"Workshop to scope activities associated with assessing impacts on Biodiversity & Ecosystems"

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Workshop to scope activities associated with assessing impacts on biodiversity & ecosystem services

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OVERVIEW OF PROJECT WORK AND OUTCOMES

Non-technical summary

Now counting 116 member nations, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is on a path to becoming the leading intergovernmental body for assessing the planet's biodiversity, ecosystems, and the essential services they provide for human well-being. Through a first of its kind biodiversity and ecosystem service (BES) case study review and hosting a workshop in Seoul in September 2013, APN helped elaborate Asia-Pacific regional strategies under its Ecosystems, Biodiversity, and Land Use (EBLU) research agenda and developed strong synergies with IPBES and other stakeholders. The project enhanced APN's capacity to address contemporary needs for applied multidisciplinary research into biodiversity management and ecosystem change.

Outputs from the project included: a review on the state of biodiversity and ecosystem service (BES) knowledge in the Asia-Pacific informed by 58 regional assessments; a workshop featuring 41 science and policy experts from across the Asia-Pacific; a formal information document recommending actions to the second IPBES plenary (IPBES-2) in Antalya, Turkey in December 2013; a presentation of project results at official International Union for the Conservation of Nature (IUCN) side-event at IPBES-2; and a conference paper for the 2013 International Symposium on Ecotopia Science in Nagoya.

Keywords

Biodiversity, ecosystem services, capacity building, knowledge sharing, IPBES

Objectives

The main objectives of the project were to:

1. develop proposals for future actions in regional interpretation of the IPBES conceptual framework
2. share knowledge on biodiversity and ecosystem services for regional assessment and
3. elaborate the APN Strategy to create strong synergies with IPBES based on outcomes of the workshop and IPBES-2.

Amount received and number years supported

The Grant awarded to this project was US$70,000 for one year.

Activity undertaken

Workshop to scope activities associated with assessing impacts on biodiversity & ecosystem services

Results

The project included a case study review of 58 Asia-Pacific biodiversity and ecosystem service (BES) assessments held in the IPBES Catalogue of Assessments (IPBES 2012). The Catalogue was considered the most comprehensive resource available to identify gaps and strengths in the current state of knowledge of BES research in the region. The project also supported a workshop with 41 participants from 25 different government, academic, international, non-government and private sector organizations to share knowledge and critically discuss the implementation of the IPBES conceptual framework in regional Asia-Pacific context. Presentations, discussions, and breakout working groups tested assumptions stemming from the case study review and shared knowledge on strengths and gaps in current Asia-Pacific BES assessments.

12 key messages were developed from the workshop targeted at developing the four IPBES core functions of: 1) conducting assessments; 2) capacity building; 3) knowledge sharing; and 4) developing policy support tools and methodologies. These messages were accepted as a formal

Information Document to the proceedings of IPBES-2 to inform deliberations on developing the IPBES work programme and implementation of its framework in regional and sub-regional contexts (IPBES/2/INF/12, available online at www.ipbes.net/plenary/ipbes-2.html#infodocs, IPBES 2013b). A printed summary of recommended actions and full report was distributed at IPBES-2, and also presented to delegates at an official side-event.

The case study review, workshop, and presentation of results at IPBES-2 helped inform delegate input to the ongoing IPBES work programme. It also highlighted the role of APN in supporting and contributing solutions to challenging global environmental issues. The outcomes will also help synergise APN's future directions with intergovernmental needs for science-policy improvements in BES research and management.

Relevance to the APN

a) Goals

This project supports all four APN goals: (1) supporting regional cooperation, (2) strengthening appropriate input, interactions and knowledge sharing among scientists, policy-makers, and the public, (3) improving scientific and technical capabilities, and (4) cooperating with other global change networks and organizations. These are complementary to IPBES goals, and it was considered critically important to participate in the new IPBES process. Joining from the very beginning stage allows APN to maintain its role as a major scientific resource in the Asia-Pacific and build strong synergies with international peers. This project was able to contribute to the development of the IPBES work programme and identify meaningful roles for APN in internationally relevant BES research now and into the future.

b) Science agenda

Ecosystems, biodiversity and land use (EBLU) is one of the main themes under the APN's scientific agenda of APN's 3rd Strategic Plan (2010-2015). In this plan, the APN vision is to enable countries in the Asia-Pacific region to successfully address global change challenges through science-based response strategies and measures, effective science and policy linkages, and scientific capacity development. This project directly contributed to this vision by recommending strategies to redress gaps in BES assessments, capacity building, knowledge sharing, and policy support tools and methodologies.

c) Policy agenda

The APN recognizes the role of science to provide the underpinning information for policy and decision-making, and the need to work with stakeholders to identify what those needs are. IPBES is also focused around strengthening the dialogue between the scientific community, governments, and other stakeholders on biodiversity and ecosystem services. The project brought together senior decision-makers, advisors and scientists from 25 different governments and organizations to illustrate how the IPBES framework can better help policy-makers interpret scientific information to reflect complex relationships between BES and people, and how scientists can better support policy needs.

Self evaluation

The project exceeded expectations for outputs and audience. The workshop was originally intended to familiarize stakeholders to comment on IPBES draft conceptual frameworks, and evolved into a set of implementable recommendations on the core objectives of IPBES' regional activities. IUCN invited project leader Prof. Takeuchi to deliver the outcomes to an official IPBES-2 side-event, widening the project's exposure and allowing direct delivery to delegates. The workshop report, key messages summary, and case study review provide an evidence-based guide for future APN and IPBES activities.

The project outputs, including the case study review, workshop report, and official IPBES-2 information document, also provided a useful evidence base for commentary on future directions for IPBES and workshop participants. The workshop outputs were a good opportunity to communicate to the international community on Asia-Pacific BES assessment needs. Evaluation of the broad reach of reporting and feedback from participants was considered indicative of the project's value and usefulness, including:

a) Report referenced in two formal IPBES plenary interventions

The report was explicitly referenced in the delivery of two formal plenary interventions, from the United Nations University (UNU) delegation in the opening plenary session (led by project leader Prof. Takeuchi), and the Island Sustainability Alliance (Cook Islands) (ISACI) delegation in the closing plenary.

b) Multiple public outputs for use by diverse stakeholders

The project disseminated a broad spread of communication outputs including:

- a public symposium on biodiversity and ecosystem services on Day 1 of the Asia-Pacific workshop in Seoul;
- an official UN information document for IPBES-2 (IPBES/2/INF/12);
- a full report and summary of workshop outcomes distributed to workshop participants, IPBES-2 delegates, other international biodiversity related for a, and relevant stakeholders;
- a case study assessment review paper published and presented as a foundation for the workshop;
- a keynote speech and conference paper delivered to the International Symposium on EcoTopia Science in Nagoya, 15 December 2013; and
- a presentation on project outcomes to IPBES-2 delegates at an International Union for the Conservation of Nature side-event in Antalya, Turkey, 9 December 2013.

c) Web reporting beyond APN

Other than the APN website, the workshop was reported on 3 different web and news sites:

- UNU: 3 news articles in English and Japanese on the UNU-ISP and UNU web sites:
  - "Asia-Pacific Regional Workshop on IPBES takes place in Seoul" (http://isp.unu.edu/events/2013/ipbes_workshop_korea.html and http://news.unu.edu/calendar/?go=event.page&id=6945);
  - "Seoul Workshop Explores Regional Interpretation of IPBES in Asia and the Pacific" (including downloadable report, http://isp.unu.edu/news/2013/ipbes_workshop_korea.html); and
  - "UNU-ISP Helps Shape Agenda for Intergovernmental Biodiversity Body at IPBES-2 Meeting" (http://isp.unu.edu/news/2013/biodiversity_IPBES2.html).
- IPBES: 2 news articles and downloadable information document on the IPBES web site:
  - Announcement of the workshop (http://ipbes.net/events-ipbes.html);
  - "Seoul International Symposium and Workshop on the Interpretation of IPBES Conceptual Framework and Knowledge Sharing" (http://ipbes.net/events-feed/410-seoul2013); and
  - "Report from Seoul international symposium and workshop on regional interpretation of IPBES Conceptual Framework and Knowledge Sharing" (including downloadable Information Document, IPBES/2/INF/12) (http://ipbes.net/images/K1353757.pdf).
- Australian National University (ANU): Unsolicited posting of IPBES Information document by ANU's *Anton's Weekly International Law Digest*. This digest is linked further to seven leading university libraries in Australia, US, Canada and the UK (http://awild.org/tag/international-law-

international-law-scholarship/).

d) Positive feedback from participants

Unsolicited feedback indicated participants were very grateful and impressed by the synthesis of outcomes produced from the project. Direct quotes include:

"…thank you very much for your great effort to summarize the diverse discussions held in the last IPBES workshop in Korea. I also would like to thank the great hospitality of the Korean [hosts] that led success of the workshop."

"This is a good document and the key messages help."

"A very nicely drafted report!"

"Thank you very much for this summary, which I think reads extremely well."

"Thank you for putting the report together. I see that our concerns and interests are addressed. Best regards and congratulations for completing this valuable document."

"I really appreciate the effort you put in the draft summary of Seoul Workshop. I think the report is very good and comprehensive."

"I take this opportunity to thank you and the entire team at UNU for organizing and following-up on the [workshop]."

Potential for further work

The potential for future work is discussed in detail in Section 5, including:

- Capacity building for needed BES concepts and skills
- Support regional scale assessments in Asia-Pacific
- APN researcher participation in IPBES work groups and taskforces
- Support an IPBES Asia-Pacific hub.

