

An aerial photograph of terraced rice fields in a mountainous region, likely in Southeast Asia, during a sunset. The sun is a bright, glowing orb in the upper center of the frame, casting a warm, golden light over the landscape. The terraces are filled with water, reflecting the light and creating a shimmering, mosaic-like pattern. The sky is a mix of soft oranges, yellows, and pale blues. The overall mood is serene and majestic.

# ANNUAL REPORT

## FISCAL YEAR 2016

**APN**  
ASIA-PACIFIC NETWORK FOR  
GLOBAL CHANGE RESEARCH

# ABOUT APN

The Asia-Pacific Network for Global Change Research (APN) is an intergovernmental network of 22 countries working towards pursuing an Asia-Pacific region that is successfully addressing the challenges of global change and sustainability.

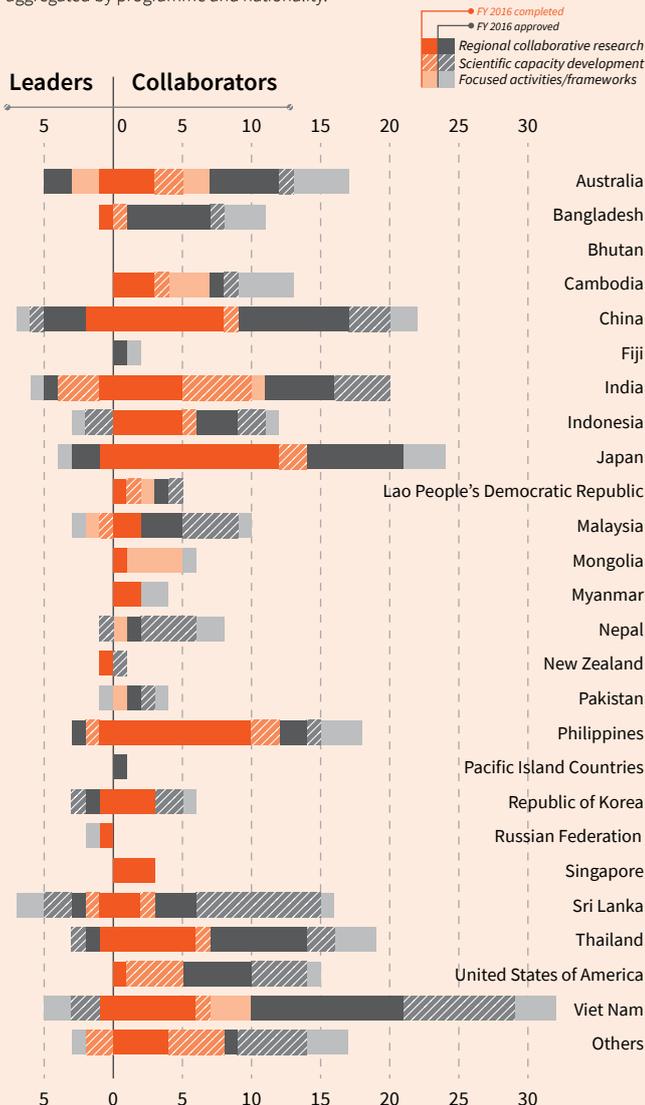
To achieve its mission, a set of programmes and activities are conducted.

- ✓ Fund regional, multi-country and transdisciplinary research projects on global change and sustainability that provides underpinning scientific input to policymaking.
- ✓ Fund and implement projects and workshops to develop the capacity of individuals and organizations to conduct high quality research on global change and sustainability.
- ✓ Foster and strengthen interactions between the science and policymaking communities to produce actionable science and informed decision-making.

## FISCAL YEAR 2016 AT A GLANCE

### Member country involvement

Project leaders and collaborators involved in APN programmes, aggregated by programme and nationality.



### RESEARCH & CAPACITY DEVELOPMENT

**24** projects completed, involving 268 collaborators.

### EXTENSIVE NETWORK

**1,807** researchers, government officials, community members and practitioners directly involved in projects.

**3,584** subscribers to the APN mailing list.

### INVOLVING YOUNG SCIENTISTS

**290** young scientists directly involved in projects.

**48%** of projects reported involvement of young scientists.

### KNOWLEDGE MANAGEMENT

**692** publications produced and shared through the APN E-Library.

**21,040**

unique page views on the APN E-Library (47% increase year-on-year).

