectors could complement the policy sectors efforts in addressing adverse effects on biodiversity?
5. What kinds of biodiversity targets might contribute to meeting the policy sector's own objectives?

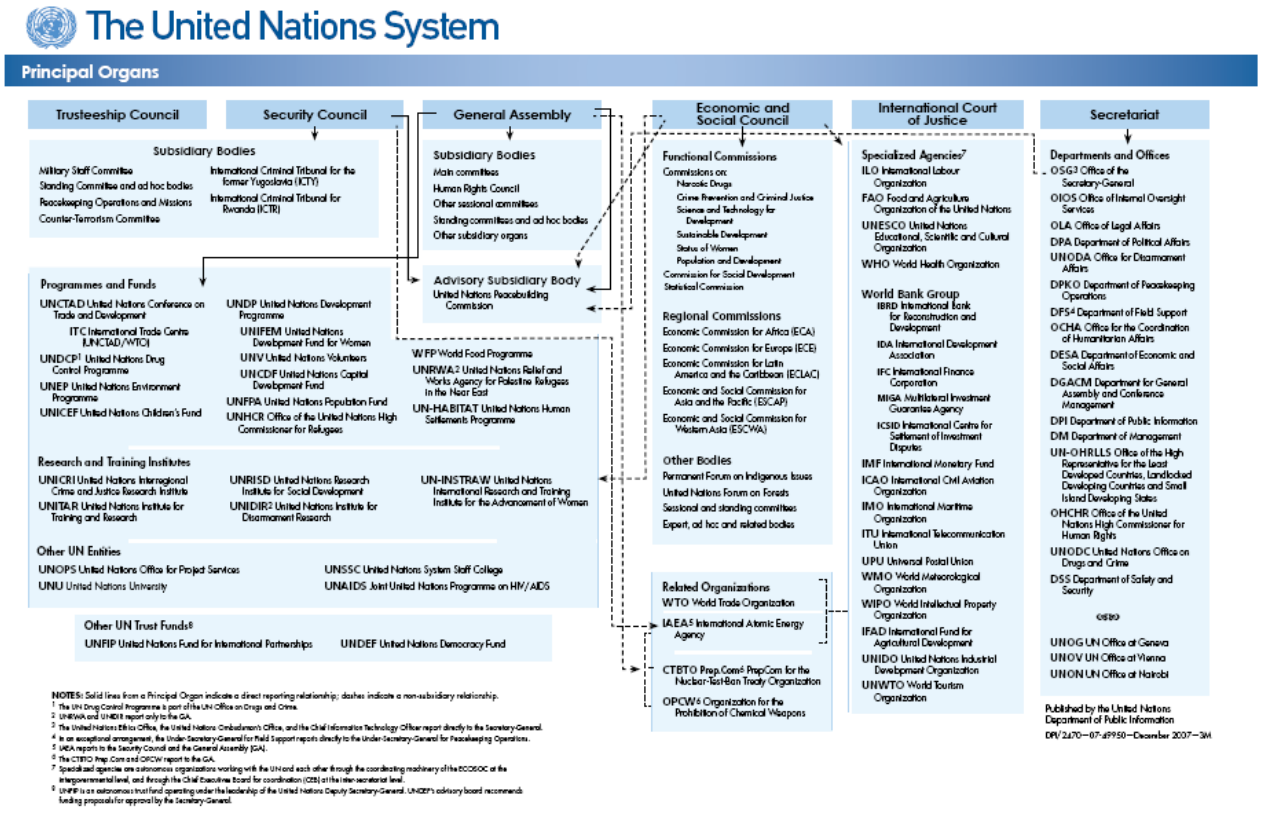


Figure 2 The UN system

D. STRENGTHENING THE INSTITUTIONAL FUNCTIONS UNDERPINNING MAINSTREAMING

Cooperation in the UN system on mainstreaming can benefit from a structured approach along key institutional functions wit a clear understanding of the contributions and expectations from each institution. The process for strengthening international environmental governance (UNEP2010) has identified several key functions out of which the following four functions are of particular relevance for cooperation on mainstreaming:

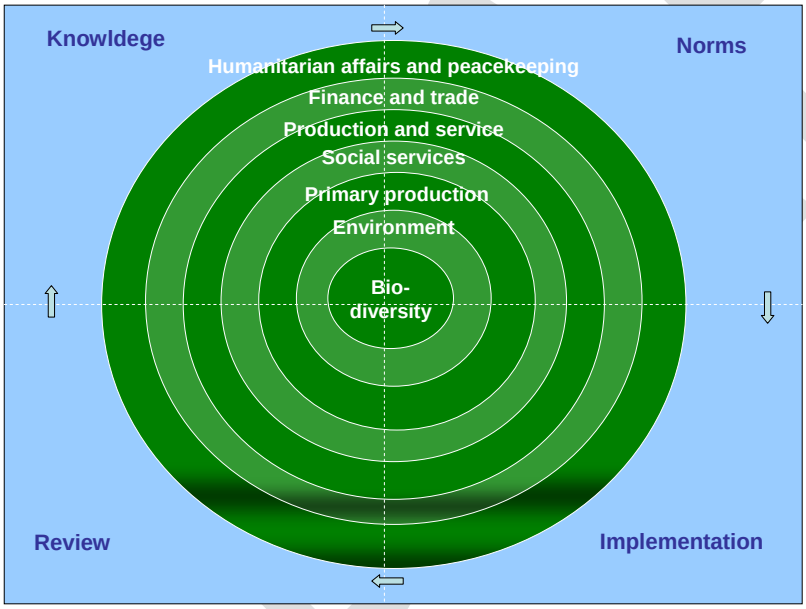
Cooperation on facilitating the interface between science and policy consists of several sub-elements including acquisition of data and information, information networking, assessments, and provision of scientific advice. All sectors will have a role in contributing to the pool of knowledge, at least on the indirect and direct drivers if not on biodiversity as such. A core contribution for biodiversity institutions is to synthesise this knowledge and make it available in a usable format. The sectors on the other hand need to clearly express their expectations and detail their information needs.

Development of norms, such as legally binding obligations and commitments, and non-binding targets and guidelines have been developed through a number of UN agencies. Increasingly, efforts to maintain ecosystem services is seen as a step in pursuit of other societal objectives such as food security, climate adaptation and mitigation, access to safe drinking water, and poverty eradication (see box 2). Cooperation is needed to avoid situations where norms in one policy sector are countered by those of another.

Box 5 The relation between policy sector institutions and biodiversity.

Biodiversity institutions are the custodian of the values biodiversity represents and the knowledge, norms, measures for implementation and review of effectiveness of measures needed to safeguard these values.

Environmental institutions include those dealing with climate change, land management, human settlements and water. They depend on ecosystem services such as those related to carbon storage, water regulation, soil formation and protection, and production of fuel and fibre. They have a role in facilitating a coherent and balanced approach to mainstreaming of environmental concerns into other sectors.



Primary production institutions include sectors like agriculture, forestry and fisheries. They depend on ecosystem services related to provision of food, fuel and fibre and a long term interest in protecting services related to regulating (such as pollination, and regulation of climate and water levels), cultural (such as aesthetic and spiritual benefits) and supporting (such as soil formation and microorganisms cycling nutrients). The sector influences drivers, such as land use, pollution, invasive species, trade in agricultural commodities, and poverty and also has tools in support of mainstreaming biodiversity concerns into other sectors.

Social services institutions such as health, knowledge and culture depend on ecosystem services such as those related to provision of food and medicines, regulation of air and water quality and recreation and cultural and spiritual values. The health sector influence drivers such as poverty, and population growth through health policies and standards. The knowledge sector influences important drivers such as science and technology and cultural change through research education and cultural programmes.

Production and service institutions include sectors like energy, industry, transport & tourism. It is a non-homogenous group when it comes to dependence on biodiversity. Some sectors like the biotechnology industry draw their raw material from genetic resources, ecotourism depends on biological and cultural diversity, and biofuels relate to agriculture and forestry. The sector influences drivers, such as land use, pollution, invasive species, and trade in commodities.

Finance and trade institutions are based on production in society which ultimately rests on well-functioning ecosystems. Measures related to trade and investments can be highly effective in altering multiple drivers. The challenge is to ensure that they are precise and for trade measures that they are applied in a non-discriminatory manner.

Humanitarian affairs and peace keeping institutions are to some extent dependant on ecosystem services although their efforts are often focused on crises response. Cooperation on maintenance of ecosystem services however can alleviate stress like resource constraints, reduce tensions and prevent conflicts.

Cooperation on support to implementation of the post 2010 biodiversity targets in developing countries may take place at a global programmatic, but should ultimately yield results at national level including through the UN development assistance framework (UNDAF) and the poverty reduction strategies and plans (PRSPs). UN agencies surveyed indicated that most agencies develop their targets at a global scale, which underlines the need for an improved implementation and monitoring system at the country level (EMG survey). Cooperation is needed in the area of investments, technology support and capacity building by building on the comparative advantage of each institution under a "delivering as one" approach. Internalization of the targets in operation of institutions can also be achieved through safeguards applied at policy, programme and project level.

Development of targets and indicators for their achievement can provide a sound basis for reviewing the effectiveness of measures. Review of effectiveness is a key function of a target and results based approach to mainstreaming and can be achieved through a mix of structured, reporting, self evaluations and independent evaluations. Such structured reviews allow institutions to incrementally improve institutional performance and results-based cooperation both with respect to individual or joint institutional activities.

Section three of the current report elaborates further on opportunities for coherent and collaborative implementation of the post 2010 biodiversity agenda. The exploration of these opportunities may help the UN towards a new paradigm for cooperation on mainstreaming biodiversity concerns into social and economic sectors. Work in the UN can be organized more effectively such as through the use of information and communication technologies to achieve economies of scale and improve institutional resilience, innovation and adaptability. Ultimately, public institutions such as the UN need to more effectively set the framework conditions for actions by private sector, households and individuals that can help halt the loss of biodiversity.

Table 2: Agencies working directly and indirectly on biodiversity targets

Specific Biodiversity Targets	Biodiversity Related Target	Biodiversity relevant targets
CBD	ESCAP	UNWTO
CITES	IMO (Globallast)	UNITAR
FAO	UNFCCC	
RAMSAR	UNDESA	
UNDP	UNESCO	
UNIDO		

Source: EMG Survey: UN system-wide response to 2010 biodiversity targets

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SECTION II.
POLICY SECTOR PERSPECTIVES OF THE UN SYSTEM

CHAPTER 3: ENVIRONMENT: - CLIMATE CHANGE, LAND AND WATER

A. CLIMATE CHANGE[3]

The Importance of Climate Change for Biodiversity and vice versa

It is now widely recognized that climate change and biodiversity are interconnected, not only through the effects of climate change on biodiversity, more extensively elaborated on in the next section, but also through changes in biodiversity and ecosystem functioning that affect climate change. The carbon cycle and the water cycle, arguably the two most important large-scale processes for life on Earth, both depend on biodiversity—at genetic, species and ecosystem levels.

Biodiversity plays a critical role in abating and mitigating climate change through the generation of soils and maintenance of soil quality, maintenance of air and water quality, pest control, detoxification and decomposition of wastes, maintaining plant reproduction, climate stabilization, and prevention and mitigation of natural disasters.

Functioning ecosystems are crucial as buffers against extreme climate events and as filters for waterborne and airborne pollutants. Protecting and enhancing ecosystem resilience through biodiversity and ecosystem service conservation, management and restoration, are amongst the most cost effective ways of tackling both the causes and consequences of climate change. Healthy ecosystems store carbon and if degraded or destroyed release this as carbon dioxide, one of the principal causes of climate change. Reducing greenhouse gas emissions originating from the degradation and destruction of ecosystems will thus contribute to better encountering the challenges posed by climate change.

Climate Change Impacts on biodiversity

There is significant scientific consensus that increasing global average temperature by 2 degrees Celsius or more will likely result in dangerous climate change with greater likelihood of irreversible changes in terrestrial, freshwater and marine ecosystems with serious implications for the provision of key ecosystem services, including climate regulation, water flows and carbon sequestration. It is possible that this 2°C warming threshold could be crossed as early as 2040 unless significant mitigation measures are taken urgently[4]. Significant impacts would likely be felt in highly vulnerable areas, many of which would be located in least developed countries, as mean global temperature change approaches 1.5 °C resulting in increased magnitude and frequency of storms, drought and floods and deleterious changes to the functioning of ecosystems[5].

Climate change will increase rates of biodiversity loss, affecting both individual species and their ecosystems. Most of the 80% of the world's coral reef may die within decades due to climate change (UNEP, 2008). The IPCC Fourth Assessment Report (IPCC AR4, 2007) states that the most vulnerable ecosystems include coral reefs, the sea-ice biome, high-latitude ecosystems such as boreal forests, mountain ecosystems, and mediterranean-climate ecosystems. Also if greenhouse gas emissions continue at or above current rates, during the next 100 years the ability of many ecosystems to adapt naturally is likely to be exceeded by an unprecedented combination of climate change, associated disturbances such as flooding, drought, wildfire, and insects and other global change issues especially land-use change, pollution and over-exploitation of resources. The report also states that approximately 20 to 30% of species currently assessed are likely to be at increasingly high risk of extinction as global mean temperatures exceed a warming of 2 to 3°C above pre-industrial levels. The report stresses that since global losses in biodiversity are irreversible, projected impacts on biodiversity are significant

[3] Climate change-related references throughout the report will be reviewed by the UNFCCC secretariat, once the preliminary draft has reached a more advanced stage. Additional information and references may be added at a later stage, as appropriate.

[4] Allison et al., The Copenhagen Diagnosis - Updating the World on the Latest Climate Science, November 2009. a handbook of science updates that supplements the IPCC AR4 released in 2007. Available at http://www.copenhagendiagnosis.org/

[5] UN World Economic and Social Survey 2009. Available at http://www.un.org/esa/policy/wess/wess2009files/wess09/wess2009.pdf

and relevant. With this level of warming, many species are at far greater risk of extinction than in the recent geological past.

Climate change is impacting ecosystems and their services and functioning in ways that are difficult to model and predict, but yet have severe repercussions. Climate change also impacts the species and genetic diversity underlying these ecosystems. The effect will be a dramatic increase in biodiversity loss across genes, species and ecosystems. The impacts of climate change are exacerbated by land use change, some of which are directly related to climate change itself (e.g. changes in agricultural areas induced by changes in temperature, precipitation and growing season, and change in distribution and biofuel crops caused by efforts to reduce consumption of fossil fuels).

The primary areas of already experienced and projected climate change impacts on biodiversity include:

- Changes in the spatial and temporal distributions of species and assemblages
- Migration and dispersal potentials of species and assemblages
- Genetic diversity and viability of populations of species
- Physiological tolerance of species
- Disturbance of functional interactions between species
- Disruption of ecosystem processes and functioning
- Increases in the number and distribution of invasive species

Challenges and opportunities for biodiversity conservation and management

The prospect of irreversible adverse effects of climate change adds to the urgency of achieving the objectives of the Rio Conventions, the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD), the objectives of which all aim at contributing towards tackling climate change in a more integrated and efficient manner. The additional challenge climate change poses to the achievement of the Millennium Development Goals (MDGs) is also important to note.

The growing threats from climate change will mainly affect populations that are already challenged by multiple vulnerabilities associated with low levels of economic and human development, for example, by multiplying heightened livelihood risks and further weakening adaptive capacities. Developing countries will increasingly be seeking to apply the broadest range of options to deal with climate change – for both mitigation and adaptation.

There are several scientific challenges which include the following:

- What are the physical changes to species and various ecosystems driven by climate change such as submersion of ecosystem by sea level rise and melting of permafrost? The various ecosystems include polar, agricultural, dry and sub-humid lands, forest, inland waters, island, marine and coastal, and mountain ecosystems. Can these changes be quantified and/or modelled?
- What changes can be accommodated. Does migration and dispersal allow for the movement of ecosystems and/or the evolution of new ecosystems?
- Is there ecosystem and species resilience to extreme climate change and weather events such as high temperature and extended drought?
- How will land use patterns affect the re-organization of ecosystems on the landscape such as by impeding migration and see dissemination?
- Is species migration limited by soil and elevation?

The UNFCCC provides an intergovernmental forum to deal with climate change-related questions and has, based on long-standing cooperation with and input from competent partners such as the Intergovernmental Panel on Climate Change (IPCC) developed the necessary basis to deal with related questions. Cooperation among international organizations, UN entities, other Conventions and their secretariats and other intergovernmental organisations is very important for an effective international response to climate change , ensuring that the Convention process has the best scientific and other relevant information available.

The Conference of the Parties (COP) and its subsidiary bodies also seek to ensure that the climate change related activities of other international organizations are coherent with the convention process and respond to the needs of the Parties, taking into account the potential linkages and synergies which may exist. Standing items on the agendas of convention bodies such as the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) relating to cooperation with relevant international organizations, reducing emissions from deforestation in developing countries and adaptation, deal with biodiversity-related issues. The issue of ecosystems/ ecosystem services are reflected and acknowledged in current draft negotiation texts[6] relating to the issues of a shared vision, adaptation and forests.

A number of organizations, including CBD, have made important contributions to reports, fora and meetings. Relevant work has been carried out under the Ad Hoc Technical Expert Group on biodiversity and climate change. Information brochures on forestry and adaptation-related issues have been produced on the initiative of the Joint Liaison Group of the Rio Conventions, and information and experience exchanged in the context of UNFCCC's web platform on Reducing Emissions from Deforestation in Developing Countries .

Other past and current cooperative activities with the CBD include: joint outreach activities, joint papers on cross-cutting issues, a joint workshop on forests, activities in the context of the Focal Point Forum of the Nairobi Work Programme on impacts, vulnerability and climate change including an action pledge of the AHTEG on biodiversity and climate change, exchange and joint work on cross-cutting issues such as on CBD's CEPA/UNFCCC's Article 6, technology, research and systematic observation, National Adaptation Programmes of Action, and an IPCC report on biodiversity. At the level of the UN Chief Executive Board, work is carried out relating to the main areas of the Bali Action Plan, including adaptation and forest-related issues, the UN-REDD programme, an Adaptation Policy Brief, an Adaptation Learning Mechanism, a Global Framework for Climate Services endorsed by the third World Climate Conference, and a gateway to UN's system's work on climate change.

Additionally, all three Rio Convention secretariats are members of the Collaborative Partnership on Forests (CPF) and collaborate with other members of the CPF in various activities to promote the sustainable management and conservation of all types of forests and long-term political commitment to enhance sustainable forest management and its integration into broader development strategies. The UNFCCC and UNCCD, together with other members of the CPF, published a "Strategic Framework for Forests and Climate Change" to enhance a coordinated forest sector response to climate change.

A portfolio of land use management activities, including the protection of natural forest and peatland carbon stocks, the sustainable management of forests, the use of native assemblages of forest species in reforestation activities, sustainable wetland management, restoration of degraded wetlands and sustainable agricultural practices can contribute to biodiversity, climate and development objectives. Activities to reduce emissions from deforestation and forest degradation have the potential to deliver significant co-benefits for biodiversity if possible mechanisms are designed accordingly.

Climate Change in Relation to Strategic plan and targets

The increased risk to biodiversity imposed by continuing and unavoidable climate change highlights the need for enhanced knowledge about the cumulative effects of climate change and other stressors that result in biodiversity and ecosystem services loss.

The issues of climate variability and climate change should be addressed and even integrated with regards to resource use and development decisions. There is a need to optimally manage the different sectors with respect to today's natural climate variability and this requires a careful evaluation of the policies, practices and technologies currently in practice. Decreasing the vulnerability of the different sectors related to biodiversity such as forestry, agriculture, marine, and energy to natural climate variability through a more informed choice of policies, practices and technologies will, in many cases, reduce the long-term vulnerability of these systems to climate change. Therefore, in order to sustainably manage current ecosystem resources with respect to im-

[6] See document as contained in FCCC/CP/2010/2 on www.unfccc.int.

pacts of climate variability and to adequately address likely future climate change impacts, decision-makers at all levels need to be aware of all aspects of the climate system.

The IPCC AR4 report stresses that there needs to be better observations on climate (temperature and precipitation) and on the impacts of climate change on biodiversity (Magrin et al 2007). While there are some tools for estimating gradual change for most impacts of climate change, there are very few for assessing the conditions that lead to circumstances where a system changes or deteriorates rapidly. Most of the past research has addressed impacts on a single sector and there have been very few studies that address the interacting responses of diverse sectors impacted by climate change, making it very difficult to evaluate the extent to which multi-sector responses limit options or create completely new outcomes (Field et al 2007).

Therefore, integrated and multi-disciplinary (biology, climatology, economics, social science) assessments on the impacts of short-term climate variability and long-term climate change on all types of ecosystems are needed.