Publications (please write the complete citation)

IPBES 2013. Report from Seoul international symposium and workshop on regional interpretation of IPBES Conceptual Framework and Knowledge Sharing. Information Document presented to Second IPBES Plenary (IPBES-2), Antalya, Turkey, 9-14 December, 2013 (IPBES/2/INF/12).

Saito, O., Landreth, N., Kamiyama, C., Hashimoto, S., and Kohsaka, R. 2013. An approach for Asia-Pacific Biodiversity and Ecosystem Assessments – Trade-offs and local synergies in Satoyama ecosystem services. Paper presented at *International Symposium on EcoTopia Science 2013*, Nagoya University, Nagoya, Japan, 13-15 December 2013.

UNU-ISP 2013. Full Report: Asia-Pacific workshop on regional interpretation of the IPBES – Conceptual framework and knowledge sharing. UNU-ISP: Tokyo.

UNU-ISP 2013. IPBES case study assessment review: Briefing paper on state of knowledge in regional and sub-regional biodiversity and ecosystem assessments. Paper presented at *Asia-Pacific Regional Workshop on Regional Interpretation of the IPBES Conceptual Framework and Knowledge Sharing*, Korea Chamber of Commerce and Industry, Seoul, Republic of Korea, 2-4 September 2013.

UNU-ISP 2013. Summary: Asia-Pacific workshop on regional interpretation of the IPBES – Conceptual framework and knowledge sharing. UNU-ISP: Tokyo.

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Acknowledgments

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TECHNICAL REPORT

Workshop to scope activities associated with assessing impacts on Biodiversity & Ecosystem Services

Preface

Held in Seoul from the 2nd to 4th of September, United Nations University Institute for Sustainability and Peace (UNU-ISP) and the Korea Environment Institute (KEI) co-hosted a first-of-its-kind international workshop on regional interpretation of the new Intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services (IPBES) in the Asia-Pacific. The workshop attracted over 40 experts from across the region and was organized with the generous support of the Ministry of Environment, Republic of Korea and APN, and in cooperation with the Ministry of the Environment, Japan and IPBES.

Now counting 116 member nations, IPBES is on a path to becoming the leading intergovernmental body for assessing the planet's biodiversity, ecosystems, and the essential services they provide for human well-being. This workshop helped advance APN's capacity to meet contemporary needs from the international community for applied multidisciplinary research into management of biodiversity and ecosystem change. Discussions were informed by a case study review identifying research gaps and opportunities from 58 regional biodiversity and ecosystem service assessments, and outcomes were formally submitted and presented to the second IPBES plenary (IPBES-2) in December 2013 in Antalya, Turkey.

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1 INTRODUCTION

1.1 Background information: IPBES in the Asia-Pacific

This document reports key messages from the project's Asia-Pacific Workshop on Regional Interpretation of the IPBES Conceptual Framework and Knowledge Sharing, co-hosted by UNU-ISP and KEI in Seoul from September 2 to 4, 2013. The intent of the workshop was to draw out key elements for the interpretation of IPBES in an Asia-Pacific context, with a focus on the state of knowledge and gaps in BES assessments. It was also able to directly inform Objective 2 of the 2014-2018 IPBES Work Programme to strengthen knowledge-policy interfaces at regional and sub-regional levels, and outcomes were accepted as an official information document at IPBES-2 (IPBES/2/INF/12, IPBES 2013b).

IPBES was established on 21 April 2012 in Panama as an independent intergovernmental body. Now with 116 member nations, it aims to provide scientific support for policy-making in the area of biodiversity and ecosystem services (BES). The four key functions of IPBES are: 1) to provide regular assessments on the state of global BES, 2) capacity building to assess and manage BES, 3) knowledge generation, and 4) policy support tools and methodologies. In December 2013, IPBES-2 was held to approve a conceptual framework and work programme to realize these four functions.

The IPBES work programme includes a focus on regional and sub-regional scientific activities that contribute to policy-making on securing BES. Developing IPBES at regional and sub-regional scales is important to adapt multilateral solutions to environmental, social, and economic characteristic often

overlooked by aggregated studies at global scales. A regional focus can also transcend historic political and geographic boundaries to the sustainable use of BES, recognizing the broader, integrated nature of our societies and environments, and also provide a fresh space for marginalized indigenous or local knowledge systems that have often spent centuries managing complex socio-ecological relationships beyond these boundaries.

The Asia-Pacific is a region expected to be a significant future flashpoint in BES management, due to high competition for land between fast growing human populations and mega-biodiversity (MA 2005), and high vulnerability to climate change and related natural disasters in South Asia and the many small island states of the Pacific (Watson, Iwamura & Butt 2013). This project conducted a case study review and workshop to collate and analyze many of the regional, national, and local assessments carried out in the Asia-Pacific to identify future challenges and potential actions for IPBES.

1.2 Significance to APN

The Asia-Pacific Network for Global Change Research (APN) is an inter-governmental network to support regional research and capacity building activities to achieve sustainable development in the region. Ecosystems, biodiversity and land use (EBLU) is one of the main themes under the APN's scientific agenda of its 3rd Strategic Plan (2010-2015). The need for a focus on BES was endorsed in the APN Temperate East Asia Sub-Regional Cooperation Scoping Meeting held in Vladivostok in February 2013, where members acknowledged that BES should be a common science agenda for APN scientists in the sub-region. APN has developed a framework for BES in response to current situations surrounding international biodiversity policy.

The framework has identified the following areas to be strengthened under APN in the future:

- **Drivers and pressure for biodiversity change that influence ecosystem services (such as land-use and climate change);**
- **Assessment of impacts of biodiversity loss and vulnerability to shrinking ecosystem services;**
- **Model-based prediction of changes in biodiversity and ecosystem services; and**
- **Adaptation, responses to and mitigation of the depletion of biodiversity and ecosystems services.**

This project sought in part to align APN activities with global science-policy research in the BES space. The project was also designed to elaborate on the IPBES framework, especially its potential regional assessment activities. It was considered critically important to participate in the new IPBES process from the very beginning stage, building APN's role as a major scientific resource in the Asia-Pacific. Outcomes of this project enabled APN to contribute to the IPBES process and identify meaningful roles in BES research.

The project provided an opportunity to focus APN's future BES work under its Ecosystems, Biodiversity, and Land Use (EBLU) research agenda by targeting specific gaps in current assessments, capacity building, knowledge sharing, and policy support tools and methodologies. APN's vision as set out in the third Strategic Plan (2010-2015) is to enable countries in the Asia-Pacific region to successfully address global change challenges through science-based response strategies and measures, effective science and policy linkages, and scientific capacity development. The project addressed all four APN goals: (1) supporting regional cooperation, (2) strengthening appropriate interactions among scientists and policy-makers, and providing scientific input to policy decision-making and scientific knowledge to the public, (3) improving the scientific and technical capabilities, and (4) cooperating with other global change networks and organizations.

1.3 Objectives

The major objectives of the workshop were to support the IPBES process and build capacity in the Asia-Pacific region to conduct policy-relevant scientific assessments of biodiversity and ecosystems through:

a) **developing proposals for future actions in regional interpretation of the IPBES conceptual framework;**
b) **sharing knowledge on BES for regional assessment; and**
c) **elaborating the APN Strategy to create strong synergies with IPBES based on outcomes of the workshop and IPBES-2.**

a) Regional Interpretation of the IPBES conceptual framework

The IPBES conceptual framework may be described as a concise summary that:

- **Depicts key social and ecological components of complex systems;**
- **Depicts relationships between these components;**
- **Provides common terminology and structure for variables in ecosystems of interest; and**
- **Propose assumptions about key relationships in the system.**

(IPBES 2013).

At the time, IPBES's conceptual frameworks were under development and expected to be adopted by member nations and stakeholder observers at IPBES-2. Participants to the proposed workshop were introduced to some draft conceptual frameworks by the IPBES Secretariat and other framework contributors. Workshop discussion was designed around capacity needs and methods to interpret and conduct regional assessment under these conceptual frameworks, and to provide feedback for the further development of IPBES frameworks and work programmes.

b) State of knowledge sharing on biodiversity and ecosystem services

Science and policy experts shared existing studies and data on BES in the Asia-Pacific region to understand the state of knowledge and gaps in conducting assessments and building capacity. Such experts included IPBES Bureau members, participating scientists in the Sub-Global Assessment (SGA) Regional Network, AP-BON, and IUCN (see Appendix 1 for full list of participants).

c) Elaborating the APN Strategy to create strong synergies with IPBES

12 key messages were developed from the project to inform both IPBES and APN on future directions in improving the science-policy interface for BES. These were submitted as a formal information document to IPBES-2, and delivered directly to delegates at an official side event. This report can also be used as a source document by APN for future directions that align with the new IPBES-2 'Antalya Consensus' work programme.

