

APN Biodiversity and Ecosystem Services Framework

OPPORTUNITY PAPER

The present paper invites member countries, stakeholders, the donor community, and the international research communities and networks to propose and engage in collaborative activities with the APN that embarks on underpinning regional-based research; capacity development via training and technology transfer; strengthening, establishing and/or interacting with science-policy mechanisms in key thematic areas under its framework for biodiversity and ecosystem services for the Asia-Pacific region, especially in developing countries.

1. Introduction

Home to more than half the world's population and a region that is spectacularly rich in biodiversity, Asia and the Pacific is rapidly developing economically.

Policy- and decision-making in the region to realise sustainable, green growth practices need to be underpinned by sound scientific knowledge, and mechanisms that effectively link biodiversity and ecosystem services (B&ES) to sustainable development and green growth is lacking.

With this rationale the APN has undertaken a series of activities over two years culminating in the present *Opportunity Paper* for the APN B&ES framework (*Appendices 1 and 2*).

In the lead up to establishing the present document, questions of "What do we know about ecosystem services?" and "How do we want to manage them?" were raised.

While it was generally agreed that the B&ES framework must include green growth and sustainable development, the question to "What extent is economics involved?" was stressed, particularly in the context of policy- and decision-making in the region.

2. Underpinning the science of B&ES for policy

Effective ways of collaborative science that ensure policy- and management- decisions are informed by the best available information, and good understanding of uncertainties associated with science, are needed.

An example of such an established, effective process is the Intergovernmental Panel for Climate Change (IPCC), particularly via its synthesis reports, for example, the IPCC Fourth Assessment Report (IPCC, 2007).

An IPCC fifth assessment is underway and a report for policy makers is expected in 2014.

A similar mechanism was established recently for B&ES called the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES; see www.ipbes.net), as agreed by Governments in the Busan Outcome (IPBES, 2010). The first plenary

of IPBES established preliminary rules and procedures for its work (IPBES, 2013).

An IPCC for biodiversity, IPBES recognises the global importance of freshwater, marine and terrestrial ecosystems, and the services they provide.

In June 2012, the landmark United Nations Rio+20 sustainability conference presented the outcome "The Future We Want" (UNSKDP, 2012a).

Under its B&ES framework, the APN supports activities that are in line with Rio+20 outputs, in particular those highlighted in Parts: (II)61; (IV)E97-99, 102, 111, 122; (V)A 160,163-165, 205, 174, 177, 193, 197, 198, 201, 202, 204, 205, 212; (VI)B275, 276; and (VI)C 280 (UNSKDP, 2012b; see *Appendix 3*).

These areas are not intended to be exclusive but rather complement the goals of the APN B&ES Framework as well as underscore the importance of marine, coastal, freshwater, forest, and wetland and dryland ecosystems for livelihoods and human well-being.

3. Opportunities under the B&ES framework

A series of meetings and workshops since February 2011 has identified important existing gaps for the Asia-Pacific region requiring attention through comprehensive scientific research, capacity development and science-policy mechanisms (APN, 2011a).

With input from key experts from ASEAN ACB, DIVERSITAS, GEOBON, ICSU, MSU, UNU, among others; the gap analysis report (*Appendix 2*) outlines important thematic areas and key activities for the region, and underscores the need for APN to effectively align its scientific theme of Biodiversity, Ecosystems and Land-Use with the international arena, importantly the work of UNCBD, Millennium Ecosystems Assessment (MEA, 2005), such as the impact of degrading ecosystems on the ability to achieve the Millennium Development Goals (see <http://www.un.org/millenniumgoals/>); UNFCCC through decisions on REDD+ mechanisms, ecosystems-based approaches to climate adaptation, among others (UNFCCC, 2012); UNCSD Rio+20 (2012a,b); and

IPBES, especially in this “United Nations Decade on Biodiversity 2011-2020” (UNCBD, 2011).

APN invites member countries, stakeholders, the donor and international research communities, etc., to propose collaborative activities that will provide opportunities, particularly in developing countries, to engage in activities under its B&ES Framework.

Encompassing a range of comprehensive, regional-based and collaborative scientific research, capacity development, and science-policy mechanisms, “thematic gaps” will include, broadly speaking:

Four main research themes:

- i. *Identification of drivers and pressures for biodiversity change that influence ecosystem services (land-use change; climate change, etc.)*
- ii. *Assessment of the impacts of biodiversity loss and vulnerability to the shrinking of ecosystem services*
- iii. *Prediction of changes in biodiversity and ecosystem services through model-based scenarios*
- iv. *Adaptation, response and mitigation of the depletion of biodiversity and ecosystem Services*

Some of the key activities related to the above four themes are outlined in *Table 1* (page 3).

Other activities that may be considered in line with the key activities in *Table 1* in are A) awareness-raising, B) capacity development, and C) science-policy mechanisms as elaborated below.

A. Awareness raising and activities that link and/or develop networks: Research on the effectiveness of conservation education/awareness raising and capacity building on diversity in nature at all levels of biological organisation; Traditional knowledge and culture in nature conservation and management; Joint curriculum development or instructional material development; Updating stakeholders on more recent developments in research on the fundamental importance of diversity in nature and ecosystems; Improving standards of professional environmental practice; Making more visible the connections between losses in diversity at all levels of biological organisation and human well-being.

B. Training: Developing capacity for scenario-development tools, training on predictive modelling and systems analysis at various scales; Training to evaluate diversity and ecosystem services for incorporating into decision-making systems and models.

C. Science-policy mechanisms: Developing appropriate tools and processes to facilitate policy and decision-making based on complex scientific understanding;

Research to better understand the needs of policy-makers and the private sector on biodiversity and ecosystem services; Research to better understand how to facilitate engagement and support of the private sector in education on biological diversity and nature conservation; Promoting research that is holistic, integrated and interdisciplinary in approach; Enhancing awareness of different types of uncertainties for model-based forecasts.

4. Framework that is forward looking

Ensuring that the framework is dynamic in nature, the following actions will be undertaken in the APN’s present third strategic phase (APN, 2011b) from April 2013 (mid-term) until March 2015 (end):

- Identifying from the present paper selected topics for the annual calls for proposals (ARCP and CAPaBLE programmes) for 2013 and 2014.
- Developing an “opportunities brochure” inviting collaboration with organizations, stakeholders and other interested parties from the member countries and international community.
- Seeking investment from the donor community.
- Synthesizing results of activities under the APN’s “Ecosystems, Biodiversity and Land-Use” Focused Activities programme (EBLU, 2011), and other relevant activities.
- Addressing and incorporating gaps identified for ecosystems services in the APN book on Climate in Asia and the Pacific: Security, Society & Sustainability (Stevenson & Manton, 2013).
- Undertaking an 18-month review (from September 2014) with the aim of integrating key activities under the B&ES framework into the 4th Strategic Plan of the APN (from April 2015).

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Table 1. Key activities for thematic areas under the APN Biodiversity and Ecosystems Framework	
Thematic Area	Key Activities for the Asia-Pacific Region
1	<ul style="list-style-type: none"> - Supporting the articulation of biodiversity and ecosystem indices - Understanding the dynamics of land and land-use change on biodiversity resources and ecosystem services including the influence of climate change
2	<ul style="list-style-type: none"> - Enhancing knowledge and understanding on the role of biodiversity in nature as a way of conferring ecosystem resilience and reducing vulnerabilities in the face of global environmental change - Research that will identify and document ecological tipping points; Research that will illustrate the linkages between socio-cultural knowledge and livelihoods to different levels of biodiversity - Case studies that will support the work of international programmes on evaluation of changes in biodiversity and ecosystem services AP-BON
3	<ul style="list-style-type: none"> - Build spatially-explicit models for areas of interest within the Asia-Pacific region that enable the potential for future change in biodiversity and ecosystem services to be assessed as a function of plausible scenarios of change in land use, climate and invasive species - Extending these models to incorporate the potential consequences of spatially-explicit configurations of management responses in terms of multiple values of diversity in nature and ecosystem services - Establishing links between models and associated models of human-natural systems and between these models and global-scale scenario modeling of biodiversity and ecosystem services
4	<ul style="list-style-type: none"> - Elucidating parsimony and conflict between carbon management and biodiversity conservation as key mitigation strategies - Integrating the human dimensions into action for biodiversity conservation and carbon management - Restoring biodiversity in disturbed or managed ecosystems - Synthesizing best practices for adaptation and mitigation for biodiversity and ecosystem services

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For more information on the APN or on the present framework, contact the APN Secretariat at info@apn-gcr.org or visit the APN Website: www.apn-gcr.org

Appendix 1
SUMMARY OF WORKSHOP
Biodiversity and Ecosystem Services Framework
22 July 2012, Bangkok, Thailand

1. PARTICIPATION

The workshop was attended by 4 members of the APN Steering Committee Members (expert members from New Zealand National Commission for UNESCO, the International Scientific Cooperation, USA; and East West Center from the USA); 1 steering committee alternate from Ministry of Environment, Indonesia; and representatives from Hiroshima University, International Council for Science Regional Office for Asia and the Pacific. The APN Secretariat facilitated the workshop, which was chaired by Dr. W.A. Matthews.

