Acknowledgment: The APN welcomes and appreciates the continuing opportunity to inform, and engage in a dialogue with SBSTA on issues of global change research, capacity development and science-policy interfacing mechanisms within the Asia-Pacific region that is relevant to the convention. The present brief[1] summarizes the current main activities undertaken by APN to address some of the issues outlined in the recently published document FCCC/SBSTA/2012/L.25 related to Doha (COP18) and SBSTA37 regards those topics for discussion at the dialogue meeting to take place during SBSTA38, taking into account developments in research activities outlined in document **FCCC/SBSTA/2007/4, Paragraph 47 (a–f)**.

Contents

[1] Stevenson, L. A., Takemoto, A., Matthews, W. A. (2013). APN submission brief to the United Nations Framework Convention on Climate Change (UNFCCC) SBSTA 38 Research Dialogue. Asia-Pacific Network for Global Change Research (APN), Kobe, Japan.

1. What is the APN:

Established in 1996, the Asia-Pacific Network for Global Change Research (APN) is a network of twenty-two member governments in Asia and the Pacific whose vision is to enable countries in the region to successfully address global change (GC) challenges through science-based response strategies and measures, effective science and policy linkages, and scientific capacity development.

As APN is an Inter-governmental network, a high priority goal is to produce sound scientific results that can be made available as a supportive tool for policy-making processes. Accordingly, the APN conducts regular synthesis and assessment activities of the projects its supports in order to identify important outcomes, research gaps and/or emerging issues that could be used to support policy development.

APN is financially sponsored by the Governments of Japan (Ministry of Environment [MOEJ]; Hyogo Prefectural Government), New Zealand (Ministry for the Environment), Republic of Korea (Ministry of Environment [MEV]) and the United States (National Science Foundation [NSF]; United States Global Change Research Program [USGCRP]).

The APN goals are achieved through a number of activities selected from the APN's two main programmes, which involve **two annual open Calls for Proposals in which scientists based in APN member or approved countries can submit proposals for funding support**. The two main programmes are the *Annual Regional Call for Research Proposals (ARCP)* and the *Scientific Capacity Development Programme (CAPaBLE)*. Particularly encouraged to submit APN proposals are developing-country researchers working in collaboration with the APN's international Global Change partners and their related core and joint projects. APN is closely following and engaging in the development of its GC partners into the Future Earth alliance.

Research and capacity building activities under the ARCP, CAPaBLE and other related initiatives of the APN focus on four scientific themes identified in the APN's Science Agenda. These are (i) **Climate Change and Climate Variability**; (ii) **Ecosystems, Biodiversity and Land Use;** (iii) **Changes in Atmospheric and Terrestrial Domains;** and (iv) **Resources Utilisation and Pathways for Sustainable Development.** Under these scientific themes, the APN supports activities that are interdisciplinary in nature and cut across natural, social, economic and political sciences.

Examples of the kinds of activities APN undertakes are:

- Promoting and strengthening GC research, including identifying gaps via syntheses and assessment work
- Identifying and developing existing methodologies and developing new methodologies and tools for effective transfer of scientific knowledge
- Strengthening the interface of policy- and decision-making processes and society in general for mainstreaming environmental concern
- Encouraging initiatives from developing countries for place-based, integrative research
- Aligning with programmes of the GC community

At its recent annual meeting, 18th IGM/SPG Meeting, April 2013, the following topics were considered by its member governments to be of interest:

- B&ES including resiliency and main issues highlighted under the new APN B&ES Framework;
- Climate Impacts on health, agriculture, livestock;
- Water security (inland and ocean): in the face of extreme events; including management, quantity, quality, etc.; and
- Energy/energy efficiency, carbon capture, case studies at community-based levels, biofuels, etc.

