Asia-Pacific Network for Global Change Research

Annual Report

2005/2006

APN

Asia-Pacific Network for Global Change Research

Annual Report 2005/2006
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MESSAGE FROM THE DIRECTOR

It is my great pleasure to introduce to you the 2005/2006 Annual Report which provides you with non-technical summaries of APN-funded projects carried out in 2005/2006.

The year 2005/2006 was significant for the APN. Not only did it celebrate its 10th anniversary, but also it entered into its second strategic phase. First, 2005/2006 began with the endorsement of the Second Strategic Plan (2005-2010) at the 10th IGM/SPG held in Kobe, Japan. The strategic plan for the ensuing five years included "three agendas," Science, Policy and Institutional, to help us achieve our mission and goals. Then, in November, the APN organized a *Scoping Workshop on Global Earth Observations and Capacity Building Needs in the Asia-Pacific*, in Tokyo Japan. Following that, a second Scoping GEOSS Workshop convened in Bangkok, Thailand, back-to-back with the APN's 11th IGM/SPG.

The APN's ten-year anniversary was a perfect occasion to reflect on its growth and accomplishments. Since its establishment, the annual budget has increased by 3 times, funding more than 200 research and capacity building projects, in the Asia-Pacific region.

I would like to express my sincere appreciation to the governments, organizations and members of the APN, who contributed to the success of APN's activities scientifically, financially and institutionally. Without your support, the work of the APN in 2005/2006 would not have been possible. Furthermore, allow me to thank all Global Change Research programmes and Capacity Development partners for their interest and collaborative efforts.

Hiroki Hashizume

Director, APN Secretariat

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

The APN has identified five goals that will be achieved through APN-funded activities. These activities are selected from the Annual Regional Call for Proposals (ARCP) process and 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

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, the 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 the 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.

APN FUNDED PROJECTS

ARCP

Highlights and publications for completed APN projects are included in this chapter of the Annual Report. Further details on any of the projects highlighted in this publication can be obtained by visiting the APN website at http://www.apn-gcr.org

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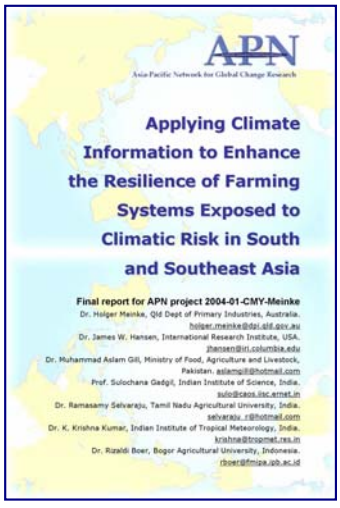
APN2004-01-CMY-Meinke: Applying Climate Information to Enhance the Resilience of Farming Systems Exposed to Climatic Risk in South and Southeast Asia

Project Leader: Dr. Holger Meinke
Email: holger.meinke@dpi.qld.gov.au
Funding: US$ 255,000 for three years
Participating Countries: Australia, India, Indonesia, Pakistan and USA

Summary: This project built on previous work done in India and Pakistan (APN2000-17) which established a network of research teams with the capacity to apply agricultural systems analysis to evaluation options for managing climatic risk. Building on that foundation, this project documented and delivered benefits from climate information to agricultural decision-makers, and plotted a course for large-scale, sustained operational support of seasonal climate information and prediction within the target countries (India, Indonesia and Pakistan).



The project culminated in a stakeholder workshop, during which an organizational 'consortium' approach was adopted by participants. This consortium approach built on the existing network and maintained the momentum generated by this project. Directors of Central Research Institute for Dryland Agriculture (CRIDA) and National Centre for Medium Range Weather Forecasting (NCMRWF) agreed to jointly take the lead in the development and set-up of such a

consortium. The consortium addressed the gaps in knowledge, institutions, and policy that obstruct change at the ground level.

The stakeholders considered the project to have had a major impact on the conduct of cross-disciplinary research, highlighting the importance of simulation modelling being the glue that connects several disciplines, providing a focus on outcomes relevant to end users and not 'science for science's sake'. This aspect was highlighted in a presentation by one of the Indian farmers at the stakeholder workshop. In addition, the project achieved considerable capacity building via staff training and the development of postgraduate scholarship opportunities. The science conducted by the team was highly regarded and considered an excellent example of the value of international, cross-disciplinary research, as evident by the publications arising from the project.

Publications:

- Selvaraju, R., Meinke, H. and Hansen, J.W. (2006). Management responses to seasonal climate forecasts in southern India's dryland cropping systems. Submitted to *Agric. Syst.*
- Kumar, K.K., Rupa Kumar, K., Ashrit, R.G., Deshpande, N.R. and Hansen, J.W. (2004). Climate impacts on Indian agriculture. *Int. J. Climatol.*, 24, 1375-1393.
- Selvaraju, R. (2003). Impact of El Niño-Southern Oscillation on Indian foodgrain production. *Int. J. Climatol.,* 23, 187-206.
- Meinke, H., Nelson, R., Stone, R.C., Selvaraju, R. and Baethgen, W. (2006). Actionable climate knowledge – from analysis to synthesis. *Climate Research*, accepted subject to revision.
- Selvaraju, R., Venkatesh, R., Babu, C., Meinke, H. and Hansen, J.W. (2006). Impact of climate variability on smallholder farners' farm level income inequality and food security: a comparison across farming systems and water availability scenarios. *World Development*, final draft.
- Meinke, H. and Stone, R.C. (2005). Seasonal and inter-annual climate forecasting: the new tool for increasing preparedness to climate variability and change in agricultural planning and operations. *Climatic Change*, 70, 221-253.
- Donald, A., Meinke, H., Power, B., Wheeler, M., Maia, A.H.N., Stone, R.C., Ribbe, J. and White, N. (2006). Near-

global impact of the Madden Julian Oscillation on rainfall. *Geophysical Res. Letters*, in press.
- Kumar, K.K., Hoerling, M. and Rajagopalan, B. (2005). Advancing dynamical prediction of Indian monsoon rainfall. *Geophysical Res. Letters*, 32.
- Selvaraju, R. and Kumar, K.K. (2004). Climate Change Impacts on Irrigated Rice Production Systems in Southern Peninsular India. *Int. Journal of Climatology* (provisionally accepted).
- Singhrattna, N., Rajagopalan, B., Kumar, K.K. and Clark, M. (2005). Interannual and Interdecadal Variability of Thailand Summer Monsoon. *Journal of Climate*, 18, 1697-1708.
- Singhrattna, N., Rajagopalan, B., Clark, M. and Kumar, K.K. (2005). Forecasting Thailand summer monsoon rainfall. *International Journal of Climatology*, 25, 649-664.
- Gadgil, S., Srinivasan, J., Nanjundiah, R.S., Kumar, K.K., Munot, A.A. and Rupa Kumar, K. (2005). On forecasting the Indian summer monsoon: the intriguing season of 2002. *Current Science*, 83 (4), 394-403.

Website: ftp://ftp.unc.edu/pub/marine/cisco/2004_10_NSY_Werner_FinalReport_15Jan2007.doc

APN2004-10-NSY-Werner: Climate Interactions and Marine Ecosystems: Effects of Climate on the Structure and Function of Marine Food-Webs and Implications for Marine Fish Production in the North Pacific Ocean Marginal Seas

Project Leader: Prof. Francisco E. Werner
Email: cisco@unc.edu
Funding: US$ 45,000 for two years
Participating Countries: Japan, P.R. China, Republic of Korea, Russian Federation and USA

Summary: Predicting and understanding the effects of global climate change on ecosystems and fish production in oceanic systems is essential in the development of quantitative approaches to managing sustainable marine resources. Hypotheses dealing with the environmentally induced variations in fish growth, regime shifts, and changes in energy cycling and structure of marine food webs were addressed by the project. A combination of existing data sets, trophodynamic models and a multi-decadal model hindcast scenario were used to assess the changes in ecosystem structure and function of certain regions in

the North Pacific. Geographic areas included the Sea of Okhotsk, coastal areas of Japan off Hokkaido Island, the Bering Sea shelf, Prince William Sounds and the coast near British Columbia.

Focusing on herring as the target fish species, existing modelling approaches were used to quantify how climate (e.g., through temperature, stratification, circulation) altered marine ecosystem structure and function. It was found that the model results were able to capture the timing in observed shifts in herring population characteristics, with geographic variations latitudinally and zonally across the Pacific basin. Estimated changes in fish size were used as a metric for fish production and fish population health. These modelling approaches have been applied by other research groups to other species.

Report of the APN workshop on "Climate interactions and marine ecosystems"

Francisco E. Werner, Bernard A. Megrey and Kenneth A. Rose

A workshop on "Climate interactions and marine ecosystems" was held from October 10-13, 2004, in Honolulu, Hawaii. In attendance were scientists from Canada, the People's Republic of China, the Republic of Korea, Russia, and the United States (Fig. 1). Funding for the workshop was provided by the Asia-Pacific Network for Global Change Research (APN; http://www.apn.gr.jp/) through the award "Effects of climate on the structure and function of marine food-webs and implications for marine fish production in the North Pacific Ocean and marginal seas". Additional support for some of the workshop participants was provided by PICES and GLOBEC. The workshop took place roughly midway through the APN award, and as such the goals of the workshop were to assess achievements of the working team to date and to develop plans for the remaining six months of the project.

The project's overall hypothesis is that global climate change can alter both the structure and function of the marine ecosystem, causing changes in energy cycling, plankton composition and dynamics, and ultimately fish production. The objectives of the project include:

- to use a common marine food-web and fisheries bioenergetics modelling approach, along with long-term area-specific oceanographic and fisheries data sets, to understand the propagation of climate change effects up the marine food-web;
- to quantify its effects on energy cycling and fish growth and production in distinct geographic regions in the North Pacific; and
- to initiate a discussion of how these results can be integrated into the decision and policy making process by fisheries and resource managers.

Fig. 1 APN workshop participants. Back row: Matt Foster (U.S.A.), Shin-ichi Ito (Japan), Skip McConnell (PICES), Alexander Lennov (Russia), Bernard Megrey (U.S.A.), Chang Ik Zhang (Korea), Jacob Schweigert (Canada), Douglas Hay (Canada), David Eslinger (U.S.A.). Front row: Harold Batchelder (PICES, CCCC), Wei Hao (China), Irina Ishmakova (Russia), Michio Kishi (Japan), Kenneth Rose (U.S.A.), Francisco Werner (U.S.A.).

Using NEMURO.FISH as a modeling framework (*PICES Scientific Report* No. 20, pp. 77-176), we focused on selected sites of the North Pacific shelf and continental margin regions. With Pacific herring as the initial target fish species, the workshop sub-hypotheses and resulting action items to be undertaken over the remaining months of the project can be summarized as follows.

Hypothesis 1: geographic variations in fish growth can be explained by differences in environmental conditions and resulting differences in lower trophic conditions.

To address this hypothesis the workshop participants:

- identified locations where data sets are available for calibration of lower trophic levels (LTLs);
- cross-referenced the LTL target list with locations that may have data on Pacific herring, sardines, anchovy, mackerel and other potential target species;
- developed a strategy for analysis of these data via a coupled LTL and fish model to address the hypothesis on geographic variability; and
- agreed to compile the available datasets with final site and target species selection to be determined depending on the quality of the various data sets.

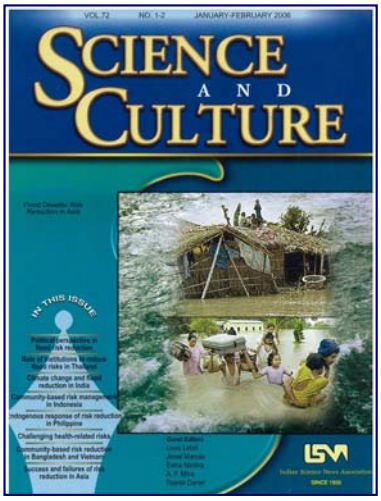
Publications:

- Ito, S., Megrey, B.A., Kishi, M.J., Mukai, D., Kurita, Y., Ueno, Y. and Yamanaka, Y. (2006). A study for interannual variability of Pacific saury (*Cololabis saira*) growth using a simple 3-box model of NEMURO.FISH. *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.07.046.
- Kishi, M.J., Kashiwai, M., Ware, D.M., Megrey, B.A., Eslinger, D.L., Werner, F.E., Aita-Noguchi, M., Azumaya, T., Fujii, M., Hashimoto, S., Iizumi, H., Ishida, Y., Kang, S., Kantakov, G.A., Kim, H., Komatsu, K., Navrotsky, V.V., Smith, L.S., Tadokoro, K., Tsuda, A., Yamamura, O., Yamanaka, Y., Yokouchi, K., Yoshie, N., Zhang, J., Zuenko, Y.I. and Zvalinsky, V.I. (2006). NEMURO – A lower tropic level model for the North Pacific marine ecosystem. *Ecol. Modelling*, doi:10.1016/j.ecolmodel.2006.08.021.
- Megrey, B.A., Ito, S., Hay, D.E., Klumb, R., Hay, D., Werner, F.E., Eslinger, D.L. and Smith, L. (2006). A bioenergetics-based population dynamics model of Pacific herring (*Clupea harengus pallasii*) coupled to a lower tropic level nutrient-phytoplankton-zooplankton model: Description, calibration and sensitivity analysis. *Ecol. Modelling*, doi:10.1016/j.ecolmodel.2006.08.020.
- Rose, K.A., Megrey, B.A., Werner, F.E. and Ware, D.M. (2006). Calibration of the NEMURO nitrogen-

phytoplankton-zooplankton food web model to a coastal phytoplankton-zooplankton model: Description, calibration and sensitivity analysis. *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.08.020.