2. FLOW OF THE WORKSHOP

The opening session focused on a 10-minute PowerPoint presentation by Dr. W.A. Matthews entitled "Preamble: why are we here and what do we want to do?" This was followed by session 1 which focused on the draft framework. It highlighted 2 working group discussions – one on the current state of the framework and the other one on revising and finalizing the framework. Session 2 touched on revising the draft framework and session 3 was on sewing the threads and finalizing the framework.

3. HIGHLIGHTS OF THE DISCUSSION

In discussing ecosystems services and biodiversity, the question of "what do we know about them, how do we want to manage them?" was raised. It was also suggested that the study of biodiversity and ecosystem services should also include green growth and sustainable development. Biodiversity is also thought to be too broad, raising the suggestion that biodiversity should be linked to other areas such as water, food security, urban development etc. On the economics of biodiversity and ecosystems, the question on to what extent are the economists involved was raised.

ICIMOD has undertaken quite good ecosystems evaluation for water, for example. Other than forest, other ecosystems must also be pursued such as mountain, coastal, marine, ecosystems. It was also conveyed that when talking about ecosystem services, the economic evaluation should also be considered at the same time. Output can be used in decision-making process. They are looking for a base. However it's controversial whether we can give a price tag to ecosystems. Are there any extra tools besides economic analysis?

It was added that that the PUP wanted to have strong input to Rio+20, and that these inputs should be examined, pulled out and put to use for APN's future work. APN is a network and is strong in networking. APN may want to think of establishing networks that could do good work on long-term basis (not only supporting projects with at least 3 involving countries, etc.). This is important but can APN move forward and look at new

relationships in the APN region and beyond (in terms of networks)?

The essence of the meeting will be presented to SC and IGM and it was suggested that some funds be allocated for this specific area, whether this may be a new specific call for proposals with due consideration to the secretariat's workload. But where will the fund come from? From additional extra contributions from donating countries or from the existing core budget? This discussion is needed among APN members.

APN could start thinking about a new programme for a strategic approach in SP dialogue as there is a need for real dialogue between good science and wise political decisions. On forest management, the question on how to teach people so they would change their way of doing business was raised. Sustainable forest management is quite a problem of forest. Extra money is needed for sustainable forest management. Many do not understand the sustainability issue of forests. What benefits do they get? So the question is what to do? Something different is needed. On the level of primary education BD/ES must be taught. Many data are available making it even more difficult for policy makers to make decision. It was suggested that maybe APN wants to look at scientific data better understandable for policy makers and public. It was suggested that the Tokyo Scoping WS report (Gap Analysis Report) be revised by also taking up points from PuP and Rio+20 reports.

The group expressed that one area to be enhanced is the Science-Policy linkage. In the previous discussion, the question should have been what are the next steps, and that the focus should be more on the contribution of APN to the development of the SP interface.

APN, therefore, could begin to design a programme to take the process step-wise, progressively, i.e. not one or two activities. Rather, a strategic programme to develop science policy relationship. It has to be driven and APN can substantially contribute to that if there were a strategic approach to that. Taking biofuel as an example, which compromises food production but make no contribution to change. APN as a science-based organization must provide scientific context no matter if or how much it is heard.

The group expressed that they must also look more closely on what is really relevant for APN, by taking into account the results from PUP and Rio+20. The group is now working on an "opportunity paper" rather than "gap paper". This was followed by a concern that too much time could be needed to go through the whole process of having the idea approved by IGM.

The group may want to discuss this idea with MOEJ for their input, as well as with ROK and Indonesia, at an early stage. It was also suggested that in the light of ROK's request of feeding them with ideas of justification of good idea the green growth may be a good area that can be suggested. The idea of creating a short paper that can provide policy makers with few basic ideas. So highlights from the PUP and Rio+20 papers will be lifted to serve what is essential for the purposes, as well as extract from Tokyo Scop WS what is really needed.

It was agreed that the gap analysis paper is relevant and useful to be converted and used as a basis for a programme within the APN. The group shall look at gaps that might exist and gaps that are of higher priority to APN. Then the paper can be augmented to include relevant information from PUP/Rio+20 to give relevance and authority to the

activities and to align with what governments agreed.

4. ACTION POINTS FROM THE WORKSHOP

- a. A two-page Opportunity Paper with some appendices will be prepared and circulated among participants to the meeting, who will comment on what should be added, what should be deleted or what should be joined together. Then the document will be submitted to the SC and also to current and future potential funding agencies.
- b. +-.
- c. The paper is to be augmented in line with the Planet Under Pressure, Rio+20 and give relevance to the policy community.
- d. Paper should highlight and cut across ARCP/CAPaBLE (i.e. in order to potentially invite proposals related to high priority areas in the next round of proposals)
- e. The paper should highlight the need for partnerships and networks such as with ADB, JST, GGGC (UNEP-funded), etc.
- f. The paper is to be circulated among the SC for comments and revisions and then presented at the 18th IGM for endorsement.

Appendix 2
APN Gap Analysis Report and Framework:
Linking and Integrating Ecosystem Services and Biodiversity¹

A. OVERALL RATIONALE

Preamble

In April 2002, the Parties to the Convention on Biological Diversity (www.cbd.int) committed themselves **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 was subsequently endorsed by the World Summit on Sustainable Development (WSSD) and the United Nations General Assembly and was incorporated as a new target under the Millennium Development Goals. However, while the 2010 CBD targets failed to be met, the United Nations capped its Biodiversity Year 2010 on a high note creating a new science policy platform to aid the reversing of the steep decline in biodiversity and ecosystem services. The new body is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES; www.ipbes.net) and was approved by Governments in June 2010 at a meeting in Busan, Republic of South Korea and finally approved at the UN headquarters in December 2010.

"IPBES represents a major breakthrough in terms of organizing a global response to the loss of living organisms and forests, freshwaters, coral reefs and other ecosystems that underpin all life - including economic life - on Earth," said Achim Steiner, Executive Director of the UN Environment Programme.

The Asia-Pacific region is spectacularly rich in biodiversity, but also home to more than half the world's human population. Policy- and decision-making to realise the objective of establishing sustainable, green growth practices in the Asia-Pacific region needs to be underpinned by sound scientific knowledge. However, much of the knowledge needed to effectively link biodiversity and ecosystem services to sustainable development and green growth is lacking throughout the region, particularly in developing countries.

With the above rationale and in the present "United Nations Decade on Biodiversity 2011-2020²," the APN seeks to contribute to this crucial and urgent period by promoting comprehensive scientific research, capacity development and science-policy connections in a new Biodiversity Framework: ***Linking and Integrating Ecosystems Services and Biodiversity***

Gap Analysis Workshop

With funding from the Ministry of the Environment, Japan (MOEJ), and as a contribution to the International Year of Biodiversity 2010, the APN conducted a Biodiversity and Ecosystem Services Gap Analysis Workshop (February 13-15, 2011). The aim of the workshop was to identify gaps in scientific research and capacity development and to establish APN's role in developing an agenda for this important area of research. The agenda would be in line with the UN Decade of Biodiversity, and contribute not only to the UNCBD, but also to the UNCSO (specifically the 2002 WSSD's Johannesburg Plan of Implementation [JPOI]³) and its

¹ Also referred to as Biological Diversity

² Official launch will be on the International Day for Biological Diversity, 22nd May 2011:
<http://www.cbd.int/doc/notifications/2011/ntf-2011-027-un-en.pdf>

³ WSSD JPOI: http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf

lead up to Rio+20⁴; the Millennium Development Goals; and, where appropriate, contribute to the Second Millennium Ecosystems Assessment (MEA2) and the IPBES.

Prior to the Gap Analysis Workshop expressions of interest were sought from experts in the global change community, particularly from those working in the Asia-Pacific region. As a result, the workshop included participation from key experts from ICSU, DIVERSITAS, United Nations University and ASEAN ACB, GEOBON and other key organisations.

Following an open questionnaire to all participants, the gaps and priorities identified in the present document were the culmination of questionnaire responses and input from reputable scientists and experts on biodiversity and ecosystem services.

B. GAPS AND PRIORITIES

Gaps and priorities outlined in this section are based on analysis of feedback received from the global change community and invited experts to the APN Gap Analysis Scoping Workshop. Initially, the following issues were considered: vulnerability and predictions; impacts; adaptation and mitigation. The workshop also reviewed and took into account key publications and background papers on biodiversity and ecosystem services and all relevant issues at the sub-regional level.

B.1 Research

Research Theme Area 1: Drivers and pressures for biodiversity change that influence ecosystem services (land-use change; climate change, etc.)

