

2008-09 APN Annual Report



Annual Report 2008/2009
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MESSAGE FROM THE DIRECTOR

It is my honour to present to you the 2008/2009 Annual Report, particularly highlighting the major activities of the network including non-technical summaries of APN-funded projects in the Asia-Pacific region carried out and completed in 2008/2009.



APN supported and managed 36 projects under the ARCP and CAPaBLE Programmes. The Annual Calls for Proposals were launched in June 2008 followed by the launching of a Special Call for Comprehensive Research Proposals under the CAPaBLE Programme. An evaluation of 18 activities conducted during Phase One of CAPaBLE culminated in the release of three publications: *CAPaBLE Phase 1: Climate Change*; *CAPaBLE Phase 1 Evaluation Report: Summary for Stakeholders*; and *CAPaBLE Phase 1: In Review*. These publications were distributed throughout the global change community and showcased at various international fora.

The 1st APN and Global Earth Observation System of Systems (GEOSS)/Asian Water Cycle Initiative (AWCI) Joint Scoping Workshop was organised in April 2008. At the Group of Eight (G8) Environment Ministers Meeting, held May 2008, the APN manned an exhibition booth and participated in various related events. A joint side event (Building Joint Capacities in Science and Policy Sectors for Environmental Decision Making) was co-organised with the Inter-American Institute for Global Change Research (IAI) at the 28th Session of the Subsidiary Body for Scientific and Technological Advice (SBSTA28), June 2008, which aimed at a new edge to integrate science into policy, which is urgently needed in the context of global change.

In October 2008, the APN's first Proposal Development Training Workshop (PDTW) successfully convened. Jointly organised with the Hyogo Prefectural Government, and DIVERSITAS in the Western Pacific and Asia (DIWPA), the APN International Seminar "Biodiversity and Human Dimensions: Promoting Harmonious Coexistence" successfully convened in February 2009. The APN attended many other events (listed on pages 56-57) to highlight global change research and capacity development activities in the region.

The APN Communications Strategy was devised and endorsed at the 14th Inter-Governmental Meeting (IGM)/Scientific Planning Group (SPG) Meeting and as part of its implementation many publications were produced/published to provide scientific information to policy-makers and the public, to further promote the network in the region, and to encourage involvement in APN activities. The APN website's new and dynamic interface is being developed and will be timely launched when the APN enters its Third Strategic Phase, from April 2010. APN also

updates an internal database that generates an electronic mailing list (EML) and uses this tool to strategically disseminate information as well as support the network.

Let me take this opportunity to express my great appreciation and thanks to the governments, organisations and members of the APN, who provided scientific input, shared their expertise, contributed financially and further strengthened its institutional foundation, all of which has made the APN's activities very successful. The APN would not have accomplished the activities specially highlighted in this Annual Report 2008/2009 without your support, cooperation and dedication.

We are also indebted to all of our global change research programmes and capacity development partners who share the same interests and whose partnerships are very valuable in the pursuit of our goals and objectives. I look forward to continually working with you all and I am very happy to present this publication to you also as a sign of our gratitude.

A handwritten signature in black ink, appearing to read 'Tetsuro Fujitsuka', with a long horizontal stroke extending from the bottom left of the signature.

Tetsuro Fujitsuka
Director, APN Secretariat

MISSION AND GOALS

APN's Mission

The mission of the Asia-Pacific Network for Global Change Research (APN)¹ is to enable investigation of change in the Earth's life support systems as it occurs in the Asia-Pacific region to:

1. Identify, explain and predict changes in the context of both natural and anthropogenic forcing;
2. Assess potential regional and global vulnerability of natural and human systems; and
3. Contribute, from the science perspective, to the development of policy options for appropriate responses to global change that will also contribute to sustainable development.

APN's Goals

In order to achieve its mission, the APN has identified five goals. Each goal will be achieved as outlined below, particularly through APN-funded activities; these activities are selected from the Annual Regional Call for Research Proposals (ARCP) process, as well as the APN's Capacity Development programme, CAPaBLE.

- Goal 1.** Supporting regional cooperation in global change research on issues particularly relevant to the region
- Goal 2.** Strengthening appropriate interactions among scientists and policy-makers, and providing scientific input to policy decision-making and scientific knowledge to the public
- Goal 3.** Improving the scientific and technical capabilities of nations in the region
- Goal 4.** Cooperating with other global change networks and organisations
- Goal 5.** Facilitating the development of research infrastructure and the transfer of know-how and technology

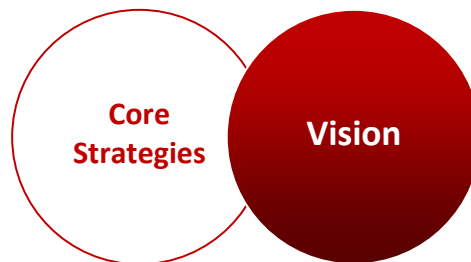
¹ The APN defines "global change research" as "research regarding global change (the set of natural and human-induced changes in the earth's physical and biological systems that, when aggregated, are significant at a global scale) and its implications for sustainable development in the Asia-Pacific region."

CORE STRATEGIES AND VISION

Core Strategies

The core strategies of the APN are to:

1. Encourage and promote research that has the potential, in addition to improving understanding of global change and its implications in the region, to contribute to the establishment of a sound scientific basis for policy-making with regard to issues for which global change is an important factor.
2. Identify, in consultation with policy-makers and practitioners, present and future needs for such research.



Vision

Changes in the Earth system are clearly impacting the societies and economies of the countries within the Asia-Pacific region. These countries support more than half of the world's population. Recent research and supporting observations have provided new insights into some of these changes and their impacts but have, at the same time, opened a number of new and challenging scientific issues.

The APN seeks to identify such emerging issues and to promote and encourage regional cooperative research to address these. In doing so, the APN assures that the results of this research contribute to the development of a sound scientific basis for policy- and decision-making related to issues for which global change is an important factor.

The APN strives to enable developing countries of the region to participate increasingly in, and to benefit fully from, cooperative research in the region. Finally, recognising the interactive role of regional processes in the overall Earth system, the APN also seeks to link the research it sponsors with research conducted in other regions and under the aegis of global-scale programmes.

HIGHLIGHTS OF 2008/2009

This section contains the major activities undertaken by the APN in 2008/2009 through the 'Funded Projects and Communications and Outreach,' which have separate sections in the succeeding pages of this Annual Report.

Project Management

Supporting/managing projects under the Annual Regional Call for Research Proposals (ARCP) and Scientific Capacity Building/Enhancement for Sustainable Development in Developing Countries (CAPaBLE) Programme is a high priority activity of the APN. Since the 13th Inter-Governmental Meeting (IGM)/Scientific Planning Group (SPG) Meeting in March 2008, the APN supported/managed 20 projects (9 new and 11 continuing) from the funded activities budget under the ARCP process. From the funded activities budget under CAPaBLE, APN supported 12 new and 1 continuing capacity building (CB) projects and 3 continuing comprehensive research projects (CRPs).



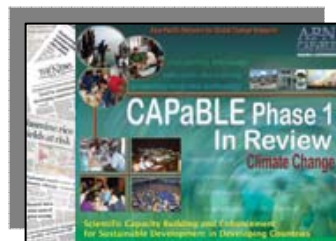
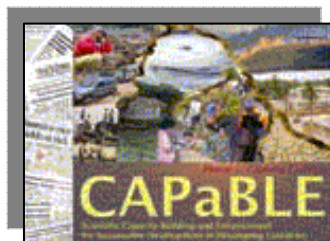
Calls for Proposals

- Launched the 2008 APN Annual Calls for Proposals under ARCP and CAPaBLE Programmes - Received 58 letters of intent; 37 summary proposals for the ARCP and 37 summary proposals for CAPaBLE; 18 full proposals for the ARCP and 19 full proposals for CAPaBLE. 11 (ARCP) and 10 (CAPaBLE) projects were selected for funding
- Launched a special Call for Comprehensive Research Proposals and managed the proposal submission and review process – Received 11 summary proposals and 8 full proposals. Two (2) projects were selected for funding



CAPaBLE Phase One Evaluation

The APN undertook an evaluation of the 18 activities conducted during Phase One of CAPaBLE, which focussed on Climate Change, and ran from April 2003 to March 2006. The results indicated that the CAPaBLE Programme is both timely and crucial for the Asia-Pacific region. Three publications were devised: *CAPaBLE Phase 1: Climate Change*; *CAPaBLE Phase 1 Evaluation Report: Summary for Stakeholders*; and *CAPaBLE Phase 1: In Review*. These publications were distributed throughout the global change community and showcased at various international fora.



1st APN and GEOSS/AWCI Joint Scoping Workshop



The 1st APN and Global Earth Observation System of Systems (GEOSS)/Asian Water Cycle Initiative (AWCI) Joint Scoping Workshop was held in Tokyo, Japan, on 16-17 April 2008, back to back with the 2nd GEOSS Symposium on Integrated Observation for Sustainable Development in the Asia-Pacific Region (2nd GEOSS AP Symposium) which convened on 14-16 April 2008. The objectives of the joint workshop were to: 1) align

climate and water-related activities currently being undertaken by APN and AWCI; and 2) discuss and plan potential future activities between APN and AWCI, which are to be co-funded or separately funded by both sides and are related, but not limited, to GEOSS activities to better inform decision-makers.

Following the adoption of the AWCI Implementation Plan under GEOSS, a discussion between APN and AWCI ensued on how to facilitate collaboration between the two organisations in addressing climate and water issues in the Asia-Pacific region. AWCI was able to hold three symposia through funding received from APN – ARCP Project “International Integrated Water Data Access and Transfer in Asia (IIWADATA). The present concept of the APN and AWCI collaboration activities focuses on two of the nine Societal Benefit Area (SBA) priority areas outlined in the GEOSS 10-year Implementation Plan: climate and water. It is expected that these two priorities will aid the Earth’s response to climate and its impacts as well as secure water resources. Currently, 12 and 18 countries in the APN region are members of GEOSS and AWCI, respectively.

Activities already undertaken by APN and AWCI have been published in the Group on Earth Observations (GEO) publication, *The First One Hundred Steps*, which was presented at the Fourth GEO Ministerial Summit held in Cape Town, in 2007. This publication highlights selected early achievements in the first two years of the GEOSS Implementation Plan. APN has demonstrated, in this publication, its GEOSS-related activities particularly the results of the two *APN Scoping Workshops on Global Earth Observations and the Capacity Building Needs of the Region: Focus – Climate*.



Exhibition Booth at the G8 Environment Ministers Meeting

The Group of Eight (G8) Environment Ministers Meeting, with the three main themes (*Climate Change, Biodiversity and 3Rs - Reduce, Reuse and Recycle*), was held from 24-26 May 2008 in Kobe, Japan to lead the discussion for the 2008 G8 Hokkaido Toyako Summit (7-9 July 2008, Toyako, Japan) on issues of global importance. While attendance at the main Ministers Meeting was limited to 19 countries and 8 international organisations, the APN participated in several related events managed by the Hyogo Prefectural Government.



To increase the APN's visibility via the G8 Environment Ministers Meeting, APN staffed an exhibition booth during the "Environment Fair in Kobe," held in Kobe Central Gymnasium, Kobe, Japan

from 23-26 May 2008. The APN showcased and distributed various publications and project-related outputs and also displayed the logos of its sponsors and partner organisations at the Fair, which was participated by private/business sectors, government institutions, non-governmental organisations (NGOs), universities, and local authorities (Hyogo Prefecture and Kobe City).

Message from Governor Toshizo Ido of Hyogo Prefecture at the Environment Ministers Meeting (25 May). In a working lunch of the Environment Ministers Meeting on 25 May 2008, Mr. Ido, Governor of Hyogo Prefecture made a presentation about the prefecture's environmental initiatives from a local government point of view. In his presentation, the APN was specifically mentioned: *"... The final point is international cooperation. The International Centre for Environmental Management of Enclosed Coastal Seas (EMECS)..., Institute for Global Environmental Strategies (IGES), the APN and others form an international global environmental research base. Through effective cooperation, the prefecture is making efforts towards widely communicating and collecting information, and contributing at the international level..."*

Joint Side Event (Building Joint Capacities in Science and Policy Sectors for Environmental Decision Making) with IAI and other events at SBSTA28



Aimed at a new edge to integrate science into policy that is urgently needed under global change, the Inter-American Institute for Global Change Research (IAI)/APN Side Event was held at the 28th Session of the Subsidiary Body for Scientific and Technological Advice (SBSTA28) on 3 June 2008. About 50 scientists and governmental delegates discussed how to foster a co-evolution of interdisciplinary science and cross-sector governmental communication towards decision-making needed to effectively respond to Global Environmental Change. It was highlighted that the complex decision processes and impact analyses needed for adaptation to global change require effective communication and integration between science and policy sectors.

The APN also attended an informal discussion on developments in research activities relevant to the needs of the Convention that convened on 5 June 2008 at SBSTA28. It was attended by about 100 people. Representatives of the Intergovernmental Panel on Climate Change (IPCC) and regional and international global change programmes and organisations, including APN, reported on a number of ongoing research activities

An informal session to develop the Chair's Summary of SBSTA28 concerning research and systematic observations was held on 6 June 2008 and participated by APN. The SBSTA recognised the substantial challenges in the research areas and related observations and encouraged Parties and the research programmes and organisations to further strengthen their efforts to address these challenges.



APN International Seminar on Biodiversity and Human Dimensions: Promoting Harmonious Coexistence



The APN International Seminar “Biodiversity and Human Dimensions: Promoting Harmonious Coexistence” successfully convened on 1 February 2009, in Kobe, Japan. It was jointly organised by APN, Hyogo Prefectural Government, and DIVERSITAS in the Western Pacific and Asia (DIWPA). This Seminar was the third in a series of APN International Seminars on biodiversity and was attended by about 120 people from Hyogo Prefecture and throughout Japan, with a handful of international participants as well.

Seven experts from Japan and abroad were invited as lecturers in order to deepen people’s understanding and promote the importance of harmonious coexistence between biodiversity and human society. The Seminar consisted of four parts: Part I - Biodiversity and International Policy; Part II - The Benefits of Biodiversity for Human Society; Part III - Sustaining Biodiversity in Rural Communities: New Models of Harmonious Coexistence; and Part IV - Panel Discussion. The report of this seminar is available for download on the APN website.

First APN Proposal Development Training Workshop



The APN's first Proposal Development Training Workshop (PDTW) successfully convened on 28 October 2008 in Shanghai, China. This was held back-to-back with the Environmental Management of EMECS 8th International Conference: Harmonizing River Catchment and Estuary.