Also, further assessments of implications for biodiversity and associated ecosystem services as temperature rises in the next 10, 20, 50 years are needed, noting that the effects of climate change are already evident, including identifying 'points of no return' for biodiversity and ecosystem services (reference to be added later). These assessments would be particularly important to undertake in regions of the world which are highly vulnerable to climate change, are highly reliant on services provided by biodiversity and ecosystems for their livelihoods and do not have the economic means to adapt quickly or comprehensively. These assessments would also be of relevance in the context of climate change adaptation planning, development planning and disaster risk reduction.

Climate change and biodiversity are interconnected. Therefore, meeting biodiversity targets can contribute to alleviating greenhouse gas emissions and to reducing the threat of climate change and corresponding negative impacts on biodiversity and many other related sectors. At the same time, the efficient implementation of the UNFCCC can bring considerable benefits for biodiversity. It is important to better understand and integrate possible direct and indirect, positive and negative linkages between climate change and biodiversity and to take them appropriately into account so to be able to harness synergies leading to win-win-situations. In the light of the findings of the IPCC and the AHTEG on biodiversity and climate change, an ambitious and effective climate change deal could play a significant role in protecting biodiversity and preventing the worst projections of the IPCC becoming a reality.

Protecting and enhancing ecosystem resilience through biodiversity and ecosystem service conservation, management and restoration, are amongst the most cost effective ways of tackling both the causes and consequences of climate change. Ecosystem-based approaches are ready for use, easily accessible, and can bring multiple benefits, including improvement of livelihoods and poverty alleviation. These approaches involve people and share responsibility for a future built in welfare, equity, security, human development and wellbeing.

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B. LAND

Land is the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system. The reduction or loss of the biological or economic productivity and complexity of cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including human –induced processes conforms to what is called land degradation. These losses can result in widespread changes to land resources, (mainly soils, water and vegetation) as well as to changes in the provision of ecosystem services. Desertification (land degradation in drylands) contributes significantly to climate change and biodiversity loss. On the whole, com-

bating desertification depends on numerous factors but has the potential to yield multiple local and global benefits and help mitigate biodiversity loss and human-induced global climate change.

Environmental management approaches for combating desertification, mitigating climate change, and conserving biodiversity are interlinked in many ways. Cooperative implementation of the Rio conventions and other thematically-clustered environmental agreements can lead to increased effectiveness, benefiting the well-being of dryland populations. Adaptation and conservation practices at the local level can mitigate some losses to the services provided by the land.

In order to decouple the indirect and direct drivers of biodiversity loss (see Chapter XXX) by means of land management improvements and a more efficient use of land resources, coordination and spatial planning efforts across MEA clusters and other UN agencies is creating a fruitful interface within the land, agriculture and forestry communities. A number of UN system-wide actions (see table XX) address the indirect drivers of biodiversity loss through policy advice, communication, education and public awareness, including the realignment of economic incentives and mainstreaming of biodiversity across sectors in government and society. Due to strongly interlinked issues, and the need for more coherent policies between desertification, biodiversity loss, and climate change, the joint implementation of the UNCCD, the Convention on Biological Diversity, and the Framework Convention on Climate Change can streamline multiple benefits and policy harmonization on mitigation and adaptation to climate change and biodiversity conservation in drylands.

The key forms of human-induced environmental change that need to be addressed by the principal UN bodies dealing with land management include climate change, desertification and land degradation, biodiversity loss, and air and water pollution. Dramatic ecosystem alterations are resulting in extended land degradation and massive biodiversity loss. Different forms of natural or human-induced changes interact and point to the need for policy coherence and synergy. One basic and pervasive form of change driving policy integration, climate change, has already lead to increased analysis of the linkages and gaps in approaches to global land change on an inter-agency basis.

The disruption of the interlinked ecosystem services provided by dryland biodiversity is often a trigger for desertification and its various manifestations, including the loss of habitats for biodiversity. Climate change may adversely affect biodiversity and exacerbate desertification due to an increase in evapo-transpiration and a likely decrease in rainfall in drylands (although it may increase globally). However, since carbon dioxide is also a major resource for plant productivity, water use efficiency can favorably improve for some dryland species. These contrasting responses of different dryland plants to increasing carbon dioxide and temperatures may lead to changes in species composition and abundances. Utilizing science and knowledge networks across agencies can drive land-based policy changes on these issues, particularly on the loss in the capacity for carbon sequestration in drylands. Advancements in scientific understanding of the underlying opportunities in carbon sequestration and addressing problems in an increase in land-surface albedo are some of the challenges for innovative policy coherence in desertification and poverty reduction issues in climate change.

Although climate change may increase aridity and desertification risk in many areas (medium certainty), the consequent negative effects on ecosystem services driven by biodiversity loss and, hence, on desertification are difficult to predict. Therefore, creating policy space for continuous interaction among actors in order to address climate change through a reduction in land degradation will require full participation of agencies working with conservation technologies, restoration and the sustainable management of forests, soils, peatlands, and freshwater and coastal wetlands.

Future targets related to 'zero-net' land degradation would bring together efforts to address DLDD issues across various international initiatives and networks relying on actors and agencies dealing with substantive synergies both within and out of the UN system (e.g., Millennium Development Goals, UN Land, CBD Programme of Work on Dry and Sub-humid lands, UNDP Drylands Program). Setting global benchmarks on reducing land degradation and the linkage to new biodiversity targets can serve to strengthen the issue prioritization on ecosystem services from the land sector. 'Zero Net' land degradation is not the same as 'zero desertification', which means no land degradation anywhere. Rather, it recognizes that changes in the configuration of the land-use mosaic are needed, provided the net quantity; quality and carbon density of the land systems is maintained. Institutional mechanisms and more coordinated approaches between the multiple perspectives of the UNCCD, FAO, WMO and the Rio conventions, among others, will help to achieve the objectives under the UNCCD 10 Year Strategic Plan. A continuous flow and dissemination of information will ensure a collective action in response to the range of land-based biodiversity problems.

Biodiversity targets remain vulnerable to the rate of land degradation and policies that are envisaged to conserve as much of the world's remaining arable land as possible. Maximizing food security is tied to sustaining political influence in dealing with conservation of biodiversity and carbon sequestration through adaptation to a changing climate. A 'zero-net' land degradation by an agreed timeframe, for example the end of the UN Decade for Deserts and the Fight against Desertification 2010-2020, can be translated into concrete land degradation reduction targets that converge with biodiversity targets for 2020 and beyond. The target of this cooperative support on land degradation also aims at reducing the rate of change in deforestation through production efficiency and land use planning combined with recognition of the economic value of ecosystem services provided by natural habitats.

An integrated approach to policymaking on sustainable land management represents a critical strategy to achieve broad-based participation by FAO, UNCCD, UNEP, UNDP, The World Bank, GEF and all UN entities with responsibilities to address the "vicious cycle" of land degradation. Effective action through policy coherence and synergy is being undertaken by UN agencies and includes a range of ecosystem service-oriented strategies that contribute to:

- UN system-wide Land Initiative;
- Increased science-policy dialogues and policy interactions on sustainable land management;
- Increased monitoring and assessment of DLDD
- Promoting responsible investments in ecosystem services, drought risk management, carbon markets and dryland agriculture systems.

Human activities directly or indirectly affect terrestrial ecosystems worldwide. Strengthening the UN system to harmonize and foster action on issues related to land governance including empowerment of local populations and the use of rights-based approaches remains a priority in sectors dealing with land administration, the rural-urban dichotomy and human settlements. The type and intensity of land management regimes modify the rates of biodiversity loss, and the flows of ecosystem services. The manner in which pastoral systems develop in Eurasia, or in which agricultural expansion takes place in Africa, or other tropical regions, and in fragile ecosystems such as mountainous and small islands, is uncertain relative to the roles of industrial sources of fertilizers, the development of irrigated lands, and the use of mechanized equipment in land use practice modifications.

Spatial connectivity between different land uses can affect ecosystem services due to modifications of biological interactions, fluxes of water and nutrients, or disturbance regimes such as fire or grazing. These impacts can then lead to changes in ecosystem dynamics, which may in turn affect the human systems that depend on them. Successful land management strategies and crop diversities will require an empowered role and increased responsibilities for women. The relevance of credible scientific information from UN agencies for the analysis of indicators for the conservation and sustainable use of biodiversity for food and agriculture, at national and international level will remain critical. Sustaining a dialogue between principal UN agencies and environmental institutions can increase understanding of the decision-making processes related to land use management and provide the foundation for both working with and promoting biodiversity indicators and achieving targets. The long-term biodiversity targets that have connections with land management methodologies can be achieved through system-wide strategies for sustainable livelihoods in agriculture: permanent cover rotation, tillage, grazing management, rotational grazing, enclosure, enrichment, etc; forestry, agroforestry, water management, water harvesting and other technologies which have been validated for soil and nutrient management.

Complementing these methodologies should be an overall increase in protected areas that maintain ecosystem services and equally produce and provide for benefits for food, fiber, fuel, freshwater provision and carbon storage. Increasing protected areas has the potential to provide the needed delivery of sustainable land management for conservation of habitats and population well being while protecting important ecosystem services. Collection, compilation and analysis of data on potential protected areas is relevant for opportunities on food production, forests management and sustainable agriculture as contained in a number of global databases.

Land management decisions not only affect the spatial patterns of land use and biodiversity, but also the interaction across landscapes and between the international agencies that overlay the national agencies. The spatial scale and temporal diffusion of land-based environmental issues that affect biodiversity and ecosystem

processes such as water fluxes, seed dispersal, disturbance regimes and plant-animal relationships are areas for collective UN action. Important is the expansion of scientific assessment, knowledge networking and the analytical groundwork on different land management practices. A system-wide set of studies and policy option development on land use effects on ecosystem dynamics, including comparative studies across gradients of land use intensities can complement regional and global analyses.

C. WATER

THE IMPORTANCE OF BIODIVERSITY TO WATER

In 2030, 47% of the world population will be living in areas of high water stress and more than 5 billion people, 67% of the world population, may still be without improved access to sanitation. Increasing water insecurity is the key natural resource factor undermining sustainable development

Water and the management of changes occurring in the water cycle is a central and cross cutting theme in relation to biodiversity and sustainable development across the multi-lateral environment agreements and practically the entire UN interests. Water is a vital resource. It is recyclable but not replaceable. Useable freshwater is finite and its distribution very uneven (including nationally). Practically all economic activities depend on or have an impact on water and better water management is central to the achievement of most of the Millennium Development Goals. Water security is a primary natural resource challenge and therefore of direct relevance to a broad range of stakeholders in addition to those interested in biodiversity. Water is very high on political, public, economic and financial agendas.

Water is central to ecosystem functioning: all life-forms depend upon it. Water supply is also one of the most valuable and essential services provided by ecosystems; for example, the value of water-related services provided by tropical forests exceeds their combined values for climate regulation, timber and non-timber products and tourism and recreation. Water moves through the biosphere through precipitation (rain and snow fall), surface waters and soil and groundwater. Biodiversity underpins ecosystem functioning that supports this cycle: for example, in most areas about 60% of local precipitation arises through transpiration of plants (particularly forests). Sustaining the water cycle therefore involves not only improved wetland management but better management of practically all land use activities. Changing water availability and quality is a major driver of changes in inland water and wetland ecosystems as well as terrestrial ecosystems.

HOW DOES WATER IMPACT ON BIODIVERSITY?

The Third World Water Development Report (UNESCO 2009) shows that major changes are already occurring in the water cycle at local, national and regional scales due to direct human interventions. The groundwater portion of the water cycle has been subjected to massive changes. Problems are emerging on continental scales and are impacting not only people but also both terrestrial and aquatic ecosystems; groundwater depletion, for example, is exerting major influences on terrestrial vegetation and agriculture. Nearly a third (31%) of freshwater species assessed for the 2009 IUCN Red List are already threatened or extinct. Competition for water exists at all levels, and is forecast to increase in almost all countries. Conflicts between agricultural and urban uses are a paramount concern; 81% of humanity is projected to be living in towns and cities by 2030 and water is the primary natural resource upon which cities depend (44% of cities already rely on forested protected areas for their water supplies). Sustaining or restoring the water related services that ecosystems provide is necessary to improve water security, with already demonstrable economic cost-savings.

The limit of ecological sustainability of water available for human uses (4000 km^3 per annum) has already been reached, but use and availability are not evenly distributed. "Nature" is still the most important player in the water cycle and evapo-transpirates an estimated 70,000 km^3/year from forests, natural vegetation and wetlands. It is inevitable that as water becomes more scarce human activities will take an increasing share of water; this needs to be managed if it is not to stimulate further negative feedbacks whereby further water abstraction and degradation undermines the ability of nature to continue to supply water for us to use.

The impacts of climate change are occurring mainly through changes in the water cycle. The findings of the IPCC third and fourth assessment reports confirm that the changing, and generally accelerating, water cycle is central to most of the climate change related shifts in ecosystems and human well-being.

The IPCC technical report on climate change and water (2008) concludes, *inter alia*, that: the relationship between climate change and freshwater resources is of primary concern and interest; so far, water resource issues have not been adequately addressed in climate change analyses and climate policy formulations; likewise, in most cases climate change problems have not been adequately dealt with in water resources analyses, management and policy formulation; and, according to many experts, water and its availability and quality will be the main pressures, and issues, on societies and the environment under climate change. The carbon cycle and the water cycle are perhaps the two most important large-scale bio-geological processes for life on Earth. Climate change mitigation is about managing the carbon cycle, adaptation is largely about managing the water cycle. But inter-actions between various stages of the carbon and water cycles can yield feedbacks to climate change. For example, the sustainability of carbon storage by forest ecosystems can be threatened unless water cycles are sustained. Mitigation efforts must pay more attention to the role of both the water and carbon cycles.

RESPONDING TO CHALLENGES AND OPPORTUNITIES

Sustaining or restoring the water related services provided by ecosystems is at the heart of managing water security for both people and nature. There is already solid evidence that ecosystem based solutions to water related problems are not only viable but can be very attractive in terms of investment returns. Water related economic interests are already driving major shifts towards improved attention to the wiser use of nature and biodiversity on the business, public and national policy agendas, including in major developing countries.

HOW DOES WATER CONTRIBUTE AND RESPOND TO THE STRATEGIC PLAN AND THE POST 2010 TARGETS

Water forges the strongest links between biodiversity and development and therefore between the MEAs and the broader development community. Amongst the Multilateral Environmental Agreements (MEAs), water is central to, and explicit in, the Ramsar Convention. Amongst the other MEAs, and in particular the CBD, there is a need for elevated attention to relationships between biodiversity, ecosystem functioning, the water cycle and development across most areas of work. Water should be a more central focus of the biodiversity agenda for the post-2010 period. It is essential to capitalise on the prominent ways in which water makes biodiversity more relevant to a broader constituency and provides one of the clearest and relevant frameworks for UN system wide efforts.

CHAPTER 4: PRIMARY PRODUCTION: - AGRICULTURE, FORESTRY AND FISHERIES

THE IMPORTANCE OF BIODIVERSITY FOR DIFFERENT SECTORS: INTERDEPENDENCY AND CO-BENEFITS

The diversity of life on this planet, be it cultivated or wild, be it on the land, in the sea, in freshwater, in the air or underground, provides the raw materials for our diets, ensures the provision of the necessary range of nutrients for our health and also provides for the range of ecosystem services that make the production of these raw materials possible.

This biodiversity in agriculture, or "agricultural biodiversity", is the result of thousands of years of human activity combined with the continuous action of natural selection. Over the years, farmers, herders, pastoralists, fisherfolk and forest dwellers have recognized the importance of agricultural biodiversity at the genetic, species and ecosystem levels. Agrobiodiversity is necessary for production, adaptation and maintenance of ecosystem functions. Also, agricultural lands and coasts managed sustainably as ecosystems contribute to wider ecosystem functions such as maintenance of water quality, soil moisture retention with reduction of runoff, water infiltration, erosion control, carbon sequestration, pollination, dispersal of seeds of wild and endangered plants, and refugee for species during droughts.

The interrelationships among biodiversity, nutrition, human health, agriculture and food production, environmental health, social stability and economic production are inextricable. Healthy and dynamic relations between wild biodiversity and managed agricultural biodiversity are necessary to ensure that this overall system continues to work, secures the necessary high levels of genetic diversity, is resilient and maintains its ability to cope with the challenges of climate change, extreme weather events, emerging diseases and economic stresses.

HOW SECTORAL ISSUES IMPACT BIODIVERSITY?

A growing world population, coupled with unsustainable production practices and increased scarcity of natural resources worsened by climate change pose serious challenges to feed the world. The latest estimates show that an increase of about 70% in world agricultural production will be required to meet food and nutrition demands by 2050 (FAO, 2009[7]). This challenge must be met through promoting production systems that are ecologically sound and sustainable and respecting the synergies and linkages between agricultural biodiversity and nutrition. Although technological progress, input use and high yielding varieties have helped in increasing agricultural production, the increasing number of undernourished people in the world show that much is still to be done. In addition risks of reduced resilience and of increased outbreaks of diseases will have to be avoided through a larger use of biodiversity.

An example of the linkages between agricultural biodiversity and nutrition is illustrated in a recent study from the Center for Indigenous Peoples' Nutrition and Environment (CINE) and FAO[8]. This study shows that, in most cases from different parts of the world, the increase of commercial food items over time results in a decrease in the quality of the diet. The study also shows the crucial role of a diversified diet based on local biodiversity and traditional food for food security, nutrition and health.

Through a unique relationship with the environment, rural populations have accumulated specialized information about biological variation, processes and their management, allowing protection against crop failure, animal loss, soil infertility, climate shifts, and other threatening factors. However, increased scientific knowledge

[7] FAO Strategic Framework 2010-2019, FAO Conference document, November 2009.
[8] "*Indigenous Peoples' food systems: the many dimensions of culture, diversity and environment for nutrition and health*", FAO and Centre for Indigenous Peoples' Nutrition and Environment – 2009 CINE - McGill University, Canada.

still needs to be collected on representative ecosystems that provide the basis for sustainable local food and agriculture systems, especially at the global level.

Experiences focusing on livelihoods in traditional rice farming in Asian communities found that cultivation of rice in flooded systems is accompanied by a rich variety of fish and other aquatic organisms, and that wild and gathered foods, from the aquatic habitat, provide important diversity, nutrition and food security. Yet this rich and important diversity, that also embraces the concepts of an ecosystem approach and the important role of agricultural biodiversity for people and the environment, is usually not recognized in national statistics, policies, and legal frameworks[1]. More recently, the value of rice-associated biodiversity for people and their livelihoods is increasingly being recognized in international fora such as the International Rice Commission (IRC) and the RAMSAR Convention[1].

RESPONDING TO CHALLENGES AND OPPORTUNITIES

The United Nations system and FAO especially, has developed the necessary knowledge to address the needs of setting standards for sustainable production practices in agriculture, fisheries and for sustainable forest management. FAO provides an intergovernmental forum where countries address issues of importance to food and agriculture, and adopt international instruments that are implemented at the national level.

The global changes we are facing will inevitably have a major impact on the most vulnerable, poor and food-insecure people and countries. In addition, there will be greater risks to the natural resource base including soil erosion, land degradation and loss of biodiversity. These threats will undoubtedly require that more attention be paid to adaptation measures, and thus to appropriate management of agricultural biodiversity and specific initiatives (Lipper et al. 2009[9]). Such initiatives will have to follow two different and balanced approaches: on the one hand we will need to improve our production capacity, and on the other hand we will have to conserve and manage biodiversity – at the genetic, species and ecosystem levels - so as to maintain our natural capital and cope with future threats.

Recognising the nutritional, economic, social, environmental and cultural importance of **fisheries** and the interests of all those concerned with the fishery sector and also taking into account the biological characteristics of the resources and their environment and the interests of consumers and other users, FAO, intergovernmental organizations, the fishing industry and non-governmental organizations elaborated the *Code of Conduct for Responsible Fisheries.*

The Code describes how fisheries should be managed responsibly, and how fishing operations themselves should be conducted. It then addresses the development of aquaculture, the linking of fisheries with other coastal zone activities, and the processing and selling of the catch. The importance of countries co-operating with one another in all aspects of fisheries is also highlighted.

INTERNATIONAL FISHERIES SECTOR INSTRUMENTS

The Code of Conduct for Responsible Fisheries sets out principles and international standards of behaviour for responsible fisheries and aquaculture practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.

Illegal, Unreported and Unregulated (IUU) fishing is a new treaty on illegal fishing which has been approved by FAO's governing Conference that aims to close fishing ports to ships involved in fraudulent practices.