# RESEARCH HIGHLIGHTS

## Toolkit increases local community awareness on resilience towards climate change



**THE LIVELIHOODS OF** people in local communities are more exposed to climate-driven changes compared to urban communities. The project developed a simple, quick and cost-efficient resilience tool targeted at the commune level to assess climate change adaptation within the existing development plans. In the process of using the tool, it enables local communities to:

- ▶ Identify priority needs for improving community resilience;
- ▶ Identify barriers and opportunities for climate resilient development;
- ▶ Encourage communication between government departments, NGOs and donors; and
- ▶ Identify interactive and locally relevant adaptation options.

The tool is framed around 39 questions developed from four key community development outcomes: livelihood and environment; infrastructure; community; and climate and disaster management.

The tool is further strengthened by a simple yet well-structured policy dialogue among communities, central and provincial governments, NGOs and research institutions to support decision-making in the absence of technical information. The dialogue bases its discussions on key findings from the questions to understand community issues and promote shared understanding of problems. In addition, the dialogues enable local communities to develop potential adaptation options by identifying existing programmes that could benefit the communities, increase cooperation among stakeholders, and develop novel and transformative solutions to address the issues.

The tool was tested and refined through three workshops covering four communes in Cambodia and Viet Nam. The tool identified Lvea Krang (Cambodia) as the most concerning community where ineffectiveness in cooperation among stakeholders and inadequate funds to implement development plans across the four key community development outcomes were proved. Chamkar Samrong (Cambodia) was identified as having inadequate funds and lacking information sharing in the areas of livelihood and environment, infrastructure and community. The tool also identified Thuy Thah (Viet Nam) as not having sufficient funds for livelihoods and environment, and disaster management. In addition, Vinh Hai (Viet Nam) was identified as not having sufficient funds to implement development plans and lack of information sharing.



- The tool was tested and refined through three workshops, which gathered village leaders, commune leaders, commune council representatives, NGO staff, researchers, United Nations project leaders, and central and provincial government officials from the departments of women's affairs, water resources management, the environment, education and agriculture.
- The tool was requested to be used as a basis for community planning in Battambang Province, Cambodia.
- Five young scientists engaged and trained in data collection, analysis and translation.

### PROJECT TITLE

Optimizing climate change adaptation through enhanced community resilience

### PROJECT LEADER

Dr Christine Jacobson  
University of the Sunshine Coast, Australia

### ORGANIZATIONS INVOLVED

- » University of the Sunshine Coast, Australia
- » Ministry of Environment, Cambodia
- » University of Battambang, Cambodia
- » Institute for Social and Environmental Transitions, Viet Nam
- » Hue University of Economics, Viet Nam

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/2028](http://www.apn-gcr.org/resources/items/show/2028)



## Vulnerability assessment tool helps enhance flood waste management capacity in vulnerable mid-scale Asian cities



**LOW-LYING CITIES** across Southeast Asia are prone to frequent floods, in which the trends are on the rise due to climate change. Plans to manage waste generated from floods are developed at the national level, yet corresponding plans at the local level continues to lack and local capacity to implement such plans are limited.

The project developed a vulnerability assessment tool for flood waste management in two flood-prone cities in Thailand and Viet Nam. The tool is based on the waste management framework developed in Japan, which guides post-disaster waste management practices in the country. The framework captures important functional areas of operations, command, logistics, finance/administration and planning.

The tool was then localized through findings from field investigations and interviews conducted in those two cities, and identified six vulnerability issue categories to be evaluated.

- ▶ Reducing flood impact on usual waste management systems;
- ▶ Securing financial resources for flood waste management;
- ▶ Adaptive planning and implementing plan for flood waste management;
- ▶ Preventing flood impact on buildings and infrastructure;
- ▶ Developing the coping capacity of people; and
- ▶ Improving vulnerability conditions.