Introductory Statement

Over the last 60 or more years, human society's pursuit of development has intensified resulting in the unsustainable and inequitable use of nature. While this has brought unprecedented economic growth for many countries in the Asia-Pacific region, it has also exerted tremendous pressures on all aspects of biological resources and the abilities of ecosystems to provide the broad range of fundamental natural services. The Global Biodiversity Outlook 3, (GBO3⁵), released in 2009, presented the critical state of the global biodiversity resources in spite of the expressed commitments by governments and intensified efforts over the last ten years to address this global concern. All levels of biodiversity continue to erode at rates way beyond nature's abilities to replenish them. The same GBO3 report identified the primary drivers of biodiversity loss. These are undeniably attributed to human activities, land use change and the physical modification of water resources and are the most significant factors for the continuing losses in biodiversity. It is projected, based on current evidence that climate change will add to the pressure points on an already overstressed resource base. Thus, societies in the region are confronted with the challenge of how to effectively respond to this very urgent issue at an appropriate scale.

Rationale

⁴ Rio+20 Summit, 4-6 June 2012: <http://www.uncsd2012.org/rio20/>

⁵ Global Biodiversity Outlook 3: <http://www.cbd.int/gbo3/ebook/>

The full implications of the stresses exerted by human activities on the environment are not well understood. The conventional wisdom of biodiversity loss (at all levels of biological organisation) has focused largely on the most obvious and common services that ecosystems provide: provisioning for food and shelter. Many still do not fully understand or appreciate the complex dynamics between diversity in nature and ecosystem services. As a result, many initiatives designed and/or pursued to address biodiversity loss do not produce the desired results because the approaches fail to establish the links between ecosystems and biodiversity. The research agenda under this theme will seek to support efforts to address this particular gap of knowledge and understanding. It will support research initiatives that will, at a minimum, examine the following:

- The scale and intensity of drivers and pressures points for loss at various levels of biodiversity
- Methodologies and approaches for measuring aspects of biodiversity loss and estimating the economic and other values provided by ecosystem services; and
- Establishing the chain of cause and effect relationship of identified drivers of biodiversity loss (at specific levels of biological and ecological organisation).

For the purposes of the research relevant to this theme, biological diversity (biodiversity) is defined as in the Convention on Biological Diversity. Given the importance of 'diversity' at all levels of biological organisation, researchers will need to clearly describe at what level of biological organisation they propose to research and justify that level. The work should focus on diversity and its role in sustaining humans and human well-being.

Key Activity Areas (initial listing)

- Support in the articulation of biodiversity and ecosystem indices.
Narrative: The ability to monitor and track changes of biodiversity and ecosystems depends largely on the having clear, measurable and trackable sets of indicators. There are existing sets of indicators that are currently being utilized in reporting progress of interventions on biodiversity. But these sets need further enhancement and in particular, linked to ecosystem services in order to provide clear picture of the effects and impacts of human activity on the ecosystems and biodiversity.
 - Developing indices for biodiversity and ecosystem services for 2020 biodiversity targets;
 - Improving monitoring mechanisms; and
 - Traditional knowledge and culture in biodiversity conservation and management.
- Understanding the dynamics of land and land-use change on biodiversity resources and ecosystem services including the influence of climate change.
Narrative: While it is recognized that there have been a number of studies at the global level that projected the impacts of land and land-use change on biodiversity and connections to climate change, there is still a wide gap that establishes the connections of such dynamics in the Asia-Pacific region. Support is needed to build a robust body of work for the region that should provide solid basis for policy makers and implementers, which best actions can be taken to address this particular driver of biodiversity loss.
 - Pollution-induced changes in relation to biodiversity loss (both inorganic and organic pollutants)
 - Build on previous land-use change studies to better understand implications for biodiversity
 - The interactions between natural disasters and climate change

- The relationship of biodiversity and climate change and vice-versa
- Linkages between blue-carbon and marine biodiversity;

Research Theme Area 2: Assessment of impacts of biodiversity loss and vulnerability to the shrinking of ecosystem services

Introductory statement

Current knowledge and information for understanding the complex dynamics between biodiversity and ecosystem services does not highlight the critical importance of their connections. Most assessments undertaken using the current set of indicators have been developed based on area (e.g. how much forest is lost - in the case of landscapes) and the quantity of species (i.e. species richness), which are more relevant in provisioning services. While these indicators are essential, other equally valuable services, such as supporting, regulating and cultural service functions, need to be assessed, or at the very least accounted for as well. The Millennium Ecosystem Assessment⁶ Report points out that, more often than not, the approach to enhancing one particular service of an ecosystem has a cost to other ecosystem services due to trade-offs. This complex relationship makes it difficult to actually determine the full cost and value of biodiversity loss and its impacts in the region at appropriate scales and levels.

Rationale

Viewed in this light, there is an urgent need for building the knowledge base that uses ecosystem services as the fundamental basis for assessing the state and condition of some levels of biodiversity resources; and integrating with it other measures such as species variability, function, quantity and distribution; in order to fully understand the role of biodiversity and the implications of its loss to human well-being. The need to build a robust knowledge base especially on the aspect of ecosystem services is imperative for the region. The region as cited earlier is home to unique biodiversity resources. But these resources are base for human development and economic activities. Support is needed to build a robust knowledge base by undertaking systematic and continuing assessments of the impacts of biodiversity loss to human societies. Initiatives should also be encouraged on undertaking vulnerability assessments of ecosystems services by human activities and identify measures that would minimize the impacts of such activities.

Key Activity Areas

- Enhancing knowledge and understanding on the role of biodiversity in nature as a way of conferring ecosystem resilience and reducing vulnerabilities to extinction in the face of global environmental change
- Research that will identify and document ecological 'tipping points'⁷,
- Research that will illustrate the linkages between socio-cultural knowledge and livelihoods to different levels of biodiversity.
- Case studies that will support the work of international programmes on evaluation of changes in biodiversity and ecosystem services such as GEO-BON, but at the regional level (e.g. those that may be undertaken by AP-BON).

⁶ Links to the various Millennium Assessment Reports: <http://www.maweb.org/en/Index.aspx>

⁷ Tipping point (or threshold): *Wikipedia defines an ecological threshold as "a point at which a relatively small change in external conditions causes a rapid change in an ecosystem... when an ecological threshold has been passed, the ecosystem may no longer be able to return to its state."*

Research Theme Area 3: Model-based prediction of changes in biodiversity and ecosystem services

Introductory statement

The overall objective of this research theme is to develop models to help assess the potential for future changes in biodiversity and ecosystem services in the Asia Pacific as a consequence of scenarios of global change (particularly land-use change, climate change, and species invasion). These models would further help to assess how alternative, spatially-explicit configurations of management responses might alter these outcomes and, in doing so, provide the basis for trading-off, and identifying co-benefits between, multiple ecosystem services and biodiversity values.

This work needs to make effective use of outputs from previous and on-going APN projects mapping and modelling land-use change, and needs to integrate site, landscape and historical effects of land use on biodiversity and ecosystem services. Wherever possible, developed models also need to incorporate best-available information about ecological thresholds or 'tipping points,' and link to coupled models of human-natural systems and relevant global modelling initiatives.

Rationale

This research theme is needed to help translate the findings and outputs from work conducted in themes 1 and 2 into quantitative, spatially-explicit assessments of the potential for future change in defined levels of, or aspects of, biodiversity and ecosystem services under scenarios of global change and management. This will thereby provide a stronger foundation for assessing the implications of alternative management responses considered in Theme 4. In this sense, Theme 3 provides the methodological connection that bridges the gap between the generation of fundamental information and understanding in Themes 1-2, and the application of this knowledge to planning and decision-making in Theme 4.

Key Activity Areas

- Build spatially-explicit models for areas of interest within the Asia-Pacific region that enable the potential for future change in biodiversity and ecosystem services to be assessed as a function of plausible scenarios of change in land use, climate and invasive species. These models should, wherever possible: make effective use of outputs from APN projects mapping and modelling land-use change; integrate site-landscape-historical effects; and incorporate best-available information about ecological thresholds (tipping points).
- Extend these models to incorporate the potential consequences of spatially-explicit configurations of management responses (particularly those involving proactive changes in land, or sea, use), thereby providing an objective basis for assessing the relative expected benefit of alternative responses (or sets of responses) in terms of multiple values of diversity in nature and ecosystem-services (for use in trade-off and co-benefit analyses in Theme 4).
- Establish links between these particular models and associated models of human-natural systems (thereby enabling consideration of more complex interactions and feedbacks between biodiversity, ecosystem services and other environmental, social and economic factors) and between these models and global-scale scenario modelling of biodiversity and ecosystem services (thereby allowing changes in aspects of biodiversity and ecosystem services in the Asia-Pacific region to be viewed within a broader global

context, and allowing modelling from this region to help refine global modelling efforts).

Research Theme 4: Adaptation, Response and Mitigation of the Depletion of Biodiversity and Ecosystems Services

Introductory statement

Loss of diversity at all levels of biological organisation is an urgent and extremely important threat to human well being. Therefore, methods and approaches to mitigation are important priorities for research. In addition, it is well recognized that adaptation is important as it focuses on ways to cope and address the pressures on different aspects of biodiversity. There has been considerable emphasis on finding means for climate adaptation, but there has been less interest in understanding global change effects on aspects of biodiversity. Research needs to be developed that focuses on mitigation strategies, building on existing research on climate change dynamics and land use change forecasts.