The FAO Species Identification and Data Programme provide tools for proper species identification as well as species-specific information on conservation status, socioeconomic and traditional importance.

Implementation of the Code is also underpinned by the implementation of four International Plans of Action addressing specific threats to marine biodiversity: to reduce fishing capacity and eliminate overfishing; to

[9] Lipper, Cavatassi and Keleman, (2009) The contribution of PGRFA to food security and sustainable agricultural development, Chapter 8, SOWPGRFA-2, FAO, Rome

combat illegal fishing[10]; to protect birds from accidental capture in longline fisheries; and to improve shark fisheries management. A major recent achievement is a new treaty on illegal fishing which has been approved by FAO's governing Conference that aims to close fishing ports to ships involved in illegal, unreported and unregulated (IUU) fishing. The FAO Species Identification and Data Programme contributes to improved knowledge on aquatic biodiversity.

In **agriculture**, with land scarcity, sustainable production intensification rather than area expansion becomes the primary option available. A challenge today is to increase food production in light of global-level crises while maintaining or improving the natural resource base. The conservation and sustainable use of agricultural biodiversity is an important way to achieve and increase food production, while both mitigating and adapting to these global crises.

As we are faced with the need to increase crop productivity in the context of an increasingly degraded environment, our challenge is to increase our ability to sustainably use and manage agricultural biodiversity, moving away from non-renewable inputs and chemicals based intensification towards farming practices relying on natural biological processes and biodiversity. Sustainable crop production intensification addresses this, through identification and use of mechanisms for valuing agricultural biodiversity and ecosystem services, in addition to sound agronomic practices (crop, soil, nutrient and water efficient management). Practices such as combining crops with livestock can add an additional benefit and impact less on biodiversity. For example, ruminants can consume crop residues, while animal products can provide a source of income at times outside of harvest season, including manure, which can be returned to the system as fertilizer. Alternatively, carefully managed grazing with livestock can yield a source of livelihood in marginal areas that are unsuitable for cultivated crop production.

In 2002 FAO, CBD, UNEP and a number of other international organizations started an initiative for the international recognition, conservation and adaptive management of Globally Important Agricultural Heritage systems (GIAHS).

INTERNATIONAL AGRICULTURE SECTOR INSTRUMENTS

Globally Important Agricultural Heritage systems (GIAHS). The initiative aims to provide adequate recognition to, and conservation of, traditional agriculture heritage systems - rich in agricultural biodiversity, wildlife and containing important resources of indigenous knowledge for food and livelihood security. To date, over 100 systems world-wide have been identified.

International Plant Protection Convention (IPPC).The Convention encourages cooperation between nations in protecting the world's cultivated and wild plant resources from the spread and introduction of plant pests, while minimizing interference with the international movement of goods and people.

The *Rotterdam Convention*, with its joint UNEP/FAO Secretariat, promotes shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm, and contributes to the environmentally sound use of those hazardous chemicals.

The Codex Alimentarius constitutes a reference point for protection and regulation of production in international food trade where quality criteria or claims for specific foods such as traditional foods are included.

International Treaty on Plant Genetic Resources for Food and Agriculture. The scope of the Treaty is all plant genetic resources for food and agriculture, but it also establishes a Multilateral System of Access and Benefit-sharing for plant genetic resources, for an agreed list of crops, established on the basis of interdependence and food security. It also provides for benefit-sharing through information exchange, technology transfer, capacity-building, and the mandatory sharing of the monetary and other benefits of commercialization of products incorporating material accessed from the Multilateral System.

With respect to the need to conserve and sustainably utilize the diversity (including at the genetic level) needed for food security and to guarantee diversified foods and adequate nutrients, FAO developed a number of international instruments adopted by countries, which are at the cross-roads between production, trade

[10] See also Report of the FAO/UNEP Expert Meeting on Impacts of Destructive Fishing Practices, Unsustainable Fishing and Illegal, Unreported and Unregulated (IUU) Fishing on Marine Biodiversity and Habitats - Organized in collaboration with the CBD Secretariat Rome, 23-25 September 2009

and the environment, and also aim at promoting harmony and synergy across the sectors. Some examples of such instruments addressing sustainable agriculture include the *International Plant Protection Convention* (IPPC) and the *Rotterdam Convention*.

The need to protect and regulate production is addressed by the *Codex Alimentarius* through the standards, guidelines and related texts developed by its Commission.

At the genetic level, responding to the need for the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, FAO developed the legally-binding *International Treaty on Plant Genetic Resources for Food and Agriculture*.

Forests are the most important repositories of terrestrial biodiversity indispensable to maintain the potential of species to adapt to environmental changes and users' future requirements, as well as to sustain ecosystems functions. Less than 10% of tropical forests, which are the most threatened by deforestation and degradation, are covered by protected areas. Production forests, which represent an important part of the remaining 90%, thus offer a very important potential for the conservation of biodiversity. The integration of biodiversity conservation concerns in the management of tropical forest concessions is developing, through the implementation of new forest policies and laws adopted by countries. However, the integration of biodiversity concerns remains incomplete in general.

To address the need of assessing the state of forest resources, FAO created the Global Forest Resources Assessments (FRA), an instrument based on countries reports for the monitoring of the world's forests.

A number of programmes and actions have also started to address the need to protect forests and their resources. FAO's programme on wildlife and protected area management seeks to conserve and sustainably manage wild animal species and their habitats with a view to make wise use of them for income and food generation, and thereby improving the livelihoods of poor rural people. A particular concern which is being addressed as an issue of priority is the rapid depletion of the common as well as uncommon wildlife species in the world's major tropical rainforest regions as a consequence of the highly commercialised bushmeat trade destined for big urban markets. By continually overhunting the unique rainforest fauna, not only will many species become extinct in the near future, but the ecological functions and services of these global biodiversity hotspots will also become severely impaired, including the forest's carbon sequestration capacities for climate change mitigation.

In the field of forest genetic resources, major emphasis is placed on sharing and transfer of information, know-how and technologies, through a wide range of tools and mechanisms, in close collaboration with national and international partners. The FAO *Global Information System on Forest Genetic Resources* contains information related to the conservation, enhancement and utilization of forest genetic resources, by species, in each country. At the **cross-sectorial** level, FAO, through its Commission on Genetic Resources for Food and Agriculture, provides an intergovernmental platform for sharing the best available knowledges on genetic resources.

The Multi-Year-Programme of Work of the Commission foresees a set of country-driven assessments leading to the publishing of *Reports on the State of the World's Genetic Resources for Food and Agriculture*. As a result of this effort, the Commission also developed and adopted *Global Plans of Action* for both plant and animal genetic resources, in recognition of the need to develop an effective framework for the management of these resources and to address the threat of genetic erosion.

INTERNATIONAL FOREST SECTOR INSTRUMENTS

Global Forest Resources Assessments (FRA). The scope of the assessments, which started from wood supply in response to fears of a wood shortage after the Second World War, has gradually expanded. The FRA presently provides a holistic perspective on global forest resources, on their management and uses and includes the assessment of timber and biodiversity resources as well as indications of the contribution of forests to the global carbon cycle, assessments of the productive, protective and socio economic functions of forests and presents information on the legal, policy and institutional frameworks related to forests.

Global Information System on Forest Genetic Resources. This instrument forms a readily available source of up-to-date information for use in planning and decision making at the national, regional and international levels. The system has been developed though close collaboration of FAO, governments and national institutes, and included by early 2000 information from 146 countries on more than 16000 tree species. The system will be updated and upgraded in relation with the preparation of the *State of the World's Forest Genetic Resources*.

Commission on Genetic Resources for Food and Agriculture (The "Commission"). At the **cross-sectorial** level, FAO, provides this intergovernmental platform for sharing the best available technical and scientific knowledge on genetic resources (animals, plants, fisheries and forests) of relevance for food and agriculture (developed by UN institutions and academia), and for policy making.

The Multi-Year-Programme of Work of the Commission foresees a set of country-driven assessments leading to the publishing of *Reports on the State of the World's Genetic Resources for Food and Agriculture*

The Global Plans of Action are rolling plans with provisions for the sustainable use, development and conservation of animal and plant genetic resources at national, regional and global levels that also outline strategic priorities and identify the roles of major stakeholders in their implementation.

HOW DIFFERENT SECTORS ARE PLACED TO CONTRIBUTE AND RESPOND TO THE CBD STRATEGIC PLAN AND THE POST 2010 TARGETS

In light of current global issues such as population growth, urbanization, volatile food prices and climate change, providing an adequate supply of food of requisite quality will depend on more efficient and resilient production systems using good farming practices that make efficient use of the natural resources base, coupled with an enabling policy and institutional framework.

The movement towards sustainability in agriculture, fisheries and forestry at FAO and in the UN system, *de facto* includes mainstreaming biodiversity. The international instruments developed within these sectors are well positioned, when implemented, to further countries' efforts to conserve and sustainably use biodiversity. The contribution of the implementation (at national level) of existing international sectoral instruments to the conservation and sustainable use of biodiversity should not be underestimated.

CHAPTER 5: SOCIAL SERVICES: - HEALTH, KNOWLEDGE AND CULTURE

A. HEALTH

Human health ultimately depends upon ecosystem products and services (such as availability of fresh water, food and fuel sources) which are requisite for good human health and productive livelihoods. Thus, biodiversity loss can have significant direct human health impacts if ecosystem services are no longer adequate to meet social needs. Indirectly, changes in ecosystem services affect livelihoods, income, local migration and, on occasion, may even cause political conflict. The resultant impacts on economic and physical security, freedom, choice and social relations have wide-ranging impacts on well-being and health, and the availability and access to health services and medicines.

Secondly, the biophysical diversity of microorganisms, flora and fauna provides extensive knowledge which carry important benefits for biological, health, and pharmacological sciences. Significant medical and pharmacological discoveries are made through greater understanding of the earth's biodiversity. Loss in biodiversity may limit discovery of potential treatments for many diseases and health problems.

HUMAN HEALTH DEPENDING ON BIODIVERSITY

- NUTRITIONAL IMPACT OF BIODIVERSITY

Biodiversity plays a crucial role in human nutrition through its influence on world food production, as it ensures the sustainable productivity of soils and provides the genetic resources for all crops, livestock, and marine species harvested for food.

The *karat* banana cultivar of Micronesia's Pohnpei, which is rich in β-carotene and is well accepted by young children, has proved to be effective to combat Vitamin A deficiency which has severe consequences for young children in the developing world.

Access to a sufficiency of a nutritious variety of food is a fundamental determinant of health. At present, the health of about 1 billion people is compromised as a result of excessive consumption of food energy, while a similar number are chronically undernourished. Undernutrition is the single most important cause of global ill health, despite aggregate global food production that is sufficient to meet the needs of all. In the future, loss of productive capacity in areas with current burdens of undernutrition through adverse global scale environmental changes threatens to worsen these nutritional disparities. Nutrition and biodiversity are linked at many levels: the ecosystem, with food production as an ecosystem service; the species in the ecosystem and the genetic diversity within species. Nutritional composition between foods and among varieties/cultivars/breeds of the same food can differ dramatically, affecting micronutrient availability in the diet. Consumption of one food variety over another can make the difference between micronutrient deficiency and micronutrient adequacy. In order to guarantee that local diets are healthy, and that the average levels of nutrients intake is adequate, biodiversity level has to be kept high[11].

Sweet potato cultivars which can differ in their carotenoid content by two orders of magnitude or more; protein content of rice varieties can range from 5 to 13%; provitamin-A carotenoid content of bananas can be less than 1 mcg/100 g for some cultivars to as high as 8,500 mcg/100 g for other cultivars.

Human efforts to enhance food production through intensified processes (irrigation, use of fertilizer), plant protection (pesticides) or the introduction of crop varieties and cropping patterns will have an impact on the global nutritional potential, but will also affect biodiversity and, as a result, human health. Habitat simplification, species loss and species succession often enhance communities vulnerabilities as a function of environmental receptivity to ill health. The

[11] The Cross-cutting Initiative on Biodiversity for Food and Nutrition, led by FAO in collaboration with Bioversity International, provides the decisive impetus to increase awareness on the crucial link among biodiversity, cultivar-specific nutrient composition data and food and nutrition security. FAO supports countries to generate, compile and disseminate nutrient composition and consumption data based on biodiversity.

impact of irrigation development on malaria, schistosomiasis and other vector-borne diseases stands as a well-documented example.

- BIOLOGICAL PRODUCTS AND TRADITIONAL MEDICINE

Many communities rely on natural products collected from ecosystems for medicinal and cultural purposes, in addition to foods.

Traditional medicine is the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness (WHO).

The use of medicinal plants is seen as the most common medication tool in traditional medicine and complementary medicine worldwide. Medicinal plants are supplied through collection from wild populations and cultivation.

Even in modern times, traditional medicine continue to play an essential role in health care, especially in primary health care (1, 2). It has been estimated by the World Health Organization that traditional medicines are used by some 60% of the world's population and in some countries are extensively incorporated into the public health system .

During the last 30 years, the use of traditional medicine has increased tremendously in varying ways from country to country, depending on each nation's health care situation. Primary health care is an inspiration for work on health systems. Besides this, it also includes integrated service delivery, including self-care.

International actions to address concerns regarding unsustainable harvests of medicinal plants were initiated in the mid-1980s. In 1988, WHO, IUCN – The World Conservation Union and WWF convened the International Consultation on Conservation of Medicinal Plants in Chiang Mai, Thailand. Outcomes of this consultation included the 'Chiang Mai Declaration', calling for action to "Save the Plants that Save Lives", publication of the proceedings of the meeting in 1991 , and, the joint WHO/IUCN/WWF Guidelines on the Conservation of Medicinal Plants', published in 1993[12].

Although synthetic medicines (over half of which originated from natural precursors) are available for many purposes, the global need and demand for natural products persists especially for biomedical research that has long relied on plants, animals and microbes to understand human physiology and to understand and treat human diseases. Some of the better-known mainstream pharmaceuticals from natural sources include aspirin, digitalis quinine and penicillin.

While some species are cultivated commercially, the majority continues to be collected from the wild. Wild harvested medicinals are still the main source of raw materials for medicinal use, whilst being an important source of income to local harvesters. If not managed appropriately, wildharvesting can damage wild plant populations, threatening species, habitats and the healthcare practices dependent on them.

WHO's work on the protection of medicinal plants

By the request of the World Health Assembly resolutions, WHO has been collaborating with other organizations of the United Nations system (e.g. FAO, UNESCO, UPOV, WIPO, UNIDO, ICSP) and nongovernmental organizations (e.g. IUCN, WWF, TRAFFIC INTERNATIONAL, WSMI, FIP) in various area related to traditional medicine, including research, protection of traditional medicine knowledge and conservation of medicinal plants resources.

[12] Over the last decade, the Guidelines have provided an agenda for national level approaches to increase knowledge of and conserve medicinal plant species, including through actions to protect these resources in their natural habitats and to conserve them in botanic gardens. WHO, WWF and IUCN have continued to work independently and together toward the shared objectives of sustainable use of medicinal plants, these guidelines are being updated in order to reflect the knowledge that has been gained in the past decade including the through the international framework and conventions such as United Nations Conference on Environment and Development, the United Nations Convention on Biological Diversity (CBD) .

For example, as a WHO's work on the protection of medicinal plants, aiming promotion of sustainable use and cultivation of medicinal plants, WHO developed guidelines on good agricultural and collection practices (GACP) for medicinal plants (3) . Although GACP for medicinal plants are the first step in quality assurance, on which the safety and efficacy of herbal medicinal products directly depend, these practices also play an important role in protecting natural resources of medicinal plants for sustainable use. These WHO guidelines note the importance of addressing species conservation and social issues related to medicinal plant use.

Another guidelines are relating to contaminants and residues of herbal medicines especially herbal materials that may impact safety of the starting materials and finished herbal medicines products (4).

- INFECTIOUS DISEASES

Biodiversity and functioning ecosystems such as forests, wetlands, and coastal zones play a critical role in regulating infectious diseases. The great majority of infectious diseases which affect humans, are transmissible between humans, birds, reptiles, and mammals. These diseases are transmitted either directly between species or via insect or rodent vectors, such as mosquitoes serving to transmit malaria, dengue, and filariasis from person to person. Sometimes these diseases negatively affect the host-reservoir species, but often they are asymptomatic carriers of the pathogen. The transmission of infectious diseases are highly sensitive to environmental disturbances and balances in biodiversity.

Increasingly, human activities are disturbing both the structure and functions of ecosystems and altering native biodiversity which play important roles in regulating or transmitting human disease. Such disturbances influence infectious disease dynamics by determining where and when during the year disease pathogens, vectors, and reservoir hosts such as birds or mammals, can survive and proliferate and be present or absent to transmit disease to humans.

Major environmental processes affecting biodiversity and infectious disease dynamics include, deforestation; land-use change; water management e.g. through dam construction, irrigation, uncontrolled urbanization or urban sprawl; resistance to pesticide chemicals used to control certain disease vectors; climate variability and change; human and animal migration and international travel and trade; and the accidental or intentional human introduction of pathogens (Patz et al 2004). Such disturbances reduce or increase the abundance of pathogens and organisms, which serve as disease vectors and host-reservoirs, modify the interactions among organisms, and alter the interactions between organisms and their physical and chemical environments.

MENTAL HEALTH AND BIODIVERSITY

Availability and access to biodiversity plays a large role in the cultural services provided by nature, such as education, recreation, spirituality, religion, inspiration and sense of place which all directly bear on people's mental health. Sacred species and places bear enormous meaning on spirituality and religion in many parts of the world. Human engagement with nature and species are shown to help relieve stress and mental fatigue; enhance a sense of well-being, tranquility, and positive outlook; and have significant restorative benefits for mental and physical health (Maller et al 2006, Ulrich et al, 1991).

- CLIMATE CHANGE, BIODIVERSITY AND HEALTH

In a very fundamental sense, biodiversity provides numerous ecosystem services that are crucial to human well-being at present and in the future. Climate is an integral part of ecosystem functioning and human health is impacted directly and indirectly by the alteration of the atmospheric composition (the greenhouse effect) and the climatic conditions upon terrestrial and marine environments.

Direct effects of climate change on health include concerns such as increased risk of mortality from heat waves. However, the indirect effects (i.e climate-induced changes in the distribution of productive ecosystems, and the availability of food, water and energy supplies) are likely to have a greater overall impact on human health, and are often mediated by local conditions of biodiversity. Changes in biodiversity and ecosystems affect the distribution of infectious diseases, nutritional status and patterns of human settlement.

Extreme climate variability, such as prolonged drought and extreme rainfall stress biodiversity essential in agro-ecological production systems. Ocean acidification related to levels of carbon in the atmosphere also affects marine biodiversity, and availability of marine products, and warming sea-surface temperatures directly affect the integrity of coral reefs and coastal fisheries. Biodiversity losses in these systems can lead to reduced food availability and quality increasing risk for malnutrition, stunted childhood growth, susceptibility to infectious diseases, food poisoning and other ailments.

Examples of biodiversity and human health linkages

Changes in agro-ecosystems alter biodiversity balances important to human health. A good example is Japanese encephalitis, a disease caused by an arbovirus spread by marsh birds, amplified by pigs, and mainly transmitted by the bite of infected mosquitoes.The increased spread of Japanese encephalitis in South and South East Asia is linked to the expansion of irrigated rice mono-cultures combined with pig husbandry. This practice created an environment which facilitated a build up of viral infected mosquitoes, and a spill over of the disease to human populations of a disease which normally remains in pig and bird populations (Keiser et al 2005). Another example of species spill over associated with land change, is the increased transmission of Lyme disease in North America which has been associated with forest fragmentation, urban sprawl, and altered population dynamics of deer, rodents, and ticks which increased human contact and disease risk for humans (Schmidt & Ostfeld 2001).

The role biodiversity plays in the emergence and transmission zoonotic diseases can be seen in examples of humans coming in close contact with animals, carcasses, and wild meat which carry pathogens that humans have had little exposure and possess little natural immunity (Wolfe et al, 2000). Examples include, first transmission of SIV, the precursor of HIV to humans (Kalish et al 2005); SARS, emerged from a previously unknown animal coronavirus to become a virus readily transmissible between humans after exploiting opportunities for mixing disease strains between wild animals in 'wet markets' in Southern China (Woo et al, 2006). The Ebola and Marburg viral hemorrhagic fevers have both decimated populations of apes in Central Africa and caused explosive and highly lethal epidemics in humans (Groseth et al 2007), the transmission from non-human primates and druikers to humans has been associated with human contact with infected carcasses (Leroy et al 2004).

In Sub-Saharan Africa, medicinal plants are the backbone of the traditional health care system and play a key role in treating diseases and reducing the severity of disease symptoms, including HIV/AIDS symptoms such as nausea, and secondary illnesses such as skin infections. These plants are rapidly disappearing due to drought and over-harvesting when populations continue to have heavy reliance on these species.