- Rose, K.A., Megrey, B.A., Hay, D., Werner, F. and Schweigert, J. (2006). Climate regime effects on Pacific herring growth using coupled nutrient-phytoplankton and bioenergetics models. *Trans. Am. Fish. Soc.*, in press.
- Rose, K.A., Werner, F.E., Megrey, B.A., Noguchi Aita, M., Yamanaka, Y., Hay, D., Schweigert, J.F. and Foster, M.B. (2006). Simulated herring growth responses in the North-eastern Pacific to historic temperature and zooplankton conditions generated by the 3-dimensional NEMURO nutrient-phytoplankton-zooplankton model, *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.06.020.
- Werner, F.E., Ito, S., Megrey, B.A. and Kishi, M.J. (2006). Synthesis and future directions of marine ecosystem models. *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.08.019.
- Werner, F.E., Megrey, B.A. and Rose, K.A. (2005). Report of the APN workshop on "Climate interactions and marine ecosystems." *PICES Press,* 12 (2), 15-17.
- Yoshie, N., Yamanaka, Y., Rose, K.A., Eslinger, D.L., Ware, D.M. and Kishi, M.J. (2006). Parameter sensitivity study of a lower tropic level marine ecosystem model NEMURO. *Ecol. Modelling* accepted.

APN2005-01-CMY-Nikitina: Institutional Capacity in Natural Disaster Risk Reduction: A Comparative Analysis of Institutions, National Policies, and Cooperative Responses to Floods in Asia



Project Leader: Dr. Elena Nikitina
Email: enikitina@mtu-net.ru
Funding: US$ 80,000 for two years
Participating Countries: Bangladesh, Myanmar, India, Japan, Lao PDR, Philippines, Russian Federation, Thailand and Viet Nam

Summary: The Institution for Floods in Asia (IFA) explored the challenging problem of *how to effectively shape human institutional*

responses to the risk of natural disasters with a special focus on floods. Gaps between the design of institutions and their action at particular stages – before, during, and after the flood – were identified. It explained successes and failures in performance of institutions and identifies common and specific problems across countries. Lessons learned and good practices were discussed, as well as problems in their transfer and adaptation across countries. Four country teams, namely Japan, Russia, Thailand and Viet Nam, performed compatible studies of domestic institutional capacities and practices in flood risk reduction in their countries employing IFA methods.

A key finding of the study was that states no longer respond to flood disasters, but tend to manage flood risks, and do so with increasingly sophisticated institutional frameworks. Lessons from IFA country studies also indicated that insufficient funding for flood risk reduction in the countries under study, especially in developing and in transition economies, are often referred to be among key problems. Furthermore, debate, consultation, public participation, and representation procedures should be incorporated as integral element into 'good governance' of floods.

Publications:

- Lebel, L., Manuta, J., Nikitina, E., Mitra, A.P. and Daniel, R. (Eds.). (2006). Flood Disaster Risk Reduction in Asia [Special Issue]. *Science and Culture,* 72 (1-2).
- Kotov, V. (2006). Unresolved problems in flood risk reduction in Russia: Some lessons learned from the Lena River floods. IFA Working Paper, EcoPolicy, Moscow.
- Kotov, V. and Nikitina, E. (2004). Russian Federation: Institutional frameworks for natural disasters risk reduction. Contribution to *Living with risk: A global review of disaster reduction initiatives*, UN ISDR, Geneva.
- Khrutmuang, S. and Manuta, J. (2005). Recovery & reconstruction of people's lives, livelihood and community: Emerging opportunities and challenges [Conference brief]. January 2005, Bangkok, Thailand.
- Lebel, L., Nikitina, E., Kotov, V. and Manuta, J. (2006). Assessing institutionalised capacities and practices to reduce the risk of flood disasters. In: Birkmann, J. (Ed). *Measuring vulnerability to hazards of natural origin. Towards disaster resilient societies.* Tokyo, Japan: UNU Press.

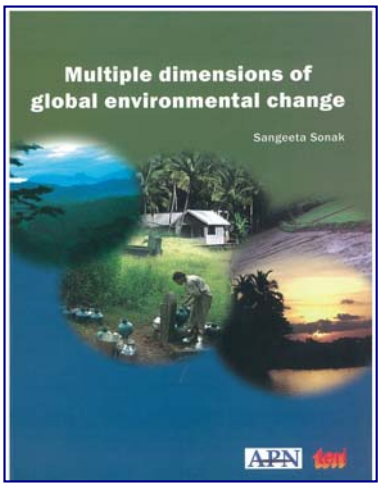
- Lebel, L. and Sinh, B.T. (2005). Too much of a good thing: how better governance could reduce vulnerability to floods in the Mekong region. USER Working Paper WP-2005-10. Chiang Mai University, Thailand.
- Lebel, L., Nikitina, E. and Manuta, J. (2005). Flood disaster risk management in Asia: An institutional perspective. USER Working Paper WP-2005-20. Chiang Mai University, Thailand.
- Manuta, J. and Khrutmuang, S. (2005). Institutionalized incapacities: The politics of re-distributing risks and altering vulnerabilities to floods in Thailand [Abstract]. *Global environmental change, globalization and international security: New challenges for the 21st century*. Conference Book, IHDP, Bonn, Germany.
- Manuta, J. and Lebel, L. (2005). Climate change and the risks of flood disaster in Asia: Crafting adaptive and just institutions. USER Working Paper WP-2005-10. Chiang Mai University, Thailand.
- Manuta, J., Khrutmuang, S. and Lebel, L. (2005). The politics of recovery: Post-Asian tsunami reconstruction in southern Thailand. *Tropical Coasts*, July, 30-39.
- Manuta, J., Lebel, L., Khrutmuang, S. and Huaisai, D. (2005). The politics of re-distributing risks and altering vulnerabilities to floods in Thailand. Vulnerability and Human Well-Being Workshop, Costa Rica, January 2005.
- Manuta, J., Lebel, L. Khrutmuang, S. and Huaisai, D. (2005). Institutional incapacities: The politics of re-distributing risks and altering vulnerabilities to floods in Thailand. IFA Working Paper, EcoPolicy, Moscow.
- Manuta, J. and Lebel, L. (2005). Human security and climate change: Governance of flood risks in Thailand. Abstract for International Workshop, Norway, June 2005.
- Nikitina, E. (Ed.). (2005). Institutional capacity for natural disasters risk reduction: Comparative analysis of institutions, national policies and cooperative responses to floods in Asia. Report from IFA Meeting, December 2004, USER, Chiang-Mai/EcoPolicy Moscow.
- Nikitina, E. Emerging trends in natural disaster governance. In: *Global environmental change and human security*. SUNY Press, USA *(in press)*.
- Nikitina, E. (2006). Learning from doing: Building links between CABRI-IFA-M-Power. *CABRI Newsletter*, N 2.
- Nikitina, E. and Kotov, V. (2005). Flood risk reduction: Explaining success and failures in performance of

institutions [Abstract]. *Global environmental change, globalization and international security: New challenges for the 21st century*, Conference Book, IHDP, Bonn, Germany.

- Sinh, B.T., Hein, H.M., Ninh, N.H. and Le, N.V. (2005). Institutional transformation of flood governance from flood control to flood risk management: The case of Red River in Viet Nam [Abstract]. *Global environmental change, globalization and international security: New challenges for the 21st century,* Conference Book, IHDP, Bonn, Germany.
- Sinh, B.T., Hein, H.M. and Ninh, N.H. (2005). Institutional capacity for floods risk reduction in Viet Nam and the Red River Delta floods. IFA Working Paper, EcoPolicy, Moscow.
- Teranishi, A., Tsunozaki, E. and Nagamatsu, S. (2005). Institutions for floods risk reduction in Japan and the Fukuoka floods. IFA Working Paper, EcoPolicy, Moscow.

APN2005-02-CMY-Sonak: Role of Institutions in Global Environmental Change

Project Leader: Dr. Sangeeta Sonak
Email: ssonak@teri.res.in
Funding: US$ 40,000 for two years
Participating Countries: India, Nepal and Sri Lanka



Summary: The role of institutions in natural resource management is being increasingly recognized in the context of global environmental change. Policy research and analysis of institutions related to global environmental change normally focuses on international or national mechanisms and programmes already in place. This project, on the other hand, looked into the environmental and resource regimes operating at local levels in assessing the role of institutions in global environmental change. It investigated how the management of resources can be improved by learning from a variety of management systems and their dynamics. It was observed that environmental signals that relate to the function of the ecosystem are normally ignored until those that relate to the function for the humans are affected.

The project arrived to several conclusions, namely, 1) integrating community concerns in decision making is necessary; 2) involvement of community in natural resource management is essential; 3) market is the driving force for changes in human-environment relationship; 4) institutions with good support from concerned organizations perform better; 5) there is a need for capacity building of concerned organizations; and 6) periodical review of performance helps in increasing responsiveness of institutions.

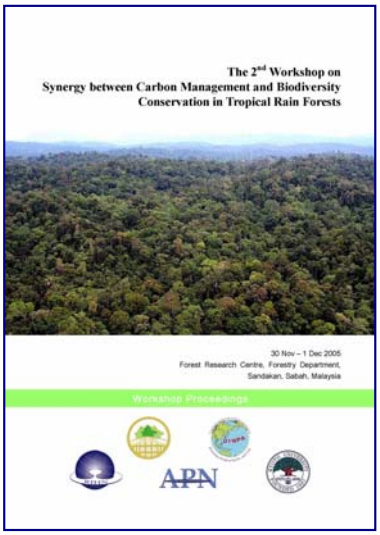
Publications:

- Sonak, S. (2006). *Multiple Dimensions of Global Environmental Change.* New Delhi, India: The Energy Resources Institute (TERI).
- Sonak, S., Kazi, S., Sonak, M. and Abraham, M. 2006. Why was traditional common property resource management system more successful in the coastal wetlands of Goa? Paper presented at the IDGEC Synthesis Conference in Bali, Indonesia, 6-9 December 2006.

APN2005-03-CMY-Kitayama: Synergy between Ecosystem Change and Biodiversity Studies in the Western Pacific and Asia: Establishing Case Studies for Carbon Management and Biodiversity Conservation

Project Leader: Prof. Kanehiro Kitayama
Email: kitayama@ecology.kyoto-u.ac.jp

Funding: US$ 79,000 for two years
Participating Countries: Indonesia, Japan, Malaysia, Philippines, P.R. China, Russian Federation and Sri Lanka



Summary: The Kyoto Protocol incorporates the vital role of forests and wetlands in its mechanisms to reduce greenhouse gases, favouring fast growing plantations. The Convention on Biological Diversity emphasizes the conservation and sustainable use of forest and wetlands that harbour biological diversity. These two international frameworks need to be synergized to jointly achieve carbon sequestration and biodiversity conservation.

The synergy concept was explored through the establishment of a pilot case study in the production forests of the Deramakot Forest Reserve, Sabah in Malaysian Borneo. How the remotely sensed data satellite could be effectively used was investigated in the sustainable management of production forests in the Reserve. A new method was also developed to estimate aboveground biomass (equivalent to volume stock) in a large area using Landsat satellite data.

The additionality of carbon gain and biodiversity conservation, that was brought about by the implementation of reduced impact logging was evaluated by comparing with the baseline scenario (logging without reduced impact system) using a new algorithm. It was found that reduced-impact logging was efficient to store carbon and conserve the biodiversity of some organism groups in the tropical rainforests. A new concept to weigh carbon with biodiversity was proposed so that tropical rainforests harbouring more carbon and richer biodiversity could gain a greater economic value.

Publications:

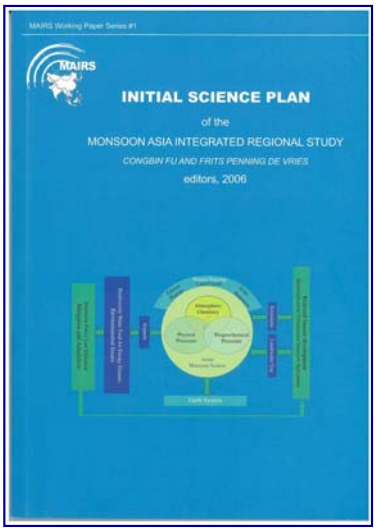
- Lee, Y.F., Chung, A.Y.C. and Kitayama, K. (Eds.). (2006). *Proceedings of the International Workshop on Synergy between Carbon Management and Biodiversity Conservation in Tropical Rain Forests*. DIWPA, Shiga, Japan.

APN2005-04-CMY-Snidvongs: 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
Email: anond@start.or.th
Funding: US$ 90,000 for two years
Participating Countries: Australia, Bangladesh, India, Indonesia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and USA

Summary: Monsoon Asia has been identified by the ESSP (IGBP, IHDP, WCRP and DIVERSITAS) as a priority region for integrated research studies. Changes to the regional climate,

biogeochemical, and terrestrial and marine ecosystem functioning brought about by human driving forces such as increase in population, intensified land use, urbanization, industrialization, and economic development may have global, as well as regional, consequences. Similarly, effects of global change will have a significant impact on sustainable development, at both regional and national levels.



Together with the ESSP, START and its regional networks in East Asia, South Asia and Southeast Asia are undertaking integrated regional studies of global change in Monsoon Asia. The integrated regional studies were preceded by a first phase of three sub-regional Rapid Assessment Projects for China/East Asia, South Asia and Southeast Asia that reviewed current knowledge regarding regional aspects of global change in Monsoon Asia.

Three books summarizing current knowledge on regional aspects of global change in Monsoon Asia, and identifying gaps in knowledge, and priorities for new research, are being produced. The first of the three books, *Changes in the Coupled Human-Monsoon System of East Asia in the Context of Global Change*, has been completed and is currently under final review, of which publication is expected in early 2007. The second book, *Global Environmental Change and the Southeast Asian Region: an Assessment of the State of the Science*, is under preliminary review. The final book on the South Asia Rapid Assessment was reviewed at a workshop in Darjeeling, India and the South Asia START Regional Center intends to publish it in early 2007. The ultimate outcome of this project provided input to the science plan for follow-up studies in Monsoon Asia and the establishment of an international network of scientists engaged in integrated regional analysis of regional environmental change, and the implications for sustainable regional development.

Website: www.mairs-essp.org

Publications:

- Fu, C., Penning de Vries, F.W.T., Ailikun, Chen, C.T.A., Lebel, L., Manton, M., Snidvongs, A. and Virji, H. (Eds). 2006. *The Initial Science Plan of the Monsoon Asia*

Integrated Regional Study. MAIRS-IPO, IAP-CAS, P.O. Box 9804, 100029 Beijing, China, 80 pp.