Three capacity development workshops were held in Thailand and Viet Nam to introduce and explain the use of the tool, and to receive feedback on the effectiveness of the tool in local settings. The workshops proved the effectiveness of the tool in developing the capacity among local officers in managing flood waste.

- The project engaged local municipality officials in adopting local flood waste management measures that will contribute to the implementation of national risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction.

### PROJECT TITLE

Adaptation of solid waste management to frequent floods in vulnerable mid-scale Asian cities

### PROJECT LEADER

Dr Masato Yamada, National Institute for Environmental Studies, Japan

### ORGANIZATIONS INVOLVED

- » National Institute for Environmental Studies, Japan
- » Kasetsart University, Thailand
- » Joint Graduate School of Energy and Environment, Thailand
- » Hue University, Viet Nam

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/1892](http://www.apn-gcr.org/resources/items/show/1892)

## Coordinated regional climate downscaling experiment in monsoon Asia increases access to regional climate data and downscaling techniques



**THE COORDINATED REGIONAL** Climate Downscaling Experiment (CORDEX) aims to promote accessible regional climate science and applications based on the use of downscaled global climate models. In order to ensure the effective generation and use of downscaled data, a systematic approach is required to address issues and capacity needs unique to each region.

The project supports the implementation of CORDEX in the monsoon Asia region by setting up an open, efficient and shared collaborative platform of groups working in the field of climate downscaling, vulnerability, impact and adaptation.

A series of workshops were organized to train 130 young scientists from developing countries on climate downscaling techniques and usage of downscaled products in hydrology, agriculture, land use change and economic impact of climate change on agricultural production, etc.

These activities have contributed in sharing and exchanging data, experiences and techniques on climate downscaling among CORDEX groups in Asia. The project led to the redesign of three subdomains for CORDEX Asia, namely South Asia, East Asia and Southeast Asia. In addition, the project resulted in the establishment of the CORDEX Asia Empirical-Statistical Downscaling group that focuses on supporting the use of climate downscaling products by end users.

- Data products resulted from downscaling techniques will help support assessment research and decision-making in various areas affected by climate change, including agriculture, ecosystems, health, hydrology, land cover change and water resources.
- More than 130 young scientists from developing countries were trained on climate modelling and downscaling.

### PROJECT TITLE

Coordinated Regional Climate Downscaling Experiment (CORDEX) in Monsoon Asia

### PROJECT LEADER

Dr Ailikun, Chinese Academy of Sciences, China

### ORGANIZATIONS INVOLVED

- » Monash University, Australia
- » Indian Institute for Tropical Meteorology, India
- » Korea Meteorological Agency, Republic of Korea
- » University of New South Wales, Australia
- » Nanjing University, China
- » International Centre for Integrated Mountain Development, Nepal
- » World Climate Research Programme, Switzerland

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/1883](http://www.apn-gcr.org/resources/items/show/1883)





Photo: ZiJing/Flickr

## Long-term data analysis improves understanding of carbon fluxes and emissions from the Red River under the influence of human activity and climate change



**WATER DISCHARGE** and sediment loads in the Red River system in Viet Nam and China have been altered dramatically over the past decades as a result of reservoir impoundment and changes in land use, population and climate. This has affected the river and streams in releasing and transferring carbon to the atmosphere and the ocean, respectively.

The project aimed to predict the impact of future scenarios of various changes in human activities by understanding the spatial and temporal dynamics of carbon exchange between terrestrial, oceanic and atmospheric environments of the Red River system.

From 2012 to 2014, the project collected data on water quality and carbon contents by conducting monthly water sampling campaigns and laboratory analysis at ten gauging stations across the Red River system. Data on carbon exchange and emissions were measured, and long-term data sets including information on land use, population, agricultural and industrial development, hydrological management and meteorology from the 1960s were also collected and synthesized.

With the compilation of the database, the Seneque/Riverstrahler model was used to calculate seasonal and spatial variations of water quality, and carbon fluxes and emissions over time. Consequently, the model succeeded in predicting the overall water quality and carbon delivery of the Red River system under different scenarios towards 2050.