1.4 Outputs

Outputs from this project provide an Asia-Pacific perspective on implementing and developing the conceptual framework of IPBES, and will also be a useful reference for advancing the IPBES work programme in other regions of the world. The full report and summary of key messages will also be distributed at other international events related to biodiversity and ecosystem services, including the upcoming meeting of the CBD's Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity (CBD-SBSTTA), the Governing Board Meeting of the Global Biodiversity Information Facility (GBIF), and the next Asia-Pacific Biodiversity Observation Network (AP-BON) meeting, amongst others.

a) Biodiversity and ecosystem service assessment case study review

To guide preparation of the workshop outcomes, UNU undertook a review of 58 Asia-Pacific biodiversity and ecosystem service case studies collated by the IPBES Catalogue of Assessments. This

review identified gaps, themes and areas for future research. The review and summary data were also published in the workshop supporting documents (see Appendix 2 for assessment data summary and Appendix 3 for case study review paper and presentation slides).

b) 12 key messages summary from project outcomes

Summary of the project outcomes was distributed to delegates at IPBES-2, and formed the basis of a presentation to delegates by project leader Prof. Kazuhiko Takeuchi (Senior Vice-Rector, UNU). The summary and full report are available for download from http://isp.unu.edu/news/2013/ipbes_workshop_korea.html (Appendix 4).

c) Official IPBES information document

The 12 key messages from the project case study review and workshop were summarized into a concise paper accepted as an official information document supporting proceedings at the IPBES-2 and is available for download from the IPBES website (IPBES/2/INF/12, IPBES 2013b) (Appendix 4).

d) Full workshop report

The workshop report included the summary of key messages and recommendations, the final workshop program, presentation materials (powerpoint slides), summaries of discussions, photos, and list of participants. The report was distributed to delegates online and at IPBES-2. The report is also downloadable from the websites of the United Nations University and Korea Environment Institute (Appendix 4).

e) Presentation of outcomes at IPBES-2

Project leader Prof. Takeuchi was invited by IUCN to present the outcomes of the workshop to an official IPBES-2 side event: *Practical recipes for engaging stakeholder for supporting IPBES*. Alongside representatives from IUCN and the International Council for Science (ICSU) (among others), Prof. Takeuchi highlighted how findings from this APN project could focus the ensuing IPBES work programme and prioritize stakeholder needs and knowledge to drive assessments, capacity building, knowledge generation, and policy support tools. The side-event was attended by over 40 official IPBES delegates (see Appendix 3 for presentation materials).

f) Conference paper presented to the International Symposium on EcoTopia Science 2013

The case study review formed a significant basis for a keynote presentation delivered by project collaborator, Dr. Osamu Saito (UNU-ISP), to the International Symposium on EcoTopia Science 2013, held at Nagoya University, Japan, from 13-15 December 2013 (Appendix 3 for full paper and presentation materials).

1.5 Scientific significance

The case study review and regional scoping workshop discussed and identified key elements of regional activities under the IPBES framework to report to IPBES-2. The workshop directly addressed Objective 2 of the IPBES 2014-2018 Draft Work Programme (IPBES 2013), seeking to strengthen the knowledge-policy interface on biodiversity and ecosystem services at regional and sub-regional levels. IPBES Objective 2 deliverables targeted by this project were:

a) supporting and building a guide for the development and endorsement of regional and sub-regional deliverables, assessments, and capabilities by June 2014, including the existing Sub-Global Assessments network (http://www.ecosystemassessments.net);

b) clear and applicable guidance on working with different, especially indigenous and local, knowledge systems by March 2015, building on work undertaken at the previous, APN-supported IPBES Multidisciplinary Expert Panel (MEP) Workshop on Indigenous and Local Knowledge held at UNU, Tokyo in June 2013; and

c) a set of regional and/or sub-regional assessments and the institutional capacity developed to deliver them by March 2017, including scoping processes that identify:

- Structure, content, and key questions for assessments;
- Capacity needs;
- Needs for knowledge in the form of research, data, and modeling; and
- Needs for policy-relevant tools and methodologies.

(IPBES 2013).

IPBES has strong linkages to APN's existing intergovernmental work, including to support the Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity 2012-2020 and the Aichi Biodiversity Targets.

2 METHODOLOGY

The project combined quantitative data from the case study review with qualitative, expert inputs and evidence from the workshop to collectively make recommendations to the future work of IPBES, APN and their wider body of Asia-Pacific stakeholders in the BES science-policy space.

2.1 Case Study Review

The case study review paper presented and published to support the workshop included two sub-objectives:

1. Find the state of knowledge in ecosystem and biodiversity assessments and frameworks for the Asia-Pacific region; and
2. Identify gaps and needs for further knowledge, capacity-building, and funding.

58 global to sub-national scale Asia-Pacific region studies from the IPBES *Catalogue of Assessments of Biodiversity and Ecosystem Services* (IPBES 2012) were analyzed to compare the frequency of simple indicators reflecting the current state of knowledge in biodiversity and ecosystem services. The IPBES catalogue is considered the most comprehensive available, and was used to identify trends in the following:

a) availability of knowledge on different information groups;
b) gaps in geographical range and integration;
c) level of temporal consideration;
d) dominant assessment frameworks;
e) gaps in ecosystem types;
f) gaps in services assessed;
g) level of cross-scale stakeholder engagement and consideration of trade-offs;
h) level of integration of different types of knowledge; and
i) level of policy impact and capacity building.

2.2 Workshop

41 academics, senior-policy makers, private sector representatives and leading non-government organizations from 25 governments and institutions across the region participated in the workshop. The broad objective was to discuss elements for consideration in future regional assessments, gaps in knowledge, and relevant proposals for IPBES. The workshop used the case study review as an embarkation point to collate outputs and knowledge on biodiversity and ecosystem services across 46 categories, including knowledge gaps in ecosystem types and services, tools and processes employed, stakeholder engagement, integration of different types of knowledge, policy impacts, and capacity needs for the Asia-Pacific.

Information from 26 presentations, 2 panel sessions and 4 breakout working groups were organised

to identify 1) current state of knowledge and gaps in Asia-Pacific regional assessments; 2) things to consider in future regional assessments; 3) relevant proposals for IPBES; and 4) exemplary case studies and examples. The programme is included in Appendix 4.

The workshop also identified lessons from cases where collective scientific understanding and communication of complex interactions between ecosystems, biodiversity, and human life had already developed positive roles for policy-makers. Breakout group discussions were coordinated to build upon this shared knowledge to inform IPBES on how to deliver on its four key functions in the Asia-Pacific, which formed the structure of the concluding 12 key messages submitted to IPBES-2 (see section 3.2):

1. Structure, content, and key questions for assessments;
2. Capacity needs;
3. Needs for knowledge in the form of research, data, and modeling; and
4. Needs for policy-relevant tools and methodologies.

3 RESULTS & DISCUSSION

3.1 Case study assessment

58 assessments covering the Asia-Pacific region were analyzed to identify the state of knowledge and gaps in current research gathered by the IPBES assessment database (IPBES, 2012). These were organised to reflect the 13 information groups and 45 information sub-group fields compiled in the database (see Appendices 2 and 3). This analysis can be used to indicate areas where coverage may be considered sufficient (such as high representation of food and water-related ecosystem services; or high representation of forest, coastal, and cultivated ecosystem assessments), and where gaps in research need to be addressed (such as low representation in Western Asia; low rates of information provided regarding knowledge generation, assessment outputs, and capacity building; or low integration rates of citizen science with other forms of knowledge).

a. Most assessments missing information on knowledge generation, assessment outputs, and capacity building

Many assessments did not cover all 46 IPBES database information fields. In an average assessment, 60.5% of the 46 fields were completed. This could reflect a) no available data due to shortfalls in assessment; b) ongoing assessments that have yet to process requested information (24.1% were ongoing assessments); or c) incomplete data entry. Most catalogued assessments provided documentation or links for further investigation, but 15.5% offered no assessment outputs, including those with inactive websites, to further detail their programs. 2 assessments (both from India) had no information entered in the database at all.

Database trends in information deficits can identify areas where knowledge is most lacking. Information groups where less than 50% of assessments had provided information included (from least to most complete): knowledge generation, assessment outputs, capacity building, data availability, policy impact, and tools and processes. Training materials (in the 'assessment outputs' group) were by far the most overlooked information field, identified in only 3.4% of assessments.

Table 1. Information availability and assessment outputs

Information group	**Frequency**	**Units**	**N**	***No data entered***
Average proportion of complete data fields	56.1%	Data fields	46	0.0%
Assessments with less than 50% completion	37.9%	Assessments	58	0.0%

Information groups with less than 50% completion rate	11. Knowledge generation (17.2%) 10. Assessment outputs (27.9%) 9. Capacity building (28.7%) 8. Data availability (32.8%) 7. Policy impact (39.1%) 6. Tools and processes (45.1%)	Data fields	Var.	0.0%
Assessments with active websites	55.2%	Assessments	58	32.8%
Assessments with available supporting data	27.6%	Assessments	58	72.4%
Assessments with reports	36.2%	Assessments	58	63.8%
Assessments with communication materials	13.8%	Assessments	58	86.2%
Journal publications	15.5%	Assessments	58	84.5%
Training materials	3.4%	Assessments	58	96.6%
Assessments documenting methods for integrating knowledge systems	12.1%	Assessments	58	87.9%
Assessments with no outputs	15.5%	Assessments	58	n/a

b. Low geographical representation from Western Asia, Polynesia, and East Asia

This geographic scope of this research covered assessments that included one or more of: the 53 nations of the UN Asia-Pacific Group; 17 dependent or disputed territories of the region; 3 Caucasus nations (Armenia, Azerbaijan, and Georgia); 4 Asia-Pacific nations of the UN Western Europe and Others Group (Australia, New Zealand, Israel and Turkey); Russia (UN Eastern Europe Group); and Kiribati (no UN group). These were divided into sub-groups of Northern Asia, South-eastern Asia, Eastern Asia, Southern Asia, Central Asia, Western Asia, Australia and New Zealand, Melanesia, Micronesia, and Polynesia (see Appendix 2 for further data).

