ANNUAL REPORT

FISCAL YEAR 2022

JULY 2022 - JUNE 2023

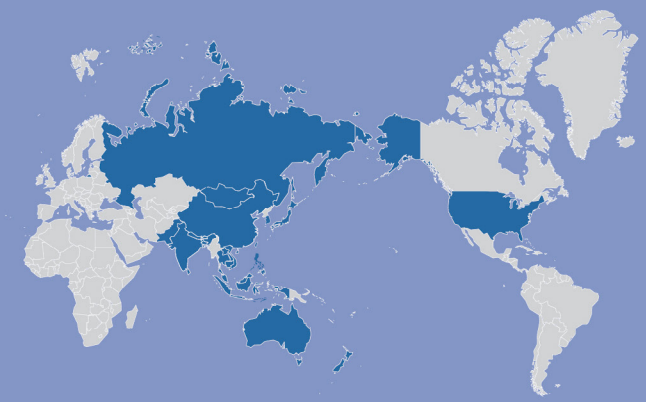
APN

ASIA-PACIFIC NETWORK FOR
GLOBAL CHANGE RESEARCH

The Asia-Pacific Network for Global Change Research (APN) is an intergovernmental network of 22 countries working towards 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.

- Funds regional, multi-country and transdisciplinary research projects on global change and sustainability that provide underpinning scientific input to policymaking.
- Funds and implements projects and workshops to develop the capacity of individuals and organisations to conduct high quality research on global change and sustainability.
- Fosters and strengthens interactions between the science and policymaking communities to produce actionable science and informed decision-making.



FISCAL YEAR 2022 AT A GLANCE

RESEARCH & CAPACITY DEVELOPMENT

24

Projects completed, implemented by 158 persons, including project leaders and collaborators.

EXTENSIVE NETWORK

7,600+

Researchers, government officials, community members and practitioners directly involved in projects.

4,100+

Active subscribers to the APN mailing list.

INVOLVING EARLY-CAREER PROFESSIONALS

60%

Percentage of projects led by early-career professionals.

KNOWLEDGE MANAGEMENT

2,154

Outputs in the Publications Library.

93,810

Page views of APN projects and publications.

Climate

High-resolution analysis empowers localised extreme climate event projections in Southeast Asia

HIGH-RESOLUTION OBSERVATIONAL DATA on probable weather and climate extremes is crucial to developing effective adaptation measures. However, such information is lacking in Southeast Asia, which has a complex climate due to diverse topography and monsoon patterns, leading to unique climate dynamics in the region. Using high-resolution data, factors contributing to climate extremes can be better understood, improving the capacity to project localised extreme climate events.

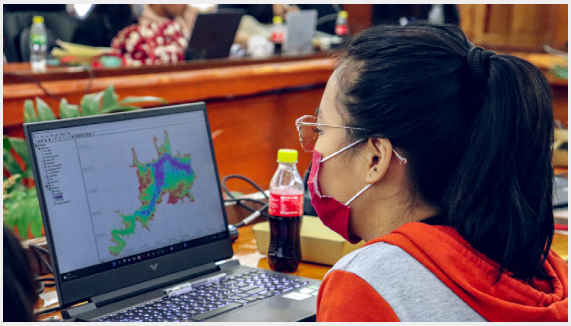
The second phase of the SEACLID/CORDEX Southeast Asia project developed high multi-model, multi-scenario climate projections for key vulnerable areas in Southeast Asia. In particular, the project generated a downscaled dataset with a 5 km resolution for the Lower Mekong region, Mindanao in the Philippines, Java Islands in Indonesia and Peninsular Malaysia. These projections were archived for open access through the Earth System Grid Federation. Additionally, the project evaluated model performance and uncertainties, developing guidelines for data usage dissemination to users.

The project completed six face-to-face and two online workshops that strengthened the collaboration among stakeholders and enhanced the capacity of early-career climate researchers to use climate modelling in studying climate change. The high-resolution climate dataset allowed participating countries to improve their national climate change scenarios and support further studies on vulnerability, adaptation and climate change impacts. ■

PROJECT SEACLID/CORDEX Southeast Asia Phase 2: High-resolution analysis of climate extreme over key areas in Southeast Asia **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Jerasorn Santisirisomboon, Ramkhamhaeng University, Thailand **ORGANISATIONS INVOLVED** National University of Malaysia, Malaysia; Vietnam National University - Hanoi University of Science, Vietnam; University of Science and Technology of Hanoi, Vietnam; Manila Observatory, Philippines; Agency for Meteorology Climatology and Geophysics, Indonesia; Agency for Assessment and Application of Technology, Indonesia; Chulalongkorn University, Thailand **GRANT DOI** https://doi.org/10.30852/p.4553

▸ The project assessed the impacts of climate change and human activities on sedimentation, floods and erosion in Vu Gia-Thu Bon basin in Vietnam and Cagayan River basin in the Philippines. This has led to improved rainfall prediction and reservior sediment evaluation, resulting in the development of integrated and sustainable flood and sediment management strategies.

PROJECT LEADER Dr Sameh Ahmed Kantoush, Kyoto University, Japan
GRANT DOI https://doi.org/10.30852/p.13492



Air, land, coasts and oceans

Strengthening air quality management in ASEAN through comprehensive training

THE PROJECT EFFECTIVELY addressed the pressing issue of air pollution, focusing on mitigating PM2.5 pollution within Southeast Asia. This pollution significantly impacts health and mortality rates in many developing countries, including ASEAN nations, which often lack technical capabilities for monitoring and mitigating air pollution. The project aimed to bridge this gap by building the technical capacities of ASEAN countries in air quality management and PM2.5 emission reduction.

Two pivotal capacity building workshops were facilitated. The first engaged over 150 participants from 29 countries, covering essential aspects such as air quality monitoring, emission inventory, modelling, impact assessment and policy formulation. The second targeted key stakeholders from the ASEAN Haze Agreement and the Malé Declaration, with 55 trainees participating on-site. These workshops provided comprehensive training, including lectures, demonstrations and site visits to air quality labs.