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B. SCIENCE AND TECHNOLOGY, EDUCATION AND CULTURAL DIVERSITY

THE IMPORTANCE OF TACKLING THE ULTIMATE DRIVERS OF BIODIVERSITY

Societies in where there is an investment in S&T, particularly science education and science policy, can positively influence the institutional arrangements for ecosystem management as well as rights over ecosystem services, thus decreasing pressures on biodiversity.

Science and Technology (S&T) is recognized as a main driver of change affecting ecosystem structure and functioning. The Millennium Ecosystem Assessment (MA), both in its conceptual framework as well as in its final findings (MA 2003 and 2005), identifies S&T as one of the ultimate drivers of biodiversity erosion and loss. Cultural and religious factors also act as a main driver of biodiversity. S&T and education can positively affect cultural and believe systems so that behaviors compatible with the conservation and the sustainable and equitable use of biodiversity can be adopted and widely promoted. S&T and education can also provide elements of policy responses to other ultimate drivers of biodiversity loss, namely, dealing with demographic changes and designing governance systems that take into account multi-stakeholder perspectives and dialogues. The current debate on the contribution of cultural diversity to the resilience of social organization can play an important role in counterbalancing the perverse effects of globalization. This debate finds a parallel in discussions and actions in the area of biological diversity, and interlinkages between biological and cultural diversity, both in terms of mutual dependency as well as synergy opportunities, are increasingly apparent, demonstrated and capitalized upon, including in the context of Multilateral Environmental Agreements (Bridgewater *et al.* 2007).

RESPONDING TO CHALLENGES AND OPPORTUNITIES

Science & Technology

S&T can have both positive and negative impacts on biodiversity. The UNESCO World Science reports (UNESCO 2005; UNESCO World Science Report 2010, under development) give accounts of research in biodiversity and biotechnology having assisted in the inventorying of biodiversity, the enhanced management of natural resources and the development of applications such as pharmaceuticals from biodiversity in several regions of the world. The development of drugs from biodiversity is an example of a potentially formidable application of S&T to enhancing human health and also in terms of economic development. These issues are therefore at the heart of an equitable regime on access to and the sharing of benefits arising from biodiversity.

On the other hand, S&T applied to specific sectors such as water management in the context of large dams and similar infrastructures has had adverse impacts on biodiversity and requires particular attention in predicting and mitigating the realization of such macro-technological infrastructures (World Dams Commission 2000; World Water Development Report 2009),

Many positive experiences have demonstrated that S&T can be at the service of biodiversity conservation and the maintenance of ecosystem services on which human well-being and development depend. Selected examples pertaining to specific ecosystems, sectors and issues follow:

- In the marine environment, natural and social sciences-based marine spatial planning (MSP) has demonstrated that spatial planning is one of the most effective approaches to the conservation and sustainable use of biodiversity, as a consequence of coordinated action among the actors and stakeholders operating in given areas. Successful MSP plans and programmes have been developed and implemented to tackle the designation of marine protected areas, delimitate managed fishing zones, regulate transportation, reduce pollution and mitigate cumulative impacts of various sectors on biodiversity. These experiences could inform positive policy decisions and actions in the terrestrial environment terms of landscape-level planning that be compatible with the three objectives of the CBD (UNESCO 2007 and 2009).
- With regard to the climate change problem, scientific knowledge on biodiversity's responses to climate change has lead to the development of biogeography theory and action in support of the design and implementation of climate change adaptation plans. At the same time that biodiversity science is main-

streamed further into climate change science and policy, the integration of scientific findings on the evolution and impacts of climate change on biodiversity into biodiversity strategies and action plan is also of a paramount importance if biodiversity is to adapt to change in the global climate system. Linking the biodiversity and climate change agendas, including through S&T, is mandatory if appropriate measures to deal with mitigation of and adaptation to climate change that are compatible with biodiversity are to be taken (IPCC 2002; CBD 2007, 2009, UNESCO 2010).

- The taxonomic knowledge base of biodiversity, which is characterized by large gaps due to the potentially huge number of species and genes yet to be described, can be greatly enhanced through the application of the new generation of taxonomic tools such as metagenomics and proteomics, which are greatly assisted by biodiversity informatics. This information proves of great importance not only from the standpoint of enhancing our fundamental knowledge of biodiversity but also when it comes to practical applications such as setting priorities in conservation and related funding (UNESCO 2010).
- Other sectoral examples of the application of S&T for achieving the three objectives of the CBD include agricultural systems and the promotion of local varieties; the application of scientific knowledge on species and ecosystems, as well as on genetic dispersal, to programmes related to water management; and the contribution of remote sensing operations to the gathering and compilation of relevant information and data that are subsequently made available to all concerned users (GEO, GTOS, GOOS and GCOS 2010).

Velcro, infrared, sonars and self-cleaning surfaces all are examples of biomimicry, a growing scientific field of study where modern engineers, scientists and architects are turning to biodiversity, not to extract products from nature, but for inspirational, innovative and sustainable solutions to technically challenging problems. This is vitally important to such industries such as biomedicine, nanotechnology and materials science. Some industries are inspired by nature like aviation, which is based on mimicking birds' wings and behavior. Another example is the Eastgate Centre building in Zimbabwe, which is modeled on termite mounds which can maintain a stable inner temperature even when outside temperatures fluctuate between 3°C and 42°C. The building uses only 10% of the energy consumed in a conventional air-conditioned building, thus reducing energy costs and CO2 emissions. Losing biodiversity means losing the potential to find innovative solutions to future problems faced by humankind.

Moreover, in addition to scientific research and monitoring, S&T also encompass scientific assessments. Assessments are an integral element of the biodiversity policy-making process, in that informed decisions can be taken only on the basis of relevant, accurate and timely scientific information. It is expected that the proposed Intergovernmental Platform on Biodiversity and Ecosystem Services will embody a strong element in terms of scientific assessments (IPBES 2010).

Education

Education is essential in promoting the sustainable use of biodiversity. Education for Sustainable Development is the educational process of achieving human development through economic growth, social development, and environmental conservation that is inclusive, equitable and secure. It is possible to learn to live full lives within the capacity of the Earth to satisfy our needs – this is one of the main objectives of the UN Decade on Education for Sustainable Development (2004-2013), the plan of implementation of which encompass a specific biodiversity element (UNESCO 2010).

Because positive changes in the underlying drivers of biodiversity erosion and loss are thought to largely depend on effective communication and education, in 2002, the Conference of the Parties to the CBD at its sixth meeting adopted the CBD Programme of Work on Biodiversity Communication, Education and Public Awareness (CEPA). This Programme of Work was developed on the basis of a Global Initiative on CEPA, jointly developed by the CBD and UNESCO as of 1998. The Global Initiative has allowed paving the basis for mainstreaming CEPA into the work of the Convention as well as those of the other biodiversity-related Conventions. It has allowed to collect case studies on experiences, solutions as well as on emerging and unresolved issues related to biodiversity CEPA at multiple levels, Practical approaches to CEPA have been conceived in the context of the Global Initiative and the related Programme of Work. These include toolkits for CBD National Focal Points, approaches for mainstreaming CEPA into NBSAPs and the role of global campaigns, which are exemplified by the on-going International Year of Biodiversity.

It appears, based on both expert advice in the context of the Global Initiative as well as review of the CEPA Programme of Work on behalf of the CBD governing bodies, that CEPA remains and essential element for the successful implementation of the Convention's Strategic Plan. However, the success of the Global Initiative will continue being hampered until proper political attention and funding are devoted to CEPA, in the context of the CBD and beyond.

Undoubtedly, biodiversity communication, education and public awareness is an area in which virtually all policy sectors can contribute to meeting biodiversity targets individually and collectively.

Culture

There is a growing recognition that reduced diversity makes the world and its inhabitants increasingly vulnerable to natural and human-induced changes. The past decades have seen a rise of interest in biological and cultural dimensions of diversity, the interactions between them and their connection to social and economic development. This has resulted in increasing awareness of the "inextricable link between biological and cultural diversity" (Declaration of Bélem, 1988), and the recognition of the crucial role that it plays in sustainable development (UNESCO 2002) and human well-being worldwide (UNDP 2004).

The notion of the 'inextricable link' implies not only that biological and cultural diversity are linked to a wide range of human-nature interactions, but also that they are co-evolving, interdependent and mutually reinforcing. Each culture possesses its own set of representations, knowledge and cultural practices which depend upon specific elements of biodiversity for their continued existence and expression. Cultural groups develop and maintain significant ensembles of biological diversity, with knowledge and practice as the media for their management. Maintaining local and indigenous traditional knowledge of nature as well as innovations and practices relevant to the safeguarding of biological diversity requires their continued intergenerational transmission, which occurs mainly through language as an effective means of communicating, classifying, and organizing information (UNESCO 2008; Butchart *et al.*2010).

'Biocultural diversity' has arisen as an area of trans-disciplinary research concerned with investigating the links between the world's cultural and biological diversity, focusing on, *inter alia*, correlations between biodiversity and linguistic diversity in specific regions and localities (Maffi 2001, 2005; Wurm, 2001).

The concepts of 'cultural landscapes', 'historical ecology' and 'biocultural heritage' have evolved to highlight the fact that biodiversity is not only used by people but is also created by them and to link different components of diversity and everyday life (UNESCO 2008). The recreational value of biodiversity ecosystems, which play a key role locally as well as in the context of the tourism sector, has been recognized as a key cultural service to local cultures and the global economy (Millennium Ecosystem Assessment 2005).

Several intergovernmental processes, policy instruments and international scientific assessments have made explicit reference to cultural drivers when dealing with biological diversity and *vice versa* (Bridgewater *et al*. 2007). It has been demonstrated that, in given contexts, species that are listed under the Convention on the International Trade of Endangered Species (CITES) list that had been attributed cultural values can indeed be managed sustainably, such as in the case of *ekipas* produced from ivory in Namibia. CITES has recently engaged into more systematic work on the cultural aspects of the management of endangered species.

However, both systematic research and empirical work that focus on these linkages is still limited. Even though interdisciplinary research in ethnoscience, ethnobiology, ethnoecology, and ethnolinguistics has developed a number of methods to address the linkages between biological and cultural diversity, many conceptual and methodological aspects of how to study the interactions between biological and cultural diversity as well as the concrete ways of applying the myriad expressions and outcomes of such interactions need further elucidation.

In this context, great expectations are placed on the proposed joint initiative of UNESCO and CBD in relation to the interlinkages between biological and cultural diversity that will be presented for adoption at the tenth meeting of the CBD COP in Nagoya in October 2010.

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CHAPTER 6: PRODUCTION AND SERVICE: - ENERGY, INDUSTRY, TRANSPORT, TOURISM

A. ENERGY

THE NEXUS BETWEEN ENERGY AND BIODIVERSITY

The nexus between energy and biodiversity is a multifaceted one; there can be positive and negative impacts on biodiversity from the many different parts of the 'energy system'. Impacts vary, but *all* sources of primary and secondary energy come with advantages and drawbacks. The challenge is to reduce the drawbacks and increase the opportunities for synergies with biodiversity goals by making informed choices, managing all parts throughout the supply chain to end use, aiming at a mix of energy sources, and ensuring cooperation amongst all players of society.

While climate change has been identified as the most pressing environmental problem linked to energy use and has received heightened attention over the past decade, there are numerous other detrimental effects on human health and biodiversity at all physical scales linked to the extraction, transportation, processing and use of primary fuels – both fossil and biomass – and the generation and transmission of electricity. All deserve more attention. In addition, as discussed in chapter 3, climate change has negative impacts on biodiversity, which can be attributed as secondary or indirect impacts linked to energy.

The dichotomy is further exacerbated by the fact that biodiversity is more and more under threat, calling urgently for conservation activities. At the same time, global demands for energy are growing rapidly, with estimations of the world's energy needs in 2030 being almost 60% higher than today, and projections that fossil fuels will still dominate the energy mix in the near future.[13] Although most growth in energy demand is in developing countries and countries in transition seeking to supply more lighting, cooking, heat, mechanical power, transport, communication and other energy services that drive development, demand for energy is also increasing in industrialized countries. [14] Trade offs don't come easily as biodiversity is the basis for ecosystem services and hence the basis for human life, while energy use lies at the core of modern industrialized society.

IMPACTS CAN BE NEGATIVE AND POSITIVE

Negative impacts on biodiversity related to energy production and transport may mean habitat conversion, degradation or fragmentation; wildlife disturbance and loss of species; air, water and soil pollution; deforestation; soil erosion and sedimentation of waterways; soil compaction; contamination from improper waste disposal or spills; and loss of productive capacity and degradation of ecosystem functions.

Positive impacts can occur for example, if countries and companies go beyond mitigation of negative impacts from operations and, for example, support biodiversity conservation in and around project sites and in countries and regions where they operate, particularly where capacity and resources for protecting the environment are scarce due to pressing other social and economic needs. Measures can include managing concessions as protected areas and use of buffer zones. Some of the renewable energy sources have been highlighted as creating opportunities for biodiversity enhancement on wind and solar farms, then leading to nesting sites, etc., or biofuels if conservation agriculture or similar techniques are used.

Impacts can be primary and secondary in nature. Primary impacts are those impacts directly related to the production and use of a given energy source, while secondary or indirect impacts are triggered by operations and may begin or extend beyond a project's life cycle.

Recently, indirect impacts of the development of biofuels on climate change, biodiversity and food security due to land use change have received great attention, with indications that negative impacts may possibly

[13] IEA, World Energy Outlook, 2009
[14] Ren21, Global Status Report, 2009

outweigh benefits from bioenergy.[15] Secondary impacts in the oil and gas sectors has also been extensively assessed.[16] These are the main impacts from these sectors, and relate to population changes in an area and new or additional economic activities resulting from large infrastructure investments, such as roads, ports and towns. For example, immigration and new settlements due to labour opportunities in non-developed areas have led to deforestation from clearing of land for agriculture, building houses, collection of wood for construction, cooking and heating; increased demands on water; illegal logging; extraction of non-timber forest products such as fibres, medicinal plants and wild food sources from both plants and animals.

Impacts can be assessed by impact category and energy source:

USE OF LAND RESOURCES AND DEFORESTATION

Energy production, consumption and use need land. The surface mining of coal, refineries, pipelines and shipping terminals, power plants and transmission lines all occupy land. Hydropower schemes can inundate large areas and their operation can cause erosion along the riverbed both upstream and downstream of the dam site. Habitat fragmentation by large reservoirs is an additional environmental impact of hydropower schemes. Similarly, biomass grown for fuel purposes requires large areas of land and, over time, can deplete the soil of nutrients. Recent biofuel developments based on production of dedicated crops have come under scrutiny. Using waste or residues may help alleviate this problem. Advanced generation biofuels and use of degraded land may help reduce the potential impact, but are not a panacea either. At the same time, biofuel crops produced on degraded land can help recover land. Renewable energy technologies are not without their own impacts. Often lauded for their distributed nature, wind farms, for example, pose aesthetic concerns and wind turbines that are installed in inappropriate locations have been associated with bird deaths, noise and visual disturbances. Finally, in many developing countries, traditional biomass use is the prevailing energy source. Combined with growing populations and increased demand for energy, the search for firewood – a rather inefficient way to supply energy and using resources - is a key source for deforestation.

WATER QUANTITY AND QUALITY

Most forms of energy production and transformation also involve the consumption or use of water in some manner, with associated impacts on the system that supplies the water. Fossil fuel, thermal and nuclear power plants need large quantities of cooling water to operate, and fish and other aquatic life are often killed when these plants remove water from a lake or river or raise its temperature. Coal mines often need large amounts of water to remove impurities from the coal in coal washing operations; similarly, geothermal plants can require water to extract the energy available in dry rocks. Oil and gas production in offshore environments and the shipment of crude oil and refined products pose the risk of catastrophic spills that particularly affect marine and coastal environments. The water needs of biofuel plantations can be substantial, and crop choices have to be matched with local geo-climatic conditions and good agricultural practices to be applied to ensure most efficient use of water and avoid negative impacts on water quality (fertilizer use; cumulative effects). Conversion technologies that turn biomass into fuel also need water, and end products and refinery concepts need to be adapted not to overuse it. Last but not least, by blocking a river's flow, dams prevent silt from reaching the downstream basin. By modifying the hydrological regime of a river, dams can alter local climatic conditions and disrupt ecosystems.

ACIDIFICATION AND EUTROPHICATION

Emissions of sulphur dioxide present in coal, lignite and oil fuels, and nitrogen oxides and their secondary reaction products result in acid deposition that can affect forests, soils and freshwater ecosystems. Acidification causes changes in the chemical composition of the soil, damages vegetation and the built environment and adversely affects terrestrial and aquatic ecosystems. Nitrogen compounds can lead to eutrophication of water bodies by disrupting the nutrient balance of the affected ecosystems. Acidification and eutrophication are also

[15] International Panel for Sustainable Resource Management, 'Towards Sustainable Use of Resources: Assessing Biofuels' 2009 ; UN Energy, 'Sustainable Bioenergy: A Framework for Decision-Makers, 2007

[16] Biodiversity Working Group established by the International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Association of Oil and Gas Producers (OGP), working to increase awareness of biodiversity issues, encourage good practices and develop industry guidance.

part of the concerns raised in relation to bioenergy development, linked to energy crop production and the levels of fertilizer use.

INTRODUCTION OF NON-NATIVE SPECIES

Non-native species that may become invasive are a concern raised in the context of bioenergy and in oil and gas development. Many of the plants suggested as second generation biofuel crops are on the list of potentially invasive species, and hence need to be managed under application of the precautionary principle. In the oil and gas sector, non-native species have often been introduced along pipeline corridors, either through poor selection of reseeding programmes for erosion control or reforestation, or through human activities. Both can be mitigated relatively easily by proper planning applying good care.

HAZARDOUS WASTE

Energy production leads to large quantities of hazardous wastes. Again, the nature and significance of the environmental insults varies from technology to technology. Soil at coal-fired power plant sites can become contaminated with various pollutants, in particular heavy metals, and take a long time to return to a natural state after the plant is closed. Similarly, oil spills on land and waste products from oil refining such as wastewater sludge and residues can all easily contaminate land if not treated responsibly. At a different temporal scale, the storage of used nuclear fuel essentially precludes any future use of land in the vicinity of the storage site.

HOW ENERGY SECTOR IS PLACED TO CONTRIBUTE AND RESPOND TO THE CBD STRATEGIC PLAN AND THE POST 2010 TARGETS

All energy sources have environmental drawbacks. A diverse energy mix, or in another term 'energy-diversity' has been identified by the climate community as key to successful mitigation, and is also the way to minimize impacts on biodiversity. Solid land use planning and identifying the right spots for energy development is critical. The UN system has a role in bringing scientific knowledge of policy-relevance to decision-makers in governments and industry, and to convene industry and civil society to make the business case for protecting biodiversity and share and develop good practices.[17]

B. INDUSTRY

NATURAL RESOURCE INDUSTRIES

Renewable and extractive resource industries including agri-businesses and mining companies rely directly or indirectly on natural ecosystems and their resources for the supply of raw materials or ecosystem services. Many of the natural resources required by these industries are traded through a complex web of supply chains. Raw materials used in these supply chains may be categorized as 1) 'biological resources' such as fish, timber, forest products etc., 2] ecosystem services provided by landscapes and seascapes, such as fresh water for irrigation, in most cases "for free" and; 2) non-biological resources such as non-renewable oil, gas and minerals. The harvest of biological resources, utilisation of ecosystem services, and extraction of non-biological resources by these industries can have marked impacts on ecosystems, and are a leading cause of biodiversity loss. The key drivers leading to biodiversity loss traceable to these industries include habitat conversion, pollution, climate change, the introduction and spread of alien invasive species and general over-exploitation of biological resources.

[17] For example, in the area of bioenergy, FAO and UNEP, as leaders of the renewables cluster of UN Energy, have developed a 'Bioenergy Decision Support Tool' to assist decision-makers in developing robust bioenergy policy and strategy by providing guidance on key questions that need to be asked when considering trade-offs, and processes that need to be undertaken to maximise opportunities and minimize risks. Forthcoming: May 2010

ECOLOGICAL FOOTPRINT OF VARIOUS INDUSTRIES

Many multinational companies and the thousands of suppliers that make up the often complex product supply chains to them are heavily dependent on biodiversity and ecosystem services. This realisation has led some businesses to incorporate biodiversity conservation and risk management into their long-term business models-- a concept more typically known throughout the conservation sector as 'mainstreaming' biodiversity protection. Unfortunately, such good industry practices are far from being universally applied. There is an urgent need to develop sustainable industry production practices that allow profits to be realised from renewable and non-renewable resource use, without compromising biodiversity in the process.