- Forthcoming books: *Changes in the Coupled Human-Monsoon System of East Asia in the Context of Global change, Global Environmental Change and the Southeast Asian Region: an Assessment of the State of the Science,* and MAIRS South Asia Rapid Assessment

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APN2005-05-CMY-Adrianov: Climate Variability and Human Activities in Relation to Northeast Asian Land-Ocean Interactions and Their Implications for Coastal Management

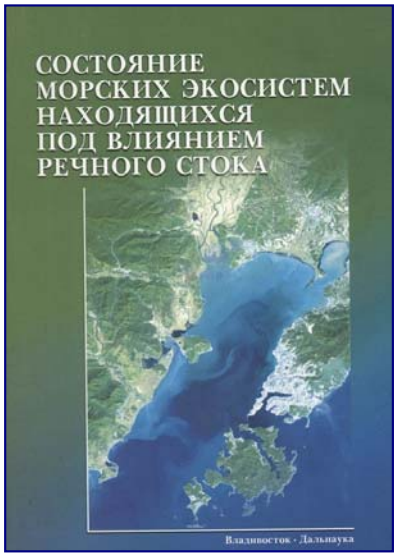
Project Leader: Dr. Adrey V. Adrianov
Email: inmarbio@mail.primorye.ru
Funding: US$ 118,000 for two years
Participating Countries: P.R. China, Republic of Korea and Russian Federation

Summary: The objectives of this project were to identify estuarine and coastal changes in terms of hydrology, hydrochemistry, geochemistry, geomorphology, ecosystem and material cycling patterns of the North-eastern Asia region, with special reference to the Amur, Tumen and Razdolnaya Rivers; to evaluate the sensitivity of regional changes in relation to anthropogenic processes and climate change; and to provide recommendations for management of sustainable coastal development of the region and assistance to policy/decision-makers. Results obtained dealt with climatic changes, riverine and coastal modifications, environmental changes in the coastal zone and the state of bottom and plankton communities, as well as practical recommendations for coastal zone management.

Young Scientist Workshop Participants
Vladivostok, Russia, October 2005

It was shown that surface air temperature anomalies in the Okhotsk Sea area and sea surface temperature in the sub arctic North Pacific are very sensitive to the ENSO signal that is not of tropical origin. Changes in the water regime of the Amur River in

the last 100 years have led to the disturbance of the ecological equilibrium in the valley of the lower Amur. Meanwhile, analysis of the environmental changes in the coastal zone revealed that no positive conclusion can be made about the improvement of the state of coastal ecosystems in Amursky Bay and the estuarine zone of Razdolnaya Rivers in the 2000s, as compared to the 1980s and 1990s.



Decreasing trends in the concentration of oil hydrocarbons and cadmium in the sediments have been observed, while concentrations of other metals and total organochlorine pesticides remained rather high. The project also examined the management schemes of coastal zones in P.R. China, Republic of Korea and Russian Federation, and recommendations were made on how to enhance these management strategies.

Publications:

- *Proceedings of the Workshop on Climate Variability and Human Activities in Relation to Northeast Asian Land-ocean Interactions and their Implications for Coastal Zone Management*. (2004). Nanjing, China: Nanjing University, 157 pp.
- Gramm-Osipov, L.M. (Ed.). (2005). *Condition of marine ecosystems influenced by river flow*. Vladivostok: Dalnauka Publishing House.
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continental shelf ecosystem. *Continental Shelf Research* (submitted).

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- Lazaryuk, A.Yu and Ponomarev, V.I. (2006). The reduction of response error of CTD measurements in the ocean. *Bulletin of the Far Eastern Branch, Russian Academy of Sciences* (4), 106-111.
- Kaplunenko, D.D., Ponomarev, V.I. and Polyakova, A.M. (2005). Climatic oscillations in respect to the typical atmospheric patterns in the North Pacific. *Pacific Oceanography*, 3 (2), 86-97.
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- Ponomarev, V.I., Kaplunenko, D.D. and Krokhin V.V. (2005). Climatic trends of the second half of the 20th century in north-eastern Asia, Alaska and north-western Pacific. *Meteorology and Hydrology* (Moscow), (3), 15-26.
- Ponomarev, V.I., Savelieva, N.I., Rudyky, N.I., Dmitrieva, E.V. and Makhinov, A.N. (2005). Changing linkages between Amur River discharge and ice extent in the seas of Okhotsk and Japan. *Pacific Oceanography,* 3 (2), 144-158.

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- Vashchenko, M.A. and Lutaenko, K.A. *Ecological studies and state of the ecosystem of Amursky Bay and estuarine zone of the Razdolnaya River (Sea of Japan)*. Vladivostok: Dalnauka Publishing House (*in preparation*).

APN2005-06-NSY-Brigham-Grette: PAGES Second Open Science Meeting

Project Leader: Prof. Julie Brigham-Grette
Email: juliebg@geo.umass.edu

Funding: US$ 25,000

Participating Countries: Australia, India, Japan Mongolia, Nepal, New Zealand, P.R. China, Russian Federation and USA

Summary: PAGES (Past Global Changes), a core project of the International Geosphere-Biosphere Programme (IGBP), held its Second Open Science Meeting (OSM) in Beijing, China on 10-12 August 2005,

with the theme “Paleoclimate, Environmental Sustainability and Our Future”. Cutting-edge research into past climate, environmental change and human impact was presented with the aim of developing predictive models of future global changes. The meeting was attended by 370 scientists, 70% of whom were from APN member countries. A total of 45 countries were represented. Thirty-two participants from Australia, India, Japan, Mongolia, Nepal, New Zealand, P.R. China, Russian Federation and USA received support from the APN.

The APN funding boosted the attendance from developing countries, as well as covered some costs for key scientists, therefore contributing substantially to the success of the meeting. The supported scientists were able to strengthen existing relationships and establish new links with colleagues in similar areas of paleoresearch from a wide range of developed and developing nations within the APN network and beyond. Young participants were introduced to a wealth of information, including workshops and training opportunities, online databases, student opportunities and potential mentors. A third OSM, to be held in the USA, is planned for 2009.

Publications:

- Brigham-Grette, J., Kiefer, T., Wang, P. And Wanner, H. (Eds.). (2006). Paleoclimate, environmental sustainability and our future [Special Issue]. *Climate of the Past Discussions*. Available at http://www.copernicus.org/EGU/cp/cpd/special_issue1.html.
- PAGES 2nd Open Science Meeting – Abstract book, 189 pp. Hardcopy and digital format, and an online poster exhibition (www.pages2005.org/posters.html).
- Wang, P., Chai, Y., Guo, Z. and Kull, C. (Eds.). (2005). Chinese Paleoscience, *PAGES News,* 13, 2.
- Chinese “National PAGES” (www.pages-igbp.org/about/national/china).

APN2005-08-NSY-Shi: The Surface Ocean – Lower Atmosphere Study (SOLAS) International Summer School 2005: Attendance of Young Scientists from the APN Region

Project Leader: Prof. Guang-Yu Shi
Email: shigy@mail.iap.ac.cn
Funding: US$ 12,000
Participating Countries: Global activity

Summary: The 2005 SOLAS Summer School ran from 29 August to 10 September 2005 at the Institute d'Etudes Scientifique de Cargese, Corsica, France. Seventy-four students from 29 countries attended the School, and six students received funding directly from the APN. The aim of the Summer School was to build capacity in the scientific areas of SOLAS and global change research by bringing together postgraduate students and young scientists from around the world for a series of lectures and practical sessions ran by leading SOLAS scientists.

Capacity building was achieved not only through lectures and practical sessions, but also by providing ample opportunity for scientific discussion and networking. Furthermore, the learning achieved at the Summer School was not a one-way process, as the lecturers also expressed their joy in the opportunity to learn how a new generation of SOLAS scientists approached the scientific questions that drive research into air-sea interaction and global change.

APN2005-09-NSY-Srivastava: The 2005 Open Meeting of the Human Dimensions of the Global Environmental Change Research Community

Project Leader: Dr. Leena Srivastava
Email: leena@teri.res.in
Funding: US$ 25,000
Participating Countries: Global activity

Summary: The 2005 Open Meeting, the 6th biennial international conference of its kind, brought together over 1,000 participants

from nearly 90 countries – the biggest and most diverse gathering of social scientists and policy-makers dealing with global environmental change. Its title, "International Security, Globalization and Global Environmental Change," aptly reflected current global realities. The structure of the conference was deliberately chosen to address the main objectives of the meeting: to develop the research agenda on human dimensions, identify areas of future research, promote capacity building, and foster the translation of scientific knowledge into the policy arena.

APN funds were used to support the participation of researchers from APN member countries; the majority were young scientists from developing countries. Regional collaboration and capacity building were top priorities for the 6th Open Meeting. Participants had the chance to meet colleagues from the region and to exchange experiences, data and techniques.

Numerous regional-level side meetings were organized, taking advantage of the presence of a high number of participants from various regions. A particularly successful side event was the embedded mini-conference for IHDP's National Committees. This meeting was well attended and all regions were represented. Representatives from the Asia-Pacific region had numerous opportunities to network and exchange ideas and experiences with other researchers from the region.

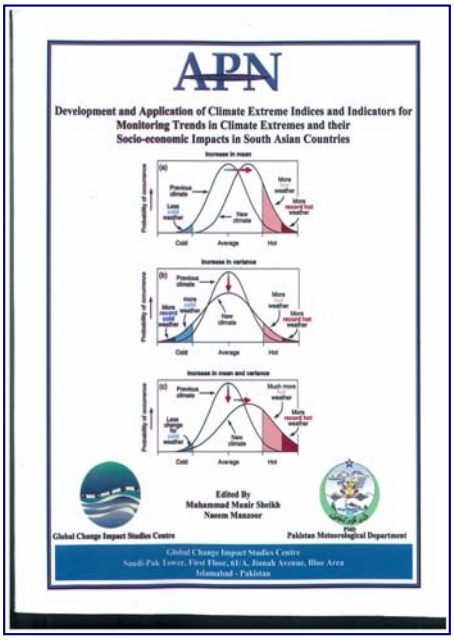
Publications:

- Materials are being gathered for two books of an Open Meeting publication, with NOMOS as the publisher. Regional comparison and case studies have been pinpointed from each of the main themes at the 6th Open Meeting, and editors will be from well-established researchers in the human dimension. The publication will showcase the best successes and exciting current and future trends of human dimensions research.

APN2005-10-NSY-Sheikh: Development and Application of Climate Extreme Indices and Indicators for Monitoring Trends in Climate Extremes and their Socio-economic Impacts in South Asian Countries

Project Leader: Mr. Muhammad Munir Sheikh
Email: munir.sheikh@gcisc.org.pk
Funding: US$ 37,600
Participating Countries: Bangladesh, India, Nepal, Pakistan and Sri Lanka

Summary: Extreme weather and climate extremes have received attention in the last few years due to the often-large loss of human life and increasing costs associated with them (Karl and Easterling 1999). These can have major impacts on society, the economy and the environment (Manton et al. 2001). This project aimed to build/enhance the capacity of South Asian countries in the area of climate extreme indices and indicators and their socio-economic impacts, and to promote application of climate trend indicators for government policy developments.



Trends in extreme daily temperatures and rainfall have been analyzed using 1971-2000 as the base period for 209 precipitation and 160 temperature stations over the five South Asian countries comprising Bangladesh, India, Nepal, Pakistan and Sri Lanka. The raw daily temperature and precipitation data underwent extensive quality control and homogeneity testing, and using these data, trends in climate extremes were calculated using 19 core indices, 11 for temperature and 8 for precipitation. Both temperature and precipitation indices were generally seen to show rising trends over the South Asia region.

Publications:

- A publication on the results collected during the 1-year project is being prepared.

APN2005-11-NSY-Bawa: DIVERSITAS First Open Science Conference 2005: Travel Fund for Scientists from Developing Countries in the Asia- Pacific Region

Project Leader: Prof. Kamaljit S. Bawa
Email: kamal.bawa@umb.edu
Funding: US$ 15,000
Participating Countries: Global activity

Summary: The DIVERSITAS First Open Science Conference took place in Oaxaca, Mexico, from 9-12 November 2005. The conference assembled many perspectives from the natural and social sciences to highlight the causes and consequences of biodiversity loss. Following closely the Millennium Ecosystem Assessment launch, it examined changes in beneficial ecosystem services and the economic consequences of biodiversity loss.

The conference featured a mix of plenary lectures, symposia, oral and poster sessions, presented by invited speakers, as well as scientists selected from a call for abstracts on the three following themes: 1) How is biodiversity changing, and why? 2) What are the consequences of biodiversity changes for ecosystems and for the delivery of ecosystem services? and 3) What can we do to promote a more sustainable use of biodiversity and improve human well-being?

Funds from the APN were used to support the participation of 11 scientists from the Asia-Pacific region. Overall, the conference succeeded in attracting close to 700 scientists and policy-makers from 60 countries, including a large proportion of young scientists and scientists from developing countries. The conference also produced and adopted the "Oaxaca Declaration on Biodiversity" which represented an important step on the way towards the establishment of a new international mechanism of scientific expertise for biodiversity.

Oaxaca Declaration on Biodiversity

The scientists participating in the DIVERSITAS First Open Science Conference, Integrating biodiversity science for human well-being, held in Oaxaca, November 9-12, 2005, support the conclusions of the Millennium Ecosystem Assessment and of the Conference Biodiversity Science and Governance held in Paris in January 2005:

- Biodiversity is our common natural heritage and the foundation for a wide variety of ecosystem services that are crucial to human well-being.
- Irreversible destruction of biodiversity is taking place globally as a result of human activities; there is insufficient political and public attention to its extent and consequences.
- Mechanisms to conserve and sustainably use biodiversity have been developed at local, national and international levels; these need to be supported and considerably expanded.
- Scientific knowledge of biodiversity must be substantially increased, but immediate actions must be taken to better protect biodiversity based on existing knowledge.