The goals of the workshop were to provide information on the Annual Calls for Proposals under the ARCP and CAPaBLE Programmes and, particularly, to enhance the capacity of young/early-career scientists in writing proposals intended for submission to the APN so they can effectively compete in the APN Calls for Proposals process. Organised in partnership with the East China Normal University, the PDTW was attended by 18 participants from 5 countries in Temperate East Asia and South Asia (Bangladesh, China, Mongolia, Nepal and Pakistan), the SPG Member for Bangladesh (Prof. Giashuddin Miah), APN Project Leaders, and representatives from the APN Secretariat. The report of this workshop is available for download on the APN website.

APN-FUNDED PROJECTS



ARCP2007-06CMY-Huda

Climate and Crop Disease Risk Management: An International Initiative in the Asia-Pacific Region

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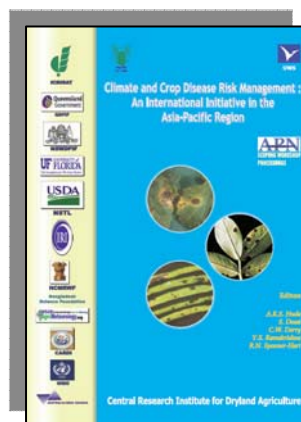
Participating Countries: Australia, Bangladesh, Cambodia, India, USA

APN Funding: US\$70,000 (For 2 Years)

The International Workshop on Climate Prediction and Agriculture held at the World Meteorological Organization (WMO) in 2005 suggested the potential for integrating medium-range (3-10 days) weather forecasting with historically- and seasonally-based climatic forecasting to facilitate strategic decision-making in agriculture.

The present project followed up on this recommendation and aimed to integrate a diverse body of knowledge that included agro-meteorological modelling, risk analysis, crop disease impact and community interaction. The activity was timely in terms of the growing importance of climate change and climate variability scenarios to develop a network to examine international relationships for sustained operational support for better forewarning of crop disease occurrence.

Outcomes from the 2006 project scoping workshop included reports on innovative modelling for connecting climate, crop and pest/disease management, coping strategies for agro-meteorological risks, agro-meteorological services, regional data needs, linking short- and medium-term climate forecasting and institutional and stakeholder collaboration. Some results have appeared in *Managing Weather and Climate Risks in Agriculture*, a Springer publication, under the auspices of the WMO.



Field experiments and data analyses (carried out in 2006, 2007 and 2008) for peanut, mustard and canola indicated the importance of developing functional relationships between meteorological observatory and crop canopy weather parameters to incorporate into models for weather-based forewarning systems. Results from these field experiments were discussed during the Review and Planning Workshop, 11-14 February 2008 in Dhaka, Bangladesh. This workshop provided the opportunity for project participants to share their ideas and critically evaluate the results. Deliberations in the workshop developed a number of excellent research proposals and strategies to pursue sources of funding, aimed at insuring long-term sustainability and regionalisation of the project.

Publications:

- Boote, K. J., Jones, J.W. and Hoogenboom, G. 2009. Crop Simulation Models as Tools for Agro-advisories for Weather and Disease Effects on Production. *Journal of Agrometeorology-Special Issue* (in press).
- Coughlan, K.J. and Huda, A.K.S. 2009. Use of Weather and Climate Information for Agricultural Planning and Decision Making, *Journal of Agrometeorology-Special Issue* (in press).
- Coughlan, K.J., Huda, A.K.S., Derry, C.W. and Asaduzzaman, M. 2009. "Climate and Crop Disease Risk Management: An International Initiative in the Asia-Pacific Region" Proceedings of the Project Review and Planning Workshop, 11-14 February 2008, BSF, Dhaka, Bangladesh.
- Huda, A.K.S. and Evans, J. 2009. Australian National Drought Policy, Book Chapter resulting from "Workshop on Drought and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture", organised by World Meteorological Organisation as part of Commission on Agricultural Meteorology (CagM) Expert Team presentation (Huda serving as an expert team member), Beijing, China, 16-17 February 2009.
- Huda, A.K.S., Mehrotra, R. and Sharma, A. 2009. Mitigation and Adaptation Strategies in Coping with Climate Change Impacts for Improved Crop Health and Sustainable Food Production in South Asia, Springer Book Chapter, resulting from Regional Symposium on Climate Change, Food Security, Sea Level Rise, and Environment in South Asia, held at University of Dhaka, Bangladesh, 25-30 August 2008, sponsored by Ohio State of University, the WMO, the Food and Agriculture Organization (FAO) Regional Office for Asia and the Pacific, and the United Nations Economic and Social Commission for Asia and Pacific (UNESCAP).
- Huda, A.K.S., Desai, S., Derry, C.W., Ramakrishna, Y.S. and Spooner-Hart, R.N. 2007. "Climate and Crop Disease Risk Management: An International Initiative in the Asia-Pacific Region" Proceedings of the Scoping Workshop, 6-10 November 2006, India: Central Research Institute for Dryland Agriculture (CRIDA). p. 46 (ISBN 978-81-904360-1-4).
- Huda, A.K.S., Hind-Lanoiselet, T., Derry, C., Murray, G., and Spooner-Hart, R.N. 2007. Examples of Coping strategies with Agrometeorological Risks and Uncertainties for Integrated Pest Management. Chapter 16 in "Managing Weather and Climate Risks in Agriculture" (eds. Sivakumar and Motha), pp. 265-280, Springer, New York.
- Khan, S.A., Choudhuri, S., and Jha, S. 2009. Weather-based Forewarning of Mustard Aphids. *Journal of Agrometeorology-Special Issue* (in press).
- Rathore, L.S., and Stigter, C.J., 2007. Challenges to Coping Strategies with Agrometeorological Risks and Uncertainties in Asian Regions. In: "Managing Weather and Climate Risks in Agriculture" (eds. Sivakumar and Motha), pp. 53-69, Springer, New York.

- Stigter, C.J. 2007. From Basic Agrometeorological Science to Agrometeorological Services and Information for Agricultural Decision-Makers: A Simple Conceptual and Diagnostic Framework. Guest Editorial. *Agriculture For Meteorology* 142: 91-95.
- Stigter C.J., Tan Ying, Das H.P., Zheng Dawei, Rivero Vega R.E., Nguyen van Viet, Bakheit NI, Abdullahi Y.M. 2007. Complying with Farmers' Conditions and Needs using New Weather and Climate Information Approaches and Technologies. In: "Managing Weather and Climate Risks in Agriculture" (eds. Sivakumar and Motha), pp. 171-190, Springer, New York.
- Stigter K. 2008. Agrometeorological Services Under a Changing Climate: Old wine in New Bags. *WMO Bulletin* 57(2): 114-117.
- Stigter, K. 2008. Policy support for capacity building in weather and climate services focused on agriculture, *Journal of Agrometeorology* 10(2): 107-112.
- Winarto, Y., Stigter, K., Anantasari, and Hidayah, S., 2008. Climate Field Schools in Indonesia: Coping with Climate Change and Beyond. *Low External Input Sustainable Agriculture (LEISA) Magazine*, 24 (4): 16-18.



ARCP2007-07CMY-Oanh

Investigation on the Impacts of Urban-Rural Air Pollution on Air Quality and Climate in Southeast Asia

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Participating Countries: Japan, Thailand, Viet Nam

APN Funding: US\$60,000 (For 2 Years)

This research project was designed to investigate the influences of various emission sources, typically present in rural and urban areas, on air pollution levels and atmospheric climate-related properties. The goal of this project was to initiate the measurements of the climate change relevant properties of airborne particles in selected cities that can be further expanded to other countries in Asia.



The monitoring activities were conducted in two selected Metropolitan Regions in Southeast Asia: Bangkok, Thailand and Hanoi, Viet Nam. The research focussed on airborne particles (PM), particle compositions and key gaseous pollutants emitted from typical sources in the region such as traffic and open biomass burning. During the first year (2007), sampling activities were completed in Hanoi with over 400 PM samples and 200 gaseous measurements. In the second year (2008), PM sampling was deployed in Bangkok including 137 pairs (274 single) of PM_{2.5} and PM_{10-2.5} samples. In parallel, measurements of climate change-relevant species of particles (i.e. Elemental Carbon-EC/Black Carbon-BC and Organic Carbon-OC), CO and meteorology were conducted continuously using the Research Centre for Advanced Science and Technology (RCAST) automatic equipment from March 2007, which generated thousands of data points.

For capacity development and networking, one AIT student was sent to RCAST in Tokyo University for training on OC/EC monitoring. Several scientist visits were made among the three project partners. The RCAST researchers undertook two training sessions at AIT for the RCAST equipment installation and operation. One Vietnamese research fellow from Hanoi University of Science (HUS) spent three months on data analysis at AIT. The launching workshop, organized at AIT in April 2007, was attended by 50 participants and included members from the partner institutions, local experts and graduate students. The AIT project principal investigator (PI) also visited Hanoi in December 2007 to discuss the HUS workplan for 2008.

An APN workshop in Viet Nam was organised in October 2008. The regional dissemination workshop was held as a special event at Best Air Quality (BAQ) 2008 in Bangkok (13 Nov. 2008), which was attended by 29 participants. The project sponsored five (5) experts from Viet Nam, Lao PDR, Cambodia, Thailand and Japan.

Publications:

- Cao Dung Hai. 2007. "Particulate Matter Air Pollution in Hanoi with Focus on Source Apportionment Study by Receptor Modelling," EV-07-4, Asian Institute of Technology, Thailand.
- Kim Oanh N.T. 2007. "Investigation on the Impacts of Urban-Rural Air Pollution on Air Quality and Climate in Southeast Asia (ARCP2007-07CMY-Oanh)," APN Newsletter, Volume 13, Issue 4, October 2007.
- Kim Oanh N. T. and Hai C. D. 2009. "Fine Particulate Matter Air Pollution in Hanoi in Relation to the Emission Sources and Meteorology," (manuscript is under preparation).
- Kondo, Y., Sahu, L., Kuwata, M., Miyazaki, Y., Takegawa, N., Imaru, J., Moteki, N., Han, S., Kim Oanh, N.T., Hu, M., and Kim, Y. J. 2008. "Stabilization of the Absorption Cross Section of Black Carbon for Filter-Based Absorption Photometry by the Use of a Heated Inlet," Aerosol Science and Technology, Volume 43, Number 8, August 2009, pp. 741-756.
- Lalitcha Imchuenri. 2008. Characterization of Atmospheric Particles for Source Apportionment. Master Research Thesis No. EV-08-4, Asian Institute of Technology, Thailand.



ARCP2007-08CMY-De Costa

Assessment and Management of Change in Coastal Zones caused by Salinity Intrusion

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Participating Countries: Australia, India, Japan, New Zealand, Pakistan, Sri Lanka

APN Funding: US\$70,000 (For 2 Years)

Due to the increasing need for fresh water, surface and ground water are being extensively used worldwide. As a result, gradual changes in human dimensions and adjacent waters of coastal zones caused by salinity intrusion has been a problem for a long time in some countries and is an emerging problem in many others.



The present research investigated changes in coastal zones caused by salinity intrusion, i.e. first investigated changes and trends in water bodies, and next looked at catchment change. The long-term salinity intrusion situation was assessed and predicted and then a link simulation multiple objective optimisation model was developed.

Numerous management strategies were investigated and discussed, thereby it is envisaged that policy-makers would be equipped to make optimal decisions with multiple objectives and to develop the best suited solution to manage their unique situations.

After detailed data collection, the Waiwhetu aquifer in Wellington was rigorously analysed and simulated. Thereby a model was developed to forecast the salinity situation in this aquifer. Aquifer behavior for numerous future scenarios was also analysed and thereby a technical management strategy to manage salinity intrusion was developed.

In addition, a model for multiple objective optimal management was proposed herein. Catchment change characteristics of the Waiwhetu catchment were looked into and linkages between catchment change and water regimes were established.

Further, numerous other management strategies were investigated with a view to adapt the best suited to the conditions given. Construction of underground dams to control salinity intrusion was looked into by analysing the ground water behaviour near Miyako island underground dam, in Japan. Controlling abstraction volume via a licensing system was investigated by analysing the numerous management strategies implemented in the Bundaberg area of Australia. Construction of recharge and abstraction wells on the saline boundary as a measure of controlling salinity was investigated by looking at the Andra Pradesh area in India, and various dredging scenarios were looked into as a measure of controlling and maintaining a balance of seawater intrusion to surface water systems.

Publications:

- Groundwater Behaviour in Subsurface Area of Underground Dams. Proceedings of the 16th Congress of the International Association for Hydraulic Research (IAHR), 2008.
- Management of Coastal Surface Waters Subject to Sea Water Intrusion. 33rd Congress of International Association for Hydraulic Research, 2009.
- Salinity Intrusion, its Management and Control - Future Scenarios, Case of the Waiwhetu Aquifer, 33rd Congress of International Association for Hydraulic Research, 2009.
- Strategic Management of Coastal Aquifers Subject to Salinity, Proceedings of the 32nd Congress of the International Association for Hydraulic Research, Vol. 1, pp.520, Full paper on CD-ROM, 2007.



ARCP2008-03CMY-Baguinon

Collaborative Studies in Tropical Asian Dendrochronology: Addressing Challenges in Climatology and Forest Ecology

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APN Funding: US\$70,000 (For 2 Years)

Participating Countries: India, Malaysia, Philippines, Sri Lanka, Thailand, USA

The main objectives of this project were to: a) establish tree ring laboratories in the region; b) conduct reconnaissance of indigenous tropical Asian tree species with clear distinct growth rings; c) undergo preliminary work to find if tree species with distinct growth rings have relevance to reconstructing past events; and d) establish and maintain xylaria.



Dendrochronology was temperate-oriented (Worbes, M. 2004). Asian tropical trees with distinct growth rings should exist as in tropical America (Worbes, M. 1999). If true, then Asian dendrochronology would go beyond pine-teak locations and the aforementioned vision would be realised. The objective to show cross-matching and cross-dating was barely realised because of the huge number of samples against our limited manpower resources.

Notwithstanding the aforementioned limitations, tree ring patterns of five (5) species from India and the Philippines showed evidence of cross-matching (e.g. ring pulses between trees tend to agree). When overlaid with the Southern Oscillation Index, very narrow rings correspond with El Niño events while broad rings reflect La Niña events. A sequel dendrochronology study should answer more questions addressing tropical Asian climatology/forest ecology.