A dedicated project website also disseminated valuable training materials, complementing the hands-on sessions.

This initiative significantly contributed to regional air quality management by enhancing understanding and technical skills, strengthening professional networks and influencing national air quality policies. Evaluation data indicated substantial improvements in the knowledge of participants, underscoring the workshops' effectiveness in fostering collaboration and capacity building. With long-term implications for air quality management, this effort aligns with ASEAN's commitment to fostering a healthier environment and achieving the sustainable development goals (SDGs), thus aligning with the UN's 2030 Agenda for the SDGs. ■

PROJECT Capacity development programme on air quality management and emission reduction of PM2.5 for ASEAN countries **PROGRAMME** Scientific Capacity Development Programme **PROJECT LEADER** Dr Ram Lal Verma, Regional Resource Centre for Asia and the Pacific, Thailand **ORGANISATIONS INVOLVED** Asian Institute of Technology, Thailand; Pollution Control Department, Thailand; Environmental Research and Training Center, Thailand; National Institute of Technology Bandung, Indonesia; Universiti Malaya, Malaysia; United Nations Environment Programme, Philippines **GRANT DOI** https://doi.org/10.30852/p.13678

▸ Using the Global Climate Model (GCM) and Weather Research Forecast (WRF) Model, the project developed climate scenarios of Southeast Asia (RCP4.5, 6.0, 8.5), identifying vulnerable areas and enhancing adaptation strategies. Key outputs included biomass burning and biogenic emission inventories, air quality hotspots and valuable insights into climate change impacts on regional air quality.

PROJECT LEADER Dr Justin Sentian, Universiti Malaysia Sabah, Malaysia
GRANT DOI https://doi.org/10.30852/p.4572

▸ The project aimed to address the challenges of frequent unplanned fires and smoke pollution in Southeast Asia through Integrated Fire Management (IFM) with community participation. The project developed fire risk maps for the northern highlands of Indochina, incorporating meteorological and air pollutant emissions data, and engaging communities in fire management.

PROJECT LEADER Dr Kobsak Wanthongchai, Kasetsart University, Thailand
GRANT DOI https://doi.org/10.30852/p.4592

Biodiversity and ecosystems

Future of island mangroves in the Asia-Pacific region aids in designing sustainable strategies

MANGROVE ECOSYSTEM SERVICES are pivotal to building nature-based resistance to climate change and hydro-meteorological hazards in coastal areas. However, a dearth of reliable quantitative information on future extent and availability of ecosystem services hinders effective policy planning.

To address the information gaps, this project pioneered a scenario-based approach to quantify vital mangrove ecosystem services in the Asia-Pacific region. The project developed trajectories of mangrove ecosystems by simulating future land use scenarios for 2050. Detailed case reports were developed for the Andaman Islands and Odisha in India, Tamasi Estuary in Taiwan, Ba River Delta in Fiji, Oriental Mindoro in the Philippines and Ishigaki Island in Japan. The cases present land use land cover mapping and change analysis, spanning diverse landscapes and shedding light on critical services such as coastal resilience, carbon sequestration and habitat preservation.

These findings, encapsulated in detailed maps and datasets, offer invaluable insights for policymakers and stakeholders. These knowledge resources also provide insights into locally important drivers of mangrove loss, the trends and dynamics of land cover changes and changes in mangrove ecosystem services. With this robust information, it is hoped that development planners can design sustainable strategies to promote coastal resilience, mitigate climate risks and safeguard the ecological riches of these vital ecosystems. ■

PROJECT Plausible alternative futures of island mangroves in the Asia-Pacific: Scenario-based analysis and quantification of mangrove ecosystem services in coastal hazard mitigation and climate **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Shizuka Hashimoto, Institute for Global Environmental Strategies, Japan **ORGANISATIONS INVOLVED** Research Institute for Humanity and Nature, Japan; Wildlife Institute of India, India; National Environmental Engineering Research Institute, India; National Taiwan University, Taipei, China; University of the Philippines , Philippines; WWF-Pacific, Papua New Guinea **GRANT DOI** https://doi.org/10.30852/p.4582

Enhancing social adaptive capacity for resilient water environments

RAPID GLOBAL CHANGE is affecting local water bodies, particularly in isolated riverine islands, where communities face significant vulnerabilities due to poor adaptive capacities. The vulnerability of communities primarily stems from water resources, which pose risks of limited water availability for household consumption and farming, salt-water intrusion and flooding.

Focusing on Sagar in India, Dakshin Bedkashi in Bangladesh and Con Dao Island in Vietnam, the project adopted a socio-hydrological approach to enhance social adaptive capacity and develop adaptation and mitigation strategies for resilient water environments. Over three years, the team identified and tackled environmental water issues in these regions, including water pollution. The project quantified the impact of environmental change, hydro-meteorological disasters and extreme weather conditions on the status of socioeconomic and ecological conditions.

Other sociological aspects explored by the project are the migration and voluntary non-migration issues, particularly in Bangladesh, shedding light on the sociopsychological advantages benefitted by non-migrants. Additionally, risk and vulnerability analysis due to climate change in the Indian study site provided valuable insights into water resource management and human well-being.

Importantly, the project contributed to understanding the multifaceted interactions between human and water systems, informing sustainable management practices and decision-making processes for the future. ■

PROJECT Socio-hydrological perspective of climate change adaptation in large riverine islands: Comparative study from India, Bangladesh and Vietnam **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Pankaj Kumar, Institute for Global Environmental Strategies, Japan **ORGANISATIONS INVOLVED** Khulna University, Bangladesh; Indian Institute of Technology, India; Vietnam National University, Vietnam; Hokkaido University, Japan; Keio University, Japan **GRANT DOI** https://doi.org/10.30852/p.4601

Food, water and energy

Climate-smart agriculture scaled up in the Himalayan Region to improve climate adaptation

RAPID CLIMATE CHANGE poses a significant threat to the farming communities and ecosystems of the Hindu Kush Himalayas (HKH) region, which sustains over 200 million people. Traditional adaptation methods adopted by the communities have become inadequate, underscoring the need for climate-smart solutions.