A 'hierarchy' of threat management measures exists, and forms the basis for regulating the activities of industry. These are, in order: prevention of damage; reduction and mitigation of actual impacts while damage is still not severe; compensation and rehabilitation *in situ* when damage is already severe; off-setting.

Governments have a key role to play in 'regulating the conduct' of industry in production landscapes and seascapes so as to reduce the impact of production on biodiversity. Such regulation needs to occur at the planning level and across the different stages and levels of production, and requires information, sound compliance monitoring, incentives and enforcement systems.

Consumerl have an important role to play in influencing industry to improve corporate policy and conduct. The challenge remains for industry to promote low-impact operations across supply chains, greening both upstream and downstream processes. The power of both internal and external market forces associated with supply chains can be harnessed to catalyse the mainstreaming of biodiversity conservation in production practices.

Producer countries and industries will need to consider the following issues, in developing plans and activities to address any future biodiversity targets.

WHAT THREAT SPECIFICALLY DOES THE SECTOR, AND PRODUCTION PRACTICE, POSE TO BIODIVERSITY?

Sometimes this is obvious, as when the development of crop plantations leads to the drainage of wetlands. However, production practices may have un intended secondary effects as when production encourages other economic activities (for example when mining activities in a tropical forest serve as a catalyst for in-migration by outside communities, thus increasing human consumption pressures on the ecosystem). These impacts need to be factored into the production equation when seeking to engineer sustainability. The primary and secondary threats posed by different production practices employed by different industries are sector and context specific (depending for instance on the extent to which other land/ water uses threaten biodiversity in the production landscape).

WHY DOES THE THREAT OCCUR?

Does the threat occur because the governance framework for the industry is weak (as when policies intended to reduce environmental impacts are not enforced)? Or can the threat be traced to a failure of the market targeted by the industry to incorporate the negative environmental externalities imposed by biodiversity loss. Alternatively, the threat could be traced to a lack of know-how or market penetration of technology to mitigate impacts. These factors need to be considered when developing strategies.

WHAT IS THIS IDEAL SCENARIO?

What change in the production practices employed by any particular industry in particular locations is desirable, in order to mitigate threats to biodiversity? Does the know-how and technology exist to achieve this scenario? What is the attached cost?

There are tradeoffs between biodiversity persistence and economic benefits, inherent in all production practices. The question arises as to what level of tradeoff is permissible. This is a political question, framed by societal needs and values, and the answer will change over time as societal values and needs evolve. The concept of no 'net loss' has recently become a goal in the arenas of environmental impact assessment and management. This strives to ensure that development does not have an overall negative impact on biodiversity. However, as the human population grows, and its environmental footprint grows as societies become more prosperous, the prospects for achieving this are diminishing.

WHAT ARE THE DRIVERS INCLUDING THE RISK DRIVERS FOR THE PRODUCTION SECTOR TO CHANGE ITS BEHAVIOUR, AND ADOPT PRODUCTION PRACTICES THAT HAVE LESS NEGATIVE IMPACT ON BIODIVERSITY?

Sometimes this is clear. Many consumers have in recent years become more aware of the impacts of industry on the environment. Although awareness is mostly environmentally orientated rather than biodiversity specific, this trend is increasing the reputational risks that businesses confront in failing to avoid, reduce and mitigate their impacts on biodiversity. Not only is industry faced with losses of revenue from consumer boycotts but some industries face supply side risks, owing to the depletion of the resources they depend upon. An industry dependent on biodiversity/ natural resources that 'mines' its resource base beyond its regenerative capacity is likely to go out of business. This may pave the way for a more sustainable industry-led approach to using natural resources and responding to the Post 2010 targets.

However, not all industries are dependent on biodiversity. The mining industry and petroleum and natural gas industries are examples—both of which have often severe indirect impacts on biodiversity. In this case there may be other risks that need to be considered. Reputational risk is one; financial risk is another—this is the risk that the company will be saddled with litigation or incur clean-up costs, as a result of poor management. The risk of losing access to future natural resource concessions also needs to be considered (as when a company's poor past environmental management record counts against it when new resource concessions are awarded).

Finally, the risk of losing access to finance is yet another risk that companies need to consider—especially as many major banks have subscribed to the UNEP Finance Initiative, requiring them to increase due diligence in managing the environmental impacts of their portfolios. Assessment of these risks can improve the negotiating strength of producer countries in soliciting industry investment in avoiding and reducing impacts on biodiversity.

IS GOVERNANCE AND /OR MARKET REFORM NEEDED?

Sometimes mainstreaming requires improved governance—improved enforcement of existing laws aimed at strengthening environmental management, or improved accountability for decision making within production sectors. Often a mix of governance and market reform is needed. Market reforms can include the development of certification and verification systems for goods produced in environmentally sustainable and socially responsible ways – allowing discerning consumers to exercise free choice in their consumption patterns (in favour of good environmental management practice). Ultimately the economic prospects of any business will be determined in the market place, and efforts to inform and reform product markets will be needed, in order to invoke the desired changes in production by industry.

HOW IS INDUSTRY PLACED TO CONTRIBUTE AND RESPOND TO THE CBD STRATEGIC PLAN AND THE POST 2010 TARGETS

Successful mainstreaming will be critical in order to meet the post 2010 Biodiversity Strategy, given that most biodiversity resides on production lands—in particular lands used for renewable and extractive natural resource production. There is no easy blueprint for mainstreaming, which is a context-specific process, and which will be shaped by the answers to the above questions. Clearly, partnerships between Governments and industry will be pivotal in addressing the post-2010 biodiversity challenges. The UN Compact and the private sector programmes of UN Agencies such as UNDP, UNEP and UNIDO can play an important role in building

capacities in Government and in industry to work together to address the loss of biodiversity and ecosystem services.

C. TOURISM

THE IMPORTANCE OF BIODIVERSITY FOR TOURISM

Biodiversity and tourism are closely inter-related. On the one hand, biodiversity is a major basic resource for tourism, a sector which, if sustainable developed and well managed, can generate important economic benefits and can play a critical role in preserving biodiversity. On the other hand, unsustainable tourism can threaten biodiversity and ecosystem services. Tourism is also one of the largest global economic sectors and is a significant contributor to may national and local economies around the world, playing an important role in alleviating poverty, creating employments, investments and trade. Despite the global economic crisis, in 2008, there were 922 million international tourist arrivals, representing a growth of 2% while international tourism receipts rose by 1.7% to US$ 944 billion.[18]

Tourism is also a primary source of foreign exchange earnings in 46 out of 50 of the world's Least Developed Countries (LDCs)[19]. With international tourist arrivals projected to reach 1.6 billion by 2020[20], tourism will continue to have an important role in contributing to the Millennium Development Goals (MDGs), particularly the alleviation of poverty, environmental sustainability and gender equality. In line with such approach, supporting the traditional management of agriculture and agricultural biodiversity can also encourage local communities to have a stronger involvement in the growth of the tourism sector and also act as an incentive for *in-situ* conservation of biodiversity from the ecosystem level to genetic resources. Thus, conservation, sustainable use and fair and equitable sharing of benefits related to the use of biodiversity, the three objectives of the Convention on Biological Diversity (CBD), play also an important role in the attainment of the MDGs, and sustainable tourism is an important instrument for biodiversity conservation and poverty alleviation.

It is recognized also that the loss of biodiversity and the degradation of ecosystems may have a negative influence on tourism, especially on nature based and wildlife tourism, which rely on a healthy environment. Biodiversity friendly tourism therefore could contribute: a) to maintain the quality of ecosystems through nature based sustainable tourism products, b) to generate income for ecosystem conservation and for local populations, c) to the security of tourists and populations by constituting protection against natural disasters (e.g. mangrove barriers) and d) to adaptation to climate change in vulnerable and exposed areas, among others.

The quality of destinations depends on the quality of the ecosystem services of biological diversity – the interest of the tourism sector, therefore, is to promote the conservation and sustainable management of biodiversity resources as its natural capital. Tourism is also an excellent vehicle to use for encouraging actions to safeguard biodiversity and reduce biodiversity loss, and in spreading environmental awareness and positive behavioural change for sustainable consumption and production worldwide, not to mention the livelihood support it increasingly provides for communities living in and around reserves and natural areas.

Landscapes, often modelled by a dynamic interaction between traditional agricultural practices and the natural environment, as well as the result of such practices such as typical food products, wines and cultural traditions, are also becoming key elements for an increasing source of tourism. These elements, strongly linked to biodiversity and ecosystem services, are often also instrumental for the conservation of genetic resources for food and agriculture that could otherwise be lost to industrial and commercial pressures.

[18] UNWTO (2009) *Tourism Highlights 2009 Edition:*
http://www.unwto.org/facts/eng/pdf/highlights/UNWTO_Highlights09_en_LR.pdf
[19] UNWTO (2007), *Compendium of tourism statistics* (2007 edition), Madrid, World Tourism Organisation.
[20] UNWTO (2001) *Tourism 2020 Vision*, Madrid: http://www.unwto.org/facts/eng/vision.htm

International events, such as the 7th session of the UN Commission on Sustainable Development (1999), the 2002 Quebec Declaration on Ecotourism and the World Summit on Sustainable Development (2002), among others, have aided to highlight the global importance of biodiversity for tourism.

Additionally, the Global Code of Ethics for Tourism[21] , a comprehensive set of principles whose purpose is to serve as a frame of reference for the responsible and sustainable development of tourism, includes among other provisions, the protection of the natural heritage composed of ecosystems and biodiversity and the preservation of endangered species of wildlife. It is also worth mentioning the Global Sustainable Tourism Criteria (GSTC)[22], launched in 2008 which contains 37 global criteria, each with a comprehensive set of indicators- including one on biodiversity conservation- which constitutes an effort to come to a common understanding of sustainable tourism and is the minimum that any tourism business should aspire to reach.

Tourism can have a number of direct and indirect impacts on biodiversity, such as land use conversion, disturbance of species, unsustainable consumption, introduction of invasive or alien species, discharge / disposal of waste, pollution and green house emissions. It is worth noting that tourism is a contributor to climate change, for instance through the emissions of GHGs from the transportation of tourists to and from destinations, which directly and indirectly impacts biodiversity.

There is scope for further work on how to maximise the conservation benefits of biodiversity for tourism. This could be done through a review of the life cycle of the tourism value chain, particularly regarding the demand and supply sides, engaging all relevant stakeholders in order to develop new options for improving conservation benefits. Similarly, government officials may want to undertake a review of the role and responsibilities of their national tourist administrations and the policies and tools in place in order to develop policies that are both, profitable for the tourism businesses and at the same time contribute to biodiversity conservation and poverty reduction.

RESPONDING TO CHALLENGES AND OPPORTUNITIES

Based on the considerations outlined above, the United Nations are committed to work for the conservation of biodiversity also for its role in fostering local economies and traditional cultures via sustainable tourism activities, based on the adequate evaluation of biodiversity and ecosystem services; the UN system believes that such approach should also be integrated into the post 2010-process. It also strives to mobilize not only the cooperation of Members but also of the tourism industry as key actors for the sustainable use of biological diversity.

HOW TOURISM IS PLACED TO CONTRIBUTE AND RESPOND TO THE STRATEGIC PLAN AND THE POST 2010 TARGETS?

The United Nations through it various agencies- UNWTO, UNEP, CBD, Ramsar Convention Secretariat, , etc. - are working together sharing expertise and resources to address tourism and biodiversity challenges, enhance cooperation and raise awareness on the interrelationship between tourism and biodiversity . Various actions have been undertaken within the scope of the 2010 targets for biodiversity and many others are also planned to celebrate 2010 as the UN International Year of Biodiversity and World Tourism Day 2010 around the theme of 'Tourism and Biodiversity', as well as other developments that could feed into COP 10 and relevant process beyond.

[21] See http://www.unwto.org/ethics/index.php
[22] See GSTC web site:
http://www.sustainabletourismcriteria.org/index.php?option=com_content&task=view&id=13&Itemid=47

D. TRANSPORT

NOTE: THIS SECTION IS STILL LACKING SUBSTANTIVE INPUTS FROM THE OTHER MODES OF TRANSPORT (AIR, ROAD, RAIL) AND IS THUS SO FAR MAINLY FOCUSING ON MARITIME TRANSPORT.

THE IMPORTANCE OF BIODIVERSITY FOR TRANSPORT

All modes of transport may potentially have an impact on biodiversity - positive as well as negative. Transport has always been, and will continue to be, one of the main pillars of our civilization, and particularly of the modern, globalised economy. Without transport, most other sectors and services would not be able to operate. Virtually everything that we use in our daily lives, including the energy that heats our homes and offices, has at least at one point or another, been transported by road, rail, air or shipping. The ability to build larger oil tankers, and the containerization of cargo transport, are two developments during the last century that have completely changed the speed with which goods are transported across the globe. This has had tremendous positive effects on economies around the world. But, as the transport sector provides faster and more efficient services, the associated risks also increases. Several UN agencies are directly or indirectly involved in ensuring that the transport sector can provide the services humanity relies on with a minimal risk to biodiversity.

Maritime transport has a key role to play in meeting the Millennium Development Goals, for shipping not only moves the world's burgeoning trade, but can also contribute substantially to sustainable development, since international commerce promotes production, job creation and greater socio-economic prosperity.

HOW DOES TRANSPORT ACTIVITIES IMPACTS ON BIODIVERSITY (POSITIVE AND NEGATIVE)?

Many of the world's people are still directly dependent on biodiversity – in the form of draught, pack or riding animals – for their transport needs. For poor farmers, particularly those living in areas that lack good transport infrastructure, animal transport is a vital link to the markets where they sell their products. The use of animals to carry water and other goods lightens the workloads of many disadvantaged groups, including women. A wide range of species – horses, donkeys, mules, cattle, buffaloes, Bactrian camels, dromedaries, llamas, yaks, reindeer, even sheep and goats – provide transport services. Many livestock breeds have been specifically developed for transport or as multipurpose animals that are able to combine transport with other roles. This diversity of species and breeds means that animals can provide transport across a wide range of climatic zones, elevations and terrains.

Mechanization, particularly if it occurs rapidly, can threaten the survival of breeds and the locally adapted, economically and environmentally sustainable transport options that they represent. Moreover, policies and programmes for livestock development and for the management of genetic resources often overlook the significance of transport functions, with a particular tendency to disregard species such as donkeys that are important to poor people. Nonetheless, the importance of transport functions was clearly expressed in many of the country reports submitted during the preparation of *The State of the World's Animal Genetic Resources for Food and Agriculture* (FAO, 2007) and the importance of the livestock's multiple roles, including transport, is recognized in the *Global Plan of Action for Animal Genetic Resources*, adopted by the international community in 2007.

Most modes of transport may potentially have negative impact on biodiversity, through e.g. pollution or through acting as a vector for transfer of invasive alien species from one environment to another.

Maritime transport

Undoubtedly, one of the more advanced forms of mechanization for transport is that related to the movement of goods by sea. While more than 90 per cent of global trade is carried by maritime means, shipping also has potentially negative effects on the environment, for example through marine pollution (through accidental or operational spills of oil, grey water, or cargo) or air pollution. IMO is actively addressing all these issues through regulatory frameworks (Conventions and technical guidelines) as well as technical co-operation.

However, the most directly relevant issue may be the risks related to introduction of invasive aquatic species (IAS) into new environments by either ships' ballast water, or attached to ships' hulls, which has been identified as one of the greatest threats to the world's oceans. As a result, entire ecosystems are being changed, with ecological, economical and health impacts as a consequence. In the USA, for example, the European Zebra Mussel *Dreissena polymorpha* has infested over 40 per cent of internal waterways (Claudi, R., Mackie, G.L. 1994). In Australia, New Zealand and the Mediterranean, the Asian kelp *Undaria pinnatifida* is invading new areas rapidly, displacing the native seabed communities (Russell et al. 2008, Schaffelke & Hewitt 2007). In the Black and Caspian Seas, the filter-feeding North American jellyfish *Mnemiopsis leidyi* has depleted native plankton stocks to such an extent that it has contributed to the collapse of entire commercial fisheries (Zaitzev, Y. & Ozturk, B. 2002). Human health impacts can also be caused by the transfer and spread of pathogens and toxic organisms such as harmful algae in ships' ballast water. Many more examples exist. The global economic impacts of invasive alien species have not been thoroughly quantified but are likely to be in the region of tens of billions of US dollars per year or more (Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000, J.M.R. Chisholm, 2004).

Air transport
Air transport is also an important pathway for invasive alien species. Species may be moved inside the cabin in passengers clothing or luggage, stowaways in cargo, in packing materials, wheel wells and other aircraft parts. Many contracting Parties require that passengers and cargo carried by air be subject to quarantine measures and controls at borders.

Road and rail
To be inserted

RESPONDING TO CHALLENGES AND OPPORTUNITIES

Maritime transport

Through the International Maritime Organization, the maritime sector has been actively addressing the issues of environmental impacts from shipping for more than 60 years. The current High-level Action Plan for IMO puts great emphasis on mitigation and response to the impact on the environment caused by shipping incidents and operational pollution from ships, atmospheric pollution, and transfer of invasive species (IMO Assembly Res. 1012(26)). Contributing to the achievement of the Millennium Development Goals is also one of the main strategic directions of the Organization. With the Action Plan and the Strategic Plan (Assembly Res. 1011(26) as guidance, is responding to the biodiversity-related challenges both at the regulatory level (through Conventions and Guidelines, see Annex II for exampes) and through technical cooperation and capacity building, often in partnership with other UN entities as well as the shipping industry.

As a tangible example, IMO has been pro-actively addressing the risk of transfer of harmful aquatic organisms and pathogens through ships' ballast water and sediments since the late 1980s. Because this issue is both global and trans-boundary in scope, cross-sectoral coordination and cooperation are imperative. IMO has therefore been teaming up with other organizations, such as UNDP, GEF, UNEP (in particular through its Regional seas programme), IUCN, the International Ocean Institute (IOI), and the Global Invasive Species Programme (GISP), among others, and stands prepared to increase coordination with other organizations that share these common concerns. At the regulatory level, IMO has responded to this challenge by developing the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) and its Marine Environment Protection Committee has initiated the development of international measures for minimizing the translocation of invasive species through bio-fouling of ships, i.e. flora or fauna attached to a ship's hull.

The momentum precipitated by technology developers and the wide ratification of the BWM Convention will provide the necessary guarantee that their effort will be rewarded by the shipping industry by acting decisively to address the issue of invasive aquatic species in ships' ballast waters. The BWM Convention requires all ships to implement a Ballast Water Management Plan and carry a Ballast Water Record Book and will require ballast

water management procedures to be carried out to a given standard. Parties to the Convention are given the option to take additional measures, which are subject to criteria set out in the Convention.

IMO also joined forces with the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) to implement the Global Ballast Water Management Programme (GloBallast), with a view to helping developing countries reduce the transfer of harmful aquatic organisms and pathogens in ships' ballast water. The pilot phase of this programme (2000-2004) focussed on communication and awareness raising activities, capacity-building, training and technical assistance, risk assessments and port baseline surveys, as well as co-operative regional arrangements between neighbouring countries in six developing regions. A scaling-up of this pilot phase is currently being undertaken through the second phase of this programme titled **GloBallast Partnerships** (2008-2012), which assists particularly vulnerable countries to enact legal, policy and institutional reforms to meet the objectives of the BWM Convention. The project focuses mainly on 5 priority sub-regions, including 14 Lead Partnering Countries and over 40 Partnering Countries from the Wider Caribbean, the Mediterranean Sea, the Red Sea and Gulf of Aden, the Pacific coast of South America, and the West Coast of Africa.

One of the critical issues in respect to marine biodiversity and the issue of marine invasive species is to increase the awareness of the extent of the problem, and the urgent need for a precautionary approach and action. IMO has therefore collaborated with the BBC and some major maritime industry partners to produce a documentary film titled *Invaders from the Sea.* The documentary has since proven to be one of the most important and useful awareness-raising tools available. The documentary won the gold award in the category of "Best United Nations Feature", the 2007 United Nations Documentary Film Festival.

Air transport

Recognizing the potential of civil aviation to transmit invasive alien species, ICAO adopted Assembly Resolution A35-19 committing Member States to reducing threats of potential invasive alien species and for ICAO to produce guidance material and standards and recommended practices to reduce risks. ICAO conducted a worldwide survey on the problem of invasive alien species *vis-à-vis* international air transportation and asked Member States to provide their best practices in combating the spread of such species via civil aviation.