39.7% of Asia-Pacific assessments incorporated more than one country ('country' is used here to include both independent nations and dependent territories), and 34.5% were targeted beyond national boundaries to regional, sub-regional, or global scales. However, almost half (46.9%) of the 79 countries and territories in the Asia-Pacific region were not represented in any assessments, with particularly low representation from Western Asia, Polynesia, and Eastern Asia. Only territories dependent on or associated with the United States or France featured in assessments from the Polynesia and Micronesia sub-regions. India and US Pacific territory assessments were represented in 50.0% of the Asia-Pacific database (29 assessments).

Table 2. Geographical range

Information Group	**Frequency**	**Units**	**N**	***No data***
Assessments covering more than one country	39.7%	Assessments	58	*0.0%*
Countries in Asia-Pacific region included in least one assessment	42	Countries	79	*0.0%*
Regions with lowest coverage	11. Western Asia (11% of 19 countries) 10. Polynesia (30% of 10 countries) 9. Eastern Asia (38% of 8 countries)	Countries	Var.	*0.0%*

Assessments covering more than one scale	15.5%	Assessments	58	*8.6%*
Assessments at regional or sub-regional scales	25.8%	Assessments	58	*8.6%*

c. One fifth of assessments planned to be repeated

79.3% of assessments were one-time-only, raising potential difficulties in tracking changes over time.

Table 3. Timing

Information Group	**Frequency**	**Units**	**N**	***No data***
Ongoing assessments	24.1%	Assessments	58	*32.8%*
Completed assessments	43.1%	Assessments	58	*32.8%*
Repeated	20.7%	Assessments	58	*51.7%*
Assessments initiated after MA released (2005)	39.7%	Assessments	58	*15.5%*
Most commonly used tools (>30%)	1. Indicators (43.1%) 2. Modelling (36.2%) 3. Geospatial analysis (37.9%) 4. Scenarios (32.8%)	Assessments	58	25.9%

d. The Millennium Ecosystems Assessment as dominant framework

24.1% of assessments had been undertaken as part of approved or associated Sub-Global Assessments under the Millennium Ecosystems Assessment (MA 2005a). Since the MA's release in 2005, a further 39.7% of assessments had been initiated. The MA had the most significant impact on biodiversity and ecosystem assessments, implemented as the core framework in 34.5% of cases (39.7% did not identify a framework). Other frameworks were mostly borrowed from other international organizations including UNEP's Global Environmental Outlook or the Convention on Biological Diversity (CBD). The 14 US assessments covering their Pacific Island territories and associated states (24.1% of all Asia-Pacific assessments) all used frameworks developed domestically, usually through the US State Fisheries Department. Two Australian studies also implemented 'SIRO-MED' conflict resolution frameworks for assessing and settling trade-offs between foresters, conservation groups, and indigenous land owners.

Table 4. Frameworks

Information Group	**Frequency**	**Units**	**N**	***No data***
Assessment part of the MA Sub-Global Assessment	24.1%	Assessments	58	*n/a*
Use MA framework	34.5%	Assessments	58	*39.7%*
Other frameworks	25.9%	Assessments	58	*39.7%*

e. Wetland, island, urban, and dryland ecosystems least assessed

Forest and marine (including coastal, island, and reef assessments) ecosystems were the most commonly assessed (in 51.7% and 50.0% of assessments, respectively). 70.7% of assessments included more than one ecosystem, with each covering 3 different systems on average. Integration of urban ecosystems was fairly low, in 13.8% of assessments, all of which included relationships of urban to forest and cultivated/agricultural ecosystems as well, amongst others. Wetland, island, urban, and dryland ecosystems were specifically addressed in less than 20% of assessments. (however, wetlands may have been characterised in some assessments as captured under coastal or river categories).

Table 5. Ecosystems

Information Group	Frequency	Units	N	*No data*
Most common ecosystems assessed (>40%)	1. Forest and woodland (51.7%) 2. Coastal (43.1%) 3. Cultivated/ agricultural land (41.4%)	Assessments	58	*10.3%*
Least commonly assessed ecosystems (<20%)	11. Wetland (1 assessment) 10. Island (12.1%) 9. Urban (13.8%) 8. Dryland (15.5%)	Assessments	58	*10.3%*
Average number of ecosystems assessed	3	Ecosystems	11	*10.3%*

f. Cultural ecosystem services least assessed

The variety of services provided by ecosystems to human-well being are characterised by the MA (2005, p.8) framework under four categories:

- Provisioning services: the products people obtain from ecosystems, such as crops for food and income, fuel, fiber, fresh water, and genetic resources;
- Regulating services: benefits people obtain from the regulation of ecosystem processes, including climate regulation, erosion control, regulation of human diseases, carbon sequestration, and water purification;
- Cultural services: nonmaterial benefits people obtain from ecosystems through spiritual enrichment, social cohesion, reflection, recreation, and aesthetic experiences; and
- Supporting services are those that are necessary for the production of all other ecosystem services, such as biodiversity, primary production, production of oxygen, and soil formation.

38 different ecosystem service types were covered in the assessments, with an average of 7 per assessment. The cultural services category was addressed in only 51.7% of assessments, although 'recreation and tourism' was over-represented relative to most other services in 46.6% of assessments. Food and water were the most commonly addressed individual services in 63.8% and 55.2% of assessments. Ecosystem services addressed in less than 5% of assessments are identified in Table 6 below, although some of these services may overlap with other categorizations, and 'biodiversity' is not always clearly categorized as an ecosystem service. Some important ecosystem services not explicitly addressed by any assessments include: local or regional climate regulation (e.g. microclimate); biosafety; and preservation of traditional knowledge.

Further cross-referencing analysis of ecosystem services could help identify common sets of correlated ecosystem services and ecosystems in which they typically occur, improving understandings of relationships between service bundles (see also Bennett et al. 2009).

Table 6. Ecosystem services

Information Group	Frequency	Units	N	*No data*
Average number of ecosystem services assessed	7	Ecosystem services	38	*10.3%*
Assessments including provisioning services	79.3%	Assessments	58	*20.7%*
Assessments including regulating services	65.5%	Assessments	58	*34.5%*
Assessments including supporting services	72.4%	Assessments	58	*27.6%*

Assessments including cultural services	51.7%	Assessments	58	*48.3%*
Most common services assessed (<40%)	1. Food (63.8%) 2. Water (55.2%) 3. Recreation and tourism (46.6%) 4. Climate regulation (41.4%) 5. Regulation of water flows (41.4%)	Assessments	58	*10.3%*
Least common services assessed (>5%)	33. Biodiversity (1.7%), Education (1.7%), Genetic resources preservation (1.7%), Human health (1.7%), Non-timber forestry products (1.7%), Productivity of marine fish stocks (1.7%) 31. Commercial and recreational fisheries (3.4%), Fisheries biodiversity (3.4%)	Assessments	58	*10.3%*

g. Low direct engagement of cross-scale stakeholders in trade-off resolution

Incorporation of non-elite stakeholders is integral to bridging links between different forms of knowledge, a founding principle of IPBES (UNEP 2010: para. 7d). Broad stakeholder engagement is also very important for driving innovation and legitimacy in ecosystem management and policy, particularly at regional scales seeking to transcend conventional political and geographical boundaries.

Cross-scale linkages could be identified through stakeholder engagement at multiple levels. 34.5% of assessments indicated explicit stakeholder engagement process, primarily through workshops, meetings, and interviews. Of these, on average 3 different groups of stakeholders were involved, usually a mix of national or provincial ministries and departments (22.4%), research organizations and experts (17.2%), and local governments (12.1%). Assessments specifically seeking trade union, women, or farmer stakeholder engagement were the least common (in 1, 2, and 2 assessments, respectively), although farmers and women may be categorized as 'local residents and householders' in other assessments.

Over a fifth of assessments (22.4%) actively included trade-off analysis as a tool for assessment, but only 6.9% directly engaged stakeholders in understanding different resource uses, including for trade-off and conflict resolutions.

Table 7. Stakeholder engagement

Information Group	**Frequency**	**Units**	**N**	***No data***
Stakeholder engagement process identified	34.5%	Assessments	58	*65.5%*
Average number of stakeholders engaged	10-100	Stakeholders	n/a	*63.8%*
Average number of processes engaged (if any)	2.2	Stakeholder engagement processes	10	*65.5%*
Most common engagement process	Resource user/stakeholder workshops, meetings, interviews (15.5%)	Assessments	58	*65.5%*
Assessments engaging trade-off and conflict resolution processes	6.9%	Assessments	58	*65.5%*
Average number of stakeholder groups engaged	3.2	Stakeholder groups	12	*63.8%*

National/provincial ministries and departments	22.4%	Assessments	58	*63.8%*
Research organizations and experts	17.2%	Assessments	58	*63.8%*
Local government	12.1%	Assessments	58	*63.8%*
National/international NGOs	10.3%	Assessments	58	*63.8%*
Community-based NGOs and groups	8.6%	Assessments	58	*63.8%*
Private sector and industry	8.6%	Assessments	58	*63.8%*
Local residents and householders	8.6%	Assessments	58	*63.8%*
Indigenous groups	6.9%	Assessments	58	*63.8%*
Resource and conservation managers	5.2%	Assessments	58	*63.8%*
Farmers	3.4%	Assessments	58	*63.8%*
Women	3.4%	Assessments	58	*63.8%*
Trade unions	1.7%	Assessments	58	*63.8%*

h. Average assessment incorporates at least 2 different types of knowledge; citizen science under-represented

45.2% of assessments indicated the types of knowledge used, on average incorporating 2 types of either scientific, traditional, resource expert, or citizen science knowledge. The most common combination was scientific and resource expert knowledge (24.1% of assessments), with citizen science featuring least commonly in 10.3% of assessments. 20.7% of assessments included traditional or local knowledge; and 17.2% combined it with scientific knowledge as well.