- Thirty young scientists from China, Singapore and Viet Nam received training on using the Seneque/Riverstrahler model and calculating carbon emissions.

### PROJECT TITLE

Carbon fluxes and emissions from the Red River (Viet Nam and China): Human activities and climate change

### PROJECT LEADER

Dr Le Thi Phuong Quynh, Vietnam Academy of Science and Technology, Viet Nam

### ORGANIZATIONS INVOLVED

- » Vietnam Academy of Science and Technology, Viet Nam
- » Institute of Environmental Technology, Viet Nam
- » Agency of Meteorology, Hydrology and Climate Change, Viet Nam
- » National University of Singapore, Singapore
- » University of Pierre and Marie Curie, France
- » Yunnan University of Finance and Economics, China

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/1750](http://www.apn-gcr.org/resources/items/show/1750)

## CAPACITY DEVELOPMENT HIGHLIGHTS



### PROJECT TITLE

Escalating small hydropower development and aquatic biodiversity of mountain streams in Sri Lanka

### PROJECT LEADER

Prof. E. I. L. Silva, Water Resources Science and Technology, Sri Lanka

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/2010](http://www.apn-gcr.org/resources/items/show/2010)

## Stakeholders increase awareness on environmentally sustainable small hydropower plants



**NEGLIGENCE AND POOR** understanding of mountain stream ecosystems by developers and relevant authorities of small hydropower plants are provoking population decline in aquatic biota and extinction risk of endemic fish species in Sri Lanka.

The project built awareness on the importance of correctly designing and operating environmentally sustainable small hydropower plants among hydropower plant developers, their consultants, environmental officers and policymakers, and anticipated to convey the message to communities in the hilly countries. This was done by:

- ▶ Conducting a workshop on the environmental and socio-economic issues surrounding small hydropower plants which gathered 71 participants from 23 government and non-government institutions;
- ▶ Conducting an awareness programme targeted to local governments dealing with the acquisition of land and water resources in development activity. The programme included management and adaptation measures to heavy rains and landslides impacted by the development of hydropower plants;
- ▶ Developing and distributing brochures highlighting negative impacts of poorly designed small hydropower plants among around 3,250 village headmen in mountainous districts; and
- ▶ Developing and distributing a handbook titled “Small Hydropower Development and Environment” and wall photographs depicting endangered endemic fishes.

## Stakeholders in forestry sectors develop capacity in advanced remote sensing techniques, contributing to REDD+ related activities



**TO CONTRIBUTE** to activities related to Reducing Emissions from Deforestation and Forest Degradation (REDD+) and achieving sustainability in forest resources, monitoring forest cover and deforestation using advanced remote sensing techniques has become increasingly important. In addition, building the knowledge and experience of stakeholders in using these techniques has become acute.

The project developed hands-on training modules to monitor forest cover and deforestation by using Synthetic Aperture Radar (SAR) data. Based on the modules, the project organized four trainings in Cambodia, India and Sri Lanka to build the capacity of stakeholders in using SAR and optical sensors. This was done by providing knowledge on: how to download satellite data; types of data and the best suited processing tools; and how to process satellite data to accurately monitor forest cover and deforestation.

Stakeholders were also trained in using Phased Array L-band Synthetic Aperture Radar (PALSAR) that provides better results in tropical countries with limited acquisition of cloud-free optical sensor data. Training on collecting and managing forest inventory data to develop training modules to estimate forest carbon stocks were also provided.

A total of 133 participants from research institutions, government ministries, local communities and non-governmental organizations participated in the training activities.