Publications:

- Baguinon, N.T., H. Borgeonkar, K. Duangsathaporn, N. Gunatilleke, K. Tenakoon, B.M. Buckley and W.E. Wright. 2009. Collaborative Studies in Tropical Asian Dendrochronology: Addressing Challenges in Climatology and Forest Ecology, presented during the International Workshop on Climate Variability in the Greater Mekong River Basin: Paleoproxies, Instrumental Data and Model Projections, on 16-18 February 2009 held at the Agriculture Hotel, Dalat City, Viet Nam sponsored by Past Global Changes (PAGES).
- Baguinon, N.T. 2009. Studying Climate Change through Dendrochronology in the Philippines, presented on 19-20 November 2009 at the 5th Annual Convention with theme "Understanding the Climate Change Issues: A Key to Better Planning and Investment", held at the University Hotel, University of the Philippines, Diliman, Quezon City sponsored by the Philippine Meteorological Society, Inc. and the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Department of Science and Technology (DOST).



ARCP2008-04CMY-Park

Regional Collaborative Research of Climate Change Impacts on Surface Water Quality in Eastern Monsoon Asia: Towards Sound Management of Climate Risks

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APN Funding: US\$80,000 (For 2 Years)

Participating Countries: Cambodia, China, Indonesia, Malaysia, Republic of Korea, Thailand



This APN-funded project was conducted as a collaborative research activity coordinated by the International Environmental Research Centre (IERC), Gwangju Institute of Science and Technology, Republic of Korea. Although climate change is emerging as a new challenge for sound management of water resources in East Asia, there have been rare attempts to link researchers interested in this issue. Based on research networks in monitoring East Asian environments, IERC took the initiative to conduct the first regional scale research activity focussing on climate change impacts on surface water quality. Through a combination of three (3) different approaches including two (2) workshops, field monitoring and climate risk assessment, the project aimed to provide an overview of potential effects of climate change and variability on surface water quality in major regions of East Asia, with practical recommendations for developing a scientific climate risk management system as an important project outcome.

Comprehensive literature reviews performed as part of Project Module 1 identified complex relationships between climate and surface water quality in East Asia. Increasing variability and extremes in precipitation were observed across many parts of East Asia. In northern latitudes, winter snowpack dynamics and soil freeze/thaw cycles will play a pivotal role in the release of acids and nutrients from steep hillslopes. In mid latitudes including the Korean Peninsula, increasing amount and intensity of summer monsoon rainfalls, in combination with land use change and steep topography, have been predicted to lead to water quality deterioration by increased transport of sediments and nutrients. In southern China, lower precipitation with large year-to-year variations appeared to have had a substantial influence on year-to-year variations in acidity and nutrient fluxes in forest soils and headwater streams under increasing levels of acid deposition.



Although patterns of recent climate change in Southeast Asia have been more complex and subtle, the project review identified parameter-specific water quality responses to recent or future climate change, including decreases in dissolved oxygen (DO) saturation during hot and dry periods and a very strong control of hydroclimates on suspended sediments (SS). Field monitoring results showed that increased rainfalls during the wet season can increase terrestrial inputs of SS and dissolved organic matter from various non-point sources, while increased streamflow can lead to in-stream dilution of some chemicals having limited inputs via surface runoff. The results from the intensive monitoring conducted at two selected watersheds showed that flashy responses of watershed export of sediments and associated contaminants (e.g., toxic metals) to intense and extreme rainfalls could pose a threat to surface water quality in vulnerable areas such as steep mountainous watersheds, with climate impacts often amplified by land use change.

Overall, results suggest that climate change could affect surface water quality in East Asia, while the magnitudes of environmental and socio-economic impacts parameters are considered. Efficient systems of climate risk management can build on this scientific assessment and prediction of site- and parameter-specific risks and associated ecological and socio-economic losses.

Publications:

- Park, J.H. Inam, E., Kim K.W. (Eds.). 2007. Proceedings of The First International Workshop on Climate Change Impacts on Surface Water Quality in East Asian Watersheds held 8-9 October 2007, Chuncheon, Republic of Korea. International Environmental Research Center, Gwnagju, Republic of Korea.
- Park, J.H., Inam, E., Kim, K.W. (Eds.). 2009. Proceedings of the Second International Workshop on Climate Change Impacts on Surface Water Quality in East Asian Watersheds, 18-20 February 2009, Universiti Malaysia Sabah, International Environmental Research Center, Gwangju, Republic of Korea.
- Park, J.H., Duan, L., Kim, B., Mitchell M.J., Shibata, H. Potential Effects of Climate Variability and Extremity on Watershed Biogeochemical Processes and Water Quality – A Synthesis for Northeast Asia. *Environment International* (in revision).
- Park, J.H. and all APN project members. Monsoon Effects on Temporal Variations in Surface Water Quality in East Asian Watersheds (in preparation).
- Syers, J.K., Bach, N.L., Sthiannopkao, S., Yolthantham, T. Impacts of Climate Change on Water Quality in a Tropical Watershed: A Case Study from the Kok River, Chiang Rai, Thailand. *Journal of Environmental Quality* (in review).
- 8 presentations at academic conferences

Project Website: <http://apn.frp92.org/>



ARCP2008-05CMY-Adrianov

Biodiversity of the Coastal Zones in the North West (NW) Pacific: Status, Regional Threats, Expected Changes and Conservation

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Participating Countries: China, Republic of Korea, Russian Federation

APN Funding: US\$80,000 (For 2 Years)

This project aimed to investigate the status of biodiversity and changes in coastal zones of the NW Pacific with emphasis on intertidal and island ecosystems, alien invasive species and documenting overall biodiversity. New data on intertidal biota of Russky (Sea of Japan), Kunashir (Kurile Isl.) and Jeju Islands (Republic of Korea) were obtained, and recent changes in the species composition and abundance were described. In total, 2,211 species of marine biota are known for China.



Data on ship fouling in the Russian sector of the Sea of Japan collected since 1975 were reviewed and summarised and, altogether, 16 species-invasers of bottom invertebrates (cirripede barnacles, amphipods, hydroids, polychaetes and bryozoans) were registered. Distributional patterns of the coral diversity in the Indo-West Pacific were described and global trends in the coral reef ecosystems' changing are summarised; main drivers leading to a changing global biodiversity in the coral reef ecosystems were identified as follows: 1) the possible invasion of alien species; 2) the overexploitation of bio-resources of the coral reefs together with man-made pollution of the coastal seas; and 3) changing global climate and environmental stress.

Based on the data on species composition and chronology of mollusks living in the coastal areas of the Sea of Japan during the Holocene, a model of expected changes in the fauna was developed. Two workshops held in China and the Republic of Korea, development of a website and involvement of young scientists contributed to capacity building in global change research in the region. Three (3) books and 12 papers were published as a result of project activities, and are important in terms of new biodiversity information for the scientific community and can be useful for decision-makers.

Publications:

- Lutaenko, K.A. (Ed.). 2007. Biodiversity of the Marginal Seas of the Northwestern Pacific Ocean: Proceedings of the Workshop, Institute of Oceanology Chinese Academy of Science (IOCAS), Qingdao, China, November 21-23, 2007. Qingdao: IOCAS, 105 pp.
- Lutaenko, K.A. (Ed.). 2008. Marine Biodiversity and Bioresources of the North-Eastern Asia: Book of Abstracts, Workshop, Marine and Environmental Research Institute, Cheju National University, 21-22 October 2008. Jeju: Cheju National University. 227 pp.
- Zvyagintsev, A.Yu., Ivin, V.V., Kashin, I.A. 2009. The Methodical Advisories to Research Ship Ballast Waters during Realisation of Marine Bioinvasions Monitoring. Vladivostok: Dalnauka. 123 pp. [in Russian with English abstract].



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- Belogurova, L.S., Zvyagintsev A.Yu., Moshchenko, A.V. 2007. Meiofauna of Fouling Communities on the Cooling System Hydrotechnical Installations of Vladivostok Thermoelectric Power Station No. 2. - *Izvestiya TINRO*, 2007, vol. 150, pp. 250-270. [in Russian].
- Korn ,O.M., Kornienko, E.S., Zvyagintsev, A.Yu. 2007. Naturalization of the Hermit Crab *Diogenes nitidimanus* Terao, 1913 (Decapoda: Anomura: Diogenidae) in the Vostok Bay of the Japan Sea – Hypothesis or Reality? – *Izvestiya TINRO* vol. 150, pp. 291-297. [in Russian].
- Lutaenko, K.A., Xu F. 2008. A catalogue of types of bivalve mollusks in the Marine Biological Museum, Chinese Academy of Sciences (Qingdao). - *The Bulletin of the Russian Far East Malacological Society*, 2008, vol. 12, pp. 42-70.
- Lutaenko, K.A., Zhushchikhovskaya, I.S., Mikishin, Yu.A., Popov, A.N. 2007. Mid-Holocene Climatic Changes and Cultural Dynamics in the Basin of the Sea of Japan and Adjacent areas. In: D.G. Anderson, K.A. Maasch and D.H. Sandweiss (Eds.). *Climate Change and Cultural Dynamics: A Global Perspective on Mid-Holocene Transitions*. Amsterdam, etc.: Elsevier Inc., pp. 331-406.
- Pavlyuk, O.N., Tarasova, T.S., Trebukhova, Yu.A. 2008. Foraminifera and Nematoda Communities within the Area of *Ahnfeltia tobuchiensis* Field in Stark Strait (Peter the Great Bay of the Sea of Japan). - *Russian Journal of Marine Biology*, 2008, vol. 34, no. 3, pp. 151-158.
- Pavlyuk, O., Trebukhova, Y. 2007. Community Structure of Free-living Marine Nematodes in the Area of Agar-producing Alga *Ahnfeltia tobuchiensis* (Starka Strait, Peter the Great Bay, East Sea). – *Ocean Science Journal*, vol. 42, no. 3, pp. 165-170.
- Pavlyuk, O.N., Trebukhova, Yu.A., Belogurova, L.S. 2007. Effect of the Razdolnaya River on Structure of the Free-living Nematode Community of the Amursky Bay, Sea of Japan. – *Russian Journal of Marine Biology*, vol. 33, no. 4, pp. 213-221.
- Pavlyuk, O.N., Trebukhova, Yu.A., Nguyen Vu Thanh, Nguyen Dinh Tu. 2008. Meiobenthos in Estuary Part of Ha Long Bay (Gulf of Tonkin, South China Sea, Viet Nam). - *Ocean Science Journal*, vol. 43, no. 3, pp. 153-160.
- Zvyagintsev, A.Yu. 2007. Study of Marine Fouling in the Institute of Marine Biology Far Eastern Branch (FEB) Russian Academy of Sciences (RAS). – *Bulletin of the Far Eastern Branch, Russian Academy of Sciences*, no. 4, pp. 3-16. [in Russian].
- Zvyagintsev, A.Yu., Ivin, V.V., Kashin, I.A., Orlova, T.Yu., Selina, M.S., Kasyan, V.V., Korn, O.M., Kornienko, E.S., Kulikova, V.A., Bezverbnaya, I.P., Zvereva, L.V., Radashevsky, V.I., Belogurova, L.S., Begun, A.A., Gorodkov, A.N. 2009. Acclimation and Introduction of Hybrobionts Ships' Ballast Water Organisms in the Port of Vladivostok. - *Russian Journal of Marine Biology*, vol. 35, no. 1, pp. 41-52.
- Zvyagintsev, A.Yu., Sanamyan, K.E., Kashenko, S.D. 2007. On the Introduction of the Ascidian *Ciona savignyi* Herdman, 1882 into Peter the Great Bay, Sea of Japan. - *Russian Journal of Marine Biology*, vol. 33, no. 2, pp. 133-136.
- Zvyagintsev, A.Yu., Selifonova, J.P. 2008. Study of the Ballast Waters of Commercial Ships in the Sea Ports of Russia. – *Russian Journal of Biological Invasions*, no. 2, pp. 20-29. [in Russian with English abstract].

Project Website: <http://www.imb.dvo.ru/misc/apn/bio/index.htm>



ARCP2008-06CMY-Li

Quantification of Land-Use Urbanisation Level in Three Developing Asian Countries Based on the Analysis of Scale Effects in Landscape Patterns

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Participating Countries: China, Philippines, Viet Nam

APN Funding: US\$40,000 (For 2 years)

This project aimed to: a) build an international research team and database; b) provide accurate and useful land use/cover, ecological, social and economic data and information; c) train three young scientists on advanced methods of remote sensing technology and Geographic Information System (GIS) and urban landscape pattern analysis; and d) provide an integrated technical report of the quantifying urbanisation level from the aspect of land use and connecting land use patterns with urbanisation processes in the three biggest cities of three developing countries for policy-makers and the international community, and disseminate the findings.

Megacities in Asian developing countries are facing more rapid urbanisation and increasing population growth, land use pressure, and environment problems. Understanding the features of Asian urbanisation is important for sustainable development decisions and urban planning by governments. Three mega-cities in the Asia-Pacific region: Shanghai (China), Manila (Philippines) and Hanoi (Viet Nam), were selected for the present study.

In support of remote sensing technology and the gradient analysis method, landscape pattern dynamics in the recent 20 years were studied using six (6) landscape matrix indexes: contagion index, largest patch index, landscape shape index, perimeter-area fractal dimension, patch density, and Shannon's diversity index. The results showed that: 1) during urbanisation, regional landscape pattern of the three cities had changed markedly, with increasing patch density and strengthening fragmentation; 2) in land use transects, patch density and Shannon diversity index had a high correlation with the absolute distance to the city centre

(landscape index can detect the gradient of the city and show the direction of urbanisation); and 3) the desakota region of the three cities were discovered with different characteristics and different stages of urbanisation, which was typical in Asia.

Metro Manila was found to be at the highest stage of urbanisation, and with the earliest suburb urbanisation. Shanghai demonstrated a high degree of urbanisation and an obvious suburb urbanisation. In contrast, a lower level of urbanisation and unobvious suburb urbanisation was discovered in Hanoi. Ecological environmental protection for the desakota area should be given sufficient attention and put into practice.