Table 8. Types of knowledge

Information Group	**Frequency**	**Units**	**N**	***No data***
Scientific information only	8.6%	Assessments	58	*55.2%*
Scientific and traditional knowledge	17.2%	Assessments	58	*55.2%*
Scientific and resource expert knowledge	24.1%	Assessments	58	*55.2%*
Scientific and citizen information	8.6%	Assessments	58	*55.2%*
Most common knowledge type	Scientific information (36.2%)	Assessments	58	*55.2%*
Resource experts	31.0%	Assessments	58	*55.2%*
Traditional knowledge	20.7%	Assessments	58	*55.2%*
Least common knowledge type	Citizen science (10.3%)	Assessments	58	*55.2%*
Average number of types of knowledge	2	Types of knowledge	4	*55.2%*

i. Around a fifth of assessments reported some policy impact; almost half incorporated capacity building

20.7% of assessments were able to identify impacts from scientific assessment on policy and decision making, capacity building needs, and gaps in knowledge. Almost half (46.6%) had incorporated capacity building components into their assessments. Further analysis is required to neatly summarize the specific impacts, lessons, actions, and gaps identified in this section as they are highly specific to each case study.

Table 9. Policy impacts, capacity needs, and knowledge gaps

Information Group	Frequency	Units	N	*No data*
Impact on policy and/or decision making	20.7%	Assessments	58	*79.3%*
Independent/other review of policy impact	8.6%	Assessments	58	*13.8%*
Lessons learnt for future assessments	17.2%	Assessments	58	*82.8%*
Capacity building needs identified	20.7%	Assessments	58	*79.3%*
Actions taken to build capacity	46.6%	Assessments	58	*53.4%*
Gaps in capacity communicated to stakeholders	19.0%	Assessments	58	*81.0%*
Gaps in knowledge identified	20.7%	Assessments	58	*77.6%*
Gaps in knowledge communicated to stakeholders	12.1%	Assessments	58	*87.9%*

Where they are noted, the area most commonly identified for capacity development was fundamental practitioner skills to understand and implement ecosystem assessment concepts (Table 10). The capacity of assessments to effectively integrate cross-scale stakeholder knowledge and priorities was also highlighted.

Table 10. Capacity building needs

Capacity building needs	Frequency	Units	N*	*No data*
Need for researcher ecosystem assessment skills	15.5%	Assessments	58	*79.30%*
Need for valuation skills	1.7%	Assessments	58	*79.30%*
Local stakeholder engagement and capacity	3.4%	Assessments	58	*79.30%*
Integrating and reviving traditional knowledge	3.4%	Assessments	58	*79.30%*

3.2 Workshop

After 3 days, 25 presentations, and 10 sessions featuring 41 participants from 25 regional organizations, 12 key messages integrating workshop outcomes and the case study assessment were developed. These were targeted at Objective 2 of the IPBES 2014-2018 Draft Work Programme to strengthen the knowledge-policy interface on BES at regional and sub-regional levels.

These messages focused on cross-cutting issues and the four main roles of conducting assessments: building capacity, generating knowledge, and developing policy-relevant tools and methodologies. Recommendations on cross-cutting issues were also developed. The 12 key messages were:

a) Actions on cross-cutting issues should

Key Message 1 - Establish an IPBES Regional Hub to promote universal methods, policy coherence, regional collaboration, and address assessment shortfalls

The IPBES Catalogue of Assessments collates knowledge on biodiversity and ecosystem services across 46 categories. Around one third of assessments had information for less than half of all categories, with clear shortfalls in knowledge generation, assessment documentation and data sharing, and capacity building. Encouraging further reporting to address incomplete or insufficient assessments may be unwelcome due to existing reporting burdens for otherwise complementary multilateral environmental agreements, such as the CBD. Furthermore, existing regional organizations such as IUCN, SPREP (Secretariat of the Pacific Regional Environmental Programme), AP-BON (Asia-Pacific Biodiversity Observation Network) or the EAAFP (East Asian-Australasian Flyway Partnership) already undertake significant regional assessments that can fill gaps in IPBES' collective knowledge base, and also have established expertise in communicating the outcomes of

these assessments to policy-makers and resource managers in the region.

One action to take advantage of these existing networks and overcome potential challenges of duplication, increased reporting burdens, and additional bureaucracy is to establish an IPBES Asia-Pacific Regional Hub. This hub can focus on sub-global environmental, social, and economic characteristics that a centralized secretariat may have difficulty with. Important roles for this regional hub should include:

- Fostering a regional cooperation network to unite existing work of region-specific governments, organizations, and other stakeholders;
- Identifying region-specific gaps in existing work to fill through unique assessment, capacity-building, knowledge generation, and policy support activities;
- Act as a centralized common repository of regional data with common standards and a clear data-sharing mandate to emphasize the use of universal methodologies applicable across scales, such as the IUCN Red List of Threatened Species;
- Provide a platform to facilitate wider stakeholdership for the private sector, indigenous groups, and civil society in regional and national BES strategies and action plans;
- Host a high-level regional committee structure for national governments focusing on inter-agency inclusion to overcome policy incoherence, address geographic imbalance, and directly communicate the value of IPBES policy support tools; and
- Coordinate region-specific interventions and collaborations to take account of trade-off dynamics and institutions unique to the region.

b) Structure, content, and key questions for assessments should:

Key Message 2 - Highlight where IPBES can deliver advances beyond the Millennium Ecosystems Assessment framework, especially regarding status and trends in biodiversity

The Millennium Ecosystems Assessment (MA) framework has had the most significant impact on biodiversity and ecosystem assessments, used most frequently as the departure point for IPBES Catalogue case studies. This allows for a basic degree of consistency and comparability within and across regions, and helps build a common language among practitioners. A good means to communicate and develop value for IPBES is to highlight how it intends to deliver beyond the existing successes (and shortfalls) of the MA, CBD, or other MA-based initiatives like TEEB (The Economics of Ecosystems and Biodiversity), such as:

- greater focus on conventional and alternative valuation of ecosystem services;
- relationships of biodiversity and ecosystem services to human well-being;
- new models for integrating different types of knowledge;
- assessments of ecosystems, services, and biodiversity at thematic scales;
- positioning institutions and governance as the central mediating point of biodiversity and ecosystem services; and
- clearly capturing the role of all three levels/components of biodiversity in socio-ecological dynamics (i.e. genetic diversity, species diversity, and ecosystem diversity).

Key Message 3 - Address cultural services beyond recreation and tourism; and regulating and supporting services beyond climate regulation and water purification

All assessments covered a broad range of ecosystem services (on average seven services in each assessment) although almost half did not address any cultural services. 'Recreation and tourism' was the only cultural service recognized in the vast majority of those that did, with notable exceptions including the Japan Satoyama-Satoumi Assessment (JSSA) and several south-east Asian workshop

presentations that illustrated how spiritual aspects of biodiversity were still important drivers of conservation and ecosystem management. Provisioning services, especially food and water, were the most commonly addressed ecosystem services in the Asia-Pacific. An earlier assessment of the pre-2005 MA sub-global assessments (SGAs) indicated weaknesses in assessing regulating and supporting services (Layke et al. 2012), but Catalogue assessments indicate there is now a greater understanding in Asia-Pacific case studies published to 2013 especially regarding global climate regulation and regulation of water flows.

Still, there is need for greater attention to thematic assessments in less tradable or commonly regulated regulating and supporting services such as pollination, biological pest and disease control, or soil fertility, particularly given that regulating services may be key indicators of regime shift risk (Bennett et al. 2009).

To improve the precision of trade-off analysis it is also important to assess how changes in ecosystem services influence other services. This can avoid inadvertent ecosystem degradation and also open possibilities for more sophisticated policy mechanisms that improve multiple services at the same time.

Key Message 4 - Integrate biodiversity and ecosystem service co-management across public, private, and civil society sectors

Incorporation of non-elite stakeholders (e.g. indigenous, local, or civil society actors) is integral to co-management and bridging links between diverse knowledge of complex socio-ecological issues, a core principle of IPBES. Broad stakeholder engagement can drive innovation and legitimacy in ecosystem management and policy, particularly at regional scales seeking to transcend conventional political and geographical boundaries and realize IPBES objectives of more holistic and integrated management. The 'new commons' approach expounded in the Japan Satoyama-Satoumi Assessment is one example that illustrates how new socio-ecological systems can sustain functions that provide services best suited to regional needs through cooperation of local governments, private sector organizations, and non-governmental organizations. This necessitates the development of new social contracts with all actors to foster public consciousness that embrace decentralized, regional, and local initiatives.