Therefore, they call upon governments, policy makers and citizens:

- to integrate biodiversity into the criteria considered in all economic and policy decisions that affect environmental management;
- to launch and support ambitious interdisciplinary research programmes to explore the Earth's biodiversity, the ecological and socio-economic causes and consequences of its changes, and the best means to conserve and sustainably use it;
- to commit resources to build and greatly expand the capacity, especially in developing countries, to undertake biodiversity research and implement the conservation and sustainable use of biodiversity.

In agreement with the recommendations of the Paris Conference, they urge national governments and United Nations bodies to establish a properly resourced international scientific panel that includes an intergovernmental component and that aims at providing, on a regular basis, validated and independent scientific information relating to biodiversity to governments, international conventions, non-governmental organisations, policy makers and the wider public.

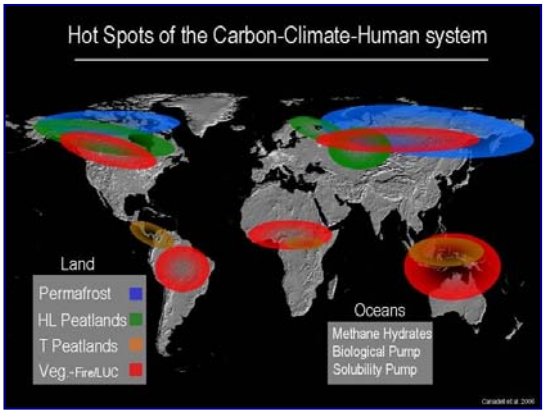
Publications:

- Perrings, C., Jackson, L., Bawa, K., Brussaard, L., Brush, S. Gavin, T., Papa, R., Pascual, U. and de Ruiter, P. (2006). Biodiversity in agricultural landscapes: saving natural capital without losing interest [Editorial]. *Conservation Biology,* 20, 263.
- Bawa, K. (2006). Globally dispersed local challenges in conservation biology. *Conservation Biology,* 20, 696-9.
- Jackson, L., Brussaard, L., De Ruiter, P., Pascual, U., Perrings, C. and Bawa, K. Agrobiodiversity. *Encyclopedia of Biodiversity 572;* online update. Levin, S. (ed.), Princeton University, Princeton, New Jersey, USA (in press).
- Special issue of the journal *Agriculture, Ecosystems and Environment* (2007).

APN2005-12-NSY-Parish: Vulnerabilities of the Carbon – Climate System: Carbon Pools in Wetlands/Peatlands as Positive Feedbacks to Global Warming

Project Leader: Mr. Faizal Parish and Dr. Josep Canadell
Email: fparish@genet.po.my; pep.canadell@csiro.au
Funding: US$ 45,000
Participating Countries: Australia, Indonesia, Japan, Malaysia, Papua New Guinea, Philippines, P.R. China, Thailand and USA

Summary: Ecosystem responses that cause carbon loss to the atmosphere as a result of warmer climates and land use changes could greatly accelerate climate change during this century. Potentially vulnerable carbon pools that currently contain hundreds of billion tons of carbon could release as much as 200 ppm of atmospheric CO_2 during this century, so rivalling the expected release from fossil fuel combustion. Wetlands, including peatlands, are one of the largest reservoirs of biospheric carbon in the Earth system.



This project aimed to: 1) quantify the extent and carbon content of tropical peatlands in the Asia-

Pacific region, and 2) analyze the risk of large releases of carbon from peatlands over this century, and the potential impact on global warming.

Results showed that peatlands cover approximately 31 million ha in Southeast Asia and store an estimated 47 Gt of carbon. Peatland carbon pools in the region are severely impacted by drainage and fire, and are emitting up to 1.5 Gt of CO_2 each year, as a result of these, and other, human activities.

Future climate change scenarios for the region indicate there will be a combination of increased temperatures and reduced rainfall in the dry seasons. This is likely to lead to a reduction in the net water tables in peatlands and lead to great carbon emissions due to decomposition of the peat layer and also through increased number of fires. Moreover, the growing population and economies in the region increase the demand for land resulting to more peatlands being cleared and converted to agriculture. This is reducing the number of natural peatlands to sequester carbon and also increasing the carbon emissions as a result of drainage and fires.

Publications:

- *Proceedings of Workshop on Vulnerability of Carbon Pools of Tropical Peatlands in Asia* [in CD-ROM], 23-26 January 2006.
- Report of Workshop on Peatland and Climate Change in Kuala Lumpur, 26-27 August 2006.
- Vulnerability of Carbon Pools in Tropical Peatlands [Special Issue] in the Springer journal of *Ecosystems* (to be published in 2007).

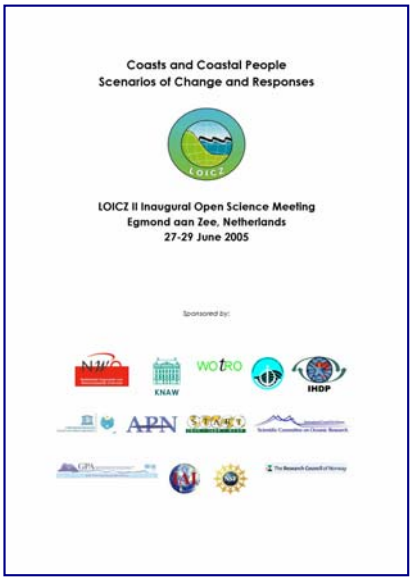
APN2005-13-NSY-Lansigan: Supporting Regional Capacity Contributions to LOICZ II Development at the IGBP/IHDP LOICZ II Inaugural Open Science Meeting

Project Leader: Dr. Felino Lansigan
Email: fplansigan@yahoo.com
Funding: US$ 15,000
Participating Countries: Global activity

Summary: The LOICZ Inaugural Open Science Meeting, held in Egmond an Zee, The Netherlands from 27-29 June 2005,

ushered LOICZ's second decade as a global change program. Building on its strengths in examining material fluxes from catchments to coast, the LOICZ project embarked on a broadly expanded research network which focussed on the interactions between humans, ecosystems and material fluxes as drivers of coastal change. Over the three-day meeting, a community of some 270 coastal scientists and managers representing 52 countries engaged in exciting dialogue about these interactions, their trajectories of change, including ways to approach sustainable coastal scenarios.

The funds provided by the APN supported regional scientists from natural and human dimension disciplines to contribute their expertise and knowledge of regional issues and needs into this first LOICZ global forum. Two plenary addresses, given each day, provided an overview of the challenges faced by the global environmental community.



Plenary addresses were followed by oral presentation sessions whereby a keynote talk and paper presentations provided insight of future research needs and work in progress in regard to the research themes covered by the LOICZ Science Plan. The meeting also included afternoon workshops to develop research proposals and action plans targeting knowledge products. It provided an opportunity for researchers and practitioners to forge new linkages or renewed ties with colleagues to pursue LOICZ related activities.

Publications:

- All presentations and a meeting report are available on LOICZ website www.loicz.org.

APN2005-14-NSY-Cambell: Community Relocation as an Option for Adaptation to the Effects of Climate Change and Climate Variability in Pacific Island Countries (PICs)

Project Leader: Dr. John Campbell
Email: jrc@waikato.ac.nz
Funding: US$ 44,295

Participating Countries: New Zealand, Pacific Island Countries and USA

Summary: There has been widespread conjecture that some, if not many, Pacific Island communities may have to be relocated in the event that climate change scenarios unfold as projected. The purpose of this project was to examine the implications of such an adaptive response. There were three main sets of activities.

First, a literature and documentary search was conducted for examples of relocated communities in Pacific Island Countries and for literature on the general issue of community relocation. Second, participatory research was performed in a village, Biausevu, in Fiji, that had relocated in response to tropical cyclone related flooding. Third, a regional workshop was held in which participants shared experiences and/or expectations of relocation in their countries. In this workshop, a village based research was also reported and training sessions were conducted using hypothetical scenarios where community relocation may be considered as an adaptation option.

Results indicated that community relocation is not uncommon in the Pacific region although in many cases the distances moved are relatively short. Long distance relocation is quite rare, especially in the post-colonial era. However, if climate change scenarios are borne out, it may well be that communities in countries entirely comprised of atolls may have to face the need for such relocation in the future.

The project also established a four-fold classification of relocation based on distance and boundaries crossed. Lessons were gathered from a community that has relocated several times. The boundaries included land tenure and international political borders. The costs and problems

associated with relocation increase with distance and boundary crossing. In fact it is unlikely that communities will be able to be relocated across international boundaries under current social, political and economic conditions. Furthermore, the project developed a series of steps that might tentatively be considered in relocation decision-making and drew on lessons learned from a community that has relocated several times in the past century or so.

Publications (pending):

- *Community relocation as an adaptive response to climate change and variability in Pacific Island Country*. This report will be made available to organizations and governments in the Pacific Island region.
- "Community relocation implications and expectations". This paper will be submitted to a refereed journal for publication. At this stage, *Global Environmental Change* is being considered.

APN2005-15-NSG-Pallewatta: Climate Change Impacts on the Ecology of Rice Pest Complex and the Resulting Threat to Food Security and Farming Economy in South Asia

Project Leader: Dr. Nirmalie Pallewatta
Email: nimmi@zoology.cmb.ac.lk
Funding: US$ 15,000
Participating Countries: Bangladesh, India, Pakistan and Sri Lanka

Summary: A regional scoping workshop that brought together collaborating researchers from Bangladesh, India and Sri Lanka was held from 23-25 September 2005 in Mount Lavinia, Sri Lanka. The main objective of this meeting was to discuss and to fully develop the theme of climate change, ecology of rice insect pests and the threat to rice farming and food security in South Asia. Specifically, the participants discussed the climate change scenarios for the South Asian region; selection of insect pests, their population changes and estimation of yield losses due to their attack; selection of geographical areas and rice farming types; socio-economic context of rice production; and the sampling procedure.

A proposal for project funding from April 2006 was submitted to the APN for further consideration as a result of this activity. Another important outcome of the workshop was the establishment of a closer working relationship among participants and the opportunity to exchange ideas on the main components of the proposed work. References in relation to the proposed project were also compiled which helped identify data gaps and the rice insect pest scenario in each country.

APN2005-16-NSY-Skilbeck: Asian Neighbours Network: Training Through Global Change Research

Project Leader: Prof. C. G. Skilbeck
Email: g.skilbeck@uts.edu.au
Funding: US$ 15,000
Participating Countries: Asia-Pacific (regional activity)

Summary: The Asian Neighbours Network: Training through Global Change Research was designed to create practical at-sea training opportunities for marine science graduate students from the Asia-Pacific region. Through participating in climate and environmental change research in a multinational and multidisciplinary environment, students gained skills in marine research and commenced international networking. Eighteen students from eight countries participated in a research cruise aboard the design-built research vessel *Marion Dufresne*.

The cruise took place from 24 June to 8 July 2005, embarking in Port Moresby, Papua New Guinea and disembarking in Darwin, Australia, 15 days later. The research training activities of the University of the Sea piggybacked on an International Marine Global Change Studies (IMAGES) cruise mainly in the Gulf of Papua and the Torres Strait. This cruise involved scientists from France, Japan and USA undertaking coring in the seaway between Australia and New Guinea, in order to analyze the record of

Website: http://uos.anu.edu.au/calendar/day1.html

past climate change and ocean circulation contained in the subsea-floor sediments.

The students' time was divided between formal instruction, through lectures and training on the research instruments available on the ship, and in the latter part of the cruise, assisting the IMAGES staff with data collection. The principal objective of providing an opportunity for young marine scientists from the Asia-Pacific region to gain experience in sea-based research activities was achieved, and all participants provided positive feedback about this.

Publications:

- DeDeckker, P., Baker, E., Keene, J., Skilbeck, G., Dickinson, J., Anderson, L., Bowen-Thomas, J., Chand, D., Donaldson, T., Dryburgh, M., Kadarwati, U., Kinna, B., Kurnia, Z., Lee, J.H., Lewis, M., Mamo, B., Pethybridge, H., Terney, P., Singh, A., Taloiburi, E., Twiggs, E., Verhoeven, M., Weiland, L., Weir, F. and Shipboard Party. (2006). The University of the Sea: Practical Marine Sciences Education. Accepted for "The Future Starts with Resourcing Geoscience Education" session of the 18th Australian Geological Congress, in Melbourne, July 2006.

APN2005-17-NSG-Costa: Optimization Strategies for the Management of Change in Coastal Zones and Inland Water Caused by Salinity Intrusion

Project Leader: Dr. Gregory De Costa
Email: gregory.decosta@openpolytechnic.ac.nz
Funding: US$ 16,000
Participating Countries: Australia, India, Japan, New Zealand and Sri Lanka


Workshop Participants
Colombo, Sri Lanka, October 2005

Summary: Changes in coastal zones and adjacent waters caused by extraction of water and resulting salinity intrusion has been a problem, and is an emerging problem, in many countries. Managing such changes necessitates many tools. A workshop was held in Colombo, Sri

Lanka, from 5-6 October 2005, in which collaborators and other stakeholders developed a strategy to identify the scope of this problem and the desired tools and methodology for detailed investigation. Here, a research proposal was developed to identify a universally applicable generalized model for forecasting salinity intrusion, as well as managing changes that it causes in coastal zones and inland waters. The proposal was submitted to the APN for funding consideration from April 2006, and has since been awarded funding. Several outcomes were also achieved, such as increased profile and awareness of continuous changes in coastal zones and inland waters; established links with policy-makers and stakeholders; enhanced international understanding; and development of an international team.

Publications:

- De Costa, G. (2006). Towards developing a strategy for managing saltwater intrusion in coastal aquifers. *Proceedings of the 15th Congress of the International Association for Hydraulic Research – Asia-Pacific Division* (pp. 1,547-1,552). Volume 3. Chennai, India, August 2006.