This project focused on identifying and scaling up such solutions in high-altitude farming areas of Bhutan, Nepal and Pakistan. The project consulted over 1,000 farmers, experts and other stakeholders to determine efficiencies in the production of high-altitude farming systems vulnerability to climate change. The project completed nine workshops for more than 450 farmers to enhance their capacity to cope with adverse climate change impacts and improve their knowledge of innovative solutions using local resources. Additionally, the project extended capacity building workshops to more than 100 officials and agricultural and extension workers to help them better guide farmers in adopting climate-smart agriculture (CSA) practices.

As a result, farming communities in high-altitude regions have become more aware of climate change issues, and networking among farmers, research and government departments to implement CSA practices has strengthened. ■

PROJECT Identification and up-scaling of climate-smart agriculture (CSA) practices for sustainable food security in high altitude farming regions of Himalaya **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Saeed A. Asad (successor), COMSATS University Islamabad, Pakistan, and Dr Muhammad Abid (original project leader), Deutsche Gesellschaft für Internationale Zusammenarbeit, Pakistan **ORGANISATIONS INVOLVED** Asian Institute of Technology, Thailand; Karakoram International University, Pakistan; International Maize and Wheat Improvement Center, Pakistan; Nepal Agroforestry Foundation, Nepal; Royal University of Bhutan, Bhutan; University of Hamburg, Germany **GRANT DOI** https://doi.org/10.30852/p.4606

Empowering upland farmers: Climate adaptation in Southeast Asia

RECENT CLIMATIC HAZARDS pose a significant threat to the food security of rural households in Southeast Asia. Food insecurity and climate change vulnerability are even more problematic in the uplands, which are home to ethnic minorities in the Indochina Peninsula.

The study examined household decision-making regarding climate change adaptation in the mountainous areas of Lao PDR, Cambodia and Vietnam. The study focused on three adaptation practices, using climate-tolerant crops, intercropping and growing cash crops, to determine the factors that may influence adoption decisions and help address food insecurity.

Data from surveys and focus groups across the countries showed that adaptation knowledge and the perceived usefulness of adaptation practices influenced adoption. Findings also show that the transition to high-value cash crops can boost farm income. However, households with lower income levels were less likely to grow cash crops. Policy instruments aiming to improve loan access are therefore crucial to support these farmers.

Lastly, access to information also positively influenced the decision to select climate-tolerant varieties and diversify crops, making the agricultural extension programme an effective strategy for encouraging adoption. ■

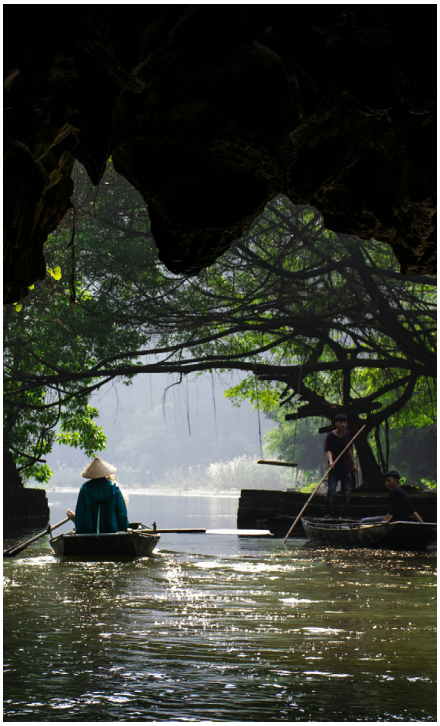
PROJECT Upland households' decision-making in climate change adaptation to enhance food security in Laos, Cambodia and Vietnam **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Thanh Mai Ha, Vietnam National University of Agriculture, Vietnam **ORGANISATIONS INVOLVED** Ministry of Health, Vietnam; Vietnam National University of Agriculture, Vietnam; National University of Laos, Lao PDR; Hue University of Agriculture and Forestry, Vietnam; Mean Chey University, Cambodia **GRANT DOI** https://doi.org/10.30852/p.13756

▸ The project, aimed at developing affordable micro-irrigation for small-scale farming in marginal lands, introduced three types of low-cost micro-irrigation technologies. Twenty-three households, including women farmers, participated in a Farmer Field School and demonstrated increased receptiveness and knowledge in operating and maintaining micro-irrigation technologies.

PROJECT LEADER Dr Reskiana Saefuddin, The National Research and Innovation Agency, Indonesia **GRANT DOI** https://doi.org/10.30852/p.17435

Risk and resilience

Enhancing groundwater resilience in Asian cities amidst climate change and urbanisation



GROUNDWATER, CONSTITUTING 94% of global freshwater resources, is vital for urban water supply, yet often underappreciated. Its resilience against quality degradation and drought is crucial for cities such as Bangkok, Ho Chi Minh City, Lahore and the Kathmandu Valley. This project recognised the pressing need for strategic groundwater management and crafted a comprehensive framework to assess groundwater resilience to climate change and human development.

Focused on evaluating the impacts of climate change and urbanisation on groundwater recharge and quality, the project mapped groundwater resilience in key Asian cities. This mapping identified areas necessitating urgent intervention and offered evidence-based strategies for sustainable management. The framework incorporated various parameters to forecast water demand and groundwater abstraction under different urbanisation scenarios, providing a holistic perspective on future groundwater levels and resilience.