However, only one third of IPBES Catalogue assessments undertook explicit stakeholder engagement processes, usually with governments, researchers, and other experts. Targeted efforts to engage 'non-elite' stakeholders were not commonly reported, such as specific inclusion of the private sector, indigenous groups, trade unions, or women stakeholders. Stakeholder processes were also rarely used to understand different resource uses for trade-off and conflict resolution. Building better networks with complimentary non-governmental regional organizations, civil society, and private sector associations can provide excellent sources of knowledge, tools, and processes for redressing these imbalances.

c) Capacity building actions should:

Key Message 5 - Facilitate common data storage and sharing of knowledge to track changes over time

Lack of common data formats may raise potential difficulties in tracking changes over time, an important component of assessments, especially considering the often raised problem of limited intergovernmental data sharing and availability complicating the capacity of new assessments to build on past work. Through developing common data protocols, general criteria, and basic sharing

facilities IPBES can build capacity for honed data curation in conjunction with existing regional organization efforts and reporting requirements, helping build common scenario tools and databases.

Key Message 6 - Address most commonly identified capacity building needs - improved practitioner skills for ecosystem assessment and methods for integrating cross-scale stakeholder knowledge and priorities

Assessments integrated capacity building actions to assess and manage BES in over a third of cases, primarily through workshops, networking, and sharing experiences. However, few assessments in the IPBES Catalogue specifically record newly identified capacity needs, making it difficult to prioritize and target enhancements required for future assessment processes in the region. Where they are noted, the area most commonly identified for capacity development was fundamental practitioner skills to understand and implement ecosystem assessment concepts. The capacity of assessments to effectively integrate cross-scale stakeholder knowledge and priorities was also highlighted as the second most important capacity development need. Formal training, fellowships, exchanges, secondments, and mentoring were the least commonly reported capacity building actions in the Asia-Pacific cases of the IPBES Catalogue of Assessments.

d) Knowledge generation actions should:

Key Message 7 - Expand scope to cover gaps in Western Asia, Polynesia, and Eastern Asia sub-regions

Almost half of the 81 nations and territories of the Asia-Pacific region are not represented in any assessments collated by the IPBES Catalogue, with particularly low representation from Western Asia, Polynesia, and Eastern Asia. However, presumptions that non-participating countries were thus weak in generating knowledge were often countered during workshop proceedings, which revealed significant biodiversity and ecosystem assessments not included in the IPBES Catalogue, especially from regional organizations such as SPREP, IUCN Asia, and AP-BON. This highlights the need for concerted centralization by IPBES of existing regional knowledge to avoid duplication and focus on true gaps in regional assessments, such as out-of-date or missing assessments in Western Asia.

Key Message 8 - Address gaps in assessments on urban and dryland ecosystems

On average, Asia-Pacific BES assessments in the Catalogue covered three different ecosystem types. These were most commonly included forests and cultivated lands. Urban and dryland ecosystems were least commonly integrated into biodiversity and ecosystem service assessments. These are important areas of attention for the Asian region as 40 per cent of its land area is classified as drylands and much of the region is undergoing rapid urban expansion (MA, 2005).

Key Message 9 - Create advanced knowledge systems across scales and institutional levels through the integration of social science, citizen, private sector, indigenous and local knowledge with contemporary science

Assessments were commonly a product of combined scientific and resource expert knowledge, but traditional and local knowledge or citizen science were infrequently integrated. Local resource managers and indigenous groups often have developed unique understandings of complex socio-ecological relationships through generations of interaction with the environment, and private sector actors often have accomplished methods for assessing resource and ecosystem service dynamics to help link regional and global scales, such as in international supply chain management systems.

Furthermore, IPBES assessments and discussions to date lean towards the natural sciences, and require greater integration with social science methods. The relationship of human well-being is often missing from current assessments, such as the way humans perceive, behave, and act towards biodiversity and ecosystem services as opposed to other goods and services. IPBES knowledge generation activities can integrate important social science issues such as culture, language, local knowledge, and history to address this gap.

e) Policy-relevant tools and methodologies should:

Key Message 10 - Develop scientific methodologies for trade-off resolution that engages cross-scale, non-elite stakeholders

Trade-off resolution can be complicated by difficulties in quantifying some ecosystem services that remain important to different stakeholders, evident in a relative lack of socio-economic and cultural data. Practical tools and methodologies need to be created to assess comparable synergies for trade-offs and co-benefits, such as relationships between maintenance of 'natural' environments, commercial intensification, and mental health. Tools for geographically-based comprehensive valuation such as InVEST and TEEB illustrate useful typologies of trade-offs that IPBES assessments could incorporate, including:

- Service trade-offs: managing for one service at the cost of another
- Spatial trade-offs: benefits in one place, costs in another
- Temporal trade-offs: benefits now, costs in future and
- Beneficiary trade-offs: some win, others lose.

IPBES can also provide institutional oversight to encourage evidence-based equity in access to resources and benefits from proposed trade-offs.

Key Message 11 - Develop verifiable criteria for holistic policy impact monitoring and reporting

Understanding how to generate policy impact from BES assessments is still not clearly understood, with IPBES Catalogue assessments largely focused on cataloguing information on biodiversity and ecosystem services, and rarely reporting policy impacts, knowledge gaps, or capacity needs. Less than a fifth of assessments in the IPBES Catalogue reported the policy impacts of BES assessments, such as policies to develop local interventions, prevention of ecologically damaging projects, incorporation into national development strategies, or raising policy-maker awareness. Difficulty in impacting policy also highlights issues of incoherence and imbalanced power between delivery agencies, such as in biofuel assessments where the priorities of one government agency to promote production may collide with the environmental priorities of another to protect and regulate land transformation. Criteria for policy impact assessments can clarify implementation capacity needs, monitoring gaps, or governance concerns in translating biodiversity and ecosystem service knowledge into effective policy.

Key Message 12 - Provide communications assistance for policy support tools

The diversity of culture and languages across the Asia-Pacific presents a significant problem to build policy outcomes, especially at local levels. Communications tools are required to translate complicated concepts for implementation by policy makers, local decision makers, and the private sector. Scientific, policy, and finance support is often identified as a need, but communication support is frequently overlooked. A role for IPBES in communicating the utility of proposed policy support tools to all stakeholders is essential to ensuring its relevance.

4 CONCLUSIONS

A summary of the results and findings of this project were submitted as an official information document to guide the proceedings of IPBES-2 (IPBES/2/INF/12, IPBES 2013b), with a full report distributed and presented to key delegates at the event. The information document was a synthesis of key messages from the project's case study review of 58 Asia-Pacific BES assessments and the outcomes of the Asia-Pacific Workshop on Regional Interpretation of the IPBES Conceptual Framework and Knowledge Sharing, co-hosted by the United Nations University Institute for Sustainability and Peace (UNU-ISP) and Korea Environment Institute (KEI) in Seoul from September 2 to 4, 2013.

The project identified common gaps and future directions for BES assessments across the region. This includes where coverage may be relatively strong, such as high representation of food and water provisioning services focusing on forest, coastal, and cultivated ecosystems, and where gaps in research need to be addressed, such as low integration of local, indigenous, and citizen science knowledge; under-representation of cultural services and non-tradable regulating services; and low consideration of cross-stakeholder priorities in trade-off analyses.

These key messages can be used to guide future directions for APN's contribution to IPBES and to prioritize funding to improve science and policy responses to biodiversity and ecosystem challenges facing the Asia-Pacific.

5 FUTURE DIRECTIONS

The 2014-18 work programme adopted at IPBES-2 addressed a number of the messages delivered to the plenary through this workshop and other stakeholders (IPBES 2013b). The final IPBES-2 'Antalya Consensus' document illustrates strong synergy with APN's goals, including assessments on pollination and pollinators associated with food production and on BES scenario analysis and modelling to be delivered by December 2015. The work programme also directly addressed specific issues raised in the project's research, including establishing taskforces to meet BES assessment capacity-building needs, to synergize knowledge systems, and improve data availability. Initial scoping was also approved for four future assessments to be completed by 2018, focusing on (i) the conceptualization of values of biodiversity and nature's benefits to people; (ii) land degradation and restoration; (iii) invasive alien species; and (iv) strengthening capacities and tools for sustainable use and conservation of biodiversity.

Significant future directions for APN to support this work include:

5.1 Capacity building for needed BES concepts and skills

This project highlighted the many skills required to address shortfalls in sustainable BES management (see also IPBES/1/INF/10, IPBES 2012a). Findings from this project and reflected at IPBES-2 stressed that conventional science must expand to encompass other disciplines, such as alternative economics to conceptualize advanced ecosystem service value systems, or communications and public information expertise to embed support for science-based BES policy amongst key stakeholders.

APN can help design and fund new capacity building training to grow advanced BES concepts and skills required to meet the challenges identified in this project and the IPBES work programme. Partner agencies, networks, and institutions have proven well equipped to host similar training, such as APN-supported international postgraduate short courses on Building Resilience to Climate Change hosted with UN-CECAR across various universities in Asia over the last few years.

5.2 Support regional scale assessments in Asia-Pacific

IPBES will begin scoping its core work of regional scale BES assessments in 2015, with assessments beginning in 2016. APN has significant experience in coordinating the required expertise and resources for such a daunting effort. APN should prioritize its funding to support the feasibility, success, and influence of these milestone assessments.

APN can design its research agenda to help realize the next steps in the IPBES work programme. In-kind, technical, and financial needs identified at IPBES-2 were outlined in a letter to member states and observers from Interim IPBES Chair, Malaysian national Prof. Zakri Abdul Hamid. Support from APN could include hosting or participating in taskforce and assessment scoping meetings, in-kind research on priority data needs and knowledge aligned to both APN and IPBES objectives. This is further outlined in the IPBES-2 work programme (IPBES 2013a: Decision IPBES/2/5).