Road and rail transport

To be inserted

HOW TRANSPORT IS PLACED TO CONTRIBUTE AND RESPOND TO THE STRATEGIC PLAN AND THE POST 2010 TARGETS

Efficient transport is an integral and indispensable part of trade, which in turn is the back-bone of the economy. Nevertheless, the various modes of transports represents the main vectors and pathways for the transfer of invasive alien species, which is being recognised by the responsible agencies.

With respect to maritime transport, IMO has taken various actions within the scope of the 2010 targets for biodiversity, focusing on promoting the ratification and uniform implementation of its relevant instruments, for example those listed in Annex II of this report. As for the BWM Convention, a review by the Marine Environment Protection Committee in 2009 concluded that ballast water treatment technologies were available and confirmed that sufficient ballast water management systems would be available for ships constructed in 2010 (IMO, 2009). IMO is working intensively to further catalyze the development and availability of ballast water management systems, for example through its Global Industry Alliance (GIA), which provides a forum for industry to facilitate their compliance with the Convention.. At the system-wide level, IMO is also working through GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) on several aspects related to potential impacts on biodiversity. For example, GESAMP has been mandated by IMO to evaluate the proposals for approval of ballast water management systems which make use of active substances to ensure that those systems do not pose any unacceptable risk to the environment and biodiversity. The Marine Environment Protection Committee of IMO has also initiated the development of international measures for minimizing the transfer of IAS through bio-fouling of ships.

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CHAPTER 7: FINANCE AND TRADE

How does each policy sector depend on biodiversity and ecosystem services?

Both international trade and financial systems are inextricably linked to and dependent on biodiversity and functioning ecosystems. At the most fundamental level, trade, finance and the environment are related because economic activity is dependent on the environment for all basic inputs (e.g. metals, minerals, soil, etc.) and for the energy needed to process them.[23] More specifically, a significant amount of international trade is focused on biodiversity-based products (e.g. fisheries, forestry, etc.) or products and services derived from healthy ecosystems (e.g. agriculture, fresh water and tourism). For instance, in 2007 total world exports of agricultural products were valued at US$876 billion, representing 6.3% of total exports.[24] Likewise, in 2006 total world exports of fish and fish products were valued at US$86 billion.[25]

In terms of finance, the importance of biodiversity is also clear. With the current rate and scale of biodiversity loss weakening the ability of ecosystems to deliver key services, financial institutions are finding themselves increasingly exposed to greater biodiversity-related risks through companies in which they invest and/or insure. These risks may include reputational damage, liability risk, increased regulatory scrutiny, increased defaults on loans, lower investment returns, and increased insurance claims.[26] However, with these risks also come opportunities, including opportunities for financing investments in businesses seeking to take advantage of new market opportunities for products and services that promote sustainable management of biodiversity and ecosystem services.[27] These opportunities represent key components of a future shift to a green economy.[28]

How does each policy sector affect biodiversity and ecosystem services?

Given the importance of biodiversity for both trade and finance it is not surprising that trade and finance policies and initiatives would, similarly, have a profound impact on biodiversity and the health of ecosystems.

Trade and biodiversity

Trade policies are neither inherently good nor bad for the environment. Rather, as noted in the preamble establishing the World Trade Organization, such policies may represent an economic tool to achieve, *inter alia*, the broader objective of sustainable development, including its three components: economic development, social justice, and environmental protection.[29] How these tools are designed and applied by countries is therefore of critical concern when considering the relationship between trade and the environment more generally, and trade and biodiversity more specifically.

If designed and implemented well, trade policies can have positive impacts on biodiversity and ecosystems – simply by promoting specialization in production and therefore improving the efficiency of resource allocation. For instance, countries with abundant water resources may have a comparative advantage in producing water-intensive agricultural products, such as rice, as opposed to countries with scarce water resources. Trade libera-

[23] UNEP and IISD, "Environment and Trade: A Handbook, Second Edition", 2005, p. 2.
[24] See FAO Statistical Yearbook 2009, Tables C.1 and C.2.
[25] See FAO, "FACT SHEET: The international fish trade and world fisheries," June 2008.
[26] See http://www.cbd.int/doc/meetings/biodiv/b2010-03/official/b2010-03-01-unep-background-note-en.pdf
[27] See UNEP Finance Initiative, CEO Briefing "Biodiversity and Ecosystem Services: Bloom or Bust?" October 2007.
[28] See e.g. UNEP, "A Global Green New Deal Policy Brief", March 2009 http://www.unep.org/pdf/A_Global_Green_New_Deal_Policy_Brief.pdf.
[29] In the Preamble to the Marrakesh Agreement Establishing the World Trade Organization (the "WTO Agreement"), WTO Members recognize that "their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, *while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development*" (emphasis added).

lization helps to ensure that tariffs or other trade-distorting policies do not create perverse situations where those with relatively limited resources are encouraged to further degrade the resources.

In contrast, if designed or implemented poorly, trade policies can lead to over-exploitation of natural resources, loss of wildlife habitats, and degradation of ecosystem services. As noted above, trade liberalization promotes specialization in production and also leads to changes in land-use patterns. For agriculture, this has typically led to the conversion of traditional agricultural systems, which might include a diverse range of crops, to less diverse agricultural productions systems or even to monoculture. It has been estimated that by 2050 almost 40% of the land currently using low-impact forms of agriculture could be converted to intensive agricultural use.[30] The expansion of agricultural production, spurred in part by trade liberalization, has also led to the conversion of forests into farm lands. In the last 300 years, the global forest area has shrunk by approximately 40% with forests virtually disappearing in 25 countries and another 29 countries losing more than 90% of their forest cover.[31] The resulting impact on biodiversity can be huge. Given this, the current WTO Doha negotiations focused on agricultural trade liberalization provide an excellent opportunity to "level the playing field", but they also present a risk of agricultural expansion occurring without adequate oversight and mitigation. This is particularly the case when processes driven by trade liberalisation take place in a setting with insufficient domestic policies that govern the sustainable use or conservation of biodiversity (e.g. through land-use planning, protected areas, regulation of chemicals use and pollution control, and/or adequate policies or programmes that support sustainable agriculture).

Increasing trade has also facilitated the intentional and unintentional movement of species which may end up as "alien species" in ecosystems outside their original distribution range. Some of these alien species may invade their new ecosystems, and if they do, it frequently - albeit sometimes after a time-lag period - results in major impacts on biological diversity. Total annual costs from invasive alien species, including losses to crops, pastures, forests, and other environmental damage and related controls, have been estimated to be in the hundreds of billions of dollars and possibly more than $1 trillion.[32] The impact of these is discussed more fully above, under the transport section in chapter 6.

Finance and biodiversity

The linkages between finance and finance policy and biodiversity have several dimensions, including the risks and opportunities posed by private financial institutions, public financing of project and biodiversity protection, and the potential for establishing financial mechanisms (whether public or private) to protect biodiversity.

Public and private financing can heavily influence company decision-making. A lack of requirements or standards associated with how this financing is used creates the risk that companies will continue to go about in a "business as usual" manner, which in the past has often meant a failure to assess biodiversity impact. For private financing, this calls for integrating biodiversity (and the wider environmental, social and governance, or "ESG" issues) into a wide range of products and services, including loans, equity, project finance and insurance. It also calls for the development of additional ESG research and the wider use of extra-financial reporting.[33]

The UNEP Finance Initiative is currently working with the non-governmental organization, Flora & Fauna International, through a "Natural Value Initiative" to stimulate companies to integrate biodiversity issues within their business models and investors to use the information in ESG research. [34] The UNEP Finance Initiative is also working with leading insurers to improve understanding of the risks and opportunities associated with insurance and biodiversity loss and ecosystem degradation, including insuring forest carbon.[35] Publicly sup-

[30] See "The Economics of Ecosystems and Biodiversity: An Interim Report", 2008, p. 9.
[31] See "The Economics of Ecosystems and Biodiversity: An Interim Report", 2008, p. 12 (citing FAO, "Global Forest Resources Assessment 2000", and FAO, "Global Forest Resource Assessment 2005").
[32] See Decision VI/23 of the Conference of the Parties to the CBD, Annex, footnote 57 defining "alien invasive species".
[33] From http://www.cbd.int/doc/meetings/biodiv/b2010-03/official/b2010-03-01-unep-background-note-en.pdf
[34] For more information, see: http://www.naturalvalueinitiative.org/
[35] See UNEP Finance Initiative (FI), "Insuring for Sustainability – Why and how the leaders are doing it" (2007); see also, UNEP FI "Making Forests Competitive – Exploring insurance solutions for permanence" (2008); and UNEP FI "The Global State of Sustainable Insurance – Understanding and integrating environmental, social and governance factors in insurance" (2009).

ported export credit and official aid flows can also have significant impacts on biodiversity. There is therefore a significant role for governments to integrate biodiversity considerations into Export Credit Agencies (ECAs) and Oversees Development Assistance (ODA) operations, including risk and priority assessments.

How could each policy sector contribute to meeting biodiversity targets individually or collectively?

Although challenging, it is essential that trade and finance policies contribute to a world in which biodiversity and ecosystem services are sustained rather than degraded. If not, the foundation upon which trade and financial activities take place will weaken and economic and financial risks will continue to mount. Good trade and financial decision-making needs to take into account the impacts on, and opportunities arising from, biodiversity. Whether done by governments, the private sector or consumers, this sort of analysis depends on good information.

Trade and biodiversity

There are a number of issues currently being negotiated within the WTO Doha Round that, if successfully concluded, could contribute to achieving biodiversity targets. For instance, the current WTO negotiations on reducing or eliminating fisheries subsidies that contribute to overfishing is a clear example of how trade policy can be applied in a manner that contributes to biodiversity protection.[36] It is estimated that global fisheries subsidies amount to $15-35 billion annually.[37] Economists and fisheries experts widely agree that many of these subsidies are a major contributor to overfishing and the current global fishing crisis.[38]

A number of other WTO Doha negotiating items are also relevant to achieving biodiversity targets, such as:

- the relationship between existing WTO rules and specific trade obligations in Multilateral Environmental Agreements (MEAs);
- procedures for regular information exchange between MEA Secretariats and relevant WTO committees; and
- the reduction or elimination of tariff and non-tariff barriers to environmental goods and services[39]

In addition, the WTO Doha Ministerial Declaration instructs WTO Members to pay particular attention to provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights, which has generated considerable discussion vis-à-vis the CBD access and benefit-sharing provisions.[40]

Although not currently under negotiation at the WTO, the elimination of fossil fuel subsidies may also help to contribute to meeting biodiversity objectives by reducing the production of fossil fuels. This could potentially have multiple environmental benefits for biodiversity, including reduced greenhouse gas emissions, decreased habitat conversion or destruction, as in the case of open-pit fossil fuel mining, and reduced risk of accidents, such as oil spills. The potential for eliminating fossil fuel subsidies has taken on new impetus with the recent Group of Twenty (G20) decision to phase-out inefficient fossil fuel subsidies that encourage wasteful consump-

[36] See WTO Doha Ministerial Declaration, para. 28.
[37] See, e.g., M. Milazzo, "Subsidies in world fisheries: A reexamination", World Bank Technical Paper No. 406 (1998); WWF, Hard Facts, Hidden Problems: A Review of Current Data on Fishing Subsidies (2001), R. Sumaila & D. Pauly, "Catching More Bait: A Bottom-Up Re-Estimation of Global Fisheries Subsidies", (U. Brit. Columbia Fisheries Centre, 2006).
[38] See, UNEP "Fisheries Subsidies: A Critical Issue for Trade and Sustainable Development at the WTO - An Introductory Guide", May 2008.
[39] See WTO Doha Ministerial Declaration, para. 31. However, as noted above, the WTO negotiations, particularly the liberalization of trade in agricultural and fisheries products, also risks *contributing* to biodiversity loss and ecosystem degradation if there are not adequate safeguards and mitigation measures in place.
[40] For more information related to the CBD's access and benefit-sharing provisions, see: http://www.cbd.int/abs/.

tion.[41] This commitment could be used as a template for replication and extension to other subsidies with harmful effects on ecosystems and biodiversity.[42]

Trade policies that actively promote trade in environmentally-friendly goods and services can also be effective in contributing to the long-term sustainability of biodiversity. For instance, several "biotrade" initiatives exist that promote the collection, production, transformation, and commercialization of goods and services derived from native biodiversity (genetic resources, species and ecosystems) and that are produced in a sustainable manner.[43]

Finally, and importantly, trade liberalization can be effective in contributing to economic growth and welfare improvement. This can be an important contribution to biodiversity protection in those cases where persistent poverty is contributing to biodiversity loss and ecosystem degradation.

Finance and biodiversity

The private and public sectors have an important role to play in responding to the biodiversity funding gap. A range of national and international conservation finance instruments have been designed to slow, or reverse, biodiversity loss, as witnessed by the creation of the Global Environment Facility (GEF). There is also an ongoing international initiative to work, under the aegis of the Convention on Biological Diversity, towards establishing a "green development mechanism" to enhance financing of biodiversity protection on a global scale.[44]

Financing focused specifically on small communities can be a particularly effective means of addressing biodiversity loss and ecosystem degradation given that the rural poor are typically the traditional biodiversity stewards and rely most heavily on the ecosystem services provided by biodiversity. For instance, the GEF Small Grants Programme has been active in funding the conservation and sustainable use and management of biodiversity with nearly 7,000 projects amounting to just over US$ 152 million in grants.[45] Micro-finance programmes can contribute to the conservation and sustainable use of biodiversity in a number of ways, including most importantly, by supporting income generation and reducing the vulnerability of the poor. Micro-finance can also support the adoption of new technologies and the creation of new enterprises that can benefit biodiversity, such as technologies and businesses associated with organic agriculture.[46]

In addition to direct financing, the concept of sustainable finance is gaining ground as seen by the development of voluntary principles such as the UNEP and UN Global Compact-backed Principles for Responsible Investment (now with more than 730 signatories from the investment industry representing more than USD 20 trillion in assets under management).[47] Other activities include ongoing work by the UNEP Finance Initiative to develop *Principles for Sustainable Insurance* for the insurance industry, forestry investment funds, environmental liability insurance, and support to enterprises dedicated to biodiversity conservation.[48]

What actions by other policy sectors could complement the policy sectors efforts in addressing adverse effects on biodiversity?

One of the prerequisites for ensuring that trade and finance help address the current biodiversity challenge is to ensure markets, companies and financial institutions are receiving the right price signals. A number of the world's environment ministers have come to this same conclusion and at the G8 environment meeting in

[41] Leaders' statement at the Pittsburgh summit, 24 and 25 September 2009, preamble, para. 27. For an analysis of how the WTO rule relate to energy-related subsidies, see Trade and Climate Change: WTO-UNEP Report, pp. 115-117 (2009).
[42] See TEEB for Policy Makers, Chapter 6 "Reforming Subsidies", The Economics of Ecosystems and Biodiversity, available at: http://www.teebweb.org/ForPolicymakers/tabid/1019/language/en-US/Default.aspx.
[43] See UNCTAD, "UNCTAD BioTrade Initiative BioTrade Principles and Criteria", 2007, http://www.unctad.org/en/docs/ditcted20074_en.pdf.
[44] See http://gdm.earthmind.net.
[45] See http://sgp.undp.org/.
[46] See M. Consuelo Muñoz Araya and Robert Peck Christen, "Microfinance as a Tool to Protect Biodiversity Hot-Spots", see: http://www.microfinancegateway.org/gm/document-1.9.24286/27.pdf.
[47] See www.unpri.org
[48] See www.unepfi.org. The UNEP Finance Initiative will be issuing a report in 2010 that details how biodiversity mitigation tools, including offsetting, are being used within the lending business of banks, and what scope there is for improvement.

Potsdam in March 2007, the environment ministers of the G8 countries together with environment ministers from five newly industrialising countries (Brazil, China, India, Mexico and South Africa) agreed to support research focusing on estimating the costs of global biodiversity loss. This initiative, known as "The Economics of Ecosystems and Biodiversity" (TEEB), is producing a global study on the economics of biodiversity loss with the aim of developing practical policy responses to this growing evidence.

The TEEB initiative is attempting to overcome the fact that unlike economic and human capital, natural capital has no dedicated system of measurement, monitoring and reporting.[49] Difficulties in obtaining monetary estimates of ecosystem services mean that decisions tend to be based on incomplete cost-benefit assessments. Moreover, because there is a tendency towards underestimating the value of such services, there are often few incentives to safeguard them. Given this, understanding and quantifying biodiversity and ecosystem values, and correcting price signals accordingly, is essential for providing the right incentives to economic actors so that their decisions can be made in a manner that supports the long-term sustainability of natural capital. Article 11 of the CBD calls upon States to adopt such incentive measures.

Closely linked to the issue of measurement is the issue of assessment. Article 14 of the CBD calls on States to "introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account." The importance of environmental assessments has also been recognized by the WTO, which encourages the sharing of expertise and experience among its members.[50] Assessing the impact of trade and finance policies has the potential to both help safeguard biodiversity and maximize gains from trade and finance.

Perhaps the greatest value in assessments is that they can bring a wide variety of perspectives to the analysis, including those of non-trade government ministries, those with expertise in environmental and social issues, and, communities that are most at risk of being impacted by the policies.[51] A number of governments and international organisations have undertaken environmental and integrated assessments of trade and finance policies. For instance, UNEP, in collaboration with the CBD, recently launched findings and recommendations from a six-country project focused on assessing trade-related policies and biological diversity in the agricultural sector.[52]

Finally, one of the most important ways in which other sectors may contribute to the mutual supportiveness of trade and biodiversity is through the establishment of official standards and trade documentation schemes. Such instruments are generally developed in the context of biodiversity to ensure that products are traded or produced in a legal and sustainable manner. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), for instance, was established to ensure that international trade in specimens of listed animal and plant species does not put the survival of these species at risk. CITES accomplishes this objective by requiring that the import, export, re-export and introduction from the sea of wildlife products are authorized through a permit and certificate system. A number of UN agencies have also been effective in producing guidance documents to ensure trade does not contribute to biodiversity loss and ecosystem degradation, such as the *FAO Technical Guidelines for Responsible Fish Trade.*[53]

Voluntary standards may have a complementary role to play. For instance, two of the most recognizable standards related to biodiversity are those of the Forest Stewardship Council (FSC), which promotes sustainable forestry by accrediting certifiers that audit wood producers, and the Marine Stewardship Council (MSC), which certifies fisheries based on sustainable management practices and fish stock.[54]

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[49] See, e.g.. The Economics of Ecosystems and Biodiversity, (TEEB), "TEEB for Policy Makers – Summary: Responding to the Value of Nature", 2009.
[50] See WTO Doha Ministerial Declaration, para. 33.
[51] See UNEP/IISD, Environment and Trade: A Handbook (Second Edition), p. 110 (2005).
[52] The project was undertaken in response to CBD Conference of Parties Decision VI/5 (http://www.cbd.int/decision/cop/?id=7179); see also: http://www.unep.ch/etb/initiatives/BiodivCountryProjects.php.
[53] See FAO, Responsible fish trade, *FAO Technical Guidelines for Responsible Fisheries*, No. 11 (2009) (ftp://ftp.fao.org/docrep/fao/011/i0590e/i0590e00.pdf).

[54] For more information see the Forest Stewardship Council website (http://www.fsc.org/) and the Marine Stewardship Council website (http://www.msc.org/).

What kinds of biodiversity targets might contribute to meeting the policy sector's own objectives?

Although it is difficult to identify specific objectives common to all aspects of the trade and finance sectors, there are a number of areas where biodiversity targets could help to ensure trade and finance operate more efficiently and contribute to the overarching objective of sustainable development.[55]

In general, the trade and finance sectors will operate more efficiently when price and market distortions are eliminated. As noted above, for trade and finance policies to contribute to the sustainable use and conservation of biodiversity, it is critical that the relevant actors receive the right price signals. Getting the prices right from a biodiversity perspective requires an understanding and internalization of the costs and benefits associated with the use of biodiversity and ecosystems. This, in turn, requires up-to-date scientific assessments and valuation studies of biodiversity and ecosystem impact. Moreover, these assessments have the potential of triggering increased financing for biodiversity.

The removal of subsidies that contribute to biodiversity loss and ecosystem degradation, such as fishery and fossil fuel subsidies, also represents an important target given that it has the dual benefit of eliminating market distortions and contributing to environmental sustainability. Promoting the development of standards and labels could also contribute to increasing trade and financing for goods whose production has a positive, or at least no overall negative, impact on biodiversity.

[55] As noted earlier, sustainable development is listed as one of the principal objectives of the WTO in its Preamble. See infra note 7.