Publications:

- Gan, X., Zhu, M., Li, J., et al. 2009. Effects of Sensor Spatial Resolutions and Classification Themes on Urban Landscape Analysis: A Case Study in Shanghai, China. *Can.J. Remote Sensing*, vol. 35, No. 4, pp. 1-12.
- Huang, J.S., Li, J.L., Flaviana, D.H., Hoang, M.H. et al. 2009. Urbanization Study and Comparison of Three Asian Megacities: Shanghai, Metro Manila and Hanoi. *International Journal of Sustainable Development & World Ecology*, 15 (Revised).
- Liangmei, H., Li, J., et al. 2008. A Fieldwork Study on the Diurnal Changes of Urban Microclimate in Four Types of Ground Cover and Urban Heat Island of Nanjing, China. *Building and Environment*, 43:7-17.
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- Cinco, T.A., Flaviana, D.H., Li, J.L. et al. 2009. Philippine Climatology and Climatic Trends in the Philippines. *J. Philippine Weather*, 35 (1):29-46.
- Zhu, M., Li, J., et al. 2008. Effects of Varied Remote Sensor Spatial Resolution and Grain Size on Urban Landscape Pattern Analysis. *Acta Ecologica Sinica*, 28 (6):2753-2763.
- Zhao, D., Li, J., et al. 2007. A Comparative Analysis of Broadband and Narrowband Derived Vegetation Indices in Predictive Leaf Area Index (LAI) and Central Composite Design (CCD) of a Cotton Canopy. *ISPRS.J. of Photogrammetry and Remote Sensing* 62(2007):25-33.
- Li, J., Zhu, M., and Fan, Y. 2007. Impacts of Road Patch Analysis on Urban Ecological Landscape Patterns: A Gradient Analysis with Changing Grain Size in Shanghai, China. *Proceeding of the 4th International Symposium on Intelligent Information Technology in Agriculture, 26-27 October 2007 in Beijing, China*. China Agricultural Sciences and Technology Press, 10. 779-788.
- Zhu, M., Xu, L., Jiang, N., Li, J., et al. 2006. Impacts of Road Corridors on Urban Landscape Pattern: A Gradient Analysis with Changing Grain Size in Shanghai, China. *Landscape Ecology*, (4):4-15.
- Zhu, M., Jiang, N., Li, J., et al. 2006. The Effects of Sensor Spatial Resolution and Changing Grain Size on Fragmentation Indices in Urban Landscape. *International Journal of Remote Sensing*, (4):1111-1123.

Project Website: <http://apn.ueplab.cn/>



ARCP2008-08CMY-Chen

Asian Mega-Deltas: Monsoon Circulation in Relation to Deltaic-Coastal Hazards and Future Mitigation: Millennial to Seasonal Dimensions

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Participating Countries: Australia, Bangladesh, Brunei Darussalam, Cambodia, Canada, China, India, Indonesia, Japan, Myanmar, Pakistan, Thailand, Republic of Korea, USA, Viet Nam

APN Funding: US\$58,000 (For 2 Years)

This project focussed on monsoon circulation in relation to hazard mitigation on deltaic-coastal regions. Specifically, the project coordinated regional climatological databases with the process-response model developed in a previous APN-funded Asia mega-delta project (2003-05). With an established network of participants (>100, mostly from developing countries), the project was in a strong position to integrate current understanding of the Asian monsoon with the resulting morphological modification of regional coastal environments, particularly via controls on precipitation and runoff.

This mega-delta project concluded that the monsoonal processes have a critical role in shaping delta-coast morphology and driving environmental hazards. For the millennium to centennial time scale, monsoon records can be effectively established by climate proxy, such as pollen spore, which has been widely used in the Asia mega-delta area, to reflect the fluctuations of temperature and moisture in the coastal region.



It is clearly shown in the Yangtze delta coast that monsoonal processes are closely associated with mega-thermal climate optimum initiated at about 7000 years before present (BP). This coevally happened with Holocene delta development at the same time, when the global sea level reached to the present. This implies that the climate of millennium scale may drive sea level rise and sediment transport from basin to coast for delta construction.

There were a few climate warming fluctuations of 100-200 year intervals before 7000 years BP, but, they did not represent the major tendency of monsoon development in the early Holocene. During the mega-thermal epoch, there were several climate warming and cooling events as revealed by the pollen records until about 4000 years, when the climate gently cooled down to present. This evolution trend of the Holocene Yangtze monsoon can be applied to other Asia mega-delta regions, but it remains 'unknown' if the monsoon was reactivated at the same time in the Asia mega-delta scale.

This collaboration is further intensifying not only scientific observation at the regional scale, but more importantly, communication with local government officers, administrators, and decision-makers, etc.

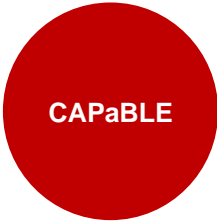
Publications:

- APN/IGCP476 – Shanghai International Conference on Deltas (abstract collection in conjunction with EMECS-8 International Conference), Harmonizing River Catchment and Estuary. 27-30 October 2008, Shanghai, China, 246pp.
- APN/IGCP476 - Dhaka International Conference on Deltas (abstract collection), 2008: Deltaic Gateways - Linking Source to Sink. Geological Survey of Bangladesh, University of Rajshahi, University of Dhaka, 86pp.
- Chen, Z., Zong, Y.Q., Wang, Z.H., Chen, J., and Wang, H. 2008. Migration Patterns of Neolithic Settlements on the Abandoned Yellow and Yangtze River Deltas of China. *Quaternary Research* 70: 301–314.
- Islam, S.N., Gnauck, A., 2008. The Mangrove Wetland Ecosystems in the Ganges-Brahmaputra Delta in Bangladesh. *Frontier of Earth Science in China*. *Front. Earth Sci. China*, 2(4): 439–448.
- Wang, Z.J., Chen, Z., Li, M.T., Chen, J., Zhao, Y.W., Wang, H., Yu, F.Y., 2009. Variations in Downstream Grain-sizes to Interpret Sediment Transport in the Middle-lower Yangtze River, China: A Pre-study of Three-Gorges Dam. *Geomorphology* (on-line available).
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Special Issues (editing in progress):

- Chen, Z., Yanagi, T., and Wolanski, E. (Eds.), 2009. *Ecohydrology of Asian Estuaries* (Special Issue on Estuarine, Coastal and Shelf Sciences).
- Chen, Z., Yoshiki, S., and Goodbred, S. (Eds), 2009. *Megadelta evolution – morphodynamical processes* (Special Issue on Earth Surface Processes and Landforms).

Project Website: <http://www.megadelta.ecnu.edu.cn/main/default.asp>



CBA2007-02CMY-Aalbersberg **Climate Change and Variability Implications on Biodiversity – Youth Scenario Simulations and Adaptations**

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Participating Countries: Fiji, Solomon Islands, Tuvalu

APN Funding: US\$63,000 (For 2 Years)

This two-year project was first piloted in Fiji (2006–2007) for the first project phase and was replicated in Tuvalu and the Solomon Islands as the second project phase (2008–2009).

USP worked through its Locally-Managed Marine Areas Network (LMMAN) partner organisation, the Foundation of the Peoples of the South Pacific that have affiliate offices in Tuvalu (Tuvalu Association of non-governmental organisations – NGOs) and the Solomon Islands (Solomon Island Development Trust). Work undertaken in the Fiji target sites included three (3) workshops on drama and climate change, three (3) workshops on climate change risk assessment and adaptation planning, youth community awareness raising performances, and community adaptation implementation. These activities were replicated in Tuvalu and the Solomon Islands.

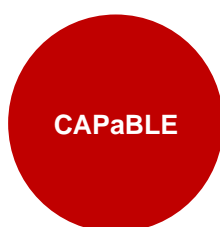
As capacity building is an integral part of the APN's work programme, the project built regional, national and local capacity in climate change and variability implications on biodiversity and sustainable development to raise policy-makers and civil society awareness and pilot adaptation options in LMMAN resource management projects as a basis for scoping climatic implications on Pacific biodiversity and as an attempt to provide answers.



The project engaged village communities particularly the youth through culturally sensitive activities. Considering the vastness of the Pacific and disperse nature of the islands, extensive and continuum capacity building is necessary to support sustainable development initiatives in the region.

Publications:

- Draft Facilitators manual for conducting Climate Change Drama and Risk Assessment and Adaptation Planning.
- Workshop reports on Solomon Islands and Tuvalu.



CBA2008-01CMY-Boer

Increasing Adaptive Capacity of Farmers to Extreme Climate Events and Climate Variability through Enhancement of Policy-Science-Community Networking

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Participating Country: Indonesia

APN Funding: US\$95,000 (For 3 Years)

This project aimed to encourage end-users, especially farmers, to realise the value of climate information in supporting their agricultural activities and reduce the vulnerability of their farming systems to climate risk. Through National Training Workshops, the project developed and enhanced the capacity of local scientists from five nodes (two scientists from each node, i.e. Asahan-North Sumatra, Bandung-West Java, Pacitan-East Java, Janeponto-South Sulawesi and Kupang-East Nusa Tenggara) in developing and using climate forecasting techniques, assessing climate-related problems and developing climate information application technologies to manage climate risk as well as to facilitate in establishing a *Policy-Science-Community Networking*.



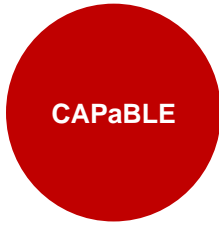
With a National APN CAPaBLE team consisting of recognised national scientists from Bogor Agriculture University, the Ministry of Agriculture, National Agency for Meteorology, Climatology and Geophysics and an extension specialist from the Indramayu District, the node scientists assisted local government staff, extension workers and farmers in using climate information application technologies to manage climate risks. Through action research, the node scientists with extension workers and farmers groups identified appropriate climate information applications for managing climate risks and revised the existing climate field school modules to suit their problems. This action and research also raised awareness of farmers to the economic value of climate information and adoption to technologies on climate information application through the Climate Field School (CFS) Program.

During the project period, a number of government representatives and extension workers from the nodes were invited to attend national workshops on climate risk management and to share lessons learnt and experiences in managing climate risks. In the project's final year, the National APN CAPaBLE team conducted monitoring activities to evaluate the implementation of the CFS Program and climate forecast skills in the nodes.

Publications:

- Boer, R., Rahadiyan, K. and Perdinan. 2007. The Use of Agriculture System Modelling for Crop Management: Case Study in Pusanegara. Indonesian Agriculture Meteorological Journal 21.
- Boer, R and Surmaini, E. 2009. Economic Benefit of Southern Oscillation Index (SOI) Phase Information for Crop Management Decision in Rice-based Farming System in West Java Indonesia. Submitted to the Indonesia Journal on Agriculture Science.
- Moron, V., Robertson, A. and Boer, R. 2008. Spatial Coherence of Spatial Predictability and Monsoon Onset over Indonesia. Journal of Climate 22: 840-850.
- Research/Technical reports, Modules for Climate Field Schools, PowerPoint presentations in national seminar and/or international symposium, and Workshops proceedings.
- CD-ROM containing Excel Programs that can be used to evaluate forecast skill using Relative Operative Characteristics (ROC), to determine monsoon onset, dry spell/wet spell, and seasonal rainfall characteristics from daily rainfall data series (<http://www.indonesiaapn-capable.totalh.com/index.php/project-activities/49-dssat/75-model>).
- Papers presented and published in national or international workshops or national media:
 - Boer, R. 2007. Is Our Agriculture Sector Resilience to Climate Change? The Jakarta Post 4 December 2007.
 - Boer, R. 2009. *Sekolah Lapang Iklim: Antisipasi Resiko Perubahan Iklim*. *Majalah As Salam*, 26 Januari 2009 (Climate field school: Anticipate risk of climate change). Published on line in *As Salam* edition 26 January 2009.

Project Website: www.indonesiaapn-capable.totalh.com



CBA2008-03NSY-Ashok

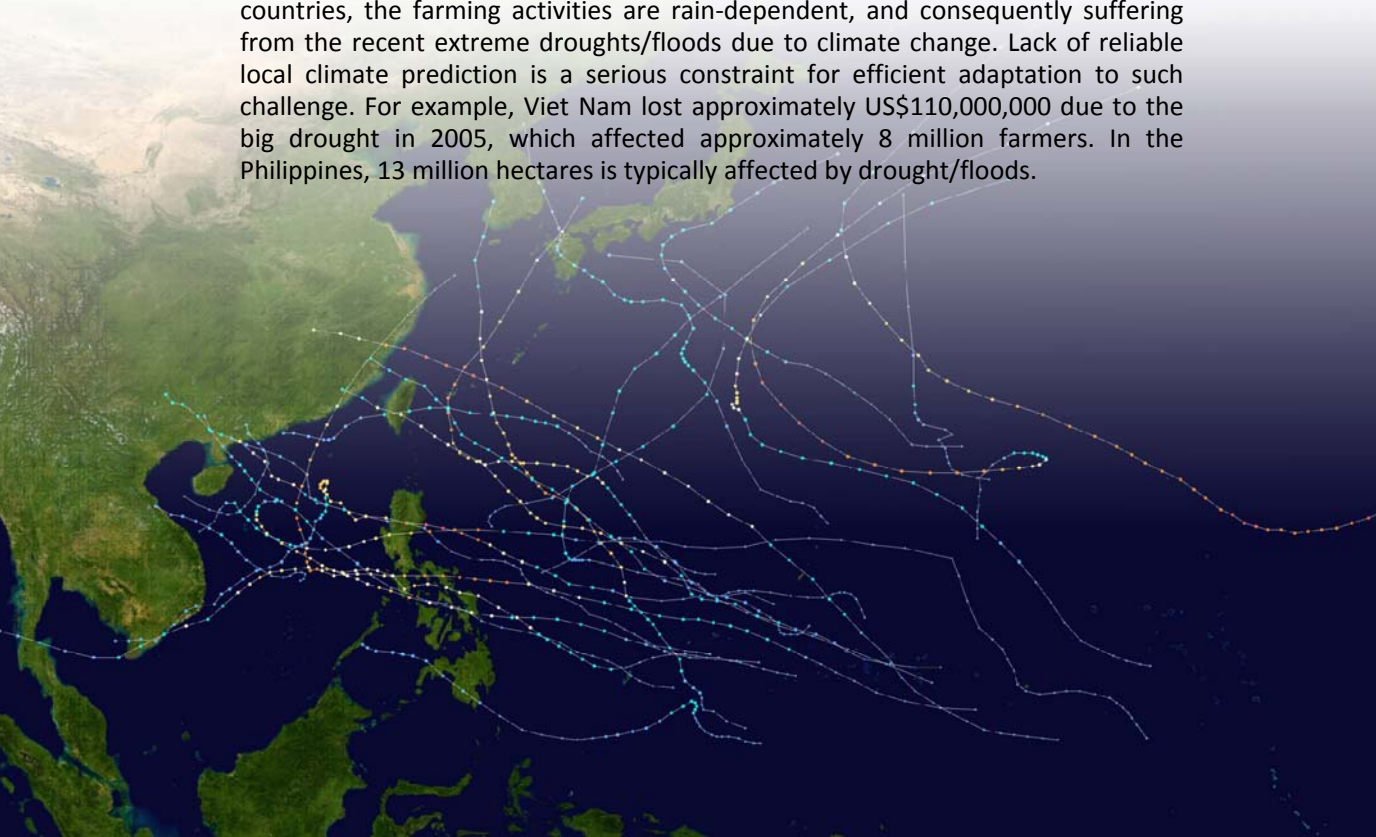
Training Course on Regional Downscaling for Asia-Pacific Region using APEC Climate Center Global Seasonal Climate Prediction

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Participating Countries: New Zealand, Philippines, Republic of Korea, Russian Federation, Thailand, Viet Nam

APN Funding: US\$40,000 (For 1 Year)

Developing economies in the Asia-Pacific region, like other nations around the globe, are dependent on agriculture. In an overwhelming majority of these countries, the farming activities are rain-dependent, and consequently suffering from the recent extreme droughts/floods due to climate change. Lack of reliable local climate prediction is a serious constraint for efficient adaptation to such challenge. For example, Viet Nam lost approximately US\$110,000,000 due to the big drought in 2005, which affected approximately 8 million farmers. In the Philippines, 13 million hectares is typically affected by drought/floods.