5.3 APN researcher participation in IPBES work groups and taskforce

IPBES also requires the input of experts on work groups to develop and implement the work programme. Nominations for the first round of eight taskforces and work groups closed on February 28, 2014. The next request for experts will be circulated at the end of March 2014, with a deadline for nominations in June 2014.

APN should prepare nominees for these work programmes, including:

- scoping and authoring regional and sub-regional assessments;
- assessments relating to land degradation and restoration;
- assessments relating to invasive alien species; and
- assessments relating to sustainable use and conservation of biodiversity.

5.4 Support an IPBES Asia-Pacific hub

Solidifying a network of governments and regional organizations and centralizing existing knowledge and data are important opportunities for IPBES. Asia-Pacific implementation of IPBES at regional scales can capitalize on established non-governmental organizations and widespread national use of complementary frameworks and agreements, such as the Millennium Ecosystems Assessment (MA) Framework, the CBD Aichi Targets, and the IUCN Red List of Threatened Species.

The workshop revealed many examples of where existing APN stakeholder activities could be coordinated to meet IPBES needs and avoid duplication and additional reporting burdens. These include covering knowledge gaps on biodiversity conservation and assessment in the Pacific through the Secretariat for the Pacific Regional Environment Programme (SPREP); knowledge on intergovernmental wetlands management through the East Asia-Australasia Flyway Partnership Program (EAAFP); and the World Business Council for Sustainable Development's (WBCSD) programmes driving ecosystem service accounting amongst private sector stakeholders.

APN can play a significant role to fund and organize knowledge and institutions that have significant contributing capacity but are not yet recognized by IPBES. An opportunity then for APN could be to help coordinate and fund an IPBES regional operating hub to overcome research gaps relevant to the Asia-Pacific region, centralize data and outputs to advance assessments, and provide communications assistance to translate science into actionable policy for governments, local resource managers, and the private sector. Integrating an IPBES hub into existing APN projects, such as *Future Earth in Asia,* could have high potential (Stevenson 2013).

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APPENDIX 1: Events, funding, participants, and glossary

1a. Conferences/Symposia/Workshops

Organized by project coordinators

Asia-Pacific workshop on regional interpretation of the IPBES – Conceptual framework and knowledge sharing
2-4 September 2013
Korea Chamber of Commerce, Seoul, Republic of Korea.

Project outcomes also presented in

Second IPBES Plenary (IPBES-2)
9-14 December 2014
Rixos Sungate, Antalya, Turkey.

International Symposium on EcoTopia Science 2013
13-15 December 2014
Nagoya University, Nagoya, Japan.

1b. Funding sources outside the APN

Funding sources outside APN

Organization	Co-funding amount	In-kind support
Ministry of the Environment, Japan (MOEJ)		Travelling and accommodation cost of three participants from the MOEJ
Ministry of Environment, ROK	40,000 USD	
IPBES		Travelling and accommodation cost of an IPBES interim secretariat
UNU-ISP		10% working time of an academic program officer from July to December 2013 25% working time of an administrative programme associate from July to October 2014
Korea Environment Institute		15% working time of a chief research fellow and two research fellows from July to December 2013

1c. List of Young Scientists

Name	Role	Institution	Nationality	Email
Mr. Moses Akuno	* UNU IPBES delegation	UNU-ISP	Kenya	moses_hillary@yahoo.com
Mr. Yaw Agyeman Boafo	* UNU IPBES delegation	UNU-ISP	Ghana	yaboafo@yahoo.co.uk
Dr. Kaoru Ichikawa	* Workshop Presenter * UNU IPBES delegation	UNU-IAS	Japan	ichikawa@ias.unu.edu
Dr. Chiho Kamiyama	* Project researcher * Workshop presenter * UNU IPBES delegation	UNU-ISP	Japan	kamiyama@unu.edu

Mr. Nicholas Landreth	* Research assistant * Workshop presenter * UNU IPBES delegation	UNU-ISP	Australia	nicholaslandreth@gmail.com
Dr. Suneetha Subramanian	* Workshop presenter	UNU-IAS	India	subramanian@ias.unu.edu

Young scientist statements

Mr. Moses Akuno, UNU-ISP M.Sc. candidate
"As an official stakeholder through UNU-ISP, IPBES-2 widened my insights in the areas of international negotiations and policy, interaction among diverse bodies as well as biodiversity and ecosystem sustainability. Specifically, the usefulness of science-policy interface for IPBES and policy compromise negotiation was very eye-opening. Additionally, I gained first-hand learning on the process of developing the main framework that captures IPBES policy coherence with national priorities at the main plenary session. This plenary also allowed me to understand better the inclusion and role of indigenous and traditional groups plus their knowledge to the promotion of better science-policy interaction as concerns IPBES. During the plenary, a diverse number of young researchers were present, and discussions with them in the evenings widened my knowledge in diverse backgrounds. It led to the formation among the students of the Young Researchers for IPBES which we are still discussing on modalities to involve our wide backgrounds to promote critical IPBES functions at different levels."

Mr. Yaw Agyeman Boafo, UNU-ISP PhD candidate
"I participated as an official stakeholder delegate for UNU-ISP and also as a doctoral researcher. My engagements in IPBES-2 offered me a rare opportunity to experience learn, share and engage in discussions on ecosystem services and biodiversity assessment. Meetings and interactions with accomplished researchers and practitioners from all over the world proved useful and thoroughly enriching to my research and academic pursuits. I gained a lot of insights into current assessment approaches in biodiversity and ecosystem services from different groups of individuals and organisations. As a doctoral researcher, I benefited immensely from discussions during stakeholder sessions."

Dr. Kaoru Ichikawa, Research Fellow, UNU-IAS
"My role in the project was to participate in the Asia-Pacific Workshop for Regional Interpretation of IPBES to make a presentation and to contribute to the discussions. The project helped me to improve my expertise, and built networks with new contacts. Knowledge I gained includes current status of biodiversity and ecosystems and the conservation and management policies in various areas in Asia-Pacific regions."

Dr. Chiho Kamiyama, Researcher, UNU-ISP
"My role was mainly to provide scientific knowledge as a researcher in the workshop supported by the UNU/APN project, and bring back the outcome to my field (Plant Ecology) for encouraging other scientists or stakeholders with respect to the interface of science-policy-traditional knowledge interfaces. I also coordinated and presented results of the workshop breakout group on capacity building needs for biodiversity and ecosystem assessments in the Asia-Pacific, co-authored the paper presented to the EcoTopia 2013 conference based partly on this project.

"I also attended IPBES-2, which was my first experience to attend such an international negotiation. I recognized many potential issues for each country or region which prevented plenary consensus. At the same time, the outcome, especially the IPBES conceptual framework, contributed to rethink and expand the research plan of my ongoing project conducted in Satoyama landscapes in Japan.

"I learned the role of traditional knowledge in IPBES and also the importance to understand synergies and trade-offs between scientific and traditional knowledge. I also gained scientific knowledge to assess biodiversity and ecosystem services quantitatively, which promoted personal discussion with other participants of the meeting and helped to break down the methodologies into my own research interests."

Mr. Nicholas Landreth, Research Assistant, UNU-ISP
"I was contracted by UNU-ISP to design and conduct the case study review, organise the workshop, present project findings to the workshop, compose the final reports, and, most importantly for me, coordinate and draft the 12 key messages directing future options for IPBES. I was also invited as an official UNU delegate to IPBES-2 to help disseminate the messages. This was an excellent opportunity for me to collaborate with leading policy-makers and scientists from around the Asia-Pacific and make meaningful contributions to the international sustainable development agenda. I am very thankful to APN for the opportunity."

Dr. Suneetha Subramanian, Research Fellow, UNU-IAS
"I presented research I prepared specifically for the workshop on "Sub-regional and national state of knowledge and actions in South Asia", regarding national policies for conservation and sustainable use of biodiversity and ecosystem services. I also co-chaired the workshop session on "Needs and gaps in knowledge sharing" in the Asia-Pacific.

"The workshop helped me get a better understanding of varied approaches of different countries even within a region that are often faced with similar challenges. It helped me also understand the various scientific and social methods that are being developed and promoted by different regional and multilateral agencies to enable better management of biodiversity. The workshop also enabled me to build good contacts with leading researchers and agencies who are doing excellent work on biodiversity management, research and outreach in the Asia-Pacific region."

1d. Glossary of Terms

ACB	ASEAN Centre for Biodiversity
ANU	Australian National University
AP-BON	Asia-Pacific Biodiversity Observation Network
APN	Asia-Pacific Network for Global Change Research
ASEAN	Association of Southeast Asian Nations
BES	Biodiversity and ecosystem services
CBD	UN Convention on Biological Diversity
EAAFP	East Asia-Australasia Flyway Partnership
EBLU	Ecosystems, Biodiversity, and Land Use
GBIF	Global Biodiversity Information Facility
ICSU	International Council for Science
IGES	Institute for Global Environmental Strategies
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPBES-2	Second IPBES Plenary
ISACI	Island Sustainability Alliance (Cook Islands)
IUCN	International Union for Conservation of Nature
KEI	Korea Environment Institute

MA	Millennium Ecosystems Assessment
MEP	IPBES Multidisciplinary Expert Panel
SGA	MA Sub-Global Assessments Network
SPREP	Secretariat of the Pacific Regional Environment Programme
TEEB	The Economics of Ecosystems and Biodiversity
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environment Programme
UNU	United Nations University
UNU-IAS	UNU Institute for Advanced Studies
UNU-ISP	UNU Institute for Sustainability and Peace
UN-CECAR	University Network for Climate and Ecosystems Change Adaptation Research
US	United States
WBCSD	World Business Council for Sustainable Development

1e. Participant list

Full telephone, fax, and address details available on request.