### PROJECT TITLE

Developing a training module to monitor forest cover and deforestation using advanced remote sensing techniques under UN-CECAR framework in support of REDD+ MRV system

### PROJECT LEADER

Dr Ram Avtar, United Nations University, Japan

### ORGANIZATIONS INVOLVED

- » Institute of Forest and Wildlife Research and Development, Cambodia
- » University of Peradeniya, Sri Lanka
- » Jawaharlal Nehru University, India

### FOR MORE INFORMATION

[www.apn-gcr.org/resources/items/show/2000](http://www.apn-gcr.org/resources/items/show/2000)

# APPROVED PROJECTS

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## REGIONAL RESEARCH

Appropriate solid waste management towards flood risk reduction through recovery of drainage function in tropical Asian urban cities

*Dr Tomonori Ishigaki, National Institute for Environmental Studies, Japan*

Assessing land use functions for sustainable land management in Asian countries

*Prof. Lin Zhen, Chinese Academy of Sciences, China*

Assessing the health effects of extreme temperatures and the development of adaptation strategies to climate change in the Asia-Pacific region

*Prof. Cunrui Huang, Sun Yat-sen University, China*

Development of new water supply strategies in two major cities of India and Sri Lanka in the context of climate change, rapid urbanization and population growth: A vulnerability assessment approach

*Dr Manish Kumar, Tezpur University, India*

Identification of the best agricultural management practices with better greenhouse gas benefits in salinity affected areas of South Asia

*Dr Erandathie Lokupitiya, University of Colombo, Sri Lanka*

Managing organic amendments to reduce greenhouse gas emissions and supplement fertilizer nitrogen inputs in tropical Indian and Sri Lankan agricultural soils

*Dr David Rowlings, Queensland University of Technology, Australia*

Risk and resilience in the Pacific: Influence of peripherality on exposure and responses to global change

*Prof. Patrick D. Nunn, University of the Sunshine Coast, Australia*

SEACLID/CORDEX Southeast Asia phase 2: High-resolution analysis of climate extremes over key areas in Southeast Asia

*Prof. Jerasorn Santisirisomboon, Ramkhamhaeng University, Thailand*

Water pollution impacts on carbon export and greenhouse gas evasion from Asian river systems

*Prof. Ji-Hyung Park, Ewha Womans University, Republic of Korea*

Water-energy-food nexus perspective: Path-making for Sustainable Development Goals to country actions in Asia

*Mr Tetsuo Kuyama, Institute for Global Environmental Strategies, Japan*

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## CAPACITY DEVELOPMENT

Adapting groundwater of Asian cities to climate change: Bridging the science and policy interface

*Dr Sangam Shrestha, Asian Institute of Technology, Thailand*

Capacity development of agrarian research-policy-technology personnel in Sri Lanka on global change and sustainability

*Mrs Renuka Weerakkody, Hector Kobbekaduwa Agrarian Research and Training Institute, Sri Lanka*

CLIVAR Open Science Conference

*Prof. Fangli Qiao, UNESCO/IOC Regional Training and Research Centre on Ocean Dynamics and Climate, China*

Ecosystem-based adaptation approach for sustainable management and governance of coastal ecosystems

*Dr Ngo Tho Hung, Asian Institute of Technology in Vietnam, Viet Nam*

Enhancing perception and capacity for national and provincial leaders and practitioners on greenhouse gas emissions inventory to support the implementation of Nationally Appropriate Mitigation Actions and development of low-carbon cities in Viet Nam

*Dr Luong Quang Huy, Ministry of Natural Resources and Environment, Viet Nam*

Facilitating the attendance, interaction and training of young and developing nation scientists from Asia Pacific at the International Conference on Regional Climate – CORDEX 2016

*Dr Hyun-Suk Kang, Korea Meteorological Administration, Republic of Korea*

Mainstreaming weather and climate information application for agroecosystem resilience in a changing climate

*Dr Rishiraj Dutta, Asian Disaster Preparedness Center, Thailand*

Rapid mapping technique for disaster observation and environmental change data acquisition

*Prof. Dewayany Sutrisno, Indonesian Society for Remote Sensing, Indonesia*

# COMPLETED PROJECTS

## REGIONAL RESEARCH

**A study on loss of land surface and changes to water resources resulting from sea level rise and climate change**

*Dr G.S. DeCosta, Unitec Institute of Technology, New Zealand*

**Adaptation of solid waste management to frequent floods in vulnerable mid-scale Asian cities**

*Dr Masato Yamada, National Institute for Environmental Studies, Japan*

**Assessing community risk insurance initiatives and identifying enabling policy and institutional factors for maximizing climate change adaptation and disaster risk reduction benefits from risk insurance**