APN2005-19-NSG-Wikramanayake: Regional Scoping Workshop on Science-Policy Interactions in Coastal Zone Management in South Asia

Project Leader: Dr. Nalin Wikramanayake
Email: tomwiks@yahoo.com
Funding: US$ 15,000
Participating Countries: Bangladesh, India, Pakistan and Sri Lanka

Summary: South Asia accommodates a population of approximately 1.4 billion, with a significant proportion of the population and the economy of the region based within the coastal zone. Sustainable management of the coastal zone requires an understanding of what causes changes in the coast and the impacts of these changes on human activities. A regional workshop on science-policy linkages in coastal zone management was conducted from 20-22

October 2005, in Sri Lanka. The workshop aimed to include scientists from the social sciences and policy and management areas into the existing regional network of coastal scientists, identify existing policies relevant to coastal zone management, and develop a proposal to study science-policy linkages in the management of the coastal zone. By holding the workshop immediately after a regional workshop on river-basin coast interactions, it was possible to have a large number of participants representing the natural and social sciences, as well as the policy and management areas.

The presentations and discussions at the workshop showed that there was an urgent need to improve the linkages between science and the development of policies that affect the coastal zone at regional, national and local levels. The key outcome of the workshop was the development of a project proposal "Development of an Integrated Framework for Science-Policy Interactions towards Enhanced Management of Coastal Systems in South Asia". This was submitted to the APN for funding consideration from April 2006 and was subsequently approved. Furthermore, an enhanced regional network of coastal scientists and managers was developed, as well as a strategy for the regional implementation of the LOICZ Science Plan.

APN2005-23-NSY-Wang: The Degraded Ecosystem Restoration in the Arid and Semi-Arid Northern China-Mongolia Region

Project Leader: Dr. Hanjie Wang
Email: eerc2502@vip.sina.com; hjwang@tea.ac.cn
Funding: US$ 28,000
Participating Countries: Australia, Mongolia, and P.R. China

Summary: Desertification/land degradation caused by global climate warming and intensive human activity has become one of the most serious problems, particularly in the ecological sensitive arid and semi-arid areas. Among these degraded ecosystems include degenerating pasture, farmland, windbreaks, shrinking and drying wetlands and other terrestrial ecosystems, which are found in Northern China, Mongolia and Western Australia. An international workshop was conducted in Yinchuan, China, from 20-23 June 2006 to exchange information on best practices for desertification control and degraded ecosystem restoration.

The most successful techniques for desertification control and degraded ecosystem restoration were identified. These are: 1) an innovative method of producing sand stabilization material using lignin extracted from the black liquor of straw paper mills; 2) a desertification control using clay, stone and vinyl net barriers; 3) an optimum tree-grass intercropping configuration for restoring the degenerated steppes and provide more fodder for domestic animals; and 4) a sustainable precept for wetland conservation and eco-tourism development.

These achievements have laid a scientific foundation for sustainable development of population, resources, and the environment in the arid and semi-arid regions in the Asia-Pacific region.

Publications:

- Wang, H. (Ed.). (2006). *Proceedings of the APN Workshop on the Degraded Ecosystem Restoration in the Arid and Semi-arid Northern China-Mongolia Region* [17 papers]. Beijing, China: China Forestry Publishing House.
- Wang, H. *et al.* (2006). A preliminary report on the field experiment of dune fixation and virescence using lignin sand stabilization material. Submitted to *Acta Ecological Sinica*.
- CD-ROM copy of workshop proceedings, workshop presentations (both PowerPoint and video files), and the post-workshop professional tour map.

APN2005-24-NSG-Babar: Impact of Global Change on the Availability of Fodder & Forage and Performance of Livestock in South Asia

Project Leader: Dr. Masroor Ellahi Babar
Email: masroorbabar@hotmail.com
Funding: US$ 20,000
Participating Countries: Bangladesh, Canada, India, Nepal and Pakistan

Summary: A proposal entitled "Impact of Global Change on the Availability of Fodder and Forage & Performance of Livestock in South Asia" was submitted in 2004 for APN funding. In response, the APN provided a seed grant to further sharpen the methodologies of the proposal. A scoping workshop was held from 15-16 December 2005, in Lahore, Pakistan to discuss different aspects of GHG emissions from livestock and its estimation methods.

Many eminent scientists from the region, engaged in livestock and fodder research, and two Canadian scientists, engaged in monitoring GHG emission from livestock systems, participated in the workshop. An inventory of local research was discussed, as were methods for monitoring GHG emissions from ruminant livestock systems. Potential strategies, crops and feeding strategies, that simultaneously improve performance and lower GHG emissions, were identified. Following discussions from the workshop, a revised proposal was submitted to the APN for funding consideration from April 2006.

APN2005-25-NSY-Sari: Issues Related to Future Action on Climate Change in Asia and the Pacific

Project Leader: Dr. Agus P. Sari
Email: agus.sari@ecosecurities.com
Funding: US$ 40,000

Participating Countries: Bangladesh, Indonesia, Japan, P.R. China and Thailand

Summary: The Kyoto Protocol entered into force in February 2005, but the Protocol is limited in terms of its duration (2008-2012) and coverage of commitments on GHG emission limitation. In order to address climate change at an acceptable level, action by countries in Asia and the Pacific is necessary in the near future. Hence, it is vital that countries be well informed about any concerns and policy development within their own country, as well as the region.

This project aimed to increase the capacity of developing countries in dealing with future institutional challenges of climate change beyond the Kyoto Protocol and the Framework Convention on Climate Change. It also sought to foster developing countries to be more proactive in the discussion of the future global climate change, and to develop a climate of trust, understanding, and good faith to facilitate the commencement of the crucial negotiation on "beyond 2012" institutional challenge on climate change.

Greenhouse gas emissions from the Asia-Pacific region are likely to rise rapidly in the near future as a consequence of growth-oriented economic policy adopted by countries in the region. Countries under study, Bangladesh, Indonesia, Japan, P.R. China and Thailand, have responded to the threat of climate change in varying degrees. Japan and P.R. China have made the most advancement; they have adopted climate change policy at the national and local levels, and they have established an institutional design and assigned an institution specifically dedicated to coordinate national climate change efforts and give policy advice.

Such institutions also exist in Indonesia and Bangladesh, however they are not functional. Thailand is in the process of developing one. On the "beyond 2012" issue, only Japan and P.R. China have started formal discussions in their respective

Website: http://www.beyond2012.org

countries. Such discussion in Bangladesh, Indonesia and Thailand has not been initiated by the government.

Publications:

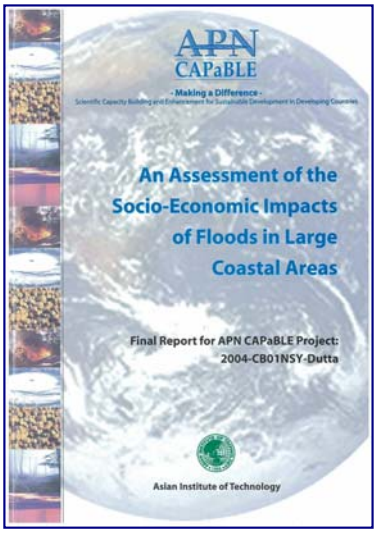
- Country papers: Bangladesh, Indonesia, Japan, P.R. China and Thailand.
- Book *Capacity Building in Asia and the Pacific on Issues Related to the Kyoto Protocol Beyond 2012* (to include India and Korea) – to be published in COP/MOP 3.

CAPaBLE

Highlights and publications for completed projects under APN's CAPaBLE Programme are included in this chapter of the Annual Report. Further details on any of the projects highlighted in this publication can be obtained by visiting the APN website at http://www.apn-gcr.org.

APN2004-CB01-NSY-Dutta: An Assessment of the Socio-economic Impacts of Floods in Large Coastal Areas

Project Leader: Dr. Dushmanta Dutta
Email: ddutta@ait.ac.th
Funding: US$ 45,000
Participating Countries: Bangladesh, India, Pakistan, Sri Lanka and Viet Nam



Summary: The present trend of rapid urbanization of coastal zones in most developing countries puts an increasing number of people and property at risk due to climate change triggered sea-level rise. The consequent flooding is expected to affect most low-lying coastal cities. A series of case studies have been conducted to assess socio-economic impacts of flooding under climate change conditions in low-lying large coastal cities of Bangladesh, India, Pakistan, Sri Lanka, Thailand and Viet Nam.

The study aimed at raising awareness among policy-makers on the socio-economic vulnerability of coastal cities under climate change, and assisting them in developing and implementing policies towards betterment of future flood management measures. At present, the Meghna Delta (Bangladesh) is highly vulnerable to floods with 83% of the total population and buildings being affected. In Hue City (Viet Nam), about 44% of the population and buildings are affected by flooding, while the

Mahanadi Delta (India), Karachi (Pakistan) and Matara City (Sri Lanka) are not in the high risk domain.

Scenario and comparative analyses of socio-economic impacts of floods due to sea level rise were performed, and it was found that the coastal cities in the Meghna Delta are highly vulnerable to floods under climate change conditions, as far as population and buildings are concerned. The extent of adverse impacts on the cities of Bangkok and Hue is considerable, albeit lower in comparison to the Meghna Delta. Cities located in the Mahanadi Delta, India, are found to be more sensitive when it comes to damage of road networks. Meanwhile, Bangladesh has addressed climate change issues, as far as making relevant policy. However, the existing policies and strategies of other countries lack any clear section pertaining to climate change, which may aggravate the future vulnerability situation, and need to be looked upon substantially and immediately.

Publications:

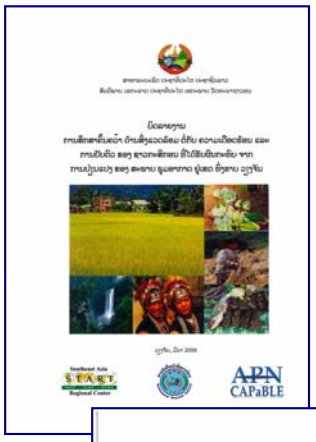
- Dutta, D. and Babel, M.S. (Eds.). (2005). *Proceedings of the International Symposium Floods in Coastal Cities under Climate Change Conditions*. Asian Institute of Technology, Thailand, June 2005, 185 pp.

APN2004-CB02-CMY-Chinvanno: Building Capacity of Mekong River Countries to Assess Impacts from Climate Change – Case Study Approach on Assessment of Community Vulnerability and Adaptation to Impacts of Climate Change on Water Resources and Food Production

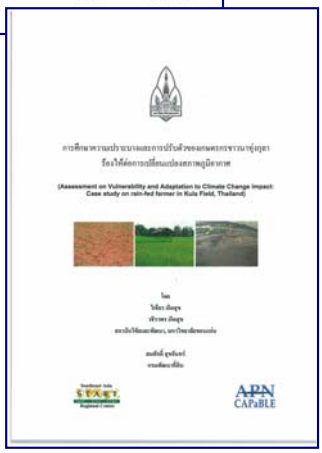
Project Leader: Dr. Suppakorn Chinvanno
Email: suppakorn@start.or.th
Funding: US$ 58,085 for two years
Participating Countries: Lao PDR and Thailand

Summary: Climate change is an issue of concern in Southeast Asia, specifically because it may cause shifts and changes in rainy season patterns that would directly affect agricultural activity and threaten the livelihood of a large population in the region. The countries in the region, many of which are developing, are vulnerable to climate change impact as they have limited resources to cope with future situations. Existing knowledge on this subject is limited in the region, as is the

know-how to conduct research on climate change and its consequences. This project aimed to fill this gap by building the research capacity of selected personnel and institutes in Lao PDR and Thailand.

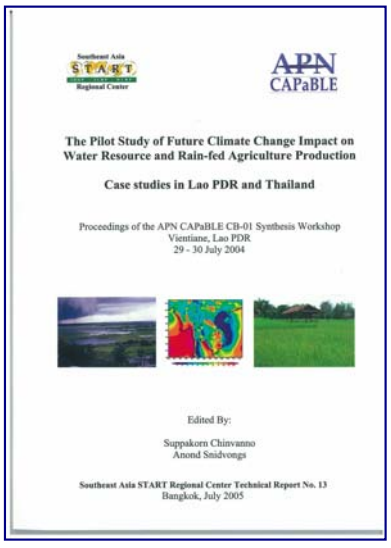


The capacity building approach employed was not based on conventional training and workshops alone, but it also included pilot research practice on real cases, conducted with guidance from the SEA START Regional Center by using data, method and know-how obtained from other global change projects, such as Assessment of Impacts and Adaptation to Climate Change (AIACC).



Over 60 scientists, academics, government officials, press and local stakeholders were involved in the process. Research capacity has been developed around the understanding of climate scenario, the hydrological analysis and crop yield analysis using a modelling approach. In addition, field assessments, which involved direct local stakeholder participation, were conducted in both countries.

Results of the climate scenario-building suggest that climate change will affect the climate system in Southeast Asia, including Lao PDR and Thailand. The impacts may vary from place to place, however the results of the climate scenarios generally show an increase in precipitation trend. The seasonal pattern may also be altered. These changes will have an impact on the systems investigated in the study, i.e., water resources and rain-fed agriculture systems. People in the region may also face higher risks of climate impacts in the future. Vulnerability assessments of communities to climate change/variability suggest that



vulnerability is a place-specific issue; and therefore, the adaptation strategy should take local context into consideration.

Publications:

- Chinvanno, S. and Snidvongs, A. (Eds.) (2005). *Proceedings of the APN CAPaBLE CB-01 Synthesis Workshop on the Study of Future Climate Change Impact on Water Resources and Rain-fed Agriculture Production*. Southeast Asia START Regional Center, Thailand, Technical Report No. 13, 113 pp.
- Kerdsuk, Vichien, Kerdsuk, Varaportn, Sukchan, Somsak. (2005). Impact Assessment and Adaptation to Climate Change: The Study of Vulnerability and Adaptation Options of Rain-fed Farmer in Tung Kula Ronghai, Khon Kaen University, Thailand.
- Suvannalath, Soulideth, Komany, Souphasay. (2006). Report on the Study of Vulnerability and Adaptation to Climate Change Impact of Rain-fed Farmer in Vientiane Plain, Lao PDR. Southeast Asia START Regional Center, Thailand.
- Chinvanno, S. (2006). Assessment on Impact, Vulnerability and Adaptation to Climate Change: Pilot Study in the Lower Mekong River Region. Southeast Asia START Regional Center, Thailand.