Asia-Pacific Workshop on Regional Interpretation of the IPBES Conceptual Framework and Knowledge Sharing

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APPENDIX 2: CASE STUDY REVIEW DATA

The IPBES Catalogue of Assessments on Biodiversity and Ecosystems (2012) review data will be submitted in a separate Excel spreadsheet file as it is too bulky to reproduce here (Review of IPBES Catalogue 20140308.xls). Data contents of the spreadsheet includes:

Contents

APPENDIX 3: ABSTRACTS, PAPERS AND POWERPOINT SLIDES

Outcomes of this project were presented as major components of:

- **Asia-Pacific Workshop on Regional Interpretation of IPBES**
  Korea Chamber of Commerce and Industry, Seoul, 2-4 September 2013
  Paper: IPBES Case Study Assessment Review: Briefing paper on state of knowledge in regional and sub-regional biodiversity and ecosystem assessments
  Presenter: Nicholas Landreth, UNU-ISP

- **Second IPBES Plenary (IPBES-2)**
  Side event: IUCN Practical recipes for engaging stakeholders for supporting IPBES
  Rixos Sungate, Antalya, Turkey, 9-15 December 2013
  Paper: Key messages from Asia-Pacific workshop on interpretation of the IPBES conceptual framework and knowledge sharing

- **International Symposium on EcoTopia Science 2013**
  Session title: Policy, economics and assessment for green environment and biodiversity
  Nagoya University, Nagoya, Japan, 13-15 December 2013.
  Keynote Paper: An approach for Asia-Pacific biodiversity and ecosystem assessments – Trade-offs and local synergies in Satoyama ecosystem services
  Presenter: Dr. Osamo Saito, UNU-ISP

A3a. IPBES Case Study Assessment Review: Briefing paper on state of knowledge in regional and sub-regional biodiversity and ecosystem assessments

See attached for paper and presentation slides.

A3b. Key messages from Asia-Pacific workshop on interpretation of the IPBES conceptual framework and knowledge sharing

See attached for presentation slides.

A3c. An approach for Asia-Pacific biodiversity and ecosystem assessments – Trade-offs and local synergies in Satoyama ecosystem services

See attached for paper and presentation slides.

APPENDIX 4: WORKSHOP REPORTS

A4a. Workshop programme

The programme for the workshop was as follows:

Day One - 2 September 2013	
International public symposium on Asia-Pacific region biodiversity and ecosystem assessments **Co-Chairs: Prof. Kazuhiko Takeuchi, Senior Vice-Rector, UNU and Director, UNU-ISP, and** **Mr. Jechul Yoo, Director-General, Ministry of Environment, Republic of Korea**	
13:30-14:00 **Opening Session**	**Moderator** Dr. Yong-Ha Park, Korea Environment Institute (KEI) **Opening remarks** Mr. Jechul Yoo, Ministry of Environment, Republic of Korea Mr. Naohisa Okuda, Global Biodiversity Strategy Office, Ministry of Environment, Japan Dr. Akio Takemoto, Asia-Pacific Network for Global Change Research (APN) Ms. Michiko Okumura, IPBES Interim Secretariat, UNEP Prof. Kazuhiko Takeuchi, United Nations University
14:00-15:00 **Session 1: Keynote presentations**	**Development in Assessments in Biodiversity and Ecosystem Services in Japan** Prof. Tohru Nakashizuka, Tohoku University, Japan **Inter-Regional Interpretation of the IPBES Framework for the Eurasian Ecological Network** Prof. Kwi Gon Kim, Seoul National University, Republic of Korea
15:00-15:30	Coffee break
15:30-16:45 **Session 2: State of knowledge in regional assessments**	**Sub-regional and national state of knowledge and actions related to promoting conservation and sustainable use of biodiversity and ecosystem services** ***Temperate East Asia*** Prof. Wenping Yuan, Beijing Normal University, China ***Southeast Asia*** Prof. Utis Kutintara, National Committee on Biodiversity, Thailand ***South Asia*** Dr. Suneetha Subramanian, UNU Institute of Advanced Studies ***Pacific*** Mr. Stuart Chape, Secretariat of the Pacific Regional Environment Program, Samoa ***Private Sector*** Ms. Ayako Kohno, Environmental Strategy Office, Hitachi Ltd., Japan
16:45-17:30 **Session 3: Panel discussion**	**Challenges and opportunities for the Asia-Pacific Region** **Moderators** Prof. Kazuhiko Takeuchi and Prof. Kwi Gon Kim **Panellists**

	Prof. Anantha Duraiappah, UNU International Human Dimension Programme on Global Environmental Change (UNU-IHDP) Dr. Jin-Han Kim, National Institute of Biological Resources, Republic of Korea Mr. Naohisa Okuda, Ministry of Environment, Japan **Closing Remarks** Mr. Jechul Yoo, Ministry of Environment, Republic of Korea
18:00	Reception

Day Two - 3 September, 2013	
Asia-Pacific Regional Workshop on IPBES	
9:30-10:00 **Session 1: Overview of workshop**	**Opening Remarks** Prof. Kazuhiko Takeuchi, UNU **Introduction of participants** **Background to the IPBES Framework** Dr. Osamu Saito, UNU Institute for Sustainability and Peace (UNU-ISP) **APN Biodiversity and Ecosystem Services Framework** Dr. Akio Takemoto, APN
10:00-12:30 **Session 2: Regional interpretation of IPBES conceptual framework**	**Co-chairs** Prof. Yoshihisa Shirayama, Japan Agency for Marine-Earth Science and Technology (JAMSTEC) Prof. Jaeyong Choi, Chungnam National University, Republic of Korea **Overview of IPBES Conceptual Framework** Ms. Michiko Okumura, IPBES Interim Secretariat, United Nations Environment Programme (UNEP) **Evolution of IPBES Conceptual Framework** Dr. Osamu Saito, UNU-ISP **Experiences and lessons from the Japan Satoyama-Satoumi Assessment (JSSA): Previous regional and national assessments** Prof. Koji Nakamura, Kanazawa University, Japan **Biodiversity of Eastern Russia: Regional and Subregional Biodiversity Assessments and Initiatives** Dr. Konstantin A. Lutaenko, A.V. Zhirmunsky Institute of Marine Biology, Russia **Biodiversity and ecosystem services management and policy in Indonesia: Current situation** Prof. Parikesit Pampang, Universitas Padjadaran, Indonesia **Assessment of Biodiversity and Ecosystem Services (Korea)** Dr. Jin-Han Kim, National Institute of Biological Resources, Republic of Korea

12:30-14:00	Lunch break
14:00-16:00 **Session 3: Framework discussion**	**Chair** Prof. Yoshihisa Shirayama, JAMSTEC **IPBES Asia-Pacific Case Study Assessment Review** Mr. Nicholas Landreth, UNU-ISP **Discussion: Applying the IPBES conceptual framework to regional assessments**
16:00-17:30 **Session 4: Breakout group core function discussion**	**Chair** Prof. Yoshihisa Shirayama, JAMSTEC **What are the key messages, gaps, and challenges for advancing the IPBES conceptual framework in the Asia-Pacific?** 1. Structure, content, and key questions for assessments; 2. Capacity building actions; 3. Policy support tools and methodologies; and 4. Knowledge generation.
18:00	Reception

Day Three - 4 September, 2013	
Asia-Pacific Regional Workshop on IPBES	
9:30-12:00 **Session 1: Needs and gaps in knowledge sharing**	**Co-chairs** Dr. Suneetha Subramanian, UNU-IAS Prof. Tae Yong Jung, Korea Development Institute **IUCN: Generating and Sharing Biodiversity Knowledge** Dr. Scott Perkin, International Union for the Conservation of Nature (IUCN) Asia **The ASEAN Clearing-House Mechanism for Biodiversity and the Asian Biodiversity Observatory** Dr. Sheila Vergara, ASEAN Centre for Biodiversity (ACB) **Partnership for East Asian – Australasian Flyway: Conservation of migratory waterbirds and their habitats for the benefit of people an biodiversity** Mr. Spike Millington, East Asian-Australasian Flyway Partnership (EAAFP) **International Partnership for the Satoyama Initiative (IPSI)** Dr. Kaoru Ichikawa, UNU-IAS **Discussion**
12:00-13:00	Lunch
13:00-15:00 **Session 2: Wrap-up session and Plenary on key messages of IPBES**	**Chair** Prof. Kazuhiko Takeuchi, UNU-ISP **Breakout Group 1: Assessments** Mr. Spike Millington, EAAFP **Breakout Group 2: Capacity Building** Dr. Chiho Kamayama, UNU-ISP **Breakout Group 3: Policy support tools** Dr. Akio Takemoto, APN

	Breakout Group 4: Knowledge generation Dr. Osamu Saito, UNU-ISP **Discussion on outline of output document** **Closing Remarks** Dr. Akio Takemoto, APN Mr. Naohisa Okuda, Ministry of Environment, Japan Dr. Yong-Ha Park, KEI
15:00	Workshop close

A4b. 12 key message summary of project outcomes

See attached for workshop summary report.

A4c. Full workshop report

See attached for full workshop report.

A4d. Official IPBES Information Document

See attached for official IPBES Information Document.