Outputs encompassed six journal articles, four theses, regional workshops and a dedicated project website. These dissemination efforts heightened awareness of groundwater resilience issues, emphasising the economic and environmental repercussions of groundwater depletion. Further, the project nurtured 16 researchers from Nepal, Thailand, Vietnam and Pakistan, cultivating a new generation of groundwater management experts. The resulting findings and strategies advocate for sustainable groundwater utilisation, which is essential for adapting to climate change and ensuring enduring water security for urban populations. ■

PROJECT Mapping groundwater resilience to climate change and human development in Asian cities **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Sangam Shrestha, Asian Institute of Technology, Thailand **ORGANISATIONS INVOLVED** Institute for Global Environmental Strategies, Japan; Department of Groundwater Resources, Thailand; Water Resources Planning and Investigation for South of Vietnam, Vietnam; International Waterlogging and Salinity Research Institute, Pakistan; Center of Research for Environment Energy and Water, Nepal; **GRANT DOI** https://doi.org/10.30852/p.4580

Tackling arsenic contamination in the Mekong River: A path to safer water

THE PROJECT AIMED to assess arsenic contamination in the Mekong River, a vital water source in Southeast Asia, to support regional planning by integrating climate change adaptation and disaster risk reduction strategies. Focused on major rivers, Mekong and Salween, the study involved extensive sampling in Cambodia and Lao PDR. Utilising advanced methods such as ion chromatography and mass spectrometry, the findings revealed significantly higher arsenic concentrations in Cambodia's groundwater than in Lao PDR, underscoring the urgent need for further research on arsenic hydrology.

Aligned with the UN's SDGs, particularly clean water and sanitation, the initiative operates within the Climate Technology Centre and Network (CTCN). Advocating for arsenic monitoring in drinking water sources, the project plans to extend efforts to Cambodian communities with elevated arsenic levels. The publicly available data fosters global scientific collaboration and aids in effective policymaking for water quality management.

Key outputs include a comprehensive database of arsenic concentrations, scientific publications and policy consultation workshops. The project successfully identified high-risk villages in Cambodia, leading to targeted mitigation efforts such as installing water filtration systems. These efforts have raised community awareness and supported government regulations for safer drinking water. The success of the project in identifying contamination levels and enhancing policy consultation has significantly contributed to improved mitigation strategies, aligning with its objectives of promoting regional awareness and preparedness for arsenic risks. ■

PROJECT The impacts of Himalaya's glacier melting on arsenic mass balance and its mobility in Mekong and Salween sub-region groundwater **PROGRAMME** Collaborative Regional Research Programme **PROJECT LEADER** Dr Cary Seah Kah Yeah, Gwangju Institute of Science and Technology, Republic of Korea **ORGANISATIONS INVOLVED** Cambodian Chemical Society, Cambodia; Chulalongkorn University, Thailand; National University of Laos, Lao PDR; Department of Groundwater Resources, Thailand; Yangon Technological University, Myanmar **GRANT DOI** https://doi.org/10.30852/p.13812

Human dimensions

Empowering South Asian farmers: Transforming agriculture through climate smart strategies

AMID THE URGENT need to address the challenges posed by shifting climatic conditions on agriculture, the project aimed to empower South Asian farmers to combat climate change with CSA strategies.

One of the key elements of the project was training master trainers in CSA methodologies and developing a comprehensive training manual available in various languages, ensuring accessibility and inclusivity. This manual served as a foundational resource for the extensive workshops conducted for trainers and farmers across India and Bangladesh. Additionally, the establishment of a dedicated website facilitated continuous access to resources and information, ensuring ongoing support for farmers.

The direct impact of these efforts was evident in the 2,450 farmers who benefited from enhanced knowledge and tools to adapt their agricultural practices to climate fluctuations. This improved agricultural productivity and increased resilience, positively impacting livelihoods and fostering community sustainability.

The lasting impact of the project was further amplified by the increased climate change awareness among farmers, improving agricultural productivity and promoting long-term sustainability. The project is instrumental in driving sustainable farming practices and bolstering climate resilience across South Asia. ■

PROJECT Building capacity to enhance farmer's capabilities to address the challenges of climate change using climate smart agriculture strategies **PROGRAMME** Scientific Capacity Development Programme **PROJECT LEADER** Dr Nutan Kaushik, Amity University, India **ORGANISATIONS INVOLVED** The University of Western Australia, Australia; KERNEL Group of Companies, Bangladesh; Kabul University, Afghanistan **GRANT DOI** https://doi.org/10.30852/p.4614

Integrating climate smart practices for a resilient agriculture in Pakistan

AGRICULTURE IN PAKISTAN is highly vulnerable to the adverse effects of climate change, leading to a stark decline in productivity and posing substantial challenges to the country's economy and food security.

The project aimed to enhance the capacities of Provincial Agriculture Service Delivery Organizations to integrate CSA practices, particularly in Khyber Pakhtunkhwa and Baluchistan provinces of Pakistan. It successfully developed and distributed a CSA resource kit to agricultural extension officers, equipping them with the necessary tools and knowledge for effective CSA implementation.

Furthermore, the project undertook a comprehensive review and adjustment of the Provincial Agriculture Training Institutes curricula to incorporate CSA elements. This ensured that future agricultural professionals are well-prepared to integrate critical CSA practices into their work. The training programmes for district agricultural extension officers were also well received, with commendations for their relevance and effectiveness in equipping officers with practical CSA applications.

A significant milestone was the national consultation workshop, which brought together key stakeholders to advocate for CSA integration nationwide. This platform facilitated sharing experiences, addressed challenges, and identified collaboration opportunities to bolster agricultural resilience in the face of climate change.

These efforts resulted in improved capabilities of extension officers, the establishment of CSA practices within provincial departments, enhanced agricultural resilience and productivity, and a strengthened network for CSA knowledge dissemination and stakeholder engagement. These outcomes ensure sustained progress towards a climate-resilient agricultural sector in Pakistan. ■

PROJECT Pathways to strengthening capabilities for climate smart agriculture in Pakistan **PROGRAMME** Scientific Capacity Development Programme **PROJECT LEADER** Dr Haroon Khan, University of Agriculture Peshawar, Pakistan **ORGANISATIONS INVOLVED** Pakistan Agricultural Research Council, Pakistan; Leadership for Environment and Development, Pakistan; Government of Balochistan, Pakistan **GRANT DOI** https://doi.org/10.30852/p.4618

Capacity development

Sulfur isotopic approach on sources and production of urban atmospheric particulate matters in East Asia

SEVERE HAZE POLLUTION plagues many East Asian cities due to rapid urbanisation, industrialisation and population growth. Recent studies reveal that PM2.5 composition in Ulaanbaatar and Beijing is heavily influenced by coal combustion sources, exacerbating local and regional atmospheric pollution. Unidentified sources pose challenges to haze mitigation efforts through evidence-based policymaking and targeted mitigation strategies.