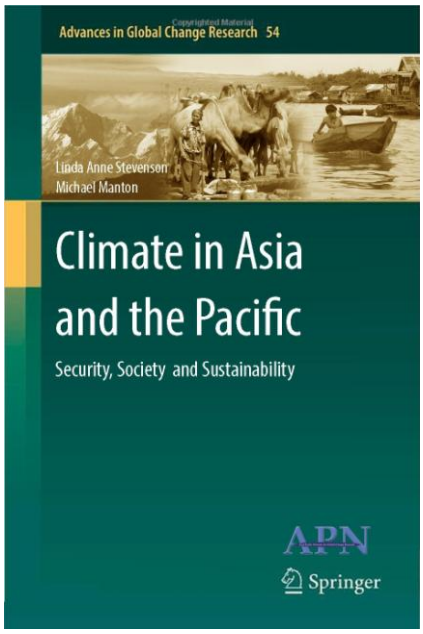
2. Ongoing and Completed APN Activities Relevant to the Convention

2.1 Climate in Asia and the Pacific: Security, Society and Sustainability

Following a mandate from its governing body, the Intergovernmental Meeting (IGM), the Asia-Pacific Network for Global Change Research (APN) produced a synthesis report of all of the activities it had conducted under one of its four broad themes of global environmental change - climate change and climate variability. The Synthesis Report – *Climate in Asia and the Pacific: A Synthesis of APN Activities* summarised more than 55 regional research and capacity building projects that the APN had conducted under this theme since 1998.

Positive feedback following wide distribution of the synthesis report prompted the need, and decision, to complement the report with a book explaining the current status of climate change and climate variability in the Asia-Pacific region; future directions in the area and overarching issues. It was agreed among the authors that the foci of the book be security (food, water and energy); society (urban and remote communities; human health and governance) and sustainability (low carbon development and ecosystem services).

The first chapter of the book addresses a number of key questions that relate to our current understanding of the interactions between climate, natural ecosystems and human communities across Asia and the Pacific. The analysis presented in subsequent chapters addresses these questions and provides recommendations for a number of future directions in research needed to better understand and manage the risks associated with climate change and variability in the region. The final chapter summarises the findings presented in the book and provides an overall picture of future needs for climate research in Asia and the Pacific. Finally, we suggest a number of overarching issues that should be taken into account in future considerations of climate interactions across the region.



Expected to complement the IPCC AR5 report and as a prelude to the release of the report, the book will be published under the Springer series *Advances in Global Change Research* in summer or autumn 2013.

2.2 Selected Research Activity related to Terrestrial Ecosystems: *Rapidly Changing Greenhouse Gas Budgets of South and Southeast Asia: A 3-year collaborative research activity.*

Within the UNFCCC, countries are continuing to negotiate emission reduction targets and exploring mitigation strategies best suited to their biophysical characteristics. One of the largest impediments to advance in this front is the lack of high quality estimates of GHG fluxes in and out of natural and managed ecosystems. In this project, we have undertaken one of the most ambitious synthesis efforts to date using global and regional datasets and model outputs to constrain the regional GHG budgets of South and Southeast Asia, where the source/sink balance of GHGs has large uncertainty. For reduction of these uncertainties, analyses of land-use and land-use change, riverine carbon export, soil carbon distributions and other bottom-up estimations are being conducted. For top-down estimations (source/sink inversion from atmospheric data and models), efforts are being made to use the existing atmospheric data from various

sources, as well as expansion of the present surface-monitoring network in the South Asia region.

The project objectives are:

- Reconciliation of top-down estimates using atmospheric GHG inversion models and bottom-up estimates using terrestrial biogeochemical models, remote sensing data, and flux and inventory datasets.
- Observational data and numerical model results of various GHGs (CO_2, CH_4, N_2O etc.) will be analyzed and archived in a central data repository.
- Access and analyze the results for the regions from 11 atmospheric CO_2 inversions, 6 global terrestrial biogeochemical model outputs, and one fire emissions product.
- Discuss among the participating scientists during the proposed workshops, and share with all parties interested through peer-reviewed publications and the data repository.

Based on work to date, the top-down and bottom-up estimations of carbon fluxes showed good agreements within their respective uncertainties, because we are able to account for the major flow of carbon in to and out of the South Asia regions. However, there are clearly some missing flux components those require immediate attention. The fluxes estimated and not estimated in this work are schematically depicted in Figure 1. Most notably the soil carbon pool and fluxes have not been incorporated in this analysis. The soil organic carbon (SOC) sequestration potential of the South Asia region is estimated to be in the range of 25 to 50 TgC yr yr-1 by restoring degraded soil and changing cropland management practices.

A key priority for the group is now to complete the second GHG budget for the region, the one for Southeast Asia. We expect to have it finalized within the next few months so that the group has also enough time to focus on some of the biggest uncertainties of the two budgets and addressed them within the duration of the project.