CHAPTER 8: HUMANITARIAN AFFAIRS AND PEACE KEEPING

<to be further developed>

The impact of war on biodiversity is high and may include habitat destruction, pollution and species extinction. Impacts may last for a long time with some being irreversible and may happen not only during the conflict, but also during the post conflict phase. In spite of the difficult conditions and alongside efforts to help relieve human suffering, some organizations such as UNHCR strive to undertake measures for environmental conservation. Such efforts by humanitarian organizations and intervention forces are important because of the role of these organizations play in supporting the rebuilding of countries after conflicts have ended. Primary attention is given to environmental aspects such as water pollution, soil erosion and deforestation, but the interest in the impacts of loss of biodiversity and ecosystem services and the attention to the benefits conservation, restoration and sustainable use of biodiversity can offer is growing.

Options available to organizations for contributing to addressing biodiversity loss depend on the characteristics of the conflict and the role different organizations play:

Humanitarian Organizations

Humanitarian organizations increasingly have developed guidelines which take into account the environmental conservation of areas where their projects take place. The further use and elaboration of such guidelines, and the enhanced integration of biodiversity considerations in the strategic policy and operational packages of relief agencies, can help reduce biodiversity loss. For example, environmentally sensitive areas can be mapped so as to avoid such areas when selecting camp locations for refugees or internally displaced people (IDP). Intensive cooperation with environmental and nature conservation organizations may improve the work of these organizations. Awareness raising and engagement of stakeholders such as refugees and host communities may help ensure the sustainability of such efforts.

Intervention Forces and the Government

For intervention forces, guidelines for military and peacekeeping activities may help prevent or limit activities which may cause biodiversity loss. Awareness and sensitivity should be created among the staff on environmental and biodiversity issues. When considering whether to intervene in an area or not, threats that armed conflicts may pose to biodiversity hotspots can be added to the list of considerations that have to be taken into account. Also in managing and directing the refugee and internally displaced people flows, taking into consideration the environmental sensitivity of the hosting areas can help minimizing long term costs to affected societies (see for example: UNHCR:www.unhcr.org/environment).

Other Development Organizations

Development organizations can maintain or increase their support to grass root organizations that remain active in difficult areas, as a means towards maintaining support regarding the ownership of natural resources – including biodiversity. Better coordination between humanitarian agencies and conservation groups could help mitigate damage and suffering from conflicts. Developing and mainstreaming conservation programmes in war-torn areas to safeguard ecosystems that will provide resources needed to support recovery after conflicts.

Challenges to the partnership include divergent institutional expectations, involvement and buy-in by staff in some cases, and achieving a match of technical knowledge and assistance among humanitarian actors and conservation actors. Close cooperation between political, military, conservation and humanitarian is now a key feature of an international approach to conflict resolution. However, this recognition is not always translated into practice. Today, humanitarian agencies are often left alone to work in areas considered too dangerous to deploy other non-humanitarian actors, thus making biodiversity protection in high-risk areas difficult.

International Nature Conservation Organizations

For international nature conservation organizations, it is crucial to establish cooperation with local groups as they are well informed on the exact circumstances in the area, and they often continue their activities in the region even during the conflict. Flexible funding arrangements and structural agreement with the humanitarian partners may facilitate such cooperation. Cross-boarder cooperation is also important, especially during the case of regional conflicts, since it could promote dialogue and contribute to peace building.

Non-Governmental Organizations

NGOs often find themselves juxtaposed between different parties involved in the conflict, and they are often left to find their own way in fulfilling their tasks. This often requires a neutral attitude towards various parties, and where possible, creation of awareness among- and even cooperation- with them. They should also seek diverse financial support. In a way this is a general rule of NGOs but in the times of conflict, this may even become crucial since donors are often inclined to withdraw their financial support when a conflict breaks out. It is advisable to establish good working relations with the different opposing parties to encourage the protection and sustainable use of biodiversity.

SECTION III.
OPPORTUNITIES FOR COLLABORATIVE AND COHERENT IMPLEMENTATION OF THE BIODIVERSITY AGENDA

CHAPTER 9: STRENGTHENING THE SCIENCE POLICY INTERFACE

Understanding the interactions between society and biodiversity requires data, expertise and knowledge from many walks of life. With its broad technical expertise base, the UN system is well placed to contribute to this. Efforts to keep the biodiversity agenda under review are, however, not confined to the technical level alone. Science and policy communities need to mutually inform each other through formal and informal processes and this dialogue can be helped through a well-structured science-policy interface. Two intergovernmental initiatives are currently under way which consider ways of strengthening this interface. Through the first, the UN General Assembly is considering the modalities of the regular process for global reporting and assessment of the state of the marine environment, including socio-economic aspects. The consideration is based on recommendation from an intergovernmental and expert-driven process jointly managed by UNEP and UNESCO/IOC in cooperation with FAO and WMO. The second process has involved elaborate intergovernmental and multi-stakeholder consideration of the possible establishment of an intergovernmental science-policy platform on biodiversity and ecosystem services (IPBES). The process is taking place under the auspices of the UNEP Governing Council and has involved a number of entities. The key processes constituting this interface and the role of the UN system is playing in facilitating these processes are outlined below.

A. Acquisition of biodiversity information: - research, modeling, monitoring and observations

The acquisition of environmental knowledge and information is done through research, monitoring and observations. Modelling of environmental change predictions, especially climate change and development of scenarios has become an increasingly important tool. Most of the world's capacity in acquisition of environmental information is found in national public institutions. The UN system is involved in the management of programmes, frameworks and systems that facilitate national cooperation in the area. In addition, a number of UN entities are themselves involved in environmental research and modelling.

Advances in remote sensing and geographical information systems have led to the evolution of global observing systems. UNESCO, WMO, UNEP and the Food and Agriculture Organisation (FAO) in partnership with ICSU initiated the formation of the Global Climate Observing System (GCOS) (coordinated by WMO), the Global Ocean Observing System (GOOS) coordinated by UNESCO/IOC, and the Global Terrestrial Observing system (GTOS) coordinated by FAO. Increasingly the overall coordination and architectural development of such systems takes place under the auspices of the Group on Earth Observations[56] and its efforts in establishing a Global Earth Observation System of Systems (GEOSS). This system now has a biodiversity component which may serve as a hub for further enhanced cooperation within the UN system.

B. Biodiversity assessments

Assessments analyse data and information stemming from research, modelling, monitoring and observations. Assessments vary in scope and in process. A commonly used tool is environmental impacts assessments of concrete projects or policies. State of the biodiversity reports are commonly used at national and sub-national level[57]. At the international level a whole host of assessments that differ in scope and process have evolved over the last two decades. A lot of attention has been given to the design and governance structure of these processes to ensure scientific independence and credibility on one hand and policy legitimacy and relevance on the other. The UN system has been at the forefront in developing these processes[58].

The Global Environment Facility (GEF) has played a key role in funding many of the global environmental assessments at thematic level. They include the Global Biodiversity Assessment (GBA) (UNEP

[56] The Group on Earth Observations is an intergovernmental mechanism established to develop a 10-year implementation plan for building a coordinated, comprehensive and sustained Global Earth Observation System of Systems (GEOSS). The focus of the Group is on advancing the GEOSS concept across the nine social benefit areas, developing the architecture and data policy required for GEOSS, further developing the science underpinning GEOSS, promoting sustained interactions with users of Earth observations and ensuring that the global capacity to produce and use Earth observations is developed.

[57] UNEP/GC.25/inf/12/Add.1

[58] UNEP/GC.25/inf/12

1995) and the Millennium Ecosystem Assessment (MA) (2005) which was prepared under the auspices of UNEP through a broad partnership including CBD, CITES, FAO, UNCCD, UNDP, UNESCO, UNDP, World Bank and WHO. The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2008) co-sponsored by FAO, GEF, UNDP, UNEP, UNESCO, World Bank, and WHO was an intergovernmental process with a multi-stakeholder Bureau. Both it and the Millennium Ecosystem Assessment included regional and sub-global assessment components.

Other well established thematic assessment processes include the Global Biodiversity Outlook of the Convention on Biological Diversity, the Global Forest Resource Assessment and State of the World's Fisheries and Aquaculture of FAO and the World Water Development Report by UNESCO on behalf of the UN World Water Assessment Programme. This programme comprises a broad range of UN partners from UN funds, programmes, agencies, regional commissions and secretariats of conventions.

A number of development assessments are also regularly produced by the UN system. These include the Human Development Report by UNDP, the World Development Report by the World Bank and publications on economic and social affairs by DESA. These reports contain information the social and economic aspects of sustainable development which are critical to understand in order to address biodiversity loss.

The biodiversity assessment landscape is crowded. Further cooperation among the UN system would probably be most valuable if it were linked to an intergovernmental assessment process such as a potential marine assessment or a potential intergovernmental science-policy platform on biodiversity and ecosystem services.

C. Information exchange and knowledge management

The world has over the last decades witnessed developments in information and communication technologies that have revolutionised the exchange of information. These developments have facilitated the growth of national and regional environmental information networks and systems such as in Africa[59], the EU[60], the United States of America[61] and other federal States, such as Australia,[62] Brazil[63] and India[64].

Networks make it possible to bridge scales, cover multiple themes, facilitate harmonisation of data and help aggregation and disaggregation of data. The UN statistical division works on gathering environmental data. A number of other UN system organisations are involved in gathering nationally reported data and information on environmental, social and economic issues. The development of environmental and sustainable development indicators has been on the agenda of several entities including DESA, CBD and UNEP.

Web-based information platforms of up-to-date, coherent and quality-assured priority data and information, indicators, early warning and alert services draw information from information networks, research, monitoring and observations. One example is the work by UNESCO IOC on the establishment of a tsunami early warning system. Another recent example is the decision in the high level declaration by the third World Climate Conference to develop with the support of WMO a Global Framework for Climate Services based on networking and the development of information systems and user interfaces[65].

The area of biodiversity information exchange is potentially an area where the UN system could join hands. An initiative in this respect could build on ongoing efforts include a joint knowledge management group among several of the multilateral environmental agreements.

D. Scientific and technical advice

Many of the environmental scientific and technical advisory bodies in the UN system are intergovernmental. A number of multilateral environmental agreements such as the three Rio conventions and a number of the other biodiversity related conventions have prominent intergovernmental scientific and

[59] The Africa Environment Information Network (AEIN)
[60] The European Environmental Information and Observation Network (EIONET)
[61] The exchange network helps the US Environmental Protection Agency (EPA), federal states, ethnic groups, territories and regulated facilities exchange environmental information more efficiently (see also http://www.exchangenetwork.net).
[62] Environmental Resources Information Network (ERIN), see http://www.deh.gov.au/erin/index.html.
[63] Sistema Nacional de Informação sobre o Meio Ambiente (SINIMA), see http://www2.ibama.gov.br/~cnia/sinima.htm.
[64] Environmental Information System (ENVIS), see http://www.envfor.nic.in/envis/envis.html.
[65] http://www.wmo.int/wcc3/page_en.php

technical advisory bodies or processes. These bodies consider assessment findings, commission studies, operate networks and advise their parent body. The UN system can contribute to their work, but they are ultimately answerable to the member states of the relevant agreement.

CHAPTER 10: INTERLINKAGES AND SYNERGIES IN THE IMPLEMENTATION OF THE BIODIVERSITY AGENDA

.] There are various conventions dedicated to biodiversity-related matters, including the Ramsar Convention on Wetlands (1971), the World Heritage Convention (1972), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973), the Convention on Migratory Species (1979), the Convention on Biological Diversity (1992) and the International Treaty on Plant Genetic Resources for Food and Agriculture (2001?). In addition, the two other conventions adopted at the Rio Conference in 1992 – the UN Framework Convention on Climate Change and the UN Convention to Combat Desertification – also address biodiversity issues, as does the World Heritage Convention. Further, many if not all UN agencies have activities which directly or indirectly relate to biodiversity. Yet while convention secretariats and UN agencies do engage in a consultative manner, both formally and informally, recommendations have surfaced over the years calling for a formal context in which to attempt greater synergy amongst their operations. Various programmes have arisen from this call, both at the global and national levels. As post-2010 targets are devised and, it is hoped, the level of effort and investment in conservation and sustainable use of biodiversity are greatly increased, a creative, effective and efficient synergy among agencies and countries is needed more than ever. Moving towards a One-UN approach at the national level may offer the opportunity to put this into practice. In addition, experts participating in a recent Nordic symposium on "Synergies in the biodiversity cluster" (Helsinki, 8-9 April 2010) considered the merits of establishing an *ad hoc* joint working group of governments (similar to one established in the chemical and waste cluster of conventions) to lead efforts aimed at improving interlinkages and synergies related to biodiversity.

A. Current global level synergies

Together with various UN bodies and specialized agencies, the secretariats of all the multilateral environmental agreements are members of the Environment Management Group which is chaired by the Executive Director of UNEP and serves as the coordination body on environmental issues for the UN system. On a number of occasions, UNEP has used its convening power to bring together representatives of MEA secretariats to discuss common administrative and substantive issues. Several meetings have been organized on the subject of harmonized reporting and information or knowledge management as well as cooperation with the World Trade Organization. In 2007 the Executive Director of UNEP established an MEA Management Team, comprising the executive heads of all UNEP-administered MEAs.

In order to enhance coherence and cooperation in implementation, a Liaison Group of Biodiversity-related Conventions (BLG) was established in 2004. The BLG currently comprises the Convention on Biological Diversity, the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the International Treaty on Plant Genetic Resources for Food and Agriculture, the Ramsar Convention on Wetlands and the World Heritage Convention. Its main purpose is coordination and synergy among Secretariats, but it has also given birth to a complementary coordination mechanism among the Conventions' scientific advisory bodies (through meetings of their Chairs – CSAB). As a member of the Joint Liaison Group of Rio Conventions (JLG), which brings together CBD, UNCCD and UNFCCC, the CBD is able to facilitate the exchange of information between the JLG and the BLG. Other coordination mechansims involving biodiversity-related conventions focus on specific thematic areas, e.g. the Collaborative Partnership on Forests, the Global Partnership on Plant Conservation, the Liaison Group on Invasive Species, or the collaborative work on illegal trade.

In order to provide a formal basis for cooperation between the conventions, various memoranda of understanding and joint work plans have been agreed by convention secretariats. Provision is usually made for these agreements to be periodically reviewed and a few have been revised, following such a review. Each convention secretariat regularly invites other secretariats to key meetings of its convention bodies or parties. The agendas for meetings of MEA governing bodies typically contain an item on cooperation with other conventions, under which interventions are made by observer conventions often highlighting specific areas of joint activity. Side events are also organized by host and observer conventions, which draw attention to issues of common interest.

Convention secretariats frequently consult each other on administrative or legal issues which arise. They also exchange information or experience, both formally and informally, on shared substantive issues. More recently, the secretariats have been entering into arrangements whereby they can share staff or consultants (e.g. the CBD liaison officer located in the CMS secretariat and the CITES-CMS coordination consultant).

While coordination among secretariats has gradually improved over the years a recent analysis carried out by the Ramsar Convention for the third meeting of Chairs of Scientific Advisory Bodies (CSAB-3; see also report of the meeting) suggests ample opportunity for additional joint activities, retrospective harmonization or interpretation of guidance, joint reporting and proactive collaboration leading for example to the joint development of guidance. A number of themes have already been identified that lend themselves for the proactive design of joint projects/programmes.

B. National level synergies – lessons learned and opportunities

Perhaps the best means for strengthening coherence among the conventions, however, is national level coordination, cooperation and coherence. Sometimes the same person or office has responsibility for many or all biodiversity-related conventions, but frequently participants in the respective instruments sit in different offices and sometimes different organizations and ministries (e.g. agriculture, environment, natural resources, sustainable development, tourism, trade, etc.).
A representative for one instrument may not have the mandate or technical competence to deal with other instruments, which makes it difficult or even impossible for them to follow and represent their countries' interests in several intergovernmental processes.

Coordination among national focal points is therefore critical and this has been achieved in some countries through overarching biodiversity policies and legislation, cooperative memoranda of understanding, informal or formal consultations, joint planning or projects and institutional mechanisms such as issue-based, biodiversity or MEA committees. Biodiversity units in regional bodies (e.g. the European Commission and the Commission on Environmental Cooperation in North America) have also made a contribution to coordination efforts. Recently, there have been government-led initiatives in the ASEAN and Oceania regions to reduce the reporting burden under various MEAs and this has provided a basis for better coordination at both national and international levels (see for example
http://www.sprep.org/2009SM20/pdfs/eng/Officials/WP_11_1_Streamlined%20reporting%20by%20PIC.pdf
and
http://www.sprep.org/2009SM20/pdfs/eng/Officials/WP_11_1_Att_1_Streamlined%20reporting%20by%20PIC.pdf). Additionally, UNEP-WCMC has conducted a case stud on harmonized reporting for various biodiversity-related conventions in selected countries. (www.unip-wcmc.org/conventions/harmonizatoin/projects.htm). (perhaps text box on results).

The nature and effectiveness of national level coordination in all countries is not fully known but there is a general sense that such coordination is seriously lacking. Indeed, responsible ministries may be actively competing with each other for broader mandates and more human or financial resources. Efforts are underway in the BLG to develop a guidance manual for enhancing cooperation among national focal points, recognizing that it may not be useful or appropriate to propose a 'one-size-fits-all' approach.

C. New Impetus for change – a UN commitment

There is a need and an opportunity to use any post-2010 biodiversity targets and the process of developing them as a fresh start to harmonization. All biodiversity-related conventions, other conventions and UN agencies should be a part of formulating the targets and all member countries should particpate in and subscribe to them. UN leadership through the EMG and BLG should mandate joint implementation of the targets and offer follow-up support.

In addressing Millenium Development Goals, a mechanism that would allow cohesive support and subscription to biodiversity targets would be to elevate them to a higher tier of implementation within the UN system. Set targets should technically satisfy relevant policy and programmatic objectives of biodiversity-related conventions, other conventions and UN agencies.

More work should be done to strengthen national level coordination. This might best be achieved by supporting responsible ministries in the development and implementation of joint work plans. Implementation and reporting burdens to countries should be reduced. More regional bodies might consider coordinating their efforts related to biodiversity. At the global level, convention secretariats and UN agencies should focus on the issuance of joint policy statements (e.g. biodiversity and Rio+20), the undertaking of joint activities (e.g. projects related to knowledge management, reduction of the reporting burden, coordinated capacity building, etc.) and the promotion of coherent decisionmaking by governing bodies.

Current work on reviewing the UN system's contribution to the 2010 biodiversity target, formulating a post-2010 target as well as strategies for achieving it, developing a suite of biodiversity indicators, negotiating an Intergovernmental Platform for Biodiversity and Ecosystems, establishing an *ad hoc* joint working group of governments to guide the biodiversity synergies process and improving international environmental governance will have significant - and presumably positive - implications for interlinkages and synergies among biodiversity-related conventions, other conventions and UN agencies.

CHAPTER 11: OPPORTUNITIES FOR INTEGRATING THE BIODIVERSITY TARGETS INTO NATIONAL DEVELOPMENT COOPERATION

A. Newly developing agendas and priorities

As set out in chapters 3 to 13 it is clear that there are new emerging issues revolving around biodiversity conservation and management, as well as old issues that are in need of new approaches. This means that much new knowledge needs to be incorporated into biodiversity action on the ground, while research and learning continue. We have to move beyond "business as usual" and embrace the following:

- *New approaches to old and emerging challenges*
- *New economic accounting*
- *New questions and perspectives*
- *New scales*
- *New partners and partnership arrangements*

B. **Development cooperation context:** How will biodiversity become a priority on the agenda?

Development cooperation will be critical if developing countries are to make major headway in implementing the Convention on Biological Diversity and in meeting any new post-2010 targets. Halting the loss of biodiversity will require cooperation between countries as well as effective cooperation at national level of state institutions, civil society and the private sector. Both global and national strategies for biodiversity management will need to be reinforced to reverse the current trend of accelerating biodiversity loss.

The scale of cooperation needed to achieve this is unprecedented given the added challenges posed by climate change, which by compounding other threats to biodiversity is likely to amplify biodiversity loss (see chapter 4). The UN system has a pivotal role to play in building the capacity of developing countries to meet these challenges. However, it must also review its own way of operating to ensure streamlined and effective action. In the biodiversity context it is clear that the important issues are often still perceived to "belong to selected specialist UN organisations", whilst the work set out in the previous chapters clearly indicates that a great variety of sectors affecting almost any aspect of life are dependent on healthy biodiverse ecosystems and the services they provide.

The key to meeting biodiversity targets is implementation of pertinent actions on both the local and national levels. The loss of biodiversity and ecosystem services is a global problem, yet responsibility for actions to prevent biodiversity loss lies with sovereign nation states. At the country level, there is a need for biodiversity management to become more firmly nested into national development policies.