*Dr S.V.R.K. Prabhakar, Institute for Global Environmental Strategies, Japan*

**Boreal and tropical forest and forest-steppes in East Asia: A comparative study on climate impacts and adaptation**

*Prof. Bair O. Gomboev, Russian Academy of Sciences, Russian Federation*

**Carbon fluxes and emissions from the Red River (Viet Nam and China): Human activities and climate change**

*Dr Le Thi Phuong Quynh, Vietnam Academy of Science and Technology, Viet Nam*

**Coastal forest management in the face of global change based on case studies in Japan, Myanmar and the Philippines**

*Dr Liang Luohui, United Nations University, Japan*

**Developing ecosystem-based adaptation strategies for enhancing resilience of rice terrace farming systems against climate change**

*Prof. Anura Srikantha Herath, United Nation University, Japan*

**Developing scientific and management tools to address impacts of changing climate and land use patterns on water quality in East Asia's river basins**

*Dr Suthipong Sthiannopkao, Dong-A University, Republic of Korea*

**Development of an integrated climate change impact assessment tool for urban policymakers (UrbanCLIM)**

*Dr Yinpeng Li, Waikato University, New Zealand*

**Seagrass-mangrove ecosystems: Bioshields against biodiversity loss and impacts of local and global change along Indo-Pacific coasts**

*Prof. Miguel Fortes, University of the Philippines, Philippines*

**Supporting governance institutions for adaptive capacity to environmental change**

*Dr Pedro Fidelman, University of the Sunshine Coast, Australia*

**Toward a fire and haze early warning system for Southeast Asia**

*Dr Jin Ho Yoo, APEC Climate Center, Republic of Korea*

## CAPACITY DEVELOPMENT

**A comprehensive capacity building programme on urban climate change resilience in India**

*Dr Divya Sharma, The Energy and Resources Institute, India*

**Capacity development of local climate change communicators in vulnerable upland communities in Southeast Asia**

*Dr Wilfredo M. Carandang, Southeast Asian Network for Agroforestry Education, Philippines*

**Developing a training module to monitor forest cover and deforestation using advanced remote sensing techniques under UN-CECAR framework in support of REDD+ MRV systems**

*Dr Ram Avtar, United Nations University, Japan*

**Escalating small hydropower development and aquatic biodiversity of mountain streams in Sri Lanka**

*Prof. E.I.L. Silva, Water Resources Science and Technology, Sri Lanka*

**Global environmental change and human health: Extreme events and urbanization in the APN region**

*Prof. Jamal Hisham Hashim, United Nations University, Malaysia*

**Integrated, resilience-based planning for climate change mitigation and adaptation in Asia-Pacific cities**

*Dr Ayyoob Sharifi, National Institute for Environmental Studies, Japan*

**International Geosphere-Biosphere Programme (IGBP) landmark synthesis event**

*Dr Sybil Putnam Seitzinger, International Geosphere-Biosphere Programme, Sweden*

**Training workshop and edited volume on "Green growth: Political ideology, political economy and policy alternatives"**

*Dr Manu V. Mathai, United Nations University, Japan*

## FOCUSED ACTIVITIES

**Building capacity for reducing loss and damage resulting from slow and rapid onset climatic extremes through risk reduction and proactive adaptation within the broader context of sustainable development**

*Prof. Kamarulazizi Ibrahim, Centre for Global Sustainability Studies, Malaysia*

**Can traditional livelihoods and mining co-exist in a changing climate: Strengthening public-private partnerships in Mongolia to reduce risk and address loss and damage**

*Dr Vigya Sharma, The University of Queensland, Australia*

**Identification of policy and institutional gaps, drivers and strategies to scale-up low carbon and energy efficient technology application in the construction and infrastructure sectors in South Asia**

*Dr Sanjay Vashist, Climate Action Network South Asia, Bangladesh*

**Optimizing climate change adaptation through enhanced community resilience**

*Dr Christine Jacobson, University of the Sunshine Coast, Australia*

# EVENTS



## Proposal development training workshop in Bhutan

In December 2016, APN and the National Environment Commission, Royal Government of Bhutan, jointly organized a proposal development training workshop (PDTW) on climate change and climate variability in Bhutan. Twenty-three scientists from South Asia participated. The PDTW was established in 2008 to increase the capacity of young and early-career scientists in developing proposals for APN.