Rationale

The Asia-Pacific region is a significant area for this kind of research. The pressures on many aspects of biodiversity, including man-made, are acutely high. Moreover, the long history of human adaptation of agriculture and forestry systems in the region has resulted in a wide range and abundance of culturally endowed nature. Society as a whole does not understand well the interrelationship between 'natural' diversity in nature and culturally endowed nature, and how pressures on both will affect human wellbeing and systems. In this Region, there is a need to develop a programme activity that is focused on adaptation and mitigation of losses in nature in both the natural and managed environments. Currently, we are not aware of any such research in Asia-Pacific region that addresses these issues. Land use transformation is the most important form of forest and other land-use and land-cover conversion.

Key Activity Areas

- *Elucidating Parsimony and Conflict between Carbon Management and Biodiversity Conservation as Key Mitigation Strategies*
Narrative: The development of strategies that mitigate climate change and decline in nature at all levels of biological organisation is an important priority in global change research. Yet interventions that maximize one may minimize or lessen the latter. For instance, land management for carbon using plantation species that sequester carbon quickly may not be a good strategy for nature conservation or restoration. On the other hand, strategies that emphasize conservation, such as assisted natural regeneration with native species, may delay the response to carbon removal from the atmosphere. Nonetheless, there may be opportunities to enhance carbon sequestration and nature at an optimal level, such that multiple mitigation benefits can be achieved. This area of research is aimed at understand these tradeoffs or mutual-benefits across the region, at various scales, geographies and landscape systems.
 - Research focused on understanding better the interrelationships between actions and interventions that focus on increasing carbon stored in landscapes and flora across landscapes.
 - Synthesis of approaches available to practitioners, land managers, policy makers etc that can maximize both carbon benefits and nature conservation. Best practices and novel approaches for "win strategies" development

**APN Biodiversity & Ecosystem Services Framework
Opportunity Paper
(Appendix 2)**

- Integration of conservation attributes and activities into the emerging protocols for carbon management, such as REDD+. A/R in the CDM and agroforestry and other agricultural schemes.
 - Development of broad integrated approaches that maximize a range of ecosystem services, beyond carbon sequestration together with nature conservation and management (e.g. Sustainable Forest Management that reduces local people's impact on forest resources).
- *Integration of the human dimensions into action for biodiversity conservation and carbon management and other ecosystem services*
Narrative: The first (above) bullet under this theme focuses on advancing our understanding of tradeoffs between carbon-oriented interventions and biotic-oriented interventions. The present activity recognises the importance of considering the human dimensions of agriculture, forestry and fisheries. Research needs to be done that considers the livelihoods of land managers – people, communities and institutions who use the land and its resources – in a way that integrates these human dimensions into the strategies for mitigation. For example, agriculture and its expansion is one of the most important agents of ecosystem degradation and habitat change and fragmentation. Yet at the same time, agricultural land offers some of the best opportunities for mitigation of losses in diversity in nature and enhancement of livelihoods, through systems that incorporate biodiversity and ecosystem services. For instance multi-species agro-forestry systems can produce a range of natural capital and ecosystem goods and services that simultaneously increase some aspects of biodiversity, carbon stocks, and economic welfare. It can also reduce further pressures on existing ecosystems, including protected areas.
- Research focused on coupling an understanding of livelihood systems and their role and impact to/from efforts at nature conservation or interventions.
 - Research focused on adaptive land management for agriculture and agro-forestry, and management of fisheries and other aquatic resources, that enhance and/or restore diversity in nature and enable improved livelihoods.
 - Research focused on coupling nature conservation and management with low carbon management in agriculture, agro-forestry and aquatic production systems.
 - Research that identifies and integrates social and cultural knowledge, local practices, traditional knowledge as measures for diversity at different levels of biological organisation support.
- *Research on restoration of biodiversity in disturbed or managed ecosystems*
Narrative: This activity is focused on understanding how human interventions can play an important and useful role in restoration of nature and ecosystem services that have heretofore been lost or degraded. This would be focused on both natural environments where human restoration could bring some of the critical elements of certain levels of biodiversity or ecosystem services back from their degraded states, even if the full range of ecosystem services that existed in the natural system cannot be recovered. One important element of this research area is to understand how intensively managed, but highly degraded, agro-ecosystems can be strengthened through restoration of and heterogeneous production systems.
- Supporting and testing, or application of existing: 1) ecological research to restore diversity in nature at different scales ; 2) land management research to restore diversity in managed systems at different scales; and

3) aquatic management research to restore diversity in fisheries and other freshwater and marine systems at different scales

· *Synthesis and outreach of best practices for Adaptation and Mitigation for Biodiversity and Ecosystem Services*

Narrative: There is a growing literature of experience and best practices in this field that is not being captured and organized. The result has been a considerable redundancy in research that could better be channelled into action. This area of research is clearly more application-oriented than the others, but it is important to begin to translate science into practice. This area of the program would focus primarily on a synthesis of practices that have been successful in this region and elsewhere and then a concerted effort focused on communication and outreach.

- Agroforestry and urban forestry at the local level, household initiatives, home gardens, community-based forest and other measures.
- Promoting healthy oceans, such as programs including UNEP Blue Carbon, MPAs etc
- Promotion of various practices for marine and terrestrial ecosystems, such as Mangroves for the Future, Seagrass Network, Integrated Coastal and River Basin Management, ESABII, AP BON, GEO BON, Satoyama, Satoumi, etc.
- REDD+
- Conservation areas and reserves
- Low ecological footprints

B-II Capacity Building

Introductory statement

The well-being of every individual and the state of the global economy is intrinsically linked to sustainable and equitable use of biodiversity at all levels of biological organisation. However, overall there is a poor understanding of the value of biological diversity. Good science must be complemented by competent practitioners and highest standard of practice. Good science by itself is not enough to address the complex issues relating to the losses in and damage to diversity in nature. Capacity building, education and training needs to be associated with and built on APN research. In doing so, it is logical to also build modern understanding on traditional knowledge. There is a strong need to support more effective ways of awareness-raising, educational and training programmes.

Rationale

To build on existing biological diversity science research, the scientific community must have strategic science communication mechanisms in order to assure that all stakeholders are properly informed.

Key Activity Areas

- **Awareness-raising at all levels**
 - Research on the effectiveness of conservation education/awareness-raising and capacity building on diversity in nature at all levels of biological organisation.
 - Traditional knowledge and culture in nature conservation and management
 - Joint curriculum development or instructional material development so many teaching practitioners can learn from each other

- Updating stakeholders on more recent developments in research on the fundamental importance of diversity in nature and ecosystems
- Improving standards of professional environmental practice such as encouraging practitioners to be certified
- Making more visible the connections between losses in diversity at all levels of biological organisation and human well being
- **Training**
 - Develop capacity for scenario-development tools, predictive modelling and systems analysis at various scales
 - Training to evaluate diversity and ecosystem services for incorporating into decision-making systems and models
- **Research on Effective Communication**
 - Promoting dialogues through different media
 - Communicating for adaptation and mitigation
 - Effectively disseminating information materials in local languages
 - Enhancing the appreciation of concepts related to the greening of the economy

B-III Science-Policy

Introductory statement

The well-being of every individual and the state of economy is intrinsically linked to sustainable and equitable use of biodiversity at all levels of biological organization. However, as noted in B-II above and reiterated here, overall there is a poor understanding of the value of biological diversity. Good science must be complemented by competent practitioners and highest standards of practice. However good science by itself is not enough to address the complex issues relating to the losses in and damage to diversity in nature. Capacity building, education and training need to be built on APN research. In doing so, it is logical to build on traditional knowledge. Furthermore, there is evidence to support the need for more effective ways of awareness-raising, educational and training programmes.

Rationale

There is an urgent need for better links between policies that would develop the science of conservation of diversity in nature, environmental and socio-economic development policies aimed at improving livelihoods and human wellbeing. There is also an urgent need for more effective ways of working collaboratively with the scientific community thereby ensuring that policy and management decisions are informed by best-available information and good understanding of uncertainties associated with scientific discoveries.

Key Activity Areas

- Development of appropriate tools and processes to facilitate policy and decision-making based on complex scientific understanding
- Research to better understand the needs of policy-makers and the private sector on biodiversity and ecosystem services
- Research to understand better how to facilitate engagement and support of the private sector in education on biological diversity and nature conservation
- Promote research that is holistic, integrated and interdisciplinary in approach

- Enhance awareness of different types of uncertainties for model-based forecasts

C. NEXT STEPS and WAY FORWARD

Some issues for consideration:

- Establish a steering group and have a follow-up meeting to further develop the framework ***Linking and Integrating Ecosystem Services and Biodiversity with Green Growth & Sustainable Development***, integrate into APN's activities and establish mechanisms (under existing APN mechanisms) for funding from 2012;
- Update the endnotes of the APN 3SP that list the range of topics and activities that APN supports to help achieve its objectives;
- Regards mechanisms for undertaking the activities under the framework, consider:
 - Establishing a 3 to 5-year framework under the ARCP programme: in line with the contents of the attached report;
 - Considering the CAPaBLE comprehensive research pillar with a fourth 3-to-5-year phase from 2012 to 2014 (or 2017)? (and/or as a Post Rio+20- initiative); and/or
 - Launching a Special Call for Proposals for Focussed Activities based on the above-mentioned research and key activity areas.