Through this project, PM2.5 source contributions were effectively assessed using intensive sampling and isotopic analysis methods in Ulaanbaatar and Beijing. Research findings indicated significant regional and seasonal variations in PM2.5 compositions and sources, providing crucial insights into air pollution dynamics in East Asia. Additionally, advanced laboratory facilities at the National University of Mongolia were established for aerosol analysis. A standardised method of PM2.5 sampling and analysis was tested and established, contributing to the overall research infrastructure and capacities of the National University of Mongolia.

As such, the project successfully achieved its objectives by conducting intensive PM2.5 sampling in Ulaanbaatar and Beijing. The strengthened research capabilities in regional aerosol chemistry through this project have contributed to fostering long-term sustainability and data accuracy in atmospheric research, supporting the global and regional efforts in addressing climate change and air pollution. Additionally, the project trained early career professionals, published three peer-reviewed papers, and organised workshops and training events, furthering scientific knowledge and fostering science-policy interactions for effective pollution control strategies. ■

PROJECT Sulfur isotopic approach on sources and production of urban atmospheric particulate matters in East Asia **PROGRAMME** Collaborative Research for Early-Career Scientists **PROJECT LEADER** Dr Soyol-Erdene Tseren-Ochir, National University of Mongolia, Mongolia **ORGANISATIONS INVOLVED** Beijing Normal University, China; North China Electric Power University, China **GRANT DOI** https://doi.org/10.30852/p.13784

Building capacities for water security assessment in Asian cities

THE PROJECT AIMED to enhance urban water security in Asian cities through the development and dissemination of a web-based Water Security Assessment Tool (WATSAT), utilising a water security assessment framework developed by a previous APN project (ARCP2015-07CMY-Babel). Although the theoretical understanding and frameworks for water security assessment are robust, a significant shift is required to translate science into practice. As such, the publicly-accessible web tool uses an indicator-based methodology to evaluate and operationalise city-level water security.

The project successfully developed and deployed the WATSAT, achieving significant outcomes in urban water management for Asian cities. The development of WATSAT was underpinned by extensive research and validation in Bangkok, ensuring its relevance and effectiveness in the South Asian context. The tool was particularly successful in assessing city level water security, offering a user-friendly interface that local decision-makers can utilise to gauge and enhance water security.

The capacity building component benefitted approximately 100 stakeholders trained across India, Vietnam and Nepal, which improved local capacities in water management. These workshops effectively translated complex water security concepts into practical applications, fostering greater understanding and engagement among participants. ■

PROJECT Building capacities for water security assessment in Asian cities **PROGRAMME** Scientific Capacity Development **PROJECT LEADER** Dr Mukand Babel, Asian Institute of Technology, Thailand **ORGANISATIONS INVOLVED** Central University of Rajasthan, India; Water Resources University, Vietnam; Tribhuvan University, Nepal **GRANT DOI** https://doi.org/10.30852/p.14065

▸ Implemented in eight Cambodian tertiary education institutions, the project trained 32 early career educators in Cambodia's agricultural education sector, aligning directly with the Cambodian Climate Change Strategic Plan (2014-2023). Its impacts included integrating climate change education into the curricula, delivering replication training to 240 students, and fostering a collaborative network among local institutions.

PROJECT LEADER Mr Sopheak Thav, Royal University of Agriculture, Cambodia **GRANT DOI** https://doi.org/10.30852/p.20541

Stakeholder engagement

UNFCCC

In December 2022, APN participated in COP27 in Egypt, playing key roles in two major side events. The first event, led by an APN project leader, focused on "Addressing Heat Equity through Vulnerable Community-Focused Heat Adaptation Plans." APN chaired this session, highlighting the impact of heat stress on vulnerable communities and discussing adaptation strategies. The second event, titled "Formulation and Implementation of National Adaptation Plans (NAPs) in the Asia Pacific," was co-organised by the National Institute for Environmental Studies, the Ministry of the Environment of Japan and IGES. APN presented on locally-led adaptation in the Asia-Pacific region, moderated a panel, and discussed best practices, challenges and initiatives for climate change adaptation.

Climate Adaptation Writeshop

In October 2022, APN and SLYCAN Trust co-organised an international writeshop in Sri Lanka to compile a publication showcasing the outcomes of APN projects focusing on climate change adaptation, disaster risk reduction, and loss and damage. Sixteen participants from eight countries, including ten project leaders from APN's Climate Adaptation Framework and related projects, attended. The main goal of the writeshop was to present and write peer-reviewed manuscripts intended for publication in a special issue by a reputable academic publisher. The book, titled "Synopsis of Book on Linking Climate Change, Adaptation, Disaster Risk Reduction, and Loss & Damage", was published in May 2024.

Gobeshona Global Conference

In March 2023, APN and IGES jointly organised a session titled "Challenges and opportunities for promoting locally-led adaptation: Cross-learning from Nepal, Fiji, Vietnam" at the Third Gobeshona Global Conference. The session showcased an APN-IGES project on locally-led adaptation (LLA) in Fiji, Nepal and Vietnam, presenting geographic and socioeconomic contexts and adaptation challenges, as well as the Asia-Pacific Climate Change Adaptation Information Platform (AP-PLAT), aiding local-scale adaptation planning. Breakout groups discussed the relevance and uses of eight LLA principles and strategies for promoting innovation in adaptation, emphasising indigenous knowledge systems. Participants highlighted the role of LLA in addressing inequality and enhancing local capacity to combat climate change while sharing project implementation challenges.