## Science-policy dialogue in Thailand

In February 2017, APN, Low Carbon Asia Research Network and Regional Resource Centre for Asia and the Pacific, jointly organized a science-policy dialogue (SPD) in Thailand on low carbon and adaptation initiatives in Asia. Participants discussed the role of green investment in cities, low carbon and energy-efficient technologies, and the water-energy-carbon nexus, among others. The SPD was established in 2012 to contribute to providing underpinning scientific input to policymaking.



## Activities supported by the Hyogo Prefectural Government, Japan

In August 2016, APN supported the participation of three former project leaders and collaborators of APN-funded projects to present their project outcomes at the 11th EMECS conference titled “Managing risks to coastal regions and communities in a changing world” held in the Russian Federation. The International Center for Environmental Management of Enclosed Coastal Seas (EMECS) was established in 1994 at Hyogo Prefecture.

In November 2016, APN and the Hyogo Prefectural Government jointly organized the Third Hokusetsu SATOYAMA International Seminar in Japan to discover new values of satoyama in the modern society. Approximately 150 people from governments, universities, private companies, volunteer groups and the general public participated.



## Celebrating the 20th anniversary of APN: Media fellowship programme in Sri Lanka

In July 2016, APN and the University of Peradeniya jointly organized a media fellowship programme in Sri Lanka under the theme of “Homegarden systems in the face of climate change”. Seven young journalists from South Asia participated. The programme produced mass media knowledge products introducing homegardens as an effective way to ensure food security and climate change adaptation at the local level. The event is the first attempt for APN to directly engage the media to disseminate information on APN-funded projects.

# FINANCES

APN receives financial contributions from the Ministry of the Environment, Japan; Hyogo Prefectural Government, Japan; Ministry of Environment, Republic of Korea; and the Ministry for the Environment, New Zealand. In addition to direct financial contributions, APN receives significant in kind contributions from member countries, in particular the Hyogo Prefectural Government, Japan. Past Global Changes (PAGES) contributed USD 6,000 to the PDTW held in December 2016 in Bhutan.

## FINANCIAL RESOURCES OF FY 2016 (USD)

Donor contributions FY 2016	Ministry of the Environment, Japan	2,165,000
	Hyogo Prefectural Government, Japan	177,800
	Ministry of Environment, Republic of Korea	50,000
	Ministry for the Environment, New Zealand	19,900
Balance brought forward from FY 2015 (including committed funds for multi-year projects)		2,397,118
Returned funds from completed projects and adjustments		165,023
PAGES contribution for young scientists in PDTW		6,000
<b>Total</b>		<b>4,980,841</b>

## USE OF RESOURCES IN FY 2016 (USD)

	<i>Executed and committed</i>
Core programmes	2,099,189
Frameworks	1,062,959
Other scientific and policy activities	144,313
Institutional activities	248,310
Personnel, administration and operational costs	874,090
<b>Total</b>	<b>4,428,862</b>

The figures include executed expenditures for old and new projects and activities, as well as committed resources for multi-year projects.