APN2004-CB06-NSY-Rhaman: Training Seminars on Methodological Issues Related to the Human Dimensions of Global Environmental Change

Project Leader: Prof. Aminur Rhaman
Email: aminur@iub.edu.bd
Funding: US$ 45,000
Participating Countries: Global activity

Summary: Four Pre-Open Meeting Training Seminars took place from 6-8 October 2005 in Königswinter, Germany. These capacity building activities focused on methodological issues related to research questions on the human dimension of global environmental change, with topics

linked to IHDP core projects and the Earth System Science projects. The four training seminars proved to be an exciting and challenging interactive exercise, which enabled young researchers from all over the world to meet with top researchers to learn from each other and feel inspired for further collaboration.

The themes/topics of the four training seminars were: 1) Urbanization and Global Environmental Change; 2) Understanding Vulnerability to Global Environmental Change in the Context of Globalization; 3) Analysis of Spatial Data for Human Dimensions Research; and 4) Economic Methods for Global Environmental Change Research. These seminars developed concrete skills and gave state-of-the-art information and knowledge about the topics in question, as well as enhanced collaboration and networking between the young researchers and the broader global environmental change research community.

APN2004-CB07-NSY-Glantz: Prototype Training Workshop for Educators on the Effects of Climate Change on Seasonality and Environmental Hazards

Project Leader: Dr. Michael H. Glantz
Email: glantz@ucar.edu
Funding: US$ 29,000
Participating Countries: India, Malaysia, Philippines, P.R. China, Sri Lanka, Thailand, USA and Viet Nam

Summary: Most environmental hazards are seasonal, and coping strategies have been sought, and in many cases developed, to respond appropriately within the limits of forecast uncertainties about the timing, magnitude, and location of occurrence of specific

hazards. As climate changes with global warming of the Earth's atmosphere, societies will gradually, and in some cases precipitously, be forced to respond to and cope with events and processes that will surprise them. Rather than focus on just the causes of such shifts in hazard behaviour or dwell only on the specific impacts on society, it is imperative to identify more specifically the chain of events from cause to ultimate impacts on humans, including responses to those impacts.

In connection with this, the emphasis on 'seasonality' was proposed. Early warnings of changes in seasonality, whether qualitatively or quantitatively based, can elevate to prominence the key influence that subtle changes in the characteristic flow of the seasons can have on the behaviour of living things and in the sea. Four countries were originally chosen for the prototype workshop: Malaysia, Philippines, Thailand and Viet Nam. In addition, participants from universities in India, P.R. China, Sri Lanka and Thailand also joined the workshop.

Educational materials on the topics of seasonality, climate variability, climate change, sustainable development, and the influence of changes in the flow of the season on human activities have been identified for use at the university undergraduate or graduate levels. The second phase of this activity will be to develop the concept for other universities and countries in the region. The participants were encouraged to interact electronically and will assist in the development of course materials for use by others in the region.

APN2004-CB08-NSY-Kishi: Toward Quantitative Understanding of Natural Fluctuations of Marine Coastal Fisheries of Sardines and Anchovies and their Impact on Fishing-Dependent Human Activities

Project Leader: Prof. Michio J. Kishi
Email: kishi@salmon.fish.hokudai.ac.jp
Funding: US$ 10,000
Participating Countries: Bangladesh, India, Japan, P.R. China and USA

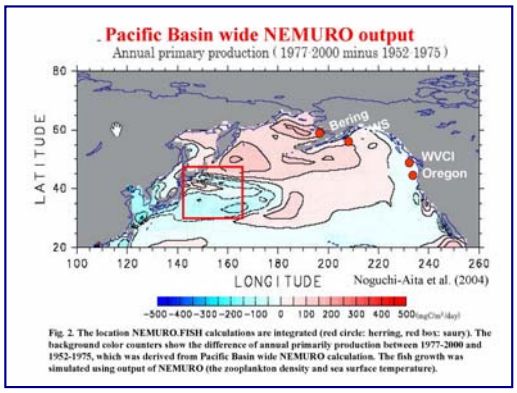


Fig. 2. The location NEMURO.FISH calculations are integrated (red circle: herring, red box: saury). The background color counters show the difference of annual primarily production between 1977-2000 and 1952-1975, which was derived from Pacific Basin wide NEMURO calculation. The fish growth was simulated using output of NEMURO (the zooplankton density and sea surface temperature).

Summary: Together with long-term ecosystem-specific oceanographic and fisheries datasets, this project sought to understand the effect of climate change on marine ecosystems and to quantify these effects on fish growth and production in distinct geographic regions that support sardine and anchovy populations. It also aimed to explain the sardine and anchovy abundance trends and explore how best to integrate these results into the decision-making process by fisheries/resource managers and policy-makers.

A workshop on "Global Comparison of Sardine, Anchovy and Other Small Pelagics: Building towards a Multi-Species Model" was held in Tokyo, Japan from 14-17 November 2005. The goal of the workshop was to explore ways to extend an existing marine food-web and fisheries model to ecosystems containing sardine and anchovy.

Global fluctuations in the populations of sardines and anchovies have been documented over the past centuries. The amplitude of fluctuation can be high, and inter-annual and longer-term fluctuations contribute significantly to the total variability of the world's fish harvest. Additionally, the fluctuations appear to be at times asynchronous across species within specific regions, as well as synchronous within species at larger (basin) scales. This led to discussions on the possibility of climate-induced variability in sardine and anchovy population fluctuations.

At the workshop, recent data and modelling approaches that could help explain the annual and inter-decadal variability of sardine and anchovy populations were reviewed. A common multi-species, spatially-explicit modelling approach was outlined, which is an extension to the NEMURO.FISH model.

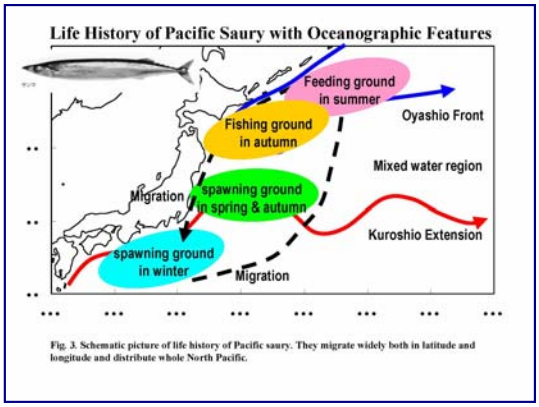


Fig. 3. Schematic picture of life history of Pacific saury. They migrate widely both in latitude and longitude and distribute whole North Pacific.

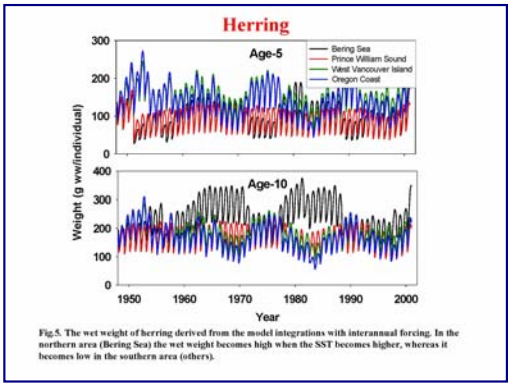


Fig.5. The wet weight of herring derived from the model integrations with interannual forcing. In the northern area (Bering Sea) the wet weight becomes high when the SST becomes higher, whereas it becomes low in the southern area (others).

Workshop attendees also outlined a comparative approach designed to study the effects of climate change on sardine and anchovy population dynamics by focusing on the populations located in key geographic areas accompanied by supporting data for model comparison, calibration and validation. Results of these efforts were presented at the PICES Annual Meeting in Yokohama, Japan in October 2006.

Publications:

- Aita, M.N., Yamanaka, Y. and Kishi, M.J. (2006). Interdecadal variation of the lower tropic ecosystem in the Northern Pacific between 1948 and 2002, in a 3-D implementation of the NEMURO model. *Ecol. Modelling*, doi:10.1016/j.ecomodel.2006.07.045.
- Fujii, M., Yamanaka, Y., Nojiri, Y., Kishi, M.J. and Chai, F. (2006). Comparison of seasonal characteristics in biogeochemistry among the subarctic North Pacific stations described with a NEMURO-based marine ecosystem model. *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.02.046.
- Ito, S., Megrey, B.A., Kishi, M.J., Mukai, D., Kurita, Y., Ueno, Y. and Yamanaka, Y. (2006). On the interannual variability of the growth of Pacific saury (*Cololabis saiba*): A simple 3-box model using NEMURO.FISH. *Ecol. Modelling*, doi:10.1016/j.ecomodel.2006.07.046.
- Kishi, M.J., Eslinger, D.L., Kashiwai, M., Megrey, B.A., Ware, D.M., Werner, F.E., Aita, M.N., Azumaya, T., Fujii, M., Hashimoto, S., Huang, D., Iizumi, H., Ishida, Y., Kang, S., Kantakov, G.A., Kiml, H., Komatsu, K., Navrotsky, V.V., Smith, S.L., Tadokoro, K., Tsuda, A., Yamamura, O., Yamanaka, Y., Yokouchi, K., Yoshie, N., Zhang, J., Zuenko, Y.I. and Zvansky, V.I. (2006). NEMURO – a lower tropic level model for the North Pacific marine ecosystem. *Ecol. Modelling*, doi:10.1016/j.ecomodel.2006.08.022.
- Mukai, D., Kishi, M.J., Ito, S. and Kurita, Y. (2006). NEMURO.FISH – Saury Version – Pacific saury growth

dependency on spawning seasons. *Ecol. Modelling*, doi:10.1016/j.ecomodel.2006.08.022.
- Werner, F.E., Ito, S., Megrey, B.A. and Kishi, M.J. (2006). Synthesis of the NEMURO model studies and future directions of marine ecosystem modelling. *Ecol. Modelling,* doi:10.1016/j.ecolmodel.2006.08.019.
- Yoshie, N., Yamanaka, Y., Rose, K.A., Eslinger, D.L., Ware, D.M. and Kishi, M.J. (2006). Parameter sensitivity study of a lower tropic level marine ecosystem model "NEMURO". *Eco.l Modelling*, doi:10.1016/j.ecomodel.2006.07.043.

APN2005-CB05-CMY-Nakane: Capacity Building for Greenhouse Gas Inventory Development in Asia-Pacific Developing Countries

Project Leader: Dr. Hideaki Nakane
Email: nakane18@nies.go.jp
Funding: US$ 120,000 for three years
Participating Countries: Cambodia, Japan and Thailand

Summary: Developing countries are particularly vulnerable to the adverse impacts and threats of climate change. To help prioritize countermeasures against those impacts and threats, greenhouse gas (GHG) inventories that can provide an accurate knowledge of GHG emission/removal trends are critically important. In the Asia-Pacific region, it is known that country-specific information for emission/removal factors and activity data, which are essential to prepare reliable GHG inventories, is not readily available.

Moreover, although the degree of development of inventories varies widely, forums for neighbouring countries to share information and experiences related to GHG inventory development have not been sufficiently established. The goal of this project was to clarify the methodology for effectively improving inventories of countries in the Asia-Pacific region and enhance the regional contribution to relevant international efforts. Pilot studies were implemented in Cambodia and Thailand to

demonstrate the comprehensive and source-specific approaches to improve inventories.

The pilot study in Cambodia prepared an inventory of the LULUCF sector for the year 2000. A full report on the methodology and procedure taken was created. A standard forest measurement technique was learned, and the availability of local information and data was improved. In Thailand, a semiconductor sensor unit was constructed and its capability to measure methane flux in rice fields reliably was confirmed. With this sensor, the emission factors for methane from irrigated rice paddies under different treatments and rain-fed rice paddies were developed and compared with old factors.

Another measurement methodology using a laser gas detector was also applied together with a semiconductor sensor to measure methane flux from landfill sites. The progress and outcomes of the studies were shared in annual regional workshops and inputs from these stimulated discussion and contributed to an increased body of knowledge on inventories in the region.

Publications:

- Report of the meeting for the pilot study in Cambodia in Year 1
- Report of the first training for the pilot study in Thailand in Year 1
- Report of the training for the pilot study in Cambodia in Year 2
- Report of the second training for the pilot study in Thailand in Year 2
- Report of the third training for the pilot study in Thailand in Year 2
- Report of the activities of the pilot study in Cambodia in Year 2
- Report of the activities of the pilot study in Thailand in Year 2
- Report of the training for the pilot study in Cambodia in Year 3
- Report of the training for the pilot study in Thailand in Year 3
- Report of the activities of the pilot study in Cambodia in Year 3

- *Proceedings for the 2nd Workshop on GHG Inventories in Asia Region*. 7-8 February 2005, Shanghai, China. Ministry of the Environment, Japan and National Institute for Environmental Studies (NIES), Japan.
- Jiaphasu-anun, T., Towprayoon, S. and Chidthaisong, A. (2006). Comparative measurements using semiconductor sensor and gas chromatography to analyze CH_4 and CO_2 emission from the rice field in Samutsakorn, Thailand. *Proceedings of the 2nd Joint International Conference on Sustainable Energy and Environment (SEE 2006)*, 21-23 November 2006, Bangkok, Thailand.

Peer-Reviewed Publications

APN2004-06-CMY-Chen

Chen, Z., Watanabe, M. and Wolanski, E. 2007. Sedimentological and ecohydrological processes of Asian deltas: The Yangtze and the Mekong. Editorial. *Estuarine, Coastal and Shelf Science*, 71 (1-2): 1-2.

Chen, Z., Saito, Y. and Goodbred, S. Jr.(Ed.) 2005. Mega-deltas of Asia-Geological Evolution and Human Impact. People's Republic of China. China Ocean Press.

APN2004-07-CMY-Lasco

Lebel, L. 2005. Carbon and water management in urbanization. *Global Environmental Change* 15: 293-295.

Lebel, L., Banaticla, M.R.N., Contreras, A., Garden, P., Lasco, R., Mitra, A.P., Tri, N.H., Ooi, G.I., Sari, A. and Sharma, C. 2007. Integrating carbon management into the development strategies of urbanizing regions in Asia: implications of urban form, function and role. *Journal of Industrial Ecology* 11 (2): (in press).