Hyogo Activities

In October 2022, APN and the University of Hyogo co-organised a session titled "Climate Change × Disaster Reduction: Sustainable City Planning and Community Perspectives'' during Bosai Kokutai 2022 in Japan. The session aimed to promote the integration of climate change and disaster risk reduction by encouraging discussions on sustainable city planning and community preparedness for future disasters. It also emphasised the importance of pursuing prosperity within planetary boundaries for sustainable development, and the significance of integrating green infrastructure and nature-based solutions into compact urban areas.

Hyogo Activities (continued)

In December 2022, APN, Hyogo Prefectural Government and IGES co-organised the "SDGs International Forum for Achieving Carbon Neutrality and Realising a Decarbonised Society" in Japan. The Governor of Hyogo Prefecture announced plans to use Expo 2025 Osaka to showcase global SDGs, promote regional economies, and introduce hydrogen transportation trials and a carbon-neutral port. The IGES President presented the "Regional Circular and Ecological Sphere" concept. Discussions included government systems, business partnerships, Gen Z involvement and Satoyama sustainability strategies.

Asian Institute of Technology (AIT)

The memorandum of understanding between APN and AIT aims to drive collaboration in addressing global and societal challenges by connecting science with policy and contributing to the sustainable development of the Asia-Pacific region. The partnership strives to advance sustainability in the region through joint workshops, research support, expert exchanges, proposal development, joint publications and capacity development for early-career professionals (ECPs).

The University of the South Pacific (USP)

The memorandum of understanding between APN and USP aims to achieve common objectives related to addressing challenges of global change and sustainability, thereby contributing to the sustainable development of the Asia-Pacific region. Activities include science-policy dialogues, joint events, regional research, capacity development, mutual event attendance and other agreed-upon initiatives to achieve common goals.

Asia-Pacific Climate Change Adaptation Information Platform

APN is a partner of AP-PLAT, a platform dedicated to empowering science-based decision-making and implementing climate change adaptation strategies across the Asia-Pacific region. Through active support and collaboration, APN contributes to generating and sharing practical scientific knowledge and tools to facilitate effective decision-making and adaptation action in the region.

Regional Circular and Ecological Sphere

APN and the Kansai Research Centre of IGES initiated the Regional-CES project, aligning with Japan's 2018 environmental policy and seeking to promote sustainable development through circularity principles and urban-rural partnerships.

National workshops convened 473 stakeholders across the Philippines (259), Thailand (46) and Indonesia (168), including representatives from local governments, academia and civil societies. Presentations covered practical R-CES applications in 44 sessions, with 28 local and 16 international presentations. These gatherings facilitated discussions on the potential of R-CES to strengthen decentralised societies, empower rural communities, and promote sustainable resource management and equitable partnerships between rural and urban areas.

Moving forward, the project will maintain its momentum with regular follow-ups, expand workshops in Southeast Asia, and conduct annual reviews to assess and refine strategies. The success of the project was highlighted by the recognition of its workshop results poster as the best at the International Forum for Sustainable Asia and the Pacific (ISAP) 2023, in Yokohama, Japan.

Empowering early career professionals in the Asia-Pacific region

Subregional cooperation in South Asia and Southeast Asia: Building capacity for global change research proposal development

The South Asia (SA) and Southeast Asia (SEA) Proposal Development Training Workshops (PDTWs) were transformative events, driving environmental leadership and sustainable development across the regions. Held at the Galle Face Hotel, Colombo, Sri Lanka (November-December 2023) and the Asian Institute of Technology Conference Centre, Thailand (May 2024), these workshops trained passionate ECPs to tackle urgent issues of climate smart agriculture and water security in their regional contexts.

Under the guidance of thematic experts including APN's national Focal Points and Scientific Planning Group members, the SA PDTW concentrated on refining proposal development skills in climate smart agriculture, culminating in the collaborative creation of refined research proposals by 29 dedicated trainees to promote sustainable agricultural practices. The SEA PDTW empowered 18 trainees to craft groundbreaking proposals on water security, with a strong emphasis on governance and regional collaboration.

Moreover, interactive sessions and science-policy dialogues, provided invaluable opportunities to underscore the significance of global change research and to sharpen the expertises of ECP trainees. The sessions were supplemented by expert keynote speeches from Dr Dipayan Dey (South Asian Forum for Environment) (SA PDTW), and Prof. Joyashree Roy (Jadavpur University, India) (SEA PDTW). With guidance from current and former APN project leaders, attendees crafted actionable recommendations that aim to bridge the gap between scientific research and policy application.

These workshops not only bolstered the professional capabilities of participants but also nurtured a resilient network of individuals dedicated to advancing regional environmental sustainability. Looking ahead, the connections forged and collaborative proposals developed during these workshops are poised to ignite significant environmental initiatives, propelling sustainable development efforts throughout South and Southeast Asia.

» South Asia PDTW, November-December 2022

» Southeast Asia PDTW, May 2023

Promoting the visibility of early career professionals in global change research in the Asia-Pacific region

The Asia-Pacific Network for Early Career Professionals for Global Change Research (APN-ECAP) is a new initiative dedicated to empowering ECPs across the Asia-Pacific region working in the field of global change research. Initiated in response to the pressing need to elevate youth visibility and engagement in global change and sustainability efforts, APN-ECAP will offer a dynamic platform for ECPs to become empowered by APN activities and be nurtured into successful project leaders, collaborators, and information and knowledge holders.

In its early stages, the APN-ECAP initiative has been collaboratively co-led by APN and the Center of Research for Environment, Energy and Water (CREEW). The initiative was launched virtually in November 2023, and has since convened regional and interaction workshops among ECPs in the Asia-Pacific region to validate the expected flagship activities and organisation of an APN-ECAP network. Examples of flagship activities for ECPs include the targeted dissemination of news and resources, early access to APN capacity building opportunities, and networking opportunities between the wide network of Asia-Pacific ECPs involved in APN projects.