Nowadays, Global Circulation Models (GCMs) have become the main tool for climate studies and climate prediction/projection on a wide-range of time scales from months to decades and hundreds of year. State-of-the-art models are able to quite successfully reproduce large-scale atmospheric processes, particularly the response of large-scale circulation to changes in external forcing such as concentration of radioactive gases, large-scale surface properties, etc. To provide accurate information for regional applications, climate prediction products from GCMs have to be “downscaled”.

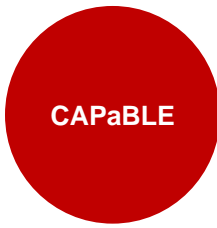
Most National Meteorological and Hydrological Services (NMHSs), particularly those of developing countries, do not have the expertise to downscale GCM outputs to local climate conditions. The present training course, which combined lectures, sharing of experience, and computer laboratory sessions for the development of downscaling tools for regional climate prediction, resulted in the enhancement of capacity to conduct climate prediction exercises over the Asia-Pacific region. Participants from NMHSs of the Philippines, Thailand, and Viet Nam learned how to make downscaling predictions based on the existing APEC Climate Center (APCC) Multi-Model Ensemble (MME) global seasonal forecasts.

For NMHS’ use, APCC provides access to its forecasts in digital data format via the Internet, as well as access to a Climate Information Tool Kit (CLIK) developed for climate data processing and analysis, that implies implementation of the received knowledge and skills in the national climate prediction institutions of the participants.

Publications:

- CD-ROM: Lecture and seminar materials from the Training Course.
- Manual on the CLIK.
- Paper “Downscaling from the multi-model ensemble predictions for East Asia” (under preparation, to be submitted to GRL).
- Web-site: Lecture and seminar materials from the Training Course.

Project Website: <http://www.apcc21.net/activities/activities08.php>



CBA2008-04NSY-Nakashizuka

Training in Science-Policy Interfacing to Promote the Application of Scientific Knowledge on Adaptation of Forests and Forest Management to Climate Change

Project Leader: Prof. Tohru Nakashizuka
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Participating Countries: Bangladesh, Cambodia, China, Fiji, India, Indonesia, Japan, Lao PDR, Mongolia, Nepal, Pacific Island Countries, Pakistan, Philippines, Sri Lanka, Thailand, USA, Viet Nam

APN Funding: US\$35,000 (For 1 Year)

This project was a short-term training measure in science-policy interfacing intended to promote the application of scientific knowledge on adaptation of forests and forest management to climate change. More specifically, the training aimed at strengthening the capacity of forest scientists in developing countries in the Asia-Pacific region on how to plan, conduct, and organise research activities so that results can more quickly and easily be transformed into usable information for problem-solving and policy-making.



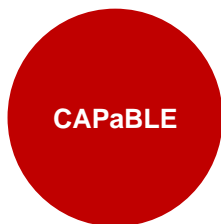
Eight (8) forest scientists from APN member developing countries took part in the training workshop and conference, which contributed to:

- Improved understanding of the concepts, methods, and best practices on how to effectively work at the interface of forest science and forest policy;
- Better insights into the nature and impacts of successes and failures of science-policy interactions, thus being able to incorporate these experiences into own research work;
- Obtaining state-of-the-art scientific knowledge on climate change research and their impact on forests and forest management worldwide; and
- Further developing communication and research cooperation through the International Union of Forest Research Organisation (IUFRO)'s global network.

Publications:

- Tohru, N., and Kleine, M. 2008. Training in Science-Policy Interfacing to Promote the Application of Scientific Knowledge on Adaptation of Forests and Forest Management to Climate Changes. APN Newsletter, October 2008.
- Miah, G. 2008. Training Workshop on Forest Science and Policy Interaction to Climate Change. 22-24 August, Umea, Sweden. APN Newsletter, October 2008.
- Pre-Conference Training Workshop – Adaptation of Forests to Climate Change: Working Effectively at the Interface of Forest Science and Forest Policy.

Project Website: <http://www.iufro.org/science/special/spdc/actpro/wkspmal07/umea/>



CBA2008-06NSY-Fuchs/Lewis

Cities at Risk: Developing Adaptive Capacity for Climate Change in Asia's Coastal Mega Cities

Project Leaders: Prof. Roland Fuchs/Dr. Nancy Lewis
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Participating Countries: Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, USA, Viet Nam

APN Funding: US\$56,500 (For 1 Year)

Much of Asia's rapid population and economic growth is occurring in large coastal cities at high risk from sea level rise and climate change. The *Cities at Risk* workshop, held 26-28 February 2009 in Bangkok, brought together nearly 80 scientists, urban planners and officials, and representatives of disaster management and development agencies to review scientific findings and projections regarding climate-related risks (e.g., sea level rise, extreme climate events, intensification of storms and storm surges) for Asia's coastal megacities.



Participants examined potential vulnerabilities and current coping mechanisms, including possible planning and governance mechanisms that better integrate science information, planning, development, and disaster management. Workshop participants also considered means for improving networking and communication among urban planners/officials and the scientific community in order to enhance urban resilience and adaptive capacities. By bringing together key stakeholders under a common umbrella, the workshop contributed to the sharing of critical knowledge and experiences among participants and helped lay a foundation for future communication and collaboration.

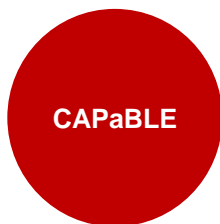
Workshop discussions generated the following take-home messages:

- Recognise the urgent need to address the disconnect between the geographic and time scales at which the scientific and planning/policy communities are working
- Encourage the urban planning community to take a comprehensive view of climate risks, including variability
- Recognise and promote the importance of identifying an “entrepreneur” in urban governments to help make climate change a priority
- Acknowledge knowledge gaps and invest in learning strategies
- Move from the traditional top-down impacts modelling approach to a critical threshold approach
- Communicate science and vulnerability in particular, more effectively
- Urgently build capacity for individual and institutional participation in responding to climate change in Asia’s coastal megacities
- Understand that effective governance at the systemic level is *essential in mainstreaming adaptation strategies*

Publications:

- A glossy publication that describes the *Cities at Risk* workshop, its major recommendations and proposed follow-on initiatives (including a brief summary of follow-on training and visioning exercises in Bangkok) was prepared by START for dissemination at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP) 15 in Copenhagen in December 2009.
- “Adapting to Climate Change in Asia’s Coastal Cities: The Challenge for Urban Planners” A manuscript for submission to *Environment & Urbanization*.
- “Cities At Risk: Asian Coastal Cities in an Age of Climate Change,” for submission to the EWC’s widely circulated *Asia Pacific Issues*.

Project Website: <http://start.org/programs/cities-at-risk>



CBA2008-08NSY-Andonowati

Integrating Indonesian Capacity for Coastal Zone Management

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Participating Countries: Indonesia, Japan and Netherlands

APN Funding: US\$35,000 (For 1 Year)

This project identified coastal oceanography as a weak part of Indonesian scientific expertise in Coastal Zone Management (CZM) in the area of Global Change. It also led to collaboration/networking of experts from various disciplines in different universities and governmental institutions through meetings and by a virtual hub accommodated by an extensive database that is available on the Internet. Results from the project are summarised as follows:

- Data on human capacity was collected.
- A free-access database was designed: www.IndonesianCoastalHUB.org.
- The two preparatory meetings and the Workshop and Symposium were organised and attended by scientists and policy-makers.
- 'Coastal oceanography' was identified as the weakest spot in CZM
- The workshop, which was organised to address 'coastal oceanography' generated recommendations on how improvements can be made.
- The symposium strengthened collaboration among CZM scientists.
- Participating scientists mutually agreed to organise an annual meeting to continue and further strengthen the link among them in order to address gaps in CZM.

Project Website: www.IndonesianCoastalHUB.org



CAPaBLE

CBA2008-09NSY-Peñalba

Enhancing Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines

Project Leader: Dr. Linda M. Peñalba
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Email: lmpenalba@yahoo.com

Participating Country: Philippines

APN Funding: US\$28,000 (For 1 Year)

This participatory action research project was conceptualised in recognition of the critical role that local government units (LGUs) play in climate risk management, the need to enhance their capacity to respond to climate change impacts and the necessity to strengthen the alliance between the LGUs and local state colleges and universities (SCUs) in the furtherance of science-based planning and policy-making.

This project generally aimed to create awareness and develop the capacity of LGUs, communities and regional universities to effectively respond to climate change for sustainable development.



Five (5) vulnerable municipalities in four (4) provinces were chosen as study sites, namely: Kawit and Rosario, Cavite; Guagua, Pampanga; San Juan, Batangas; and Ilagan, Isabela. Hands-on training on vulnerability assessment and climate change adaptation plan preparation were conducted using data from the most vulnerable barangays within the municipalities. Every available learning and alliance-building opportunity was optimised through participatory research, coaching and interactive discussions regarding climate change issues. To further amplify the awareness-raising objectives, a vulnerability assessment was performed through public consultation. The consultations began with a short lecture on climate change phenomena to inform participants about climate change and the objectives of the project.

The most devastating climate events experienced at all sites were typhoon events and the consequent flooding that typhoons caused. The hardest hit sectors were farmers, fishers and the general public, particularly those who live on river banks and in houses built of light materials.

The results of this project were communicated to stakeholders, other LGUs and other climate change initiatives through dissemination fora, scientific conferences and the circulation of a booklet on "Climate Change and Municipal Level Adaptation Planning." Some of the lessons learnt from this project include: 1) hands-on and output-oriented training can yield significant tangible results; and 2) project-introduced interventions can be institutionalised and sustained.

Publications:

- Peñalba, L.M. 2009. Adaptive Capacity to Climate Change Impacts: The Case of Three Luzon Local Government Units. Paper presented during the National Conferences on Climate Change Adaptation in Natural Resource Management held at Traders' Hotel Manila, Philippines, 29-30 June 2009.
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and Cruz, RV.O. 2009. Challenges to Adaptive Capacity Enhancement of Local Government Units in the Philippines. (Pending Journal Article).
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and Cruz, RV.O. 2009. Compendium of Lectures on Climate Change Adaptation. UPLB-APN- CBA2008-09NSY-Peñalba.
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and Cruz, RV.O. 2009. Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines. Final Report. APN, Japan. 31 July 31 2009.
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and Cruz, RV.O. 2009. Social and Institutional Dimensions of Climate Change Adaptation in the Philippines. Paper prepared for KLIMA/CLIMATE 2009 E-conference held in November 2009.
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M., Cruz, RV.O., and Esmero, E.C. 2009. Booklet on Climate Change and Municipal Level Adaptation Planning.
- Peñalba, L.M., Elazegui, D.D., Pulhin, J.M., Cruz, RV.O., and Grande, E.H.O. 2009. Primer on Climate Change Adaptation Planning. (Pending Publication).

CAPaBLE

CBA2008-10NSY-Dye

Regional Participation in the USA-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability

Project Leader: Dr. Dennis G. Dye

United States Geological Survey (USGS), Southwest Geographic Science Center
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Participating Countries: Indonesia, Japan, Malaysia, Thailand, USA

APN Funding: US\$12,000 (For 1 Year)

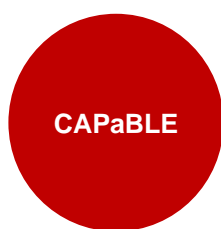
A joint USA-Japan Workshop on Tropical Forest Carbon Dynamics and Sustainability was successfully held at the Mekong Institute (<http://www.mekonginstitute.org>) in Khon Kaen, Thailand from 9-11 January 2009. The workshop had about 66 participants mostly consisting of American and Japanese scientists, those with postdoctoral positions, and students from research and public institutions. The participants included the chair of AsiaFlux from South Korea and participants from several Southeast (SE) Asian countries (Indonesia, Malaysia, and Thailand), including local scientists and students from the Mekong Institute, the Geo-Informatics and Space Technology Development Agency (GISTDA), Khon Kaen University, and other universities in Bangkok. The workshop included a field trip to the Sakaerat (Eddy-covariance) Flux Tower Site near Khao-Yai National Park, central Thailand.



The APN-sponsored participants included researchers engaged in activities relevant to policy and management for sustainability and/or forest ecosystem services in the context of the SE Asia regional carbon budget. The workshop provided opportunities for professional development through presentations and extensive dialogue with workshop participants from both developed and developing countries. The APN-sponsored participants were active and vital contributors to the presentations and scientific discussions.

Publications:

- Asia Workshop on Tropical Forest Carbon Dynamics and Sustainability, 9-11 January 2009, Khon Kaen, Thailand, to be submitted to EOS, Transactions, American Geophysical Union.
- Dye, D.G., 2009. Report on the US-Japan SE Asia Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability. Oral presentation to Working Group 6 on Necessity and Possibility of Observations, Forecasting and Data Sharing through the "Interdisciplinary Collaboration of "Ecosystem-Climate Change-Disaster", The 3rd GEOSS Asia-Pacific Symposium, Kyoto, Japan, 4-6 February 2009. Available online: http://www2.restec.or.jp/geoss_090415/pdf/day2/WG/WG6/03/02_Dennis_Dye.pdf.
- Website for the 2009 US-Japan-Southeast Asia Workshop on Tropical Forest Carbon Dynamics and Sustainability: <http://tbrs.arizona.edu/tropical-asia/>.