Development cooperation will be critical if developing countries are to make major headway in implementing any post-2010 biodiversity targets. Most developing countries lack the capacity and funding to address biodiversity problems on their own, given their numerous other pressing social and economic development priorities. It is essential that the intricate links between biodiversity, sustainable development, poverty reduction and the long-term achievement of the MDGs are fully understood and incorporated into development frameworks.

The Paris Declaration and Accra Agenda for Action called for the harmonisation of development cooperation, to build the capacities of developing countries to achieve sustainable development. The Paris Declaration more fully empowers developing countries to drive their own development agenda. Thus, it is more important than ever to position UN assistance at the national level in order to ensure that post-2010 biodiversity targets are addressed appropriately. Bilateral donors and multilateral agencies will need to be responsive to country priorities and empower them to address the interlinked agendas of development, poverty reduction, environment and biodiversity management.

C. Setting national agendas

The major thrusts of the post 2010 biodiversity agenda are i) country leadership in setting biodiversity management priorities and targets guided by the global state of play on biodiversity management; ii) scaling up of country level responses in addressing national priorities and targets for biodiversity management, and addressing the likely economic trade-offs through integrated approaches to development that take social and economic needs and biodiversity management objectives into account; iii); increased responsibility by the private sector in mitigating biodiversity loss attributable to company operations and iv). multilateral and bilateral development assistance. The *Paris Declaration and Accra Agenda for Action* called for the harmonisation of development cooperation, to build the capacities of developing countries to achieve sustainable development. Bilateral donors and multilateral agencies will need to be responsive to country priorities.

Instruments developed through multi-lateral processes, such as the National Biodiversity Strategies and Action Plans (NBSAPs), serve as critical entry points for focussed development cooperation support. The current preparations for the new strategic plan of the CBD reconfirm the critical role of NBSAPs as key instruments for outlining country level plans, actions and investment priorities for the management of biodiversity. Some 160 countries have so far prepared NBSAPs. However, NBSAPs need to be better integrated into national development and economic sector plans, and considerations relating to climate change adaptation and mitigation plans. Effective mainstreaming of biodiversity concerns and targets into such development plans may be an alternative or additional way of addressing biodiversity conservation needs. There is an urgent need to factor-biodiversity management objectives into the decision-making processes of major economic sectors and concomitant national budget processes. The threat of climate change offers the opportunity for developing a new outlook on development, recognizing the role that sound biodiversity management plays in managing adverse impacts relating to climate change, for example by reducing emissions from land use change, or supplying ecosystem services, such as shoreline protection that can buffer the effects of climate change on vulnerable communities.

Development partners have registered a commitment to support the efforts undertaken by developing countries to incorporate environmental considerations into development and monitor progress in turning policy into action. One avenue identified for doing this is to integrate biodiversity management into Poverty Reduction Strategy Papers (PRSPs) and PRSP implementation, as a key development-planning instrument. Some important questions need to be answered in reforming PRSPs to address biodiversity loss, including: 1) what benefits do the poor obtain from biodiversity? Who benefits, and when do the benefits occur? 2) What are the impacts and costs of biodiversity loss on the poor, now and in the future? 3) What options exist for the poor to obtain benefits from ecosystems in a sustainable way? 4) What alternatives exist to consumptive uses of natural resources (i.e. growing village woodlots to compensate foregone use of fuelwood from forests)? What are the attached costs? It is clear though that biodiversity issues to be addressed must be incorporated into the economy and development planning at levels other than poverty reduction and PRSPs.

In the context of multi-lateral cooperation, the UN Development Assistance Framework (UNDAF) is an important cooperation instrument, negotiated between country representatives and the UN. The UNDAF can be one support mechanism to attain integrated priorities of the NBSAP or the post 2010 targets, prioritised in the country development planning. UNDAF is already providing a fruitful foundation for united action as ONE UN, and guides UN country support over a multi-year period.All UN organisations together with the Government of the host country plan the content of the UNDAF, which is the “work plan” for the UN system for the time period specified. A UNDAF which successfully addresses and mainstreams biodiversity concern and any post 2010 biodiversity targets will lay a strong foundation for meaningful support for their attainment.

Although currently only just implemented in some pilot countries, the joint delivery effort of the UN System should be furthered in partnership arrangements in all countries, even if still improved mechanisms may need to evolve. In the past, it has been difficult for the large UN system to harmonize the actions of all its instruments and organs throughout the system – both at national delivery level, but also at global support level – and the One UN effort aims to reform this.

D. Key collaboration areas, identified by countries

During the review of the 2010 Target implementation and the implementation of the last Strategic Plan of the CBD, numerous country assessments have taken place, amongst other requesting countries to identify their key collaboration needs. The One UN system must now identify where various instruments and expert organisations are best placed to provide a concerted support.

Capacity support and institutional strengthening for national action:
The UN has a pivotal role to play in building the capacity of developing countries to combat biodiversity loss. Institutions require both functional and technical capacities. UNDP has defined four core issues that should be addressed to effectively develop these respective capacities: (1) Institutional Arrangements: the overall framework for decision-making on environmental management issues, (2) Accountability: the two-way relationship between public authorities and those who are affected by their decisions and actions;
(3) Environmental Leadership: the ability to influence change and motivate action, and (4) Knowledge and information, which are crucial to ensuring that environmental management initiatives have a sound scientific and technical basis and are adapted to country conditions. Development cooperation needs to be structured so as to address each of these issues, with a view towards strengthening capacity.

Tools for M&E, research and assessments: The UN system can offer science-based input to countries as they pursue biodiversity targets and integrate them into the global context. Agencies can offer assistance in generating, monitoring, maintaining and sharing important data on biodiversity and ecosystem services. This includes assistance in developing indicators and agreed measures of biodiversity change. The GEO-Biodiversity Observation Network, GBIF and the Biodiversity Indicators Partnership are well placed to offer this support. Additional groups include the SBSTTA, DIVERSITAS, and the Programme on Ecosystem Change and Society among others, and currently an intergovernmental platform on biodiversity and ecosystem services is proposed.

Tools for calculating biodiversity value-budgeting assets and trade-offs on the national levels: Sound development policies can offer positive outcomes on multiple social, economic and environmental fronts, although invariably involving some degree of trade-off. Choices are largely a question of balance, but tradeoffs must be addressed in ways that maintain and/or restore the capacity of ecosystems to sustain biodiversity and continue to provide critical ecosystem services to humans. The value of these ecosystem services needs to be factored into the cost benefit calculus used to make development choices. Governments need to take the lead in developing national development strategies with specific biodiversity targets and actions for maintaining and restoring ecosystem services worked into them.

Identifying and addressing trade-offs requires systematic application of decision-support tools such as Strategic Environmental Assessment (SEA). SEA is an anticipatory and proactive process of analysing and weighing the environmental opportunities and constraints attached to policies, programs and projects before they are approved and implemented. A growing number of countries including South Africa, Ghana, and Vietnam are applying SEA to improve their policy plans and programs. Donor countries in Europe and elsewhere have agreed to support the systematic use of strategic environmental assessments in support of mainstreaming—which should help address tradeoffs.

E. Financial Resources

Biodiversity management on the scale needed to successfully mitigate ecosystem loss will require new environmental finance. A key priority for many countries is to identify, to access, combine and sequence environmental finance in order to meet their biodiversity management needs. Investment in biodiversity conservation can render long term development and poverty reduction benefits, and as such should become part of national development planning and budget processes circumscribing development finance.

Several observations may be drawn regarding the financing picture for biodiversity management:

- Overall public investment in biodiversity management, relative to funding needs is sub optimal;
- Funding is rarely dictated by sound business planning, establishing the costs and revenue earning potential of biodiversity management;

- Allocation and employment of funds is not always effective and means of making sure all investments have positive impact is not common practice;
- While biodiversity management can provide a significant economic stimulus such as tourism growth, these benefits are rarely considered in Government finance decisions
- There is a high asymmetry between countries in terms of revenue earning potential given difference in resources and capacities to manage these resources.
- The economic costs of inaction (failing to address biodiversity loss) are not being adequately considered.

For many developing countries; the main source of funds for biodiversity conservation has so far been the international community. OECD DAC statistics show that aid marked as contributing to biodiversity management has increased from US$ 1 billion to some 3 billion annually. In 2007 total aid amounted to US 3.128 billion from 21 countries and the European Union. However, this is well below the amounts needed to halt biodiversity loss. Development cooperation will never be able to underwrite the full cost of halting biodiversity loss, and though such assistance needs to be scaled up, other sources of finance will need to be tapped to address the challenge. UN assistance to countries in obtaining tools and developing their long-term financing agendas will be critical. See also chapter 7 regarding critical strategies and opportunities to address biodiversity targets related to finance and trade policy.

F. A framework for UN system-wide biodiversity support at the global and the national levels

As efforts are increased addressing the need for support and successful integrated approaches at the national level,certain targets ought to be addressed at the global level (e.g. those pertaining to creating a more receptive enabling environment for biodiversity sensitive action pertaining international trade); and numerous support actions can be leveraged at the global level (e.g. knowledge, networking, capacity support).

There are new and improved ways of how the One UN system can provide relevant support responsive to country priorities and empower them to address the interlinked agendas of development, poverty reduction, environment and biodiversity management.

Box x

The case of Protected Areas as a Means for Development

Protected areas are the cornerstone of any strategy for conserving biodiversity. To date, 13.9% of land, and 5.9%[66] of territorial marine areas are under some form of legal protection – the largest deliberate decision of land use allocation in history. Protected areas are vital for conserving biodiversity; they maintain key habitats, provide refugia, allow for species migration and movement, and ensure the maintenance of natural processes. But protected areas secure not only the future of biodiversity, they also secure the wellbeing of humanity itself. Protected areas provide livelihoods for nearly 1.1 billion people[67], are the primary source of drinking water for over a third of the world's largest cities[68], are a major factor in ensuring global food security through the protection of fisheries, wild crop relatives and ecosystem services[69], and provide a critical safety net for the one billion people living on less than a dollar a day[70].

If protected areas are to be effective at conserving biodiversity, while at the same time providing an array of societal goods and services, they must be embedded in comprehensive and ecologically representative networks, and be supported by an enabling environment of effective management, appropriate policies and sustainable funding. These same preconditions form the basis of the Convention on Biological Diversity's Programme of Work on Protected Areas, which was approved in 2004. Despite progress, many of the challenges that led to the adoption of the CBD Programme of Work on Protected Areas in 2004 remain in 2010. There continue to be major gaps in the coverage and representation of the global protected area network, including, for example, marine, freshwater and temperate grassland biomes[71]. These ecological gaps are highlighted even further in national-level gap assessments, where many species, ecosystems and ecoregions lack protection altogether. There continue to be major gaps in funding the world's protected areas – the current gap is estimated to

[66] Coad, L. *et al* . 2008. Progress towards the convention on Biological Diversity terrestrial 2010 and marine 2012 targets for protected area coverage. Parks 17(2)35-42. IUCN, Gland, Switzerland.
[67] UN Millennium Project, 2005.
[68] UNEP/CBD/SBSTTA/14/5, 29 August 2009 (CBD Information Note)
[69] Dudley, N. S. Mansourian, S. Stolton and S. Suksuwan. 2008. Food stores: Protected areas and crop wild relatives.
[70] Dudley, N. and S. Stolton. 2008. Safety net: Protected areas and poverty reduction.
[71] UNEP-WCMC. 2008. State of the world's protected areas: an annual review of global conservation progress. Cambridge: UNEP-WCMC.

be between $40 and $50 billion per year[72], and continues to grow. A recent study of Peru's protected area finance, for example, found that funding was less than half of what was needed to plan and manage the protected area system[73]. There continue to be major gaps in management effectiveness; a recent study of nearly 7,000 assessments of protected areas from more than 100 countries found that less than a quarter were considered effectively managed[74].

In addition to these challenges, protected areas are now facing a whole new set. Global and national economic crises continue to unfold, straining already tight budgets for protected areas. In a world of diminishing natural resources, poverty alleviation, not nature conservation, is the top priority for most developing countries, and protected areas are increasingly expected to provide benefits and services to offset their costs. At the turn of the century, the global climate crisis barely registered as a mainstream issue; today it is one of the predominant drivers in economic and resource decisions, eclipsing protected areas as a global and national concern. These new pressures necessitate a whole new set of responses and approaches in planning, establishing and managing protected areas, including:

New approaches to old and emerging challenges – There is an urgent need to incorporate climate change, ecosystem services and poverty alleviation into traditional protected areas assessments and practices. For example, planners can incorporate areas important for fisheries, storm surge protection, and wild crop relatives into their ecological gap assessments, thereby increasing the transparency with which tradeoffs can be made. They can look beyond strained government budgets and identify innovative and sustainable finance mechanisms that capitalize on protected areas services, such as water, tourism, agriculture and carbon storage. They can assess not only how well biodiversity is managed within protected areas, but also how well other values are managed, such as areas important for water supplies, tourism, livelihoods and adaptation to climate change.

New economic accounting – Policy makers must increasingly consider protected areas as a strategic investment in their national economies. A recent report that summarized over 1,000 studies worldwide, for example, estimated that investments in creating and managing protected areas would yield a return on societal benefits on the order of between 25:1 and 100:1[75]. Therefore, policy makers must systematically assess the full range of values and services afforded by their protected area systems.

New questions and perspectives – Protected areas are increasingly recognized as a key strategy for climate change adaptation and mitigation[76]. However, planners must consider not only how protected areas enable biodiversity to adapt to climate change; they must also consider how they enable human communities to weather the changes likely to occur under different climate change scenarios.

New scales – Traditionally, policy makers and managers have focused on individual protected area sites. However, because national and regional interconnected networks are necessary for adapting to climate change adaptation and providing ecosystem services, because sustainable finance mechanisms such as tourism typically apply to multiple protected areas, and because threats and management weaknesses are often systemic, planners will increasingly need to think at the level of protected area systems, not sites.

New partners – Managing for societal values beyond biodiversity, managing at larger scales, and integrating protected areas into national economies and sectors will require involving a whole new set of partners. These may come from sectors that have previously been wholly absent in protected area planning, finance and management. Examples include involving insurance companies to identify areas at risk from severe flooding, involving companies interested in financial investments in protected area management, involving cities in the planning, management and finance of water catchment areas within protected areas, and involving indigenous and local communities in processes that would include their lands as part of an integrated land-use planning process.

The challenges facing protected areas have not only increased, but they are now compounded by the new challenges of the coming decades. However, these challenges may also present new opportunities. If policy makers can embrace the changes required to make protected areas relevant to these new challenges, they will be able to position protected areas as an investment that will pay long-term dividends in alleviating poverty, securing food and water, sustaining local livelihoods, bolstering national economies and buffering humanity against the coming climate crisis.

[72] P. Sukhdev, ed. 2009. The Economics of Ecosystems and Biodiversity.
[73] Flores, M. and G. Chan. 2008. Business-oriented financial planning for protected areas. Arlington, VA: The Nature Conservancy.
[74] Leverington, F., M. Hockings and K.L. Costa, 2008. Management Effectiveness Evaluation in Protected areas: Report for the project 'Global study into management effectiveness evaluation of protected areas'. Queensland: The University of Queensland.
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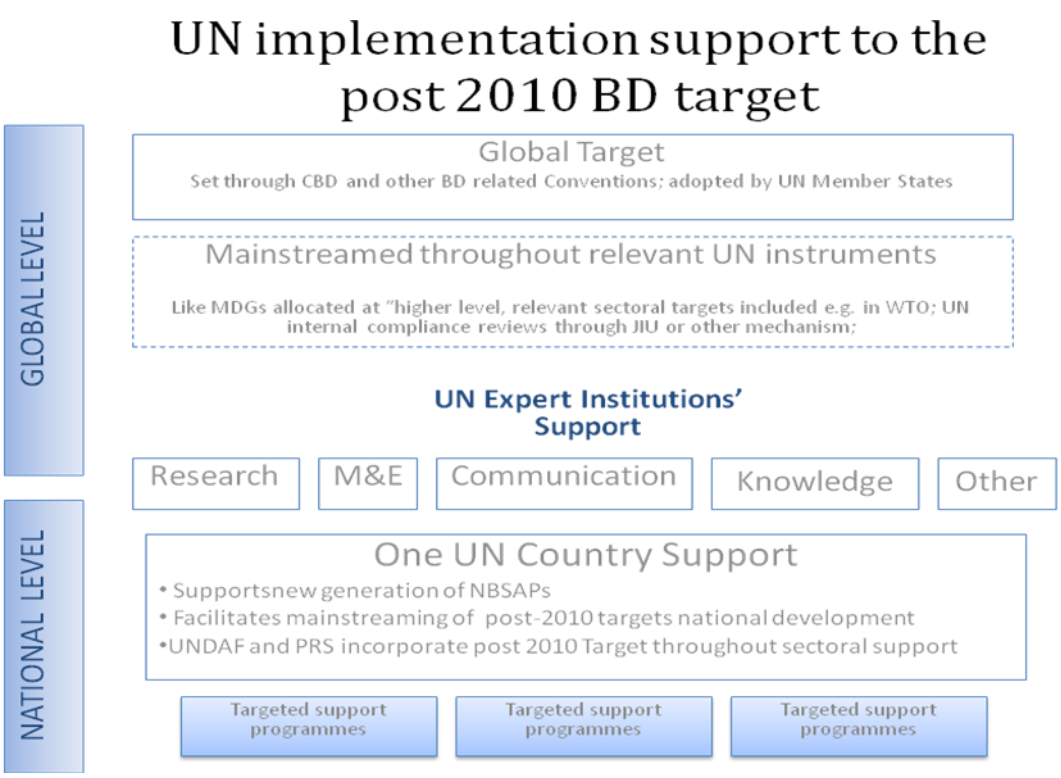
UN implementation support to the post 2010 BD target
GLOBAL LEVEL
Global Target
Set through CBD and other BD related Conventions; adopted by UN Member States
Mainstreamed throughout relevant UN instruments
Like MDGs allocated at "higher level, relevant sectoral targets included e.g. in WTO; UN internal compliance reviews through JIU or other mechanism;
UN Expert Institutions' Support
Research
M&E
Communication
Knowledge
Other
NATIONAL LEVEL
One UN Country Support
• Supportsnew generation of NBSAPs
• Facilitates mainstreaming of post-2010 targets national development
•UNDAF and PRS incorporate post 2010 Target throughout sectoral support
Targeted support programmes
Targeted support programmes
Targeted support programmes

CHAPTER 12: REVIEW OF EFFECTIVESS IN IMPLEMENTATION OF THE TARGETS

Development of targets and indicators for achievement of biodiversity targets can provide a sound basis for reviewing the effectiveness of measures. UN entities can potentially play a role in the review process through structured, reporting, self evaluations and indicators. In addition valuations allow institutions to incrementally improve institutional performance and results-based cooperation.

As a central custodian of the post 2010 biodiversity target, the COP of the CBD may want to consider the modalities of such a review process building on its existing processes which in practical terms are facilitated by the Executive Secretary of the Convention and the Ad-hoc Working Group on Review of Implementation of the Convention.

The UN contribution to the review could be based on an assessment of progress against the targets supported by indicator measurements and benchmarks as relevant. Some EMG members, including CITES, FAO, UNEP, UNESCO and WHO, are partners in the 2010 Biodiversity Indicators Partnership coordinated by the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC).

The partnership currently coordinates the delivery and communication of the suite of indicators measuring progress towards the 2010 Biodiversity Target. Funds allocated by the GEF to the Partnership amount to over $3.6 million and cover activities from late 2006 to late 2009, including establishing and maintenance of the Partnership, developing and delivering the range of indicators showing progress towards the 2010 target at a global scale, implementing a communications strategy, and increasing the capacity of national governments and regional organizations to develop and use biodiversity indicators in the context of the 2010 target.

This partnership could possibly serve as a foundation for a system whereby a broader range of UN entities could take responsibility for or contribute to measurement of indicators in particular as they relate to indirect and direct drivers of biodiversity loss and degradation of ecosystem services. Many UN entities such as WHO, UNDP, FAO are well placed to provide data on indicators reflecting the impact of biodiversity change on human well-being. Such a system could also complement or be part of possible UN based initiatives on exchange of biodiversity information as mentioned in chapter 9, in particular as it relates to socio and economic data.

The evolution of review and indicators partnership in the UN can also lay the foundation for a strengthened support to developing countries efforts to review effectiveness of their own national biodiversity strategies and action plans (NBSAPs), Poverty Reduction Strategy Papers (PRSPs), national strategies for the Millennium Development Goals and equivalent strategies. Such support may help strengthen the socio economic aspects of regional and national biodiversity information networks, and clearing house mechanisms.

CONCLUSIONS AND OUTLOOK

A. A shared UN vision and perspective

<to be developed>

B. Approach to further cooperation

<to be developed>

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