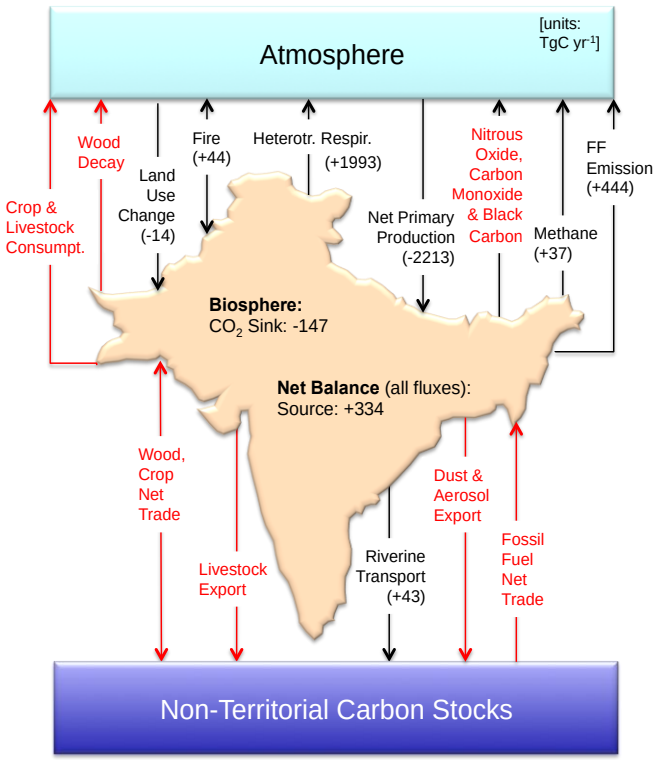


Figure 1: Schematic diagram of major fluxes of CO_2, CH_4, N_2O and related species in South Asia region. The flux components written in black ink are discussed in this work, and those marked in red ink requires attention for further strengthening our knowledge of regional GHGs budget. Direction of net carbon flow has not been determined well for some of the fluxes, which are represented by lines with arrowheads on both sides.

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Southeast Asia. Retrieved from http://www.apn-gcr.org/resources/items/show/1592

Patra, P. K., Canadell, J. G., & Lal, S. (2012). The rapidly changing greenhouse gases (GHG) budget of Asia, EOS, Transactions, American Geophysical Union. Vol. 93, 2012, Doi: 2011ES003689

Patra, P. K., Ito, A., & Yan, X. (2012). Climate change and agriculture in Asia: A case study for methane 7 emission due to rice cultivation. Stadium press (India) Pvt. Ltd., October 2012.

Patra, P. K., Canadell, J. G., Houghton, R. A., Piao, S. L., Oh, N.-H., Ciais, P., Manjunath, K. R. … & Lasco, R. (2013). The carbon budget of South Asia. *Biogeosciences.* 10. 513-527.

Other research activities under this topic that may be of interest to the parties:

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[2] Asia-Pacific Network for Global Change Research (APN). (2007). *Assessing the Mitigation and Adaptation Options for Tropical Peatlands to Reduce GHG Emissions and Increase Resilience to Climate Change*. Retrieved from http://www.apn-gcr.org/resources/items/show/1535

2.3 New projects under APN's Low Carbon Initiatives Framework for Developing Countries in the Asia-Pacific Region

APN launched a new Focused Call for Proposals under its Low Carbon Initiatives Framework. From this call, APN announced the following new activities under the programme that began work in April 2013:

Capacity Building

i. Capacity Building for Implementing a 'Measurable, Verifiable and Reportable (MRV)' Model in a Mid-Sized Thai Municipality
ii. Strengthening Community Voices in REDD+ Policy

Regional Research

i. Identification of policy and institutional gaps, drivers and strategies to scale-up low carbon and energy efficient technology application in the construction and infrastructure sectors in South Asia
ii. Understanding and Quantifying the Water-Energy-Carbon Nexus for Low Carbon Development in Asian Cities
iii. Assessment of Carbon Sequestration through Vermitechnology in Organic Farming
iv. Integrated sustainability assessment of bio energy potentials in Asia: An application of a hybrid approach on trade-offs and pathway
v. Low Carbon Urban Infrastructure Investment: Cases of China, Indonesia, and Japan