CBA2008-11NSY-Bai/Rechkemmer **6th Biennial International Human Dimensions** **Workshop (IHDW) on Global Change** **Research**

Project Leader: Dr. Andreas Rechkemmer
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Global Environmental Change (IHDP),
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Email: schmidt@ihdp.unu.edu



Participating Countries: open to all APN member countries

APN Funding: US\$40,000

Over 900 scientists, journalists and leading representatives from the private sector, institutes, international organisations and NGOs, as well as government officials and decision-makers from various fields came to Bonn, Germany, for the IHDP Open Meeting 2009, "Social Challenges of Global Change." The extremely varied backgrounds, both geographically and professionally, created a motivating and rewarding dialogue about the future global change research agenda. Scientists from more than 80 countries shared their knowledge during the conference.

The IHDP Open Meetings are the world's largest international science conferences dealing with societal aspects of global change. The seventh meeting was held from 26 to 30 April 2009, at the World Conference Center, Bonn. The conference was one of the largest UN meetings in Germany in 2009 and was organised by IHDP.

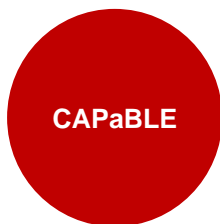
The four-day conference provided the participants with a variety of formats and opportunities for intense debates, ranging from high-level plenaries, 92 parallel sessions, about 400 papers and 25 special sessions and events, to a lively exhibition area for exchange and informal gatherings. The scientific agenda, set by the International Scientific Planning Committee, structured the conference according to four major "Social Challenges of Global Change." It was a concerted effort to consequently address the broad scope of the human dimensions research agenda, which exceeds the "purely" environmental domain. It was intended to define these challenges in a way that they are both adding to and complementing established global environmental change research.

As the organiser of the conference, IHDP is very grateful to those who made this conference possible with financial and in-kind contributions, such as the APN. One of IHDP's major strategic goals is to build capacity in global change research worldwide. In this respect, the attendance of more than 80 scholars who were supported by the funds raised was an outstanding success on its own.

These scholars presented their research in the parallel sessions, and often at times in special events as well, for example, the follow-up to the IHDW seminars held last October in New Delhi. This aspect integrated a distinct capacity and network-building component into the IHDP Open Meeting 2009.

Based on the current demand for human dimensions research on the one hand and the opportunities stemming from being a UN conference on the other, it was necessary that the IHDP Open Meeting 2009 reached out to policy-makers and practitioners. A great example of this aspect, was the special roundtable on "Science for the 21st Century," which stood out in its capacity to provide a platform for all parties to jointly discuss impending challenges in the field.

Project Website: <http://www.openmeeting2009.org/>



CBA2008-13NSG-Li

Inter-Agency Collaborative Technologies in Earth Observations (EO) for Global Change Research in the Asia-Pacific Region

Project Leader: Prof. Guoqing Li

Centre for Earth Observation and Digital Earth, Chinese Academy of Sciences

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Participating Countries: Bangladesh, China, Indonesia, Japan, Malaysia, Mongolia, Philippines, Republic of Korea, Thailand, USA, Viet Nam

APN Funding: US\$10,000 (For 1 Year)

Earth Observation (EO) data, mainly the space-based satellite observation data, is the most important global change information resource. Most global change research is directly using EO data. EO data-related processing and analysis technologies significantly contribute to the advancement of global change research, in terms of projections and methodologies.

With support from the APN, the seed grant project team was able to hold a workshop that provided an opportunity for sharing and easy-access to satellite-based data among agencies. The promotion of such capability contributed to regional global change research. The project also established a stronger working team and linked many international and professional societies that would contribute to the Asia-Pacific region's global change studies. A new proposal targeted to enhance the regional cooperation and contribute to Group on Earth Observations (GEO), was developed and submitted to the APN for funding. This proposal, which was the main project output, was recommended for APN funding and underway at the time of writing.

Project Website: <http://int.ceode.ac.cn/apn/>



Recent Publications from other APN Completed Projects

- **APN2002-18:** Sustainable Livelihoods and Biodiversity in the Uplands of Southeast Asia: A Multi-cultural Assessment of Resilience, Risks and Opportunities. Project Leader: Dr. Louis Lebel
 1. Xu, J., L. Lebel, and J. Sturgeon. 2009. Functional links between biodiversity, livelihoods, and culture in a Hani swidden landscape in southwest China. *Ecology and Society* 14(2): 20. [online] URL: <http://www.ecologyandsociety.org/vol14/iss2/art20/>
- **APN2005-04-CMY:** Integrated Regional Studies of Global Change in Monsoon Asia: Phase 1 – APN/SCOPE/START Rapid Assessment Project of Global Change in Monsoon Asia. Project Leader: Dr. Anond Snidvongs
 2. Lebel, et.al. (Eds). 2009. Critical States: Environmental Challenges to Development in Monsoon Southeast Asia. Strategic Information and Research Development Centre. 473pp.
- **APN2005-23-NSY:** The Degraded Ecosystem Restoration in the Arid and Semi-arid Northern China-Mongolia Region. Project Leader: Dr. Hanjie Wang
 3. Wang, H., Frits, P.V. and Jin, Y. 2009. A Win-Win Technique of Stabilizing Sand Dune and Purifying Paper Mill Black-Liquor. *Journal of Environment Sciences*, 21(2).
- **ARCP2007-18-NSY:** Using CDM Opportunities to Mitigate the Release of Greenhouse Gases by Improving Waste Management Practices. Project Leader: Nawa Raj Khatiwada
 4. Assessing the Viability of Solid Waste Management for Carbon Financing in Nepal. Paper presented in *International Conference on Solid Waste Management: Technical, Environmental and Socio-economical Contexts, Wastesafe 2009*, 9-10 November, 2009, Khulna, Bangladesh.
- **CBA2006-02-NSY:** ESSP 2nd Young Scientist's Global Change Conference and Open Science Conference. Beijing, China 7-12 November 2006. Project Leader: Prof. Roland Fuchs and Prof. Qin Dahe
 5. Wipf, S., and Meza, J. (2009). International Young Scientists' perspective on global change issues. *Clim Change*. doi 10.1007/s10584-009-9547-9
- **ARCP2007-05CMY:** Linking Climate Change Adaptation to Sustainable Development in Southeast Asia. Project Leader: Dr. Rodel Lasco
 6. Lasco, et. al. 2009. Mainstreaming adaptation in developing countries: The case of the Philippines. *Climate and Development*. doi:10.3763/cdev.2009.0009
- **ARCP2007-20NSY-Kwon:** Development of Indices and Indicators for Monitoring Trends in Climate Extremes and its Application to Climate Change Projection. Project Leader: Dr. Won-Tae Kwon
 7. Choi, et. Al. Changes in means and extreme events of temperature and precipitation in the Asia-Pacific Network region, 1955- 2007. <http://dx.doi.org/10.1002/joc.1979>

Feedback from Young Scientists



Project Title: Regional Collaborative Research on Climate Change Impacts on Surface Water Quality in Eastern Monsoon Asia: Towards Sound Management of Climate Risks (ARCP2008-04CMY-Park)

The research activity was quite intensive covering seven (7) countries but at the end, it was very rewarding for me. I gained knowledge through collaboration with different individuals from multi-disciplinary and cultural backgrounds. Being responsible for sampling and analysis, I was able to broaden my skills and improve upon my analytical skills. The first sampling activity had some hiccups but by the second sampling all problems were addressed and it became more successful. Working closely with the Project Leader, Prof. Park, I gained vital knowledge in data interpretation and analysis such that I feel confident to organise a similar activity in the future should there be another opportunity.

The two workshops held in the Republic of Korea and Malaysia were very interesting. I had the opportunity to interact with experts from USA and Europe who gave exciting talks as invited speakers. I was asked to chair a session, which was the first time for me in an international gathering of such magnitude. I learned a lot about climate change impacts on water quality in different continents and countries as presenters gave an in-depth analysis of their home countries' situation. The excursions were captivating experiences that enhanced the realisation of the reality of climate change. Being deeply involved with the preparation of each of the workshops, I gained valuable skills in workshop organisation and management.

In the course of this project, several publications were made. I was responsible for reporting the activities of the project in newsletters published by my centre. Also, I prepared the proceedings for the two workshops and contributed to the write-up of journal papers. These have particularly sharpened my writing skills. Reinvigorating my creative writing that I wished the project continued.

I have received great benefit from participating in this project and my scientific capacity has increased tremendously. I am very grateful to Prof. Park for showing great leadership, which enabled this project to be completed on schedule. He was a great mentor and motivator to me personally. I thank APN for sponsoring this project.

Edu Inam

International Environmental Research Centre, Gwangju Institute of Science and Technology, Republic of Korea

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Project Title: Climate Change and Variability Implications on Biodiversity – Youth Scenario Simulations and Adaptations (CBA2007-02CMY-Aalbersberg)

I am grateful for being involved in the project.

Our work at the Institute of Applied Sciences (IAS) revolves often, if not all, in Locally-Managed Marine Areas (LMMA) promoting community-based resource management work in communities. In so doing, we descend to the grassroots communities, building their knowledge through resource awareness and education and facilitating capacity building (skills development/improvement and tools provision) through participatory means that will ensure sustainable resource management and wise decision-making. Under the LMMA Programme, we try to accommodate all social groups in communities, and in most cases as barriers in cultural and traditional respect, the youth and women are seldom included in resource management in LMMA.

This is where I envisioned that APN will actually contribute significantly to bridge this gap and promote a holistic approach for communities' involvement. The APN project was quite effective in terms of bridging the gap at the piloted sites where the activities were conducted. The youth were actively engaged in incorporating climate change associated issues and threats, which we comprehensively shared with them.

We explained the causes of greenhouse gases and emphasised the human activities that contribute to the emission and their impact in terms of degrading natural assets and their value. Through this awareness and education programme, the youth were quite pleased and they started to incorporate these messages in the drama and songs they created. It's amazing how they picked up the messages and utilized their creative abilities to formulate quite a strong message through their role play and drama.

Having to share the above information even developed my knowledge and capacity in the scope of atmospheric considerations and associated diversified negative impacts. The APN project rekindled my scientific knowledge of climate change issues, though I fairly understand, but may have been demystified over the years as I had been working closely with marine science and its related ground issues. Thus, I considered incorporating climate change issues into our LMMA Programme, which has since been included in our ongoing community outreach. The project built the skills and knowledge of the youth evidenced in incorporating climate change messages into their drama and developing strong messages that effectively impacted the audience. In one of the sites, Vueti Navakavu Project, the elders were emotional realising their actions, though minor, were actually contributing to more consequential devastating events for the future generations.

All the represented social groups had an activity with regards to the impacts of environmental consequences. Though not organised independently, ways to integrate these activities for information-sharing purposes and as a motivator for them to proceed with their resource management work, were discussed. In terms of sustainability, this was quite effective for the youths who seemed to love and enjoy the activity.

I learned that grassroot communities may not be able to grasp technical scientific explanations over a dialogue or even through PowerPoint presentation. They need to actually experience (see and learn) what it actually entails before they can understand the meaning quite clearly. Hence, this project managed to demonstrate a tool that works quite effectively for raising the awareness and understanding of the communities, which served as a lesson for the LMMA Programme as well.

Equipped with knowledge and understanding, it became easier for them to develop their adaptation plan. These communities developed action plans that are simple and easy to implement/achieve in a set timeframe. I am grateful in that the set of tools introduced in the project resulted in a rather enormous undertaking.

Semisi Meo

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COMMUNICATIONS AND OUTREACH

This section contains the major communications and outreach activities undertaken by the APN in 2008/2009, featuring the communication tools that were used to showcase APN and its activities.

Communications Strategy

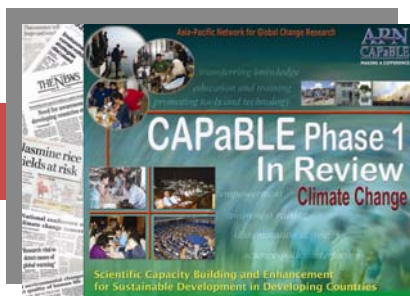
The APN Communications Strategy was devised and endorsed at the 14th Inter-Governmental Meeting (IGM)/Scientific Planning Group (SPG) Meeting to facilitate continuity and to advance APN efforts in:

- Demonstrating its work within and outside the region;
- Effectively communicating the outcomes of the projects it supports;
- Strategically disseminating the results and outputs of its activities to the global change community, including scientists, decision-makers and the public through various platforms; and
- Enhancing communications among the APN organs and with the wider global change community.

Publications

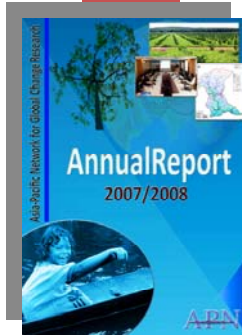
The following publications were produced/published to provide scientific information to policy-makers and the public, to further promote the network in the region, and to encourage involvement in APN activities.

CAPaBLE Phase 1: In Review



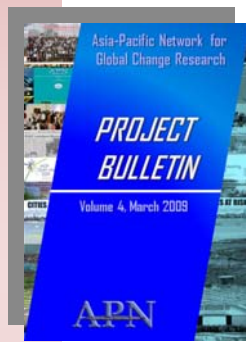
Stemming from the evaluation of the first phase, which ran from April 2003 to March 2006, of the Scientific Capacity Building and Enhancement for Sustainable Development in Developing Countries (CAPaBLE) Programme, a brochure was published (based on an earlier CAPaBLE Phase One Brochure) to highlight key outcomes of the Programme in its first phase which focussed on Climate Change. During Phase One,

activities at the community, local, national, and regional levels were conducted under 18 projects/activities spanning the Asia-Pacific region. This 12-page jazzy *CAPaBLE Phase 1: In Review Brochure* that synthesises Phase One outputs and key messages from the evaluation was disseminated to the Global Change (GC) community partners, policy-makers, stakeholders and the general public.



Annual Report 2007/2008 (in English and Japanese)

The *Annual Report 2007/2008* (produced in both English and Japanese) presents a summary of APN's efforts in promoting global change research, particularly highlighting the results and outputs of its completed projects conducted under the Annual Regional Call for Research Proposals (ARCP) and CAPaBLE Programmes, with a special section on APN's contributions to the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4).



Project Bulletin, Volume 4

The *Project Bulletin, Volume 4* contains the abstracts of research and capacity building projects funded by APN under the ARCP and CAPaBLE Programmes. There are 20 projects under the ARCP and 16 under CAPaBLE. The complete contact details of all project leaders are provided in this publication should interested individuals like to learn more about the project or seek future collaboration with the project leaders.



APN Newsletter

The APN publishes a quarterly newsletter, which features news from the Secretariat, APN's representation at national and international events, ARCP-funded projects, CAPaBLE Programme updates, list of ongoing projects, people in the APN (members and committees), newsletter questionnaire, crossword challenge and a calendar of events, which highlights particular events supported by the APN. The newsletter is available in electronic format only and all issues are available for download in PDF format in the "products" section of the APN website.