(m) Promote productive activities in developing countries that contribute to the eradication of poverty;

(n) Address the concern about inequalities and promote social inclusion, including social protection floors;

(o) Promote sustainable consumption and production patterns;

(p) Continue efforts to strive for inclusive, equitable development approaches to overcome poverty and inequality.

59. We view the implementation of green economy policies by countries that seek to apply them for the transition towards sustainable development as a common undertaking, and we recognize that each country can choose an appropriate approach in accordance with national sustainable development plans, strategies and priorities.

60. We acknowledge that green economy in the context of sustainable development and poverty eradication will enhance our ability to manage natural resources sustainably and with lower negative environmental impacts, increase resource efficiency and reduce waste.

61. We recognize that urgent action on unsustainable patterns of production and consumption where they occur remains fundamental in addressing environmental sustainability and promoting conservation and sustainable use of biodiversity and ecosystems, regeneration of natural resources and the promotion of sustained, inclusive and equitable global growth.

62. We encourage each country to consider the implementation of green economy policies in the context of sustainable development and poverty eradication, in a manner that endeavours to drive sustained, inclusive and equitable economic growth and job creation, particularly for women, youth and the poor. In this respect, we note the importance of ensuring that workers are equipped with the necessary skills, including through education and capacity-building, and are provided with the necessary social and health protections. In this regard, we encourage all stakeholders, including business and industry, to contribute, as appropriate. We invite governments to improve knowledge and statistical capacity on job trends, developments and constraints and integrate relevant data into national statistics, with the support of relevant United Nations agencies within their mandates.

63. We recognize the importance of the evaluation of the range of social, environmental and economic factors and encourage, where national circumstances and conditions allow, their integration into decision-making. We acknowledge that it will be important to take into account the opportunities and challenges, as well as the costs and benefits, of green economy policies in the context of sustainable development and poverty eradication, using the best available scientific data and analysis. We acknowledge that a mix of measures, including regulatory, voluntary and others applied at the national level and consistent with obligations under international agreements, could promote green economy in the context of sustainable development and poverty eradication. We reaffirm that social policies are vital to promoting sustainable development.

64. We acknowledge that involvement of all stakeholders and their partnerships, networking and experience-sharing at all levels could help countries to learn from one another in identifying appropriate sustainable development policies, including

93. We call for the further mainstreaming of the three dimensions of sustainable development throughout the United Nations system, and request the Secretary-General to report to the General Assembly, through the Economic and Social Council, on the progress made in this regard. We also call for and recognize the importance of the strengthening of policy coordination within key structures of the Secretariat of the United Nations so as to ensure system-wide coherence in support of sustainable development, while ensuring accountability to Member States.

94. We invite the governing bodies of the funds, programmes and specialized agencies of the United Nations development system to consider appropriate measures for integrating the social, economic and environmental dimensions across the operational activities of the United Nations system. We also emphasize that increasing the financial contributions to the United Nations development system is key to achieving the internationally agreed development goals, including the Millennium Development Goals, and in this regard we recognize the mutually reinforcing links among increased effectiveness, efficiency and coherence of the United Nations development system, achieving concrete results in assisting developing countries in eradicating poverty and achieving sustained economic growth and sustainable development.

95. We emphasize the need to strengthen operational activities for development of the United Nations system in the field that are well aligned with national sustainable development priorities of developing countries. In this regard, we emphasize that the fundamental characteristics and principles of United Nations operational activities set forth in the relevant General Assembly resolutions provide the overarching framework for all matters pertaining to the United Nations development assistance operations in the field. We recognize the importance of strengthening United Nations system coordination. We look forward to receiving the outcome of the independent evaluation of the Delivering as one initiative.

96. We call on the United Nations system to improve the management of facilities and operations, by taking into account sustainable development practices, building on existing efforts and promoting cost effectiveness, and in accordance with legislative frameworks, including financial rules and regulations, while maintaining accountability to Member States.

E. Regional, national, subnational and local levels

97. We acknowledge the importance of the regional dimension of sustainable development. Regional frameworks can complement and facilitate effective translation of sustainable development policies into concrete action at the national level.

98. We encourage regional, national, subnational and local authorities as appropriate to develop and utilize sustainable development strategies as key instruments for guiding decision-making and implementation of sustainable development at all levels, and in this regard we recognize that integrated social, economic and environmental data and information, as well as effective analysis and assessment of implementation, is important in decision-making processes.

99. We encourage action at the regional, national, subnational and local levels to promote access to information, public participation and access to justice in environmental matters, as appropriate.

100. We emphasize that regional and subregional organizations, including the United Nations regional commissions and their subregional offices, have a significant role to play in promoting a balanced integration of the economic, social and environmental dimensions of sustainable development in their respective regions. We underscore the need to support these institutions, including through the United Nations system, in the effective operationalization and implementation of sustainable development, and to facilitate institutional coherence and harmonization of relevant development policies, plans and programmes. In this regard, we urge these institutions to prioritize sustainable development through, inter alia, more efficient and effective capacity-building, development and implementation of regional agreements and arrangements as appropriate, and exchange of information, best practices and lessons learned. We also welcome regional and cross-regional initiatives for sustainable development. We furthermore recognize the need to ensure effective linkage among global, regional, subregional and national processes to advance sustainable development. We encourage the enhancement of the United Nations regional commissions and their subregional offices in their respective capacities to support Member States in implementing sustainable development.

101. We underline the need for more coherent and integrated planning and decision-making at the national, subnational and local levels as appropriate and, to this end, we call on countries to strengthen national, subnational and/or local institutions or relevant multi-stakeholder bodies and processes, as appropriate, dealing with sustainable development, including to coordinate on matters of sustainable development and to enable effective integration of the three dimensions of sustainable development.

102. We welcome regional and cross-regional initiatives for sustainable development, such as the Green Bridge Partnership Programme, which is voluntary and open for participation by all partners.

103. We underscore the need to ensure long-term political commitment to sustainable development taking into account national circumstances and priorities and, in this regard, we encourage all countries to undertake the necessary actions and measures to achieve sustainable development.

V. Framework for action and follow-up

A. Thematic areas and cross-sectoral issues

104. We recognize that in order to achieve the objective of the Conference, namely to secure renewed political commitment for sustainable development, as well as to address the themes of a green economy in the context of sustainable development and poverty eradication and the institutional framework for sustainable development, we commit to address remaining gaps in the implementation of the outcomes of the major summits on sustainable development, to address new and emerging challenges and to seize new opportunities through the actions enumerated below in this framework for action, supported as appropriate through provision of

education, training, knowledge and appropriate and affordable technologies, including for efficient irrigation, reuse of treated wastewater and water harvesting and storage. We reiterate the importance of empowering rural women as critical agents for enhancing agricultural and rural development and food security and nutrition. We also recognize the importance of traditional sustainable agricultural practices, including traditional seed supply systems, including for many indigenous peoples and local communities.

110. Noting the diversity of agricultural conditions and systems, we resolve to increase sustainable agricultural production and productivity globally, including through improving the functioning of markets and trading systems and strengthening international cooperation, particularly for developing countries, by increasing public and private investment in sustainable agriculture, land management and rural development. Key areas for investment and support include sustainable agricultural practices; rural infrastructure, storage capacities and related technologies; research and development on sustainable agricultural technologies; developing strong agricultural cooperatives and value chains; and strengthening urban-rural linkages. We also recognize the need to significantly reduce post-harvest and other food losses and waste throughout the food supply chain.

111. We reaffirm the necessity to promote, enhance and support more sustainable agriculture, including crops, livestock, forestry, fisheries and aquaculture, that improves food security, eradicates hunger and is economically viable, while conserving land, water, plant and animal genetic resources, biodiversity and ecosystems and enhancing resilience to climate change and natural disasters. We also recognize the need to maintain natural ecological processes that support food production systems.

112. We stress the need to enhance sustainable livestock production systems, including through improving pasture land and irrigation schemes in line with national policies, legislation, rules and regulations, enhanced sustainable water management systems, and efforts to eradicate and prevent the spread of animal diseases, recognizing that the livelihoods of farmers, including pastoralists, and the health of livestock are intertwined.

113. We also stress the crucial role of healthy marine ecosystems, sustainable fisheries and sustainable aquaculture for food security and nutrition and in providing for the livelihoods of millions of people.

114. We resolve to take action to enhance agricultural research, extension services, training and education to improve agricultural productivity and sustainability through the voluntary sharing of knowledge and good practices. We further resolve to improve access to information, technical knowledge and know-how, including through new information and communications technologies that empower farmers, fisherfolk and foresters to choose among diverse methods of achieving sustainable agricultural production. We call for the strengthening of international cooperation on agricultural research for development.