# MEMBERS

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## NATIONAL FOCAL POINTS

### BANGLADESH

**Muhammad Ziaur Rahman**  
Ministry of Environment and Forest

### BHUTAN

**Tenzin Wangmo**  
National Environment Commission Secretariat

### CAMBODIA

**Roath Sith**  
Ministry of Environment

### CHINA

**Chengyong Sun**  
Ministry of Science and Technology

### FIJI

**Nilesh Prakash**  
Ministry of Economy

### INDIA

**J. R. Bhatt**  
Ministry of Environment, Forest and Climate Change

### INDONESIA

**Henry Bastaman**  
Ministry of Environment and Forestry

### JAPAN

**Masanobu Kimura**  
Ministry of the Environment

### LAO PEOPLE'S DEMOCRATIC REPUBLIC

**Virasack Chundara**  
Ministry of Natural Resources and Environment

### MALAYSIA

**Alui bin Bahari**  
Ministry of Science, Technology and Innovation

### MONGOLIA

**Bayarbat Dashzeveg**  
Ministry of Environment and Tourism

### NEPAL

**Laxmi Kumari Basnet**  
Ministry of Population and Environment

### PAKISTAN

**Muhammad Irfan Tariq**  
Ministry of Climate Change

### PHILIPPINES

**Marcial C. Amaro Jr.**  
Department of Environment and Natural Resources

### REPUBLIC OF KOREA

**Beom-Sik Yoo**  
Ministry of Environment

### RUSSIAN FEDERATION

**Andrey V. Adrianov**  
Russian Academy of Sciences

### SRI LANKA

**Anura Dissanayake**  
Ministry of Mahaweli Development and Environment

### THAILAND

**Monthip Sriratana**  
National Research Council of Thailand

### UNITED STATES OF AMERICA

**Luis M. Tupas**  
United States Department of Agriculture

### VIET NAM

**Ngo Tuan Dung**  
Ministry of Natural Resources and Environment

---

## SCIENTIFIC PLANNING GROUP MEMBERS

### BANGLADESH

**Md. Giashuddin Miah**  
Bangabandhu Sheikh Mujibur Rahman Agricultural University

### BHUTAN

**Jamba Tobden**  
Royal University of Bhutan

### CAMBODIA

**Veasna Kum**  
Pannasastra University of Cambodia

### CHINA

**Wenjie Dong**  
Sun Yat-Sen University

### INDIA

**Hemant Borgaonkar**  
Indian Institute of Tropical Meteorology

### INDONESIA

**Erna Sri Adiningsih**  
National Institute of Aeronautics and Space

### JAPAN

**Kensuke Fukushi**  
University of Tokyo

### LAO PEOPLE'S DEMOCRATIC REPUBLIC

**Virasack Chundara**  
Ministry of Natural Resources and Environment

### MALAYSIA

**Fariza Yunus**  
Malaysian Meteorological Department

### MONGOLIA

**Tsogtbaatar Jamsran**  
Mongolian Academy of Sciences

### NEPAL

**Madan Lall Shrestha**  
Nepal Academy of Science and Technology

### NEW ZEALAND

**Douglas Hill**  
University of Otago

### PAKISTAN

**Amir Muhammed**  
National University of Computer and Emerging Sciences

### PHILIPPINES

**Henry Adornado**  
Department of Environment and Natural Resources

### REPUBLIC OF KOREA

**Soojeong Myeong**  
Korea Environment Institute

### RUSSIAN FEDERATION

**Alexander Sterin**  
Russian Research Institute for Hydrometeorological Information-World Data Center

### SRI LANKA

**Sarath Premalal**  
Department of Meteorology

### THAILAND

**Jariya Boonjawat**  
Chulalongkorn University

### UNITED STATES OF AMERICA

**Rachel Melnick**  
United States Department of Agriculture

### VIET NAM

**Kim Chi Ngo**  
Vietnam Academy of Science and Technology

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## INVITED EXPERTS

**Lance Clive Heath**  
Australian National University, Australia

**Ailikun**  
Chinese Academy of Sciences, China

**Kanayathu Chacko Koshy**  
Environmental Resources Research Centre, India

**Subramaniam Moten**  
Malaysia Meteorological Department (retired), Malaysia

**W. Andrew Matthews**  
New Zealand National Commission for UNESCO (retired), New Zealand

**Juan Pulhin**  
University of the Philippines Los Baños, Philippines

**Srikantha Herath**  
Ministry of Megapolis and Western Development, Sri Lanka

**Roland John Fuchs**  
East West Center, United States of America

The list above contains current members of APN at the time of publication.



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APN Secretariat  
East Building 4F,  
1-5-2 Wakinohama Kaigan Dori,  
Chuo-ku, Kobe 651-0073, Japan  
Tel: +81 78 230 8017  
Email: [info@apn-gcr.org](mailto:info@apn-gcr.org)  
Website: [www.apn-gcr.org](http://www.apn-gcr.org)

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