APN 2008 Promotional Flyer (4 languages)

After the successful translation of the APN 2007 General Brochure into 12 local languages of APN member countries in 2007/2008, the national Focal Points (nFPs) and SPG Members translated the APN 2008 promotional flyer, which highlights the activities conducted by the APN in 2007/2008 and the funded projects in 2008/2009. It was published in four (4) languages: English, Japanese, Khmer (Cambodia) and Korean. The APN members also shared in the printing expenses and disseminated the flyers to scientists and policy-makers in various organisations and government institutions which made considerable difference to the visibility of the APN at the national and sub-regional levels.



Proceedings/Workshop Reports

Electronic copies of the following proceedings/workshop reports are available for download on the APN website:

- 13th IGM/SPG Meeting Proceedings
- Proceedings of the APN International Seminar on Global Warming and Ecosystem/Biodiversity Changes: Facing the Challenges of Changing Ecosystems
- Proceedings of the 1st APN and Global Earth Observation System of Systems/ Asian Water Cycle Initiative (GEOSS/AWCI) Joint Scoping Workshop
- Proceedings of the APN Proposals Development Training Workshop



Website

This is an important communication tool of the APN which, from the time it was established, has become a source of useful information about the APN, how it is structured, who the key players are, as well as details on the projects that APN supported and is currently funding; publications that were produced; GC events; and other activities that were conducted in the past. The website is maintained daily, providing up-to-the-minute information on the APN and its activities. At the time of writing this report, the APN website is being developed with a new face and dynamic features, and will be timely launched when the APN enters its Third Strategic Phase, from April 2010.



Electronic Mailing List

APN maintains an internal database that generates an electronic mailing list (EML), a tool that is used strategically to disseminate information as well as support the network. Aside from the quarterly Newsletter, periodic announcements and notifications that are related to global/climate change or to APN activities are also sent via our EML. These include: Upcoming GC events, calls/announcements for papers, releases of new publications such as technical papers, policy briefs, etc. APN also welcomes requests from partner organisations to post announcements on the website and distribute the information via the APN EML. The Secretariat also subscribes to other mailing list groups of various organisations to be able to receive information and further disseminate it to its Members and the GC community.



Representation at National and International Events

The APN attended and made presentations at various international fora to further raise its visibility/recognition in the region. Committed to strengthening appropriate interactions among scientists and policy-makers, and providing scientific input to policy decision-making and scientific knowledge to the public, the APN is also continuously cooperating with the global change programmes and other institutions and bodies such as the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) particularly on holding events in connection with the Subsidiary Body for Scientific and technological Advice (SBSTA).





PEOPLE IN THE APN

The APN is made up of dedicated experts who play an active role in promoting the APN programme and its activities in their countries, sub-regions and the global change community.

The lists below are current, at the time of publication, January 2010.

APN national Focal Points (nFP) and Scientific Planning Group (SPG) Members

Each member country appoints one nFP who sets policy for programmes, finances and other APN activities, and one SPG Member, who recommends science themes and activities for the Inter-Governmental Meeting (IGM) to consider for support.

Australia

David WALLAND (SPG)
Bureau of Meteorology

Bangladesh

Martuza AHMED (nFP)
Ministry of Environment and Forests
Giashuddin MIAH (SPG)
Bangabandhu Sheikh Mujibur Rahman
Agricultural University

Cambodia

Sundara SEM (nFP)
Ministry of Environment
Khieu HOURT (SPG)
Cambodia National Mekong Committee

China

Xuedu LU (nFP)
National Climate Center
Wenjie DONG (SPG)
Beijing Normal University

Fiji

Epeli NASOME (nFP)
Ministry of Land, Mineral Resources and
Environment
Rajendra PRASAD (SPG)
Fiji Meteorological Service

India

Subodh SHARMA (nFP)
Ministry of Environment and Forests
B.N. GOSWAMI (SPG)
Indian Institute of Tropical Meteorology

Indonesia

Liana BRATASIDA (nFP)
Ministry of Environment
Erna Sri ADININGSIH (SPG)
National Institute of Aeronautics and
Space (LAPAN)

Japan

Hiroshi ONO (nFP)
Ministry of the Environment
Nobuo MIMURA (SPG)
Ibaraki University

Lao People's Democratic Republic

Bountanh BOUNVILAY (nFP)
Water Resources and Environment
Research Institute
Oulaphone ONGKEO (SPG)
Water Resources and Environment
Research Institute

Malaysia

Kok Seng YAP (nFP)
Malaysian Meteorological Department
Subramaniam MOTEN (SPG)
Malaysian Meteorological Department

Mongolia

Bayarbat DASHZEVEG (nFP)
Ministry of Nature and Environment and
Tourism
Tsogtbaatar JAMSRAN (SPG)
Mongolian Academy of Sciences

Nepal

Meena KHANAL (nFP)

Ministry of Environment, Science and Technology

Madan Lal SHRESTHA (SPG)

Nepal Academy of Science and Technology

New Zealand

W. Andrew MATTHEWS (nFP/SPG)

New Zealand National Commission for UNESCO

Pakistan

Neelofur HAFEEZ (nFP)

Ministry of Environment

Amir MUHAMMED (SPG)

National University of Computer and Emerging Sciences

Philippines

Samuel PEÑAFIEL (nFP)

Land Administration and Management Program (LAMP2)

Adeluisa SIAPNO (SPG)

Ecosystems Research and Development Bureau

Republic of Korea

Su-ho SEONG (nFP)

Ministry of Environment

Chang-keun SONG (SPG)

National Institute of Environmental Research

Russian Federation

Alexander STERIN (SPG)

Russian Research Institute for Hydrometeorological Information - World Data Center

Sri Lanka

M.A.R.D. JAYATILAKE (nFP)

Ministry of Environment

G.B. SAMARASINGHE (SPG) Department of Meteorology

Thailand

Saksit TRIDECH (nFP)

Ministry of Natural Resources and Environment

Jariya BOONJAWAT (SPG)

Chulalongkorn University

United States of America

Louis BROWN (nFP)

U.S. Climate Change Science Program; National Science Foundation

Luis M. TUPAS (SPG)

US Department of Agriculture

Viet Nam

Xuan Bao Tam NGUYEN (nFP)

Ministry of Natural Resources and Environment

Nga MAI NGOC (SPG)

Center for Support of Social Development Programmes

Invited Experts to the SPG

International organisations and research institutions involved in global change research activities may attend the SPG Meeting as observers and to participate in SPG activities.

Congbin FU, START Regional Committee for Temperate East Asia

Kanayathu KOSHY, Centre for Global Sustainability Studies, Universiti Sains Malaysia

Chao Han LIU, Southeast Asia START Regional Committee

Members of the Steering Committee (SC)

The SC acts on behalf of the IGM during the period between IGMs, implementing IGM decisions, with assistance from the Secretariat.

Elected Members

Su-ho SEONG, Republic of Korea (Chair)

Kok Seng YAP, Malaysia (Vice-Chair)

Bayarbat DASHZEVEG, Mongolia

Ex-Officio

Erna Sri ADININGSIH, SPG Member for Indonesia

W. Andrew MATTHEWS, nFP/SPG Member for New Zealand

Co-opted Members

Louis BROWN, nFP for USA

Roland FUCHS, Senior Fellow, East-West Center (former START Secretariat Director)

M.A.R.D. JAYATILAKE, nFP for Sri Lanka

Hiroshi ONO, nFP for Japan

Members of the Capacity Development Committee (CDC)

The CDC oversees the processes related to the operation of the CAPaBLE Programme and the development of strategies for its advancement.

SPG Co-Chair

Erna Sri ADININGSIH, SPG Member for Indonesia

W. Andrew MATTHEWS, nFP/SPG Member for New Zealand

SC Chair

Su-ho SEONG, nFP for Republic of Korea

Donor Representative

Hiroshi ONO, nFP for Japan

Capacity Building Experts

Roland FUCHS, East-West Center

Srikantha HERATH, Institute for Sustainability and Peace, United Nations University

Harini NAGENDRA, Ashoka Trust for Research in Ecology and the Environment

Members of the SPG Sub-Committee

The SPG Sub-Committee oversees the implementation and development of the APN scientific activities, particularly the Annual Regional Call for Proposals.

Erna Sri ADININGSIH, SPG Member for Indonesia

Andrew MATTHEWS, nFP/SPG Member for New Zealand

Giashuddin MIAH, SPG Member for Bangladesh

Luis TUPAS, SPG Member for USA

Secretariat

The Secretariat performs the daily operations of the APN and, in particular, assists the IGM, the SC, the SPG and the CDC, in implementing the APN's Strategic Plan and Operational Plans; programme; budget; and other activities, as appropriate. Its Office is located in Kobe, Japan, under the support of the Hyogo Prefectural Government.



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Scientific Officer

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Administrative Assistant

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**Mr. Erdenesaikhan
NYAMJAV**

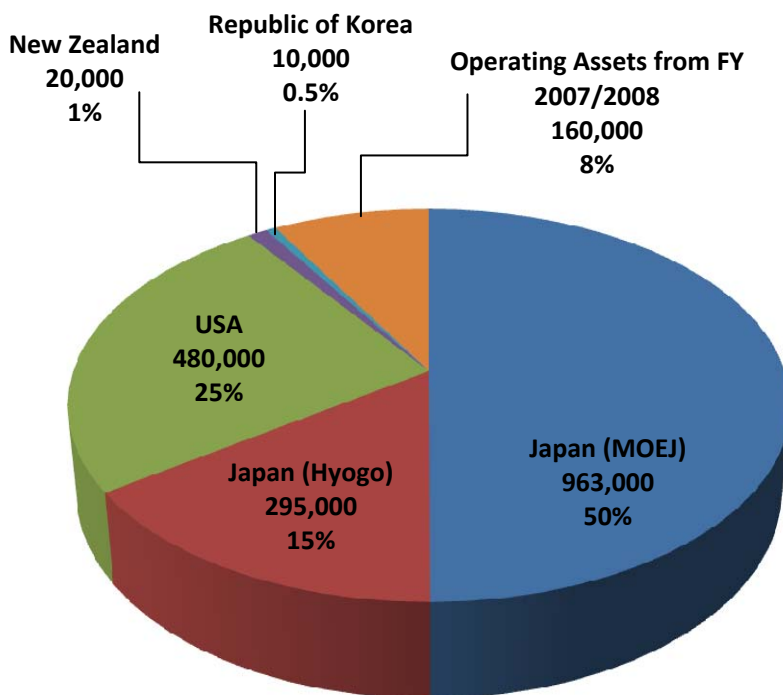
Programme Fellow for
Science and Institutional
Affairs

enyamjav@apn-gcr.org

FINANCIAL RESOURCES

The following member countries provided direct financial support to the APN for its activities in 2008/2009: Japan (Ministry of the Environment and Hyogo Prefectural Government); USA (National Science Foundation/United States Global Change Research Program); New Zealand (Ministry for the Environment); and Republic of Korea (Ministry of Environment). The figure below displays member countries' contributions.

Revenue in FY 2008/2009 (US\$)



Also, APN's 21 member country governments, including Hyogo Prefectural Government, the host of the APN Secretariat in Kobe, Japan, together with the staff from a whole range of institutions, strongly support the network with in-kind contributions including providing their time and equipment, supplies and other support. In addition, national Focal Points and Scientific Planning Group Members spend considerable time on issues directly related to the APN. These include:

- Attending annual IGM/SPG and Sub-Regional Cooperation Meetings, including direct payment of travel expenses;
- Hosting APN Meetings
- Reviewing the science activities and agendas of the APN;

- Reviewing proposals under the APN annual Calls for Proposals;
- Producing APN materials in vernacular languages and distributing at strategic events and to in-country institutions;
- Communicating with the Secretariat on issues that require regular input throughout the year; and
- Promoting APN and its programmes and activities on various occasions at the national, sub-regional and international levels.

The Hyogo Prefectural Government generously supports the Secretariat by providing office space and fixtures, etc. This in-kind support amounts to more than US\$ 500,000/year.

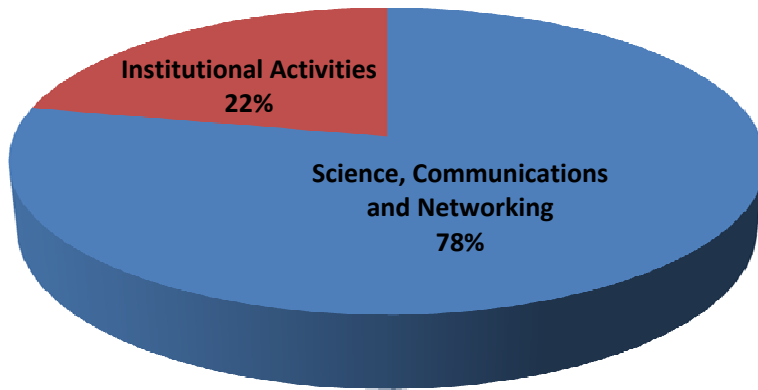
Furthermore, in order to successfully conduct many APN-funded projects/activities, substantial in-kind support, as well as additional resources, in the form of matching funds, are in the order of US\$ 2 million/year by the institutions of the Leaders and Collaborators of the projects/activities and other sources of funding.

Of the completed projects in 2008/2009, the following successfully secured in-kind contributions and fund-matching from other sources. Other projects did not specify the amount of in-kind contributions and fund-matching secured.

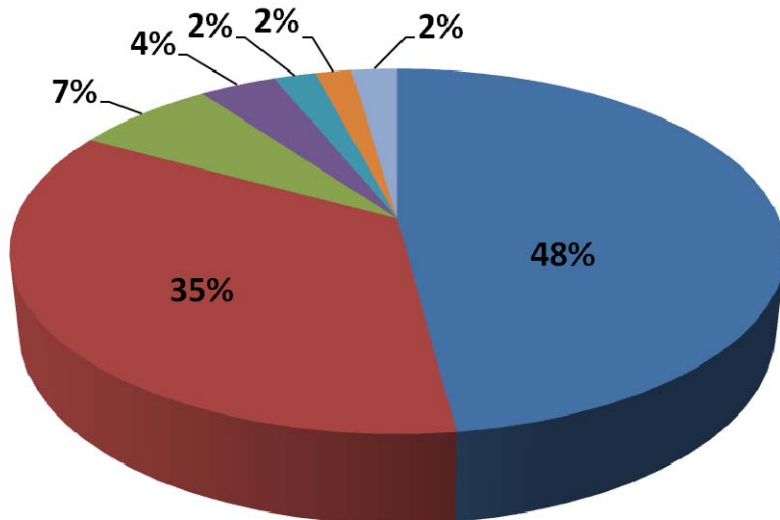
- *ARCP2007-06CMY-Huda: US\$38,900*
- *ARCP2007-08CMY-De Costa: US\$71,000*
- *ARCP2008-04CMY-Park: US\$29,500*
- *ARCP2008-05CMY-Adrianov: US\$26,000*
- *ARCP2008-06CMY-Li: US\$38,000*
- *CBA2007-02CMY-Aalbersberg: US\$26,000*
- *CBA2008-01CMY-Boer: US\$48,500*
- *CBA2008-03NSY-Ashok: US\$100,000*
- *CBA2008-08NSY-Andonowati: US\$7,100*
- *CBA2008-09NSY-Peñalba: US\$42,500*
- *CBA2008-13NSG-Li: US\$6,400*

Majority (78%) of the overall direct cash contribution to APN was invested in supporting/conducting global change research, capacity development, and networking activities. Investments were also made in fellowship programmes and science/policy for a. Twenty-two (22%) was spent on institutional activities. The below figures show the breakdown of expenditure in 2008/2009.