115. We reaffirm the important work and inclusive nature of the Committee on World Food Security, including through its role in facilitating country-initiated assessments on sustainable food production and food security, and we encourage countries to give due consideration to implementing the Committee on World Food Security Voluntary Guidelines on the Responsible Governance of Tenure of Land,

Fisheries and Forests in the Context of National Food Security. We take note of the ongoing discussions on responsible agricultural investment in the framework of the Committee on World Food Security, as well as the principles for responsible agricultural investment.

116. We stress the need to address the root causes of excessive food price volatility, including its structural causes, at all levels, and the need to manage the risks linked to high and excessively volatile prices in agricultural commodities and their consequences for global food security and nutrition, as well as for smallholder farmers and poor urban dwellers.

117. We underline the importance of timely, accurate and transparent information in helping to address excessive food price volatility, and in this regard take note of the Agricultural Market Information System hosted by the Food and Agriculture Organization of the United Nations (FAO) and urge the participating international organizations, private sector actors and Governments to ensure the public dissemination of timely and quality food market information products.

118. We reaffirm that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system will promote agricultural and rural development in developing countries and contribute to world food security. We urge national, regional and international strategies to promote the participation of farmers, especially smallholder farmers, including women, in community, domestic, regional and international markets.

Water and sanitation

119. We recognize that water is at the core of sustainable development as it is closely linked to a number of key global challenges. We therefore reiterate the importance of integrating water in sustainable development and underline the critical importance of water and sanitation within the three dimensions of sustainable development.

120. We reaffirm the commitments made in the Johannesburg Plan of Implementation and the Millennium Declaration regarding halving by 2015 the proportion of people without access to safe drinking water and basic sanitation and the development of integrated water resource management and water efficiency plans, ensuring sustainable water use. We commit to the progressive realization of access to safe and affordable drinking water and basic sanitation for all, as necessary for poverty eradication, the empowerment of women and to protect human health, and to significantly improve the implementation of integrated water resource management at all levels as appropriate. In this regard, we reiterate the commitments to support these efforts, in particular for developing countries, through the mobilization of resources from all sources, capacity-building and technology transfer.

121. We reaffirm our commitments regarding the human right to safe drinking water and sanitation, to be progressively realized for our populations with full respect for national sovereignty. We also highlight our commitment to the 2005-2015 International Decade for Action, “Water for Life”.

122. We recognize the key role that ecosystems play in maintaining water quantity and quality and support actions within respective national boundaries to protect and sustainably manage these ecosystems.

of women and children, and to address international migration through international, regional or bilateral cooperation and dialogue and a comprehensive and balanced approach, recognizing the roles and responsibilities of countries of origin, transit and destination in promoting and protecting the human rights of all migrants, and avoiding approaches that might aggravate their vulnerability.

Oceans and seas

158. We recognize that oceans, seas and coastal areas form an integrated and essential component of the Earth's ecosystem and are critical to sustaining it, and that international law, as reflected in the United Nations Convention on the Law of the Sea, provides the legal framework for the conservation and sustainable use of the oceans and their resources. We stress the importance of the conservation and sustainable use of the oceans and seas and of their resources for sustainable development, including through their contributions to poverty eradication, sustained economic growth, food security and creation of sustainable livelihoods and decent work, while at the same time protecting biodiversity and the marine environment and addressing the impacts of climate change. We therefore commit to protect, and restore, the health, productivity and resilience of oceans and marine ecosystems, and to maintain their biodiversity, enabling their conservation and sustainable use for present and future generations, and to effectively apply an ecosystem approach and the precautionary approach in the management, in accordance with international law, of activities having an impact on the marine environment, to deliver on all three dimensions of sustainable development.

159. We recognize the importance of the United Nations Convention on the Law of the Sea to advancing sustainable development and its near universal adoption by States, and in this regard we urge all its parties to fully implement their obligations under the Convention.

160. We recognize the importance of building the capacity of developing countries to be able to benefit from the conservation and sustainable use of the oceans and seas and their resources and, in this regard, we emphasize the need for cooperation in marine scientific research to implement the provisions of the United Nations Convention on the Law of the Sea and the outcomes of the major summits on sustainable development, as well as for the transfer of technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology.

161. We support the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, established under the General Assembly, and look forward to the completion of its first global integrated assessment of the state of the marine environment by 2014 and its subsequent consideration by the Assembly. We encourage consideration by States of the assessment findings at appropriate levels.

162. We recognize the importance of the conservation and sustainable use of marine biodiversity beyond areas of national jurisdiction. We note the ongoing work under the General Assembly of an ad hoc open-ended informal working group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction. Building on the work of the ad hoc working group and before the end of the sixty-ninth session of the General Assembly we commit to address, on an urgent basis, the issue of the conservation and sustainable

use of marine biological diversity of areas beyond national jurisdiction, including by taking a decision on the development of an international instrument under the United Nations Convention on the Law of the Sea.

163. We note with concern that the health of oceans and marine biodiversity are negatively affected by marine pollution, including marine debris, especially plastic, persistent organic pollutants, heavy metals and nitrogen-based compounds, from a number of marine and land-based sources, including shipping and land run-off. We commit to take action to reduce the incidence and impacts of such pollution on marine ecosystems, including through the effective implementation of relevant conventions adopted in the framework of the International Maritime Organization (IMO), and the follow-up of the relevant initiatives such as the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, as well as the adoption of coordinated strategies to this end. We further commit to take action to, by 2025, based on collected scientific data, achieve significant reductions in marine debris to prevent harm to the coastal and marine environment.

164. We note the significant threat that alien invasive species pose to marine ecosystems and resources and commit to implement measures to prevent the introduction, and manage the adverse environmental impacts, of alien invasive species, including, as appropriate, those adopted in the framework of IMO.

165. We note that sea-level rise and coastal erosion are serious threats for many coastal regions and islands, particularly in developing countries, and in this regard we call on the international community to enhance its efforts to address these challenges.

166. We call for support to initiatives that address ocean acidification and the impacts of climate change on marine and coastal ecosystems and resources. In this regard, we reiterate the need to work collectively to prevent further ocean acidification, as well as enhance the resilience of marine ecosystems and of the communities whose livelihoods depend on them, and to support marine scientific research, monitoring and observation of ocean acidification and particularly vulnerable ecosystems, including through enhanced international cooperation in this regard.

167. We stress our concern about the potential environmental impacts of ocean fertilization. In this regard, we recall the decisions related to ocean fertilization adopted by the relevant intergovernmental bodies, and resolve to continue addressing with utmost caution ocean fertilization, consistent with the precautionary approach.

168. We commit to intensify our efforts to meet the 2015 target as agreed to in the Johannesburg Plan of Implementation to maintain or restore stocks to levels that can produce maximum sustainable yield on an urgent basis. In this regard we further commit to urgently take the measures necessary to maintain or restore all stocks at least to levels that can produce the maximum sustainable yield, with the aim of achieving these goals in the shortest time feasible, as determined by their biological characteristics. To achieve this we commit to urgently develop and implement science-based management plans, including by reducing or suspending fishing catch and effort commensurate with the status of the stock. We further commit to enhance action to manage bycatch, discards and other adverse ecosystem impacts from fisheries, including by eliminating destructive fishing practices. We also commit to

enhance actions to protect vulnerable marine ecosystems from significant adverse impacts, including through the effective use of impact assessments. Such actions, including those through competent organizations, should be undertaken consistent with international law, the applicable international instruments and relevant General Assembly resolutions and FAO guidelines.

169. We urge States parties to the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks to fully implement that Agreement and to give, in accordance with part VII of the Agreement, full recognition to the special requirements of developing States. Furthermore, we call upon all States to implement the Code of Conduct for Responsible Fisheries and the FAO international plans of action and technical guidelines.

170. We acknowledge that illegal, unreported and unregulated fishing deprive many countries of a crucial natural resource and remain a persistent threat to their sustainable development. We recommit to eliminate illegal, unreported and unregulated fishing as advanced in the Johannesburg Plan of Implementation, and to prevent and combat these practices, including through the following: developing and implementing national and regional action plans in accordance with the FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing; implementing, in accordance with international law, effective and coordinated measures by coastal States, flag States, port States, chartering nations and the States of nationality of the beneficial owners and others who support or engage in illegal, unreported and unregulated fishing by identifying vessels engaged in such fishing and by depriving offenders of the benefits accruing from it; as well as cooperating with developing countries to systematically identify needs and build capacity, including support for monitoring, control, surveillance, compliance and enforcement systems.

171. We call upon States that have signed the FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing to expedite procedures for its ratification with a view to its early entry into force.

172. We recognize the need for transparency and accountability in fisheries management by regional fisheries management organizations. We recognize the efforts already made by those regional fisheries management organizations that have undertaken independent performance reviews, and call on all regional fisheries management organizations to regularly undertake such reviews and make the results publicly available. We encourage implementation of the recommendations of such reviews and recommend that the comprehensiveness of those reviews be strengthened over time, as necessary.