3. New Opportunities for Developing Countries in the Asia-Pacific Region

*3.1 New Opportunities under APN's Climate Adaptation Framework for Developing Countries in the Asia-Pacific Region (**see also Appendix 1**)*

Climate Change and Variability is 1 of APN's 4 research themes and, recently, we launched our **Climate Adaptation Framework** and our book on **Climate in Asia and the Pacific: Security, Society & Sustainability** (Springer: in press). APN aims to share research, capacity development & partnership

opportunities with the international climate community and has, since August 2012, developed the following:

Scoping Workshop in 2012: Based on needs, gaps & lessons for climate adaptation in the Asia-Pacific region APN's research & capacity development activities focus on the following themes:

- *Developing high-resolution observational, model & downscaled datasets;*
- *Sharing of needs-oriented data;*
- *Calibrating/validating RCMs; & uncertainty analysis/assessment;*
- *Developing/utilizing impact, vulnerability, risk & economic assessments;*
- *Improving communication skills of scientists & practitioners with all stakeholders for encouraging decision makers to formulate/implement adaptation plans based on the latest scientific knowledge;*
- *Utilizing available information including climate data in adaptation practices.*

18th IGM, April 2013: Particularly relevant to the recent COP18 Conference in Doha to address loss & damage, and other climate impact-related issues are: Enhancing understanding of slow onset events, approaches to address them, etc; impacts on the most vulnerable (slow onset & extreme weather events); risk reduction, risk sharing & risk transfer tools; identifying/developing approaches to address slow onset events & extreme weather events, including through risk reduction, risk sharing & risk transfer tools; integrating impacts into climate-resilient processes; climate change impacts on mitigation & human displacement, etc.

Activities envisaged, in support of above:

- *Strengthening & supporting the collection & management of relevant data*
- *Enhancing coordination, synergies & linkages among various organizations, institutions & frameworks, to enable the development*
- *Strengthening & promoting regional collaboration, centres & networks*
- *Enhanced capacity-building at the national & regional levels*

A focussed call for proposals will be launched in summer 2013 for activities that address the above.

*3.2 New Opportunities: Biodiversity and Ecosystem Services Framework (**see also Appendix 2**)*

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.

With input from key experts from ASEAN ACB, DIVERSITAS, GEOBON, ICSU, MSU, UNU, among others; the gap analysis report 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. In this context, 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 the Opportunity paper (see **Appendix 2**). Other activities that may be considered in line with the key activities are A) awareness-raising, B) capacity development, and C) science-policy mechanisms as elaborated below.

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).

SBSTA38: Submission from APN (Appendix 1)
APN Climate Adaptation Framework

APN Framework on Climate Change Adaptation

1. As a result of the discussions at the *APN-ICAS Scoping Workshop to Enhance the Climate Adaptation Actions of APN Developing Countries*, it is suggested that the APN establishes a multi-year strategic framework focusing on climate adaptation from FY2013 (April 2013), pending resource availability.

2. The framework aims to enhance science-based adaptation activities of APN developing countries and comprises the following components:
   i. regional research programme that has a capacity building element
   ii. capacity building programme (including projects at national and sub-national scales)
   iii. activities jointly conducted with other organizations and networks

3. Themes of activities under the framework include a range of climate adaptation areas prioritized in the decisions at Conference of the Parties of Unite Nations Framework Convention on Climate Change including COP16 related to *"Enhanced action on adaptation"* (1/CP.16, para.14.(a)-(i), FCCC/CP/2010/Add.1) and COP18 related to *"Approaches to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change to enhance adaptive capacity"* (3/CP.18, para.7(a)-(f), FCCC/CP/2012/Add.1).