Approved projects

Establishing baselines for marine plastics and bridging indigenous knowledge with ocean policy to improve livelihood security in the Pacific • Dr Amanda Ford, The University of the South Pacific, Fiji

Examining the impact of aerosol, urbanisation and irrigation on extreme rainfall occurrences over India using cloud-resolving simulations • Dr Chandan Sarangi, Indian Institute of Technology Madras, India

REgional cooperation for FReshwater Ecosystem Services in Himalayas (REFRESH): Understanding the influences of monsoon variability and compound extremes • Dr Ashutosh Sharma, Indian Institute of Technology Roorkee, India

Ecosystem-based adaptation in Temperate East Asia: Development of the indicator system for evaluating rural ecosystem restoration programs • Dr Kikuko Shoyama, Ibaraki University, Japan

Policy and governance approaches to cooperative mitigation of peatland carbon emissions and transboundary haze in Southeast Asia • Assoc. Prof. Helena Muhamad Varkkey , Universiti Malaya, Malaysia

Enhancing coastal risk reduction science and practice by considering climate, ecosystems, and communities in the tropical region • Prof. Mohamed Shawal Bin M Muslim, Universiti Malaysia Terengganu (UMT), Malaysia

Real time flood modeling for improved community resiliency in Southeast Asia • Dr Hidayah Basri, Universiti Tenaga Nasional, Malaysia

The Science-policy adaptive capacity for local herding and government groups to reduce climate vulnerability • Dr Suvdantsetseg Balt, Mongolian Academy of Sciences, Mongolia

Strengthening local adaptation plan through integrating socio-economic vulnerability assessment and policy gap analysis in Mongolia and China • Dr Altanbagana Myagmarsuren, Mongolian Academy of Sciences (MAS), Mongolia

Building capacities for climate resilient water resources development under climate uncertainty • Mr Dibesh Shrestha, Nepal Development Research Institute, Nepal

Developing the capacity of student scientists for supporting disadvantaged communities to cope with flooding (DECAF) • Dr Alex Lo, Victoria University of Wellington, New Zealand

Participatory assessment of land capability for agroforestry in selected upland farming communities in the province of Laguna, Philippines using agroforestry land capability assessment and mapping schemes (ALCAMS) • Ms Ma. Armie Janica Ramirez, University of the Philippines Los Baños, Philippines

Safeguarding the regional food security under climate change impacts via mainstreaming nature-based solutions-centered adaptation strategies (NAFOS) • Dr Loc Huu Ho, Asian Institute of Technology, Thailand

Strengthening livelihood resilience through community-based aquaculture in rural northern Thailand • Dr Khajornkiat Srinuansom, Mae Jo University, Thailand

Promoting youth role in raising community resilience to climate change in the vietnamese mekong delta (Mekong Delta CoRe • Mr Trung Phan, Can Tho University, Vietnam

Strengthening the capacity of officials on Integrated Flood Management Plans (IFMP): Integrating IFMP into provincial disaster prevention plans in coastal provinces of Central Vietnam • Assoc. Prof. Anh, Tran Ngoc, Center for Environmental Fluid Dynamics, Vietnam

Multidimensional poverty, agricultural commercialization, and environmental impacts: from discovering conflicts to building sustainable livelihood models for upland communities in developing countries • Mr Tien Dung Nguyen, Hue University, Vietnam

Promoting nature-based solutions for food security and climate change resilience among ethnic minority people in the Northern Mountainous Region of Vietnam • Dr Son Ho Ngoc, Thai Nguyen University of Agriculture and Forestry, Vietnam

Environmental education in combatting marine plastic waste - the role of youth in schools • Dr Thi Minh Hang Tran, Vietnam National University Hanoi, Vietnam

Completed projects

Building capacity of extension officers to help farmers better adapt to climate change in the coastal area of Cambodia • Mr Dara Sum, Ministry of Environment, Cambodia

Building future expertise in climate change research for agricultural universities and institutions in Cambodia (BUILD-FUTURE-CLIMATE CHANGE) • Mr Sopheak Thav, Royal University of Agriculture, Cambodia

Water-food-energy nexus in East Asia: Insights from changes in consumption pattern • Dr Jingli Fan, China University of Mining and Technology, China

Building capacity to enhance farmer's capabilities to address the challenges of climate change using Climate Smart Agriculture strategies • Dr Nutan Kaushik, Amity University, India

Development of affordable micro irrigation for small-scale farming in marginal land for food security and efficiency of water use • Dr Reskiana Saefuddin, Hasanuddin University, Indonesia

Socio-hydrological perspective of climate change adaptation in large riverine islands: Comparative study from India, Bangladesh and Vietnam • Dr Pankaj Kumar, Institute for Global Environmental Strategies, Japan

Integrated Flood and Sediment MAnagement in River basins for susTainable development (FSMART) • Dr Sameh Ahmed Kantoush, Kyoto University, Japan

Plausible alternative futures of island mangroves in the Asia-Pacific: Scenario-based analysis and quantification of mangrove ecosystem services in coastal hazard mitigation and climate change adaptation • Dr Shizuka Hashimoto, The University of Tokyo, Japan

Sulfur isotopic approach on sources and production of urban atmospheric particulate matters in East Asia • Dr Soyol-Erdene Tseren-Ochir, National University of Mongolia, Mongolia

Identification and up-scaling of Climate-Smart Agriculture (CSA) practices for sustainable food security in high altitude farming regions of Himalaya • Dr Muhammad Abid, COMSATS University Islamabad, Pakistan

Towards capacity building of media and awareness of public and students to develop strong science-policy communication on climate change in Pakistan • Ms Rida Sehar Kiani, COMSATS University Islamabad, Pakistan

The impacts of Himalaya's glacier melting on arsenic mass balance and its mobility in Mekong and Salween sub-region groundwater • Dr Cary Seah Kah Yeah, Gwangju Institute of Science and Technology, Republic of Korea

Building capacities for water security assessment in Asian cities • Prof. Mukand Babel, Asian Institute of Technology, Thailand

Mapping groundwater resilience to climate change and human development in Asian cities • Prof. Sangam Shrestha, Asian Institute of Technology, Thailand

Capacity development programme on air quality management and emission reduction of PM2.5 for ASEAN countries • Dr Ram Lal Verma, Asian Institute of Technology, Thailand

Integrated highland wildfire, smoke, and haze management in the Upper Indochina Region • Dr Kobsak Wanthongchai, Kasetsart University, Thailand

SEACLID/CORDEX Southeast Asia Phase 2: High-resolution analysis of climate extreme over key areas in Southeast Asia • Dr Jerasorn Santisirisomboon, Ramkhamhaeng University, Thailand

Upland households' decision making in climate change adaptation to enhance food security in Laos, Cambodia, and Vietnam • Dr Mai Thi Thanh Ha, Vietnam National University of Agriculture, Vietnam

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.