173. We reaffirm our commitment in the Johannesburg Plan of Implementation to eliminate subsidies that contribute to illegal, unreported and unregulated fishing and overcapacity, taking into account the importance of this sector to developing countries, and we reiterate our commitment to conclude multilateral disciplines on fisheries subsidies that will give effect to the WTO Doha Development Agenda and the Hong Kong Ministerial Declaration mandates to strengthen disciplines on subsidies in the fisheries sector, including through the prohibition of certain forms of fisheries subsidies that contribute to overcapacity and overfishing, recognizing

that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation, taking into account the importance of the sector to development priorities, poverty reduction and livelihood and food-security concerns. We encourage States to further improve the transparency and reporting of existing fisheries subsidies programmes through WTO. Given the state of fisheries resources, and without prejudicing the WTO Doha and Hong Kong ministerial mandates on fisheries subsidies or the need to conclude these negotiations, we encourage States to eliminate subsidies that contribute to overcapacity and overfishing, and to refrain from introducing new such subsidies or from extending or enhancing existing ones.

174. We urge the identification and mainstreaming of strategies by 2014 that further assist developing countries, in particular the least developed countries and small island developing States, in developing their national capacity to conserve, sustainably manage and realize the benefits of sustainable fisheries, including through improved market access for fish products from developing countries.

175. We commit to observe the need to ensure access to fisheries and the importance of access to markets, by subsistence, small-scale and artisanal fisherfolk and women fish workers, as well as indigenous peoples and their communities, particularly in developing countries, especially small island developing States.

176. We also recognize the significant economic, social and environmental contributions of coral reefs, in particular to islands and other coastal States, as well as the significant vulnerability of coral reefs and mangroves to impacts, including from climate change, ocean acidification, overfishing, destructive fishing practices and pollution. We support international cooperation with a view to conserving coral reef and mangrove ecosystems and realizing their social, economic and environmental benefits as well as facilitating technical collaboration and voluntary information-sharing.

177. We reaffirm the importance of area-based conservation measures, including marine protected areas, consistent with international law and based on best available scientific information, as a tool for conservation of biological diversity and sustainable use of its components. We note decision X/2 of the tenth Meeting of the Conference of the Parties to the Convention on Biological Diversity, that by 2020 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are to be conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures.

Small island developing States

178. We reaffirm that small island developing States remain a special case for sustainable development in view of their unique and particular vulnerabilities, including their small size, remoteness, narrow resource and export base, and exposure to global environmental challenges and external economic shocks, including to a large range of impacts from climate change and potentially more frequent and intense natural disasters. We note with concern that the outcome of the five-year review of the Mauritius Strategy concluded that small island developing States have made less progress than most other groupings, or even regressed, in economic terms, especially in terms of poverty reduction and debt sustainability. Sea-level rise and other adverse impacts of climate change continue to pose a

strengthen in a timely manner risk assessment and disaster risk reduction instruments.

188. We stress the importance of stronger interlinkages among disaster risk reduction, recovery and long-term development planning, and call for more coordinated and comprehensive strategies that integrate disaster risk reduction and climate change adaptation considerations into public and private investment, decision-making and the planning of humanitarian and development actions, in order to reduce risk, increase resilience and provide a smoother transition between relief, recovery and development. In this regard, we recognize the need to integrate a gender perspective into the design and implementation of all phases of disaster risk management.

189. We call for all relevant stakeholders, including Governments, international, regional and subregional organizations, the private sector and civil society, to take appropriate and effective measures, taking into account the three dimensions of sustainable development, including through strengthening coordination and cooperation to reduce exposure to risk for the protection of people, and infrastructure and other national assets, from the impact of disasters, in line with the Hyogo Framework for Action and any post-2015 framework for disaster risk reduction.

Climate change

190. We reaffirm that climate change is one of the greatest challenges of our time, and we express profound alarm that emissions of greenhouse gases continue to rise globally. We are deeply concerned that all countries, particularly developing countries, are vulnerable to the adverse impacts of climate change, and are already experiencing increased impacts, including persistent drought and extreme weather events, sea-level rise, coastal erosion and ocean acidification, further threatening food security and efforts to eradicate poverty and achieve sustainable development. In this regard we emphasize that adaptation to climate change represents an immediate and urgent global priority.

191. We underscore that the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions. We recall that the United Nations Framework Convention on Climate Change provides that parties should protect the climate system for the benefit of present and future generations of humankind on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. We note with grave concern the significant gap between the aggregate effect of mitigation pledges by parties in terms of global annual emissions of greenhouse gases by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2° C, or 1.5° C above pre-industrial levels. We recognize the importance of mobilizing funding from a variety of sources, public and private, bilateral and multilateral, including innovative sources of finance, to support nationally appropriate mitigation actions, adaptation measures, technology development and transfer and capacity-building in developing countries. In this regard, we welcome the launching of the Green Climate Fund and call for its prompt operationalization so as to have an early and adequate replenishment process.

192. We urge parties to the United Nations Framework Convention on Climate Change and parties to the Kyoto Protocol to fully implement their commitments, as well as decisions adopted under those agreements. In this regard, we will build upon the progress achieved, including at the seventeenth session of the Conference of the Parties to the Convention and the seventh session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol, held in Durban, South Africa, from 28 November to 9 December 2011.

Forests

193. We highlight the social, economic and environmental benefits of forests to people and the contributions of sustainable forest management to the themes and objective of the Conference. We support cross-sectoral and cross-institutional policies promoting sustainable forest management. We reaffirm that the wide range of products and services that forests provide creates opportunities to address many of the most pressing sustainable development challenges. We call for enhanced efforts to achieve the sustainable management of forests, reforestation, restoration and afforestation, and we support all efforts that effectively slow, halt and reverse deforestation and forest degradation, including, inter alia, promoting trade in legally harvested forest products. We note the importance of such ongoing initiatives as reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. We call for increased efforts to strengthen forest governance frameworks and means of implementation, in accordance with the non-legally binding instrument on all types of forests, in order to achieve sustainable forest management. To this end, we commit to improving the livelihoods of people and communities by creating the conditions needed for them to sustainably manage forests, including through strengthening cooperation arrangements in the areas of finance, trade, transfer of environmentally sound technologies, capacity-building and governance, as well as by promoting secure land tenure, particularly decision-making and benefit-sharing, in accordance with national legislation and priorities.

194. We call for urgent implementation of the non-legally binding instrument on all types of forests and the Ministerial Declaration of the high-level segment of the ninth session of the United Nations Forum on Forests on the occasion of the launch of the International Year of Forests.

195. We recognize that the United Nations Forum on Forests, with its universal membership and comprehensive mandate, plays a vital role in addressing forest-related issues in a holistic and integrated manner and promoting international policy coordination and cooperation to achieve sustainable forest management. We invite the Collaborative Partnership on Forests to continue its support to the Forum and encourage stakeholders to remain actively engaged in the work of the Forum.

196. We stress the importance of integrating sustainable forest management objectives and practices into the mainstream of economic policy and decision-making, and to that end we commit to working through the governing bodies of member organizations of the Collaborative Partnership on Forests to integrate, as appropriate, the sustainable management of all types of forests into their strategies and programmes.

Biodiversity

197. We reaffirm the intrinsic value of biological diversity, as well as the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its critical role in maintaining ecosystems that provide essential services, which are critical foundations for sustainable development and human well-being. We recognize the severity of the global loss of biodiversity and the degradation of ecosystems and emphasize that these undermine global development, affecting food security and nutrition, the provision of and access to water and the health of the rural poor and of people worldwide, including present and future generations. This highlights the importance of the conservation of biodiversity, enhancing habitat connectivity and building ecosystem resilience. We recognize that the traditional knowledge, innovations and practices of indigenous peoples and local communities make an important contribution to the conservation and sustainable use of biodiversity, and their wider application can support social well-being and sustainable livelihoods. We further recognize that indigenous peoples and local communities are often the most directly dependent on biodiversity and ecosystems and thus are often the most immediately affected by their loss and degradation.

198. We reiterate our commitment to the achievement of the three objectives of the Convention on Biological Diversity and call for urgent actions that effectively reduce the rate of, halt and reverse the loss of biodiversity. In this context, we affirm the importance of implementing the Strategic Plan for Biodiversity 2011-2020 and achieving the Aichi Biodiversity Targets adopted by the Conference of the Parties to the Convention at its tenth meeting.

199. We note the adoption of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity, and we invite parties to the Convention on Biological Diversity to ratify or accede to the Protocol, so as to ensure its entry into force at the earliest possible opportunity. We acknowledge the role of access and benefit-sharing arising from the utilization of genetic resources in contributing to the conservation and sustainable use of biological diversity, poverty eradication and environmental sustainability.

200. We welcome the strategy for resource mobilization in support of the achievement of the three objectives of the Convention on Biological Diversity, including the commitment to substantially increasing resources from all sources in support of biodiversity, in accordance with decisions taken at the Conference of the Parties at its tenth meeting.

201. We support mainstreaming the consideration of the socioeconomic impacts and benefits of the conservation and sustainable use of biodiversity and its components, as well as ecosystems that provide essential services, into relevant programmes and policies at all levels, in accordance with national legislation, circumstances and priorities. We encourage investments, through appropriate incentives and policies, which support the conservation and sustainable use of biological diversity and restoration of degraded ecosystems, consistent and in harmony with the Convention on Biological Diversity and other relevant international obligations.