4. Based on needs, gaps and lessons for climate adaptation in the Asia-Pacific region (as described in the Appendix), regional research and capacity building projects should contribute to improving applicability by users, focusing on the following themes:
   i. Development of high-resolution observational, model and downscaled datasetsthat can contribute to filling data gaps
   ii. Sharing of needs-oriented data
   iii. Calibration and validation of regional climate models; and analysis of projections and assessment of uncertainties
   iv. Development and utilization of impact, vulnerability, risk and economic assessments
   v. Improvement of communication skills of scientists and practitioners with stakeholders including local government, community, private sector and civil society, for encouraging policy-makers to formulate and implement adaptation plans based on the latest scientific knowledge
   vi. Utilization of available information including climate data in applications for adaptation

5. It is recommended that the APN enhance its partnerships with local, national, regional and international organizations and networks under the new program, which include (but are not limited to) the following:
   i. ADB
      a. Collaboration on a regional climate scenarios consortium and library in the areas of coordination of data collection, rescue, mining and calibration
      b. Collaboration on needs assessment of users at national and local levels
   ii. APAN
      a. Multi-year collaboration on capacity development for scientists and practitioners on climate adaptation including themes onadaptation plans and "train the trainers" activities
      b. Organization of a follow-up meeting for recommendations to strengthen partnerships at the 2013 Adaptation Forum
   iii. ICAS
      a. Involvement of Japanese scientists for adaptation activities implemented by APN and its partners
      b. Organization of follow-up events with APN
   iv. Ministry of Interior, Thailand
      a. Cooperation with the APN national Focal Point for Thailand on the development of community-based adaptation activities that involves local governments and communities in

Thailand

SBSTA38: Submission from APN (Appendix 1)
APN Climate Adaptation Framework

v. **UNU (UN-CECAR)**
   a. Training activities for scientists and practitioners on climate adaptation including modeling, downscaling, resilience, etc

vi. **WCRP**
   a. Collaboration with CORDEX-Asia on capacity development in climate downscaling

vii. **International Center for Climate Change and Development ICCCAD:**
   a. Collaboration on activities on loss and damage associate with climate change impacts including Asia Pacific Forum on Loss and Damage

viii. **Asia-Pacific Center for Security Studies (APCSS)**
   a. Collaboration on activities related to science and security associated with climate change impacts

ix. **Climate Change Institute of Australia National University (CCI-ANU)**
   a. Collaboration on scientific activities on climate adaptation

6. It is recommended that APN further develops its climate adaptation programme and expand its partnerships with organizations and networks through relevant platforms. This should be considered in accordance with the APN work programme and budget, and the APN Strategic Plan and Framework Document.

Appendix to text
Needs, gaps and lessons for climate adaptation in the Asia-Pacific region

- **Data, Modeling, Downscaling**
  - Objective of downscaling
    - Huge spectrum, variety of purposes
    - Dynamic or statistically downscaling can be selected depending on the purposes
  - Data observation, collection and mining
    - In particular, the lack of capacity to collect and mine data
    - Development of common data formats
  - Calibration of RCMs
    - How to combine downscaled data with local data
  - Development of high resolution downscaling that is suitable to users' needs (sector-specific)
  - Time scale
    - Ranging from seasonal to decadal predictions, medium term(about 5 years) to long-term predictions; and long-term climate projections
  - Data distribution/interface with users
    - Capacity development to be a good user (individual and institution)

- **Impact and vulnerability assessment**
  - Development of assessment models
    - Different types of assessment models (impact assessment, risk assessment, and vulnerability assessment)
    - Cost analysis
    - Current/ future impacts
  - Compound impacts (integrated assessment of climate and non-climate impacts)
  - Capacity building for both modelers and users

- **Adaptation planning and implementation**

- Scientific capacity of practitioners/decision-makers to formulate national adaptation plans
- Development of a screening tool on climate risk assessment for infrastructure
- Development of approach to encourage policy makers to adopt scientific knowledge
    - ✧ Present response which is favored by practitioners
    - ✧ Consideration of policy priorities other than climate policies such as development policy
    - ✧ Consideration of economic aspects
- Role of public and private sector
- Range of capacity building
    - ✧ Individual, institution, governance
- Consideration of uncertainty
- Consideration of politics, governance, and culture
- Enhancement of communication skills for both scientists and policy makers
    - ✧ Scientists' capacity to communicate with society (i.e., mass-media)
    - ✧ Risk perception
    - ✧ People's acceptance

APN Biodiversity and Ecosystem Services Framework (SBSTA38/APN Appendix 2)

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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(SBSTA38/APN Appendix 3)

Table 1. Key activities for thematic areas under the APN Biodiversity and Ecosystems Framework

Thematic Area	Key Activities for the Asia-Pacific Region
1	– 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	– 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	– 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	– 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