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

FINANCIAL RESOURCES IN FY 2022 (USD)

Donor contributions FY 2022	Ministry of the Environment, Japan	1,514,353
	Hyogo Prefectural Government, Japan	147,627
	Ministry of Environment, Republic of Korea	35,404
	Ministry for the Environment, New Zealand	19,920
Balance brought forward from FY 2021 (including committed funds for multi-year projects)		1,397,437
Returned funds from completed projects and adjustments		456,878
	Total	3,571,619

USE OF RESOURCES IN FY 2022 (USD)	*Executed and committed**
Core programmes	2,267,905
Frameworks	16,000
Other scientific and policy activities	224,032
Institutional activities	223,319
Personnel, administration and operational costs	513,194
Total	3,244,450

Members

** The lists below contain current members of APN at the time of publication.*

NATIONAL FOCAL POINTS

BANGLADESH
Iqbal Abdullah Harun
Ministry of Environment, Forest and Climate Change

BHUTAN
Tenzin Khorlo
Ministry of Energy and Natural Resources

CAMBODIA
Roath Sith
Ministry of Environment

CHINA
Xiaofeng Fu
Ministry of Science and Technology

FIJI
Krishan Pratap
Office of the Prime Minister

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

INDONESIA
Henri Bastaman
Ministry of Environment and Forestry

JAPAN
Naoko Nakajima
Ministry of the Environment

LAO PDR
Virasack Chundara
Ministry of Natural Resources and Environment

MALAYSIA
Muhammad Helmi Abdullah
Malaysian Meteorological Department

MONGOLIA
Tserendulam Shagdarsuren
Ministry of Environment and Tourism

NEPAL
Rajendra K.C.
Ministry of Forests and Environment

NEW ZEALAND
Douglas Hill
University of Otago

PAKISTAN
Muhammad Azim Khoso
Ministry of Climate Change and Environmental Coordination

PHILIPPINES
Marial C. Amaro Jr.
Department of Environment and Natural Resources

REPUBLIC OF KOREA
Hyungsup Lee
Ministry of Environment

RUSSIAN FEDERATION
Andrey V. Adrianov
Russian Academy of Sciences

SRI LANKA
B.K. Prabath Chandrakeerthi
Ministry of Environment

THAILAND
Monthip Sriratana
National Research Council of Thailand

SCIENTIFIC PLANNING GROUP MEMBERS

BANGLADESH
Giashuddin Miah
Bangabandhu Sheikh Mujibur Rahman Agricultural University

BHUTAN
Tenzin Khorlo
Ministry of Energy and Natural Resources

CAMBODIA
Uy Kamal
Ministry of Environment

CHINA
Wenjie Dong
Sun Yat-sen University

FIJI
Awnesh Singh
The University of the South Pacific

INDIA
Hemant Borgaonkar
Indian Institute of Tropical Meteorology

INDONESIA
Erna Sri Adiningsih
National Research and Innovation Agency

JAPAN
Kensuke Fukushi
The University of Tokyo

LAO PDR
Virasith Phomsouvanh
Ministry of Natural Resources and Environment

MALAYSIA
Diong Jeong Yik
Malaysian Meteorological Department

MONGOLIA
Tsogtbaatar Jamsran
Mongolian Academy of Sciences (Retired)

NEPAL
Madan Lall Shrestha
Nepal Academy of Science and Technology (Retired)

NEW ZEALAND
Douglas Hill
University of Otago

PAKISTAN
Muhammad Arif Goheer
Global Climate- Change Impact Studies Centre

PHILIPPINES
Maria Lourdes G. Ferrer
Department of Environment and Natural Resources

REPUBLIC OF KOREA
Soojeong Myeong
Korea Environment Institute

RUSSIAN FEDERATION
Alexander Sterin
All-Russia Research Institute of Hydrometeorological Information-World Data Centre

SRI LANKA
Athula Karunanayake
Department of Meteorology

THAILAND
Jariya Boonjawat
Chulalongkorn University

UNITED STATES OF AMERICA
Michael Robotham
United States Department of Agriculture

VIETNAM
Kim Chi Ngo
Vietnam Academy of Science and Technology

INVITED EXPERTS

Lance Heath
FreeLance Solutions, Australia

Patrick Nunn
University of the Sunshine Coast, Australia

Dawa Yoezer
Ministry of Energy and Natural Resources, Bhutan

Ailikun
Alliance of International Science Organizations, China

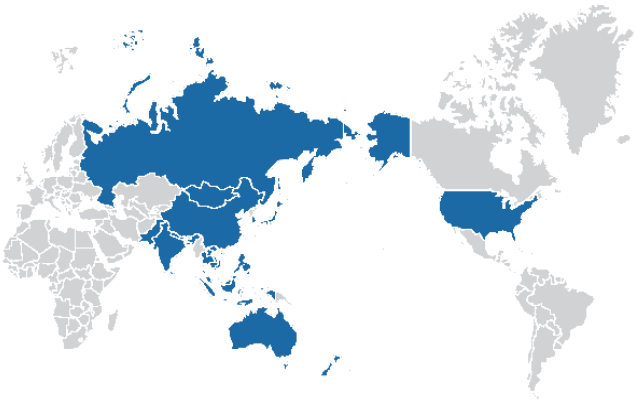