Lebel, L. 2004. Transitions to sustainability in production-consumption systems. *Journal of Industrial Ecology* 9: 1-3.

1) PAGES Second Open Science Meeting, Beijing, China, 10-12 August 2005; Theme: Paleoclimate, Environmental Sustainability and Our Future (APN2005-06-NSY-Brigham-Grette)

I am a PhD student studying the reaction of glaciers on climatic changes in internal Tien Shan. I think my research could be useful to many scientists who are interested in glaciology, climatology and satellite methods. I couldn't afford travel to Beijing, so I am grateful to APN for giving me a chance to take part in the OSM. It was my first large international meeting. It was really good experience for me. I met a lot of scientists from different countries (Ireland, Australia, China, Japan, and Switzerland). These contacts could be very useful for our future international projects, especially because I am going to be working in Central Asia.

Stanislav Kutuzov
Russian Academy of Sciences
Moscow, Russia
Email: kutuzoff@list.ru

Abstract: **The retreat of Tien Shan glaciers (Central Asia) since the "Little Ice Age" obtained from moraine positions, aerial photographs and satellite images**

Stanislav Kutuzov

The retreat of the terminus of glaciers and loss of glacier's area from their maximum extent during the "Little Ice Age" (LIA) maximum (17th-19th centuries) have been estimated using aerial photographs from 1956 to 1987 and the latest satellite images from 2001 to 2004 from the central Tien Shan mountains (Kyrgyz Republic). In order to increase the accuracy in the identification of the moraines at the satellite and aerial images, all kinds of published information about the front positions of glaciers at the end of the XIX century was used. The glaciers under investigation are located on Teskey Alatau, Ak-Shyrak,

Adir-Tor ranges. There is a great diversity of types, exposure and size of glaciers in the research area.

On average, the glaciers in these areas have retreated by 900-600 m since the LIA maximum. Thus in the second part of the XX century, glaciers area has changed by about 25-30% compared to 5-8% between 1880 and 1970s. Unprecedented wastage of glaciers in the Tien Shan from the mid-1970s till the beginning of the XXI century most likely resulted from the increase of summer air temperature and decrease of summer precipitation which have been recorded at meteorological stations (the Tian Shan station etc.). Changes in atmospheric pressure over the central North Atlantic Ocean during the mid-1970s can be one of the possible reasons for these processes. The study was supported by the ISTC grant #2947.

2) Surface Ocean – Lower Atmosphere Study (SOLAS) International Summer School 2005, Corsica, France, 29 August – 10 September 2005 (APN2005-08-NSY-Shi)

The 2005 SOLAS Summer School provided me with a valuable experience. I was able to gain a diverse impression of fields relating to SOLAS science. It also allowed me to meet many people working in the same area. In particular, I learned a lot from discussions with lecturers and other friends, who kindly offered a great deal of advice and good ideas.

With help from lecturers, we learned the skills which are necessary to become eligible and successful scientists. This year, I have been selected to join an exchange program, which is hosted by the Max Planck Institute for Meteorology in Germany. I think the experience gained from attending the SOLAS Summer School had helped me to get the opportunity. And I have encouraged my colleagues in our institute to join the next SOLAS Summer School.

Kai Zhang
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Beijing, China
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3) The 2005 Open Meeting of the Human Dimensions of the Global Environmental Change Research Community, Bonn, Germany, 9-13 October 2005 (APN2005-09-NSY-Srivastava)

I was supported by APN and IHDP so that I could attend and participate in the recent 2005 IHDP Open Meeting and Training Seminar on Spatial Analysis for Human Dimensions. I was very interested to participate in both the open meeting and training because of their themes' relevance to my current work in conservation.

My organization has embarked on different strategies to deal with conservation issues and one of which targets the link of human welfare with biodiversity conservation. It is high time that when we are faced with conservation concerns and problems in the field we should be approaching these in an integrated manner of dealing with human dimensions and environmental sustainability.

My specific interest is the application of spatial analysis in diagnosing the problems and, perhaps, in providing the solutions. It was very fulfilling to know the recent trends in this application area and the cutting-edge tools available to accomplish these tasks. Because of my awareness of these trends and tools, I am now able to deal appropriately with spatial analysis problems stemming from conducting studies/research in the relationship of human dimensions and conservation issues.

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Abstract: **Estimating Human-Induced Pressure in Biodiversity Conservation Priority Areas**

Oliver Coroza and Felino Lansigan

The paucity of high-resolution socio-economic and demographic data forces modellers to look for alternative means of estimating

them for specific locations from global data sets. Several researchers and modellers have provided prescription methods on how to overcome difficulties in obtaining reliable estimates from higher level or global data sets. The methods range from using the simple areal weighting method, complex areal weighting method to the smarter or clever spatial interpolation methods. Each of these methods has its own innate data requirements for it to perform well in its calculations.

Most of these data would not be even available in most countries, except perhaps in advance countries, where an intensive data collection program is part of their mandate to make better-informed appropriate decisions. A project was developed to study the relationship of socioeconomic and demographic factors with indicators of biodiversity loss. The lack of either municipality or barangay data on most of these factors has forced the project to explore alternative means of estimating the data inside conservation priority areas (CPAs).

The level of data available for all of the population variables is at the provincial scale. Hence, a method was developed to spatially combine regression data from the provincial-data source zone with biodiversity data in a CPA target zone using a GIS. The combination method resulted into an index measure of vulnerability of the CPAs to socioeconomic-demographic pressure, which also highlighted their level of priority for urgent conservation actions. Further on-site assessment is still much to be desired to assess current threats to species.

4): LOICZ Inaugural Open Science Meeting, Egmond aan Zee, The Netherlands, 27-29 June 2005 (APN2005-13-NSY-Lansigan)

First of all, I would like to give special thanks to APN, who gave me a chance to attend the meeting. I was surprised when I knew that I was the only delegate from my country Indonesia. Due to lack of funding, it is not easy to join international conferences or meetings such as this. This opportunity was very honourable for me because I met scientist working in similar fields from all over the world, both developed and developing countries. We shared scientific information and discussed some important issues in the future.

The occasion opened my mind to understand the real problem in the world concerning oceans and coasts. The meeting was very interesting and scientific assessment from multi-discipline perspectives was conducted. This meeting was my first access with LOICZ. After the meeting in small groups from East Asia and Southeast Asia collaborating countries, there was a follow up action plan. Even now, I still keep in touch and have a linkage with some of the participants and LOICZ. So, I got an important benefit during and after the meeting.

Ivonne M. Radjawane
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Abstract: **On the Study of Simulated Nutrient Budget in Lampung Bay, Indonesia Using a Coupled Hydrodynamic-Ecosystem Model**

I. M. Radjawane, S. Hadi, and A. F. Koropitan

The purpose of this research is to study the dynamic of an aquatic ecosystem in semi-enclosed Lampung Bay, Sumatera, Indonesia by using a numerical coupled hydrodynamic-ecosystem model. The model calculated the nutrient budget of chlorophyll-A, zooplankton, phosphate and nitrate. The distribution of each compartment of the ecosystem model was strongly effected by the current circulation. The dynamic of current circulation was generated by the tidal driven current.

The simulated flow pattern of M2 residual current, the dominant tidal constituent in this bay, tends to flow into the western mouth of the bay from which part of them flow toward the head of the bay while the other parts flow out through the eastern mouth of the bay. The simulation also indicates the existence of an eddy with counterclockwise motion around the head of the bay. The simulated distribution pattern of each ecosystem compartment is in a good agreement with the field distribution results.

The distribution pattern of nitrate and phosphate is strongly related to the flow pattern of M2-residual current in the whole observation of the year. There is also shown an intensification of nitrate and phosphate concentrations in the bay head due to riverine inputs from Ratai River. Whereas the anticlockwise circulation in the basin region of the head bay and the smaller residual current in the head bay, therefore the 120 intensification of its concentrations will be distributed gradually to the outer part of the bay head. The calculated flushing time in Lampung Bay is 15 days, so it takes a half-month to distribute the material from riverine inputs.

The other sources of nutrients scattered along the eastern part of the bay's coastline (such as shrimp pond and rice field culture activities, Damar, 2003), the DIN concentrations will be distributed rapidly to the eastern part of the bay mouth. However, the influence of water masses coming from the Sunda Strait might occur. Related to the M2 residual current, there is a material transport (included DIN) which inflows to the Lampung Bay from Sunda Strait.

The primary production, secondary production (grazing), natural mortality of plankton and also decomposition by bacteria are less important to the budget and standing stock calculation in Lampung Bay ecosystem. The influence of rivers run off and ocean water from supply from Sunda Strait are more important than biochemical processes in the bay. The simulated rate of efficiency of heat flow from both the decomposition process and urine production by zooplankton to the primary production has missed of 30.48 %, while from the primary production to the secondary production (grazing) has added of 17.24 %.

5): Training Seminars on Methodological Issues Related to the Human Dimensions of Global Environmental Change, Königswinter, Germany, 6-8 October 2005 (APN2004-CB06-NSY-Rhaman)

I attended the IHDP 2005 Open Meeting and the pre-conference training seminar on “Understanding vulnerability to global environmental change in the context of globalization”. The training seminar exposed me to various issues of global environmental change in the context of globalization, besides

giving me a chance to interact and discuss issues with many young scientists from various regions of the world.

I participated in another workshop this year "The economics of climate change" organized by UNEP and SANDEE (South Asian Network for Development and Environmental Economics) 1-4 December, Bangkok, Thailand which helped me to develop my understanding of the issue better and this will certainly contribute to my future academic career.

I am a doctorate student at TERI University (formerly TERI School of Advanced Studies), New Delhi, India. My Ph.D. thesis involves fishery management in a mangrove-fishery ecosystem. The interface of environment, poverty, climate change, and globalization will be a dominant concern in the future. Therefore, I am thankful to APN for giving me this wonderful chance to attend the IHDP Open Meeting 2005 and the training seminar.

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6) Asian Neighbours Network: Training through Global Change Research (University of the Sea), *Marion Dufresne*, 24 June to 8 July 2005 (APN2005-16-NSY-Skilbeck)

Through the University of the Sea, my dream research came true. The students obtained long-lasting knowledge in both academic and practical experiences through the Training through Global Change Research program. The knowledge that we gained will definitely be useful in investigating marine waters in our own country. Having training on board was very essential for me as an oceanographer, who normally stays most of the time inside the laboratory. In that sense, I fully appreciate the TTR program.

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APN SCOPING WORKSHOPS ON GLOBAL EARTH OBSERVATIONS AND THE CAPACITY BUILDING NEEDS OF THE REGION: FOCUS – CLIMATE

The Asia-Pacific Network for Global Change Research (APN), in collaboration with the Ministry of Environment, Japan (MoEJ), the National Institute for Environmental Studies (NIES), the US National Science Foundation (NSF) and the Ministry of Natural Resources and Environment, Thailand (MONRE), conducted two scoping workshops on global earth observations and the capacity building needs of the region, with a focus on climate, held from 17-18 November 2005 in Tokyo, Japan and from 19-21 March 2006 in Bangkok, Thailand.

The key objectives of these workshops were to consider the capacity building necessary for research and monitoring related to climate change and its impacts, to discuss the role of the APN in such research and underpinning systematic observations, and to create road maps for designing ideas appropriate for capacity building activities in the Asia-Pacific. Experts from different countries and various disciplines gathered together to deliberate and discuss priority issues relevant to capacity building needs and on ways and means to strengthen regional cooperation in the Asia-Pacific.

Observational Data Requirements for Advancing the Understanding of Climate Change. Discussion on this topic revealed that many existing data are not accessible to researchers in Asia and the Pacific, either nationally or internationally. Resolution of this barrier requires promoting political commitment to data sharing, removing practical barriers by enhancing electronic interconnectivity and metadata, and data rescue and digitization. It was deemed important to have a systematic observation of sensitive and fragile systems (or hotspots) as detection of early warning indicators and for demonstrating the evidence of global warming to national leaders and society.

Workshop participants identified several hotspots in the Asia-Pacific region for which conventional and *in situ* and remotely sensed observational data are required for advancing the current understanding of climate variability and climate change. These hotspots include the Himalayan glaciers, high elevation areas of the Tibetan plateau, Mongolian tundra, desertification trends in arid/semi-arid areas of West Asia, among others.

Capacity Building Needs on Vulnerability and Adaptation to Climate Change for Sustainable Development. It was reported that the level and quality of adaptation in most developing countries of the Asia-Pacific region is currently insufficient and falls short of that which is required to cope effectively with present-day risks of extreme weather events. The limiting factors to the technical and scientific capacity in the region and where capacity building is needed include: inadequate user involvement; scarcity of scientists, technical infrastructure and funding; limited research experience; lack of familiarity with methods and models; and weak or lack of collaboration among scientists of multiple disciplines.

Meanwhile, food and fibre, biodiversity, water resources, coastal ecosystems, human health and settlements, and land degradation were identified as the region-specific sectors that are most vulnerable to climate change. The need for data and research on these vulnerable sectors was emphasized in enhancing the region's capacity to plan for adaptation strategies.

Priority Actions. Several priority actions were recommended to address the constraints in the capacity development of the Asia-Pacific and to achieve a comprehensive and sustained understanding of the Earth's processes. Communication was seen as an effective approach to

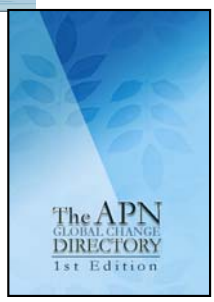
address these issues, particularly on improving information sharing and promoting public awareness. High priority was also given to: research on climate modelling and socio-economic impacts and adaptation; collection, rescue and analysis of historical data; detection of ongoing phenomena related to climate change and variability; and linking earth observations and climate modelling.

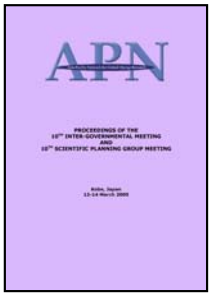
It is expected that the APN will play an important role in these endeavours through its continued support towards GEOSS-related capacity building initiatives using its existing activities, such as the Annual Calls for Proposals and the CAPaBLE Capacity Development programme. Strengthening the roles of the APN members by seeking proposals from them in response to the identified needs and facilitating the improvement of access to data by developing metadata centres and database are some areas where the APN's role is also seen. A two-way dialogue between the APN and the GEOSS Sub-Committee on Capacity Building was felt as an important step in this capacity development objective.