Expenditure in FY 2008/2009 (US\$)



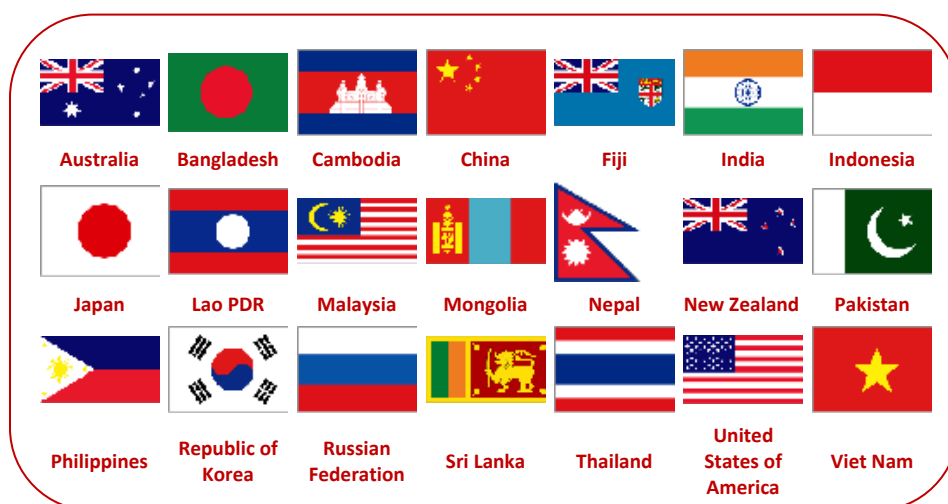
Breakdown of Expenditure for Science, Communications and Networking (US\$)



MEMBER COUNTRIES

The APN relies heavily on the generosity and commitment of all its member countries for financial and in-kind support.

The APN's membership has grown from 12 countries in 1996 to the current 21 member countries: Australia, Bangladesh, Cambodia, China, Fiji, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Russian Federation, Sri Lanka, Thailand, United States of America, and Viet Nam.



Individuals and organisations in Pacific Island States and Singapore are able to participate in all APN programme activities and are considered to be from an APN Approved Country under the programme membership participation criterion.

SPONSORS

The following sponsors provide direct funding for the APN that is complimented by in-kind support from APN members, such as hosting workshops and seminars and the sharing of scientific and management expertise.



Hyogo Prefectural Government, Japan



Ministry of the Environment, Japan



Ministry for the Environment, New Zealand



Ministry of Environment, Republic of Korea



National Science Foundation, United States of America



US Global Change Research Program, United States of America

PARTNER ORGANISATIONS

The APN believes in the value of partnerships and networks and considers working with other organisations involved in global change research, capacity building and policy development a crucial effort in fostering global change research in the region.

Together with the organisations and institutions that are directly co-implementing APN projects and activities, the following are among APN's key partners:



ESSP – Earth System Science Partnership

It is a joint initiative of four global environmental change programmes: DIVERSITAS, IGBP, IHDP, and WCRP bringing together researchers from diverse fields and from across the globes, to undertake an integrated study of the Earth System, the way that it is changing, and the implications for global and regional sustainability.



DIVERSITAS – International Programme of Biodiversity Science

The mission of DIVERSITAS is to promote an integrative biodiversity science, linking biological, ecological and social disciplines in an effort to produce socially relevant new knowledge; and provide the scientific basis for the conservation and sustainable use of biodiversity.



GEO – Group on Earth Observations

GEO is a voluntary partnership of governments and international organisations. It provides a framework within which these partners can develop new projects and coordinate their strategies and investments. GEO is coordinating efforts to build a Global Earth Observation System of Systems (GEOSS) on the basis of a 10-Year Implementation Plan for the period 2005-2015.



IAI – Inter-American Institute for Global Change Research

IAI is an intergovernmental organisation with a mandate to understand the environmental and social impacts of global change in the Americas. IAI promotes cross-border research to augment scientific capacity and to generate knowledge for free and open exchange towards scientific advice

for policy-makers on critical global change issues in the region.



ICSU – The International Council for Science

ICSU is a non-governmental organisation representing a global membership that includes both national scientific bodies (117 members) and international scientific unions (30 members). Through this extensive international network, ICSU provides a forum for discussion of issues relevant to policy for international science and the importance of international science for policy issues.

ICSU ROAP – ICSU Regional Office for Asia and the Pacific

The Office promotes the development of science throughout Asia and the Pacific and helps strengthen the participation of developing country scientist in international research in the region. It also strives to ensure that Asia Pacific scientists become involved in those aspects of the ICSU 2006-2011 Strategic Plan that are especially relevant for Asia and the Pacific.



IGBP – International Geosphere-Biosphere Programme

It is a research programme that studies the interactions between biological, chemical and physical processes and interactions with human systems and collaborates with other programmes to develop and impart the understanding necessary to respond to global change and also to provide scientific knowledge to improve the sustainability of the living Earth.



IHDP – International Human Dimensions Programme on Global Environmental Change

It is an international, interdisciplinary, non-governmental science programme. It promotes social science research that helps humans to understand and address the challenges of global environmental change and improve societal responses. It also fosters capacity-development, networking and science-policy interaction toward a shared understanding of the social causes and implications of global changes.



WCRP – World Climate Research Programme

It provides the international forum to align the efforts of the climate scientists worldwide towards the aim of determining climate predictability and human impact on climate. WCRP's mission is to improve the predictive skill of climate models from seasons to centuries and from global to local scales and to make the resulting information and knowledge available to all nations around the world for climate adaptation, mitigation and risk management.



START – Global Change System for Analysis, Research and Training

START is a non-governmental research organisation, assisting developing countries to build the expertise and knowledge needed to explore the drivers of and solutions to global and regional environmental change. Through our growing regional networks of collaborating scientists and institutions, START strives to reduce vulnerability through informed decision making.

Recognising that it cannot achieve its goal on its own, APN is constantly exploring opportunities to find new synergies for funding, research, and network-building, etc

NEXT STEPS

In the next couple of months, APN will enter its Third Strategic Phase (2010-2015). At the time of writing this report, preparation of the Evaluation Report of the APN's Second Strategic Phase (2005-2010) and the 3rd Strategic Plan (3SP) is in progress. Guided by these two publications and with the outcomes of the evaluation, APN will continue to enhance collaborative scientific research capacity in the Asia-Pacific region and create an opportunity for scientists and policy-makers to interact by providing underpinning scientific input to policy decision-making and scientific knowledge to the public.

To be able to play a more active and significant role in supporting global change research, particularly in developing countries, the APN is counting on the active participation of its 21 member countries and cooperation of partner organisations and agencies. The APN will focus on scientific research, scientific capacity development and science-policy under its Science Agenda. It will continue to make use of the expertise of its Scientific Planning Group (SPG) and the pool of external expert reviewers to provide sound and fair judgement on which proposals submitted to APN will be considered for funding and recommended at the Inter-Governmental Meeting (IGM). The Secretariat, with support and guidance from the Capacity Development Committee (CDC, SPG and the Steering Committee (SC) will continue to investigate how the Proposal Submission and Review Process as well as the Project Financial Reporting can be further streamlined.

Under the Institutional Agenda, APN will look into the following: Involvement of member countries; alignment with programmes of the global change community; financial resources; communications and outreach; and enhancing the network and institutional arrangements. APN hopes to make significant progress in devising and implementing a 'Resources Development Plan' especially during this time where countries in the world are experiencing global economic depression. Strategic mechanisms will be devised in order to encourage more support (monetary and in-kind) from members, partners and other potential sources.

Detailed strategies stipulated under both the Science and Institutional Agenda will be provided in the 3SP which is to be released in April 2010 as the APN enters its Third Strategic Phase. The APN will also devise an Annual Operating Plan as a crucial step to ensure the effective implementation of activities outlined in the 3SP under the two main agendas.

ACRONYMS

3SP	3rd Strategic Plan
AIT	Asian Institute of Technology
ANFIS	adaptive neuro-fuzzy inference system
APCC	APEC Climate Center
APD	Association for Hydraulic Research
APEC	Asia-Pacific Economic Cooperation
APN	Asia-Pacific Network for Global Change Research
ARCP	Annual Regional Call for Proposals
ARIMA	autoregressive integrated moving average
AWCI	Asian Water Cycle Initiative
BAQ	Best Air Quality
BC	Black Carbon
BP	before present
CagM	Commission on Agricultural Meteorology
CAPaBLE	Capacity Building/ Enhancement for Sustainable Development in Developing Countries
CB	capacity building
CCD	Central Composite Design
CLIK	Climate Information Tool Kit
CoP	Conference of Parties
CPAf	College of Public Affairs
CRIDA	Central Research Institute for Dryland Agriculture
CRP	comprehensive research projects
CZM	Coastal Zone Management
DIVA	Dynamic Interactive Vulnerability Assessment
DIVERSITAS	International Programme of Biodiversity Science
DIWPA	DIVERSITAS in the Western Pacific and Asia
DO	dissolved oxygen
DOST	Department of Science and Technology
EC	Elemental Carbon
EMECS	International Centre for Environmental Management of Enclosed Coastal Seas
EML	electronic mailing list
EO	Earth Observations
ESSP	Earth System Science Partnership
FAO	Food and Agriculture Organization
FEB	Far Eastern Branch of Russian Academy of Sciences
G8	Group of Eight
GAIA	Global Area and International Archive
GC	global change
GCM	Global Circulation Models
GEC	Global Environmental Change
GECAFS	Global Environmental Change and Food Systems

GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GIS	Geographic Information System
GISTDA	Geo-Informatics and Space Technology Development Agency
HUS	Hanoi University of Science
IAI	Inter-American Institute for Global Change Research
IARDS	Institute of Agrarian and Rurban Development Studies
IAS	Institute of Applied Sciences
ICSU	The International Council for Science
ICSU ROAP	ICSU Regional Office for Asia and the Pacific
IERC	International Environmental Research Center
IGBP	International Geosphere-Biosphere Programme
IGES	Institute for Global Environmental Strategies
IGFA	International Group of Funding Agencies for Global Change Research
IGM	Inter-Governmental Meeting
IGP	Indo-Gangetic Plain
IHDP	International Human Dimensions Programme on Global Environmental Change
IHDW	International Human Dimensions Workshop
IIWADATA	International Integrated Water Data Access and Transfer in Asia
IOCAS	Institute of Oceanology Chinese Academy of Science
IOC-WestPac	Intergovernmental Oceanographic Commission Western Pacific
IPCC	Intergovernmental Panel on Climate Change
IPCC AR4	Intergovernmental Panel on Climate Change Fourth Assessment Report
IUFRO	International Union of Forest Research Organisation
LAI	Leaf Area Index
LEISA	Low External Input Sustainable Agriculture
LGUs	local government units
LMMA	Locally-Managed Marine Areas
LMMAN	Locally-Managed Marine Areas Network
LOICZ	Land-Ocean Interactions in the Coastal Zones
MME	Multi-Model Ensemble
nFPs	national Focal Points
NGOs	non-governmental organizations
NIES	National Institute of Environmental Studies
NMHSs	National Meteorological and Hydrological Services
NSF	National Science Foundation
NW	North West
NWCF	Nepal Water Conservation Foundation
OC	Organic Carbon
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAGES	Past Global Changes
PI	principal investigator
PM	airborne particles
PWDW	Proposal-Writing Development Workshop

RAS	Russian Academy of Sciences
RCAST	Research Centre for Advanced Science and Technology
ROC	Relative Operative Characteristics
SBA	Societal Benefit Area
SBSTA	Subsidiary Body for Scientific and technological Advice
SBSTA28	28th Session of the Subsidiary Body for Scientific and Technological Advice
SCUs	state colleges and universities
SE	Southeast
SOI	Southern Oscillation Index
SPG	Scientific Planning Group
START	Global Change SysTem for Analysis, Research and Training
UNESCAP	United Nations Economic and Social Commission for Asia-and Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UPLB	University of the Philippines Los Baños
USGS	United States Geological Survey
USP	University of South Pacific
UWS	University of Western Sydney
WCRP	World Climate Research Programme
WMO	World Meteorological Organization

Should the contact information listed in this publication have changed, please kindly fill out the form below and return it by fax or email to:

The APN Secretariat
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 Chuo-ku, Kobe 651-0073, JAPAN
 Tel: (+81) 078-230-8017, Fax: (+81) 078-230-8018, Email: info@apn-gcr.org

Contact Details	
<i>Full Name</i> (write LAST NAME in CAPS)	<i>Title</i> (select as appropriate) <input type="checkbox"/> Dr. <input type="checkbox"/> Prof. <input type="checkbox"/> Mr. <input type="checkbox"/> Mrs. <input type="checkbox"/> Ms. <input type="checkbox"/> Other _____
<i>Qualifications/Specialty</i>	
<i>Specific areas of interest relating to Global Environmental Change</i>	
<i>Name of Organisation</i>	<i>Designation/Position</i>
<i>Type of Organisation:</i> <input type="checkbox"/> Government Agencies <input type="checkbox"/> Educational Institutions <input type="checkbox"/> NGOs/NPOs <input type="checkbox"/> Private Foundations <input type="checkbox"/> Professional Societies <input type="checkbox"/> Others	
<i>Business Address</i>	<i>Postal Code</i>
	<i>Country</i> (in CAPS)
<i>Telephone</i>	<i>Facsimile</i>
<i>Email</i>	<i>Website</i>

This form may also be downloaded from this link:
http://www.apn-gcr.org/en/downloads/blankform_apndirectory.pdf.

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