202. We agree to promote international cooperation and partnerships, as appropriate, and information exchange, and in this context we welcome the United

Nations Decade on Biodiversity, 2011-2020, for the purpose of encouraging active involvement of all stakeholders in the conservation and sustainable use of biodiversity, as well as access to and the fair and equitable sharing of benefits arising from the utilization of genetic resources, with the vision of living in harmony with nature.

203. We recognize the important role of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, an international agreement that stands at the intersection between trade, the environment and development, promotes the conservation and sustainable use of biodiversity, should contribute to tangible benefits for local people, and ensures that no species entering into international trade is threatened with extinction. We recognize the economic, social and environmental impacts of illicit trafficking in wildlife, where firm and strengthened action needs to be taken on both the supply and demand sides. In this regard, we emphasize the importance of effective international cooperation among relevant multilateral environmental agreements and international organizations. We further stress the importance of basing the listing of species on agreed criteria.

204. We take note of the establishment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and invite an early commencement of its work, in order to provide the best available policy-relevant information on biodiversity to assist decision makers.

Desertification, land degradation and drought

205. We recognize the economic and social significance of good land management, including soil, particularly its contribution to economic growth, biodiversity, sustainable agriculture and food security, eradicating poverty, the empowerment of women, addressing climate change and improving water availability. We stress that desertification, land degradation and drought are challenges of a global dimension and continue to pose serious challenges to the sustainable development of all countries, in particular developing countries. We also stress the particular challenges this poses for Africa, the least developed countries and the landlocked developing countries. In this regard, we express deep concern for the devastating consequences of cyclical drought and famine in Africa, in particular in the Horn of Africa and the Sahel region, and call for urgent action through short-, medium- and long-term measures at all levels.

206. We recognize the need for urgent action to reverse land degradation. In view of this, we will strive to achieve a land-degradation neutral world in the context of sustainable development. This should act to catalyse financial resources from a range of public and private sources.

207. We reaffirm our resolve in accordance with the United Nations Convention to Combat Desertification to take coordinated action nationally, regionally and internationally, to monitor, globally, land degradation and restore degraded lands in arid, semi-arid and dry sub-humid areas. We resolve to support and strengthen the implementation of the Convention and the 10-year strategic plan and framework to enhance its implementation (2008-2018), including through mobilizing adequate, predictable and timely financial resources. We note the importance of mitigating the effects of desertification, land degradation and drought, including by preserving and developing oases, restoring degraded lands, improving soil quality and improving water management, in order to contribute to sustainable development and poverty

eradication. In this regard, we encourage and recognize the importance of partnerships and initiatives for the safeguarding of land resources. We also encourage capacity-building, extension training programmes and scientific studies and initiatives aimed at deepening understanding and raising awareness of the economic, social and environmental benefits of sustainable land management policies and practices.

208. We stress the importance of the further development and implementation of scientifically based, sound and socially inclusive methods and indicators for monitoring and assessing the extent of desertification, land degradation and drought, as well as the importance of efforts under way to promote scientific research and strengthen the scientific base of activities to address desertification and drought in accordance with the United Nations Convention to Combat Desertification. In this respect, we take note of the decision of the Conference of the Parties to the Convention, at its tenth meeting, to establish an ad hoc working group, taking into account regional balance, to discuss specific options for the provision of scientific advice to its parties.

209. We reiterate the need for cooperation through the sharing of climate and weather information and forecasting and early warning systems related to desertification, land degradation and drought, as well as to dust storms and sandstorms, at the global, regional and subregional levels. In this regard, we invite States and relevant organizations to cooperate in the sharing of related information, forecasting and early warning systems.

Mountains

210. We recognize that the benefits derived from mountain regions are essential for sustainable development. Mountain ecosystems play a crucial role in providing water resources to a large portion of the world's population; fragile mountain ecosystems are particularly vulnerable to the adverse impacts of climate change, deforestation and forest degradation, land use change, land degradation and natural disasters; and mountain glaciers around the world are retreating and getting thinner, with increasing impacts on the environment and human well-being.

211. We further recognize that mountains are often home to communities, including indigenous peoples and local communities, who have developed sustainable uses of mountain resources. These communities are, however, often marginalized, and we therefore stress that continued effort will be required to address poverty, food security and nutrition, social exclusion and environmental degradation in these areas. We invite States to strengthen cooperative action with effective involvement and sharing of experience of all relevant stakeholders, by strengthening existing arrangements, agreements and centres of excellence for sustainable mountain development, as well as exploring new arrangements and agreements, as appropriate.

212. We call for greater efforts towards the conservation of mountain ecosystems, including their biodiversity. We encourage States to adopt a long-term vision and holistic approaches, including through incorporating mountain-specific policies into national sustainable development strategies, which could include, inter alia, poverty reduction plans and programmes for mountain areas, particularly in developing countries. In this regard, we call for international support for sustainable mountain development in developing countries.

terms, including on concessional and preferential terms, as mutually agreed. We also take note of the further evolution of discussions and agreements on these issues since the adoption of the Plan of Implementation.

270. We stress the importance of access by all countries to environmentally sound technologies, new knowledge, know-how and expertise. We further stress the importance of cooperative action on technology innovation, research and development. We agree to explore modalities in the relevant forums for enhanced access to environmentally sound technologies by developing countries.

271. We underline the need for enabling environments for the development, adaptation, dissemination and transfer of environmentally sound technologies. In this context, we note the role of foreign direct investment, international trade and international cooperation in the transfer of environmentally sound technologies. We engage in our countries as well as through international cooperation to promote investment in science, innovation and technology for sustainable development.

272. We recognize the importance of strengthened national, scientific and technological capacities for sustainable development. This can help countries, especially developing countries, to develop their own innovative solutions, scientific research and new, environmentally sound technologies, with the support of the international community. To this end, we support building science and technology capacity, with both women and men as contributors and beneficiaries, including through collaboration among research institutions, universities, the private sector, governments, non-governmental organizations and scientists.

273. We request relevant United Nations agencies to identify options for a facilitation mechanism that promotes the development, transfer and dissemination of clean and environmentally sound technologies by, inter alia, assessing the technology needs of developing countries, options to address those needs and capacity-building. We request the Secretary-General, on the basis of the options identified and taking into account existing models, to make recommendations regarding the facilitation mechanism to the sixty-seventh session of the General Assembly.

274. We recognize the importance of space-technology-based data, in situ monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations. In this context, we note the relevance of global mapping and recognize the efforts in developing global environmental observing systems, including by the Eye on Earth Network and through the Global Earth Observation System of Systems. We recognize the need to support developing countries in their efforts to collect environmental data.

275. We recognize the importance of strengthening international, regional and national capacities in research and technology assessment, especially in view of the rapid development and possible deployment of new technologies that may also have unintended negative impacts, in particular on biodiversity and health, or other unforeseen consequences.

276. We recognize the need to facilitate informed policy decision-making on sustainable development issues and, in this regard, to strengthen the science-policy interface.

C. Capacity-building

277. We emphasize the need for enhanced capacity-building for sustainable development and, in this regard, we call for the strengthening of technical and scientific cooperation, including North-South, South-South and triangular cooperation. We reiterate the importance of human resource development, including training, the exchange of experiences and expertise, knowledge transfer and technical assistance for capacity-building, which involves strengthening institutional capacity, including planning, management and monitoring capacities.

278. We call for the continued and focused implementation of the Bali Strategic Plan for Technology Support and Capacity-building, adopted by UNEP.

279. We encourage the participation and representation of men and women scientists and researchers from developing and developed countries in processes related to global environmental and sustainable development assessment and monitoring, with the purpose of enhancing national capabilities and the quality of research for policy- and decision-making processes.

280. We invite all relevant agencies of the United Nations system and other relevant international organizations to support developing countries and, in particular, the least developed countries in capacity-building for developing resource-efficient and inclusive economies, including through:

- (a) Sharing sustainable practices in various economic sectors;
- (b) Enhancing knowledge and capacity to integrate disaster risk reduction and resilience into development plans;
- (c) Supporting North-South, South-South and triangular cooperation for the transition to a resource-efficient economy;
- (d) Promoting public-private partnerships.

D. Trade

281. We reaffirm that international trade is an engine for development and sustained economic growth, and also reaffirm the critical role that a universal, rules-based, open, non-discriminatory and equitable multilateral trading system, as well as meaningful trade liberalization, can play in stimulating economic growth and development worldwide, thereby benefiting all countries at all stages of development, as they advance towards sustainable development. In this context, we remain focused on achieving progress in addressing a set of important issues, such as, inter alia, trade-distorting subsidies and trade in environmental goods and services.

282. We urge the members of WTO to redouble their efforts to achieve an ambitious, balanced and development-oriented conclusion to the Doha Development Agenda, while respecting the principles of transparency, inclusiveness and consensual decision-making, with a view to strengthening the multilateral trading system. In order to effectively participate in the work programme of WTO and fully realize trade opportunities, developing countries need the assistance and enhanced cooperation of all relevant stakeholders.