COMMUNICATIONS AND PUBLICATIONS

Website: http://www.apn-gcr.org/en/products.html

Communications and information dissemination is important to the APN in order to help achieve its goal of *"providing scientific input to policy decision-making and scientific knowledge to the public."* In its efforts to realize this goal, the APN produces publications such as annual reports, brochures, newsletters, project reports, syntheses, and workshop reports. In addition to publications, the APN website is also used as a communication tool. It provides current information about its scientific and capacity building activities, funded projects, recent and past publications, and links to other members of the global change community.



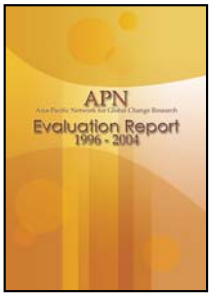


APN Newsletter

The APN publishes a quarterly newsletter which features news from the Secretariat, APN supported projects, regional news, people in the APN and a calendar of events, which highlights particular events supported by the APN. In order to reduce the environmental and economical burden, it was decided to produce the newsletter in electronic format only. All issues of the APN newsletter are available for downloading in PDF format, in the "products" section on the website.

APN Second Strategic Plan (2005-2010)

The APN's Second Strategic Plan is based on input from stakeholders and extensive scientific and institutional reviews of its first ten years. This plan contains a revised mission as well as revisions of the APN's basic goals. It also describes the three "agenda" that the APN will address: Science, policy, and Institutional.



National and International Fora

The APN attends national and international meetings, conferences and workshops, relating to global change, to disseminate information about its activities as well as to learn more about what is going on in the global change community.

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. Each member country appoints one national Focal Point (nFP), who sets policy for programmes, finances and other APN activities, and one Scientific Planning Group (SPG) member, who recommends science themes and activities for the IGM to consider for support.

The members listed below are current, at the time of publication, February 2007.

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Director
International Relations Department
Ministry of Environment

FIJI
Cama TUILOMA
Chief Executive Officer
Ministry of Local Government, Housing, Squatter Settlement and Environment

INDIA
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Director, Ministry of Environment and Forests
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INDONESIA
Liana BRATASIDA
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Ministry of the Environment

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Deputy Director General

Science, Technology and Environment Agency

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Yap Kok SENG
Director-General
Malaysian Meteorological Service

MONGOLIA
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Ministry of Nature and Environment

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SARCS Secretariat

SASCOM
Amir MUHAMMED
Chairman
SASCOM

START OCEANIA
Kanayathu KOSHY
Director
START-Oceania Regional Committee

TEACOM
Congbin FU
Director
START RC for Temperate East Asia

APN Secretariat

The Secretariat is located in Kobe, Japan under the support of Hyogo Prefecture, with a mandate to carry out the day-to-day operations of the network; provide secretariat support to the organs of the APN; and implement Inter-Governmental Meeting decisions.

The Secretariat listed below is current, at the time of publication, March 2007.

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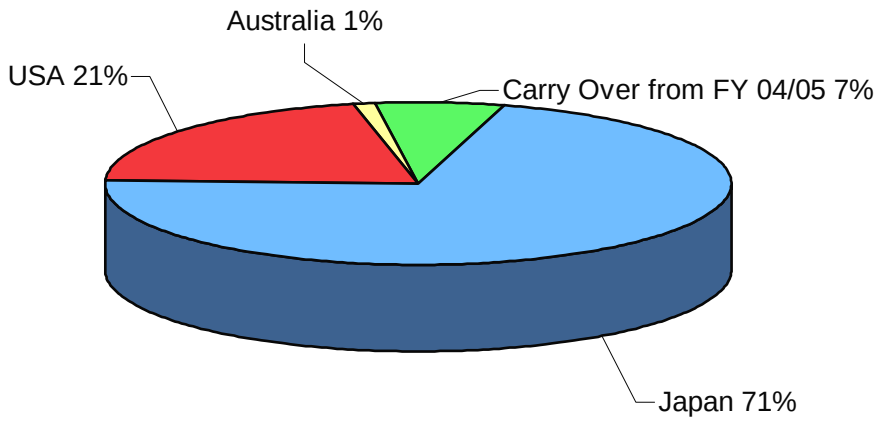
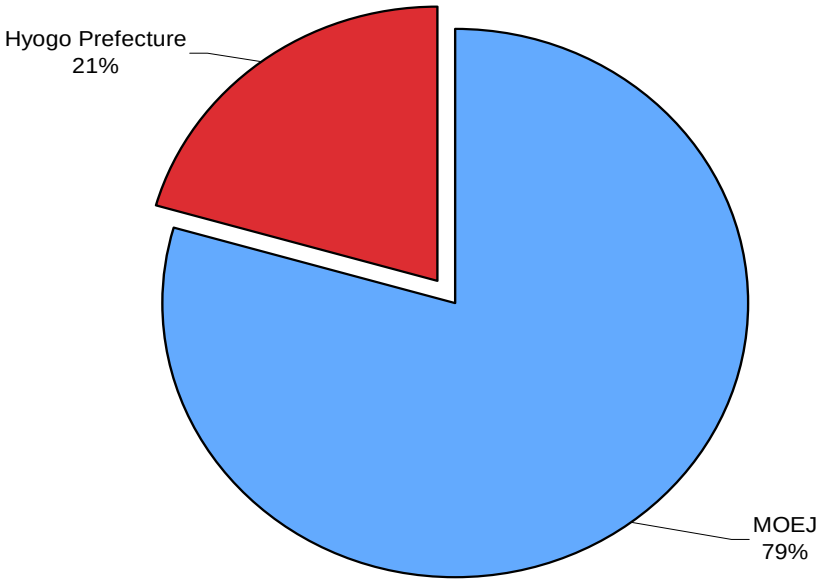
FINANCIAL RESOURCES

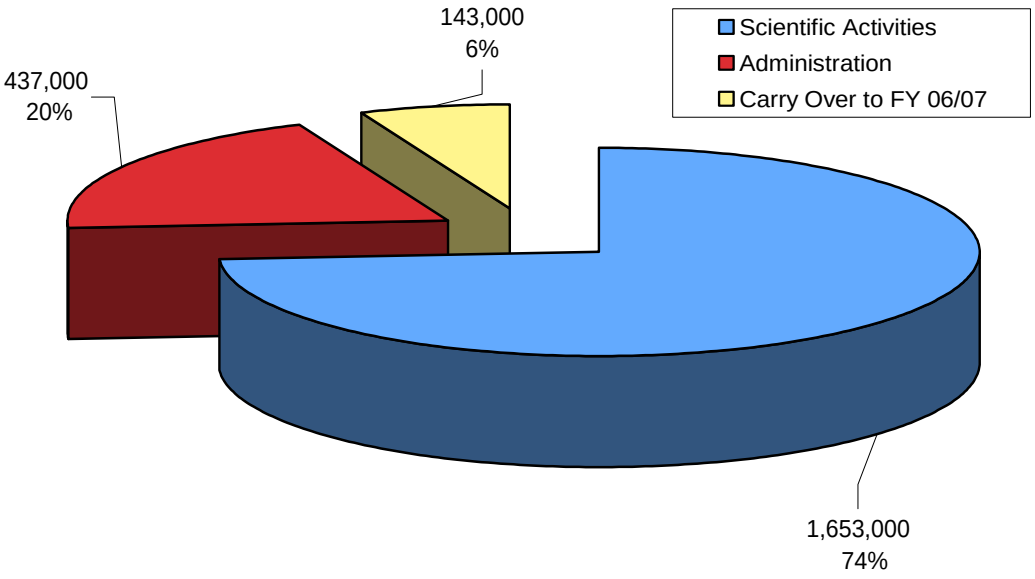
APN Member Contributions 2005/2006



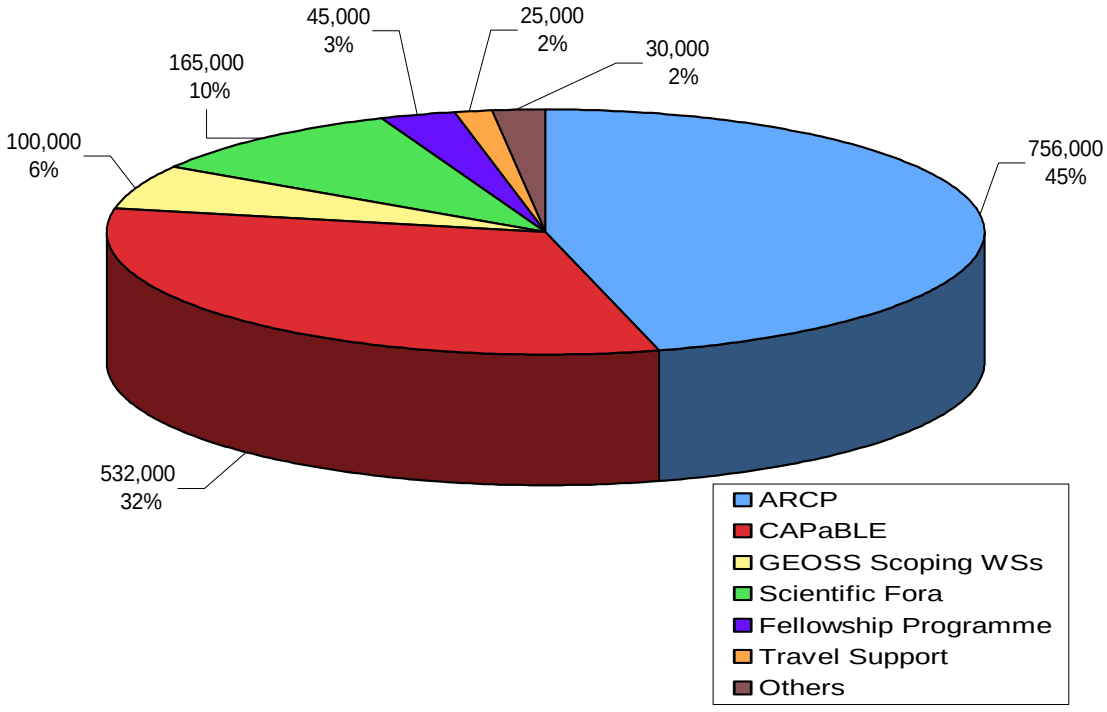
Breakdown Contributions from Japan



Expenditures in FY 2005/2006



Breakdown of Expenditures for Scientific Activities



MEMBER COUNTRIES AND SPONSORS

APN Member Countries

The APN's membership has grown from 12 countries in 1996 to the current 21 member countries:

Australia, Bangladesh, Cambodia, , Fiji, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, New Zealand, P.R. China, Pakistan, Philippines, Republic of Korea, Russian Federation, Sri Lanka, Thailand, United States of America and Viet Nam.

APN Sponsors

Ministry of the Environment, Japan

Hyogo Prefectural Government, Japan

National Science Foundation, USA

Australian Government
Australian Greenhouse Office

US Climate Change Science Program
www.climatescience.gov

Ministry for the Environment
New Zealand

아름다운 환경, 건강한 미래
환경부 Ministry of the Environment, ROK

The above 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.

ACRONYMS

AIACC	- Assessment of Impacts and Adaptation to Climate Change
APN	- Asia-Pacific Network for Global Change Research
ARCP	- Annual Regional Call for Proposals
BSMRAU	- Bangabandhu Sheikh Mujibur Rahman Agricultural University
CAPaBLE	- "Scientific Capacity Building and Enhancement for Sustainable Development in Developing Countries" Programme
CPA(s)	- Conservation Priority Area(s)
CRIDA	- Central Research Institute for Dryland Agriculture
DIVERSITAS	- International Programme of Biodiversity Science
DIWPA	- DIVERSITAS in Western Pacific and Asia
ERDB	- Ecosystems Research & Development Bureau
ESSP	- Earth System Science Partnership (DIVERSITAS, IGBP, IHDP, WCRP)
GEOSS	- Global Earth Observation System of Systems
GHG	- Greenhouse Gas
IDGEC	- Institutional Dimensions of Global Environmental Change
IAP-CAS	- Institute of Atmospheric Physics – Chinese Academy of Sciences
IFA	- Institutions for Floods in Asia
IGBP	- International Geosphere-Biosphere Programme
IHDP	- International Human Dimensions Programme on Global Environmental Change
IMAGES	- International Marine Global Change Studies
LAPAN	- National Institute of Aeronautics and Space
LIA	- Little Ice Age
LOICZ	- Land-Ocean Interactions in the Coastal Zone
LULUCF	- Land-use, Land-use Change and Forestry
MAIRS-IPO	- Monsoon Asia Integrated Regional Study-International Project Office
MOEJ	- Ministry of Environment, Japan
MONRE	- Ministry of Natural Resources and Environment, Thailand
NCMRWF	- National Centre for Medium Range Weather Forecasting
NCS	- National Conservation Strategy
NEMURO	- North Pacific Ecosystem Model for Understanding Regional Oceanography

NFP	- National Focal Point
NIES	- National Institute for Environmental Studies, Japan
NSF	- US National Science Foundation
OSM	- Open Science Meeting
PAGES	- Past Global Changes
PICs	- Pacific Island Countries
PICES	- North Pacific Marine Science Organization
RUPP	- Royal University of Phnom Penh
SANDEE	- South Asian Network for Development and Environmental Economics
SCOPE	- Scientific Committee on Problems of the Environment
SEE	- Sustainable Energy and Environment
SOLAS	- Surface Ocean – Lower Atmosphere Study
SPG	- Scientific Planning Group
START	- Global Change System for Analysis, Research, and Training
TERI	- The Energy Resources Institute, India
UNEP	- United Nations Environment Programme
USER	- Unit for Social and Environmental Research
WCRP	- World Climate Research Programme

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:

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

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http://www.apn-gcr.org/en/downloads/blankform_apndirectory.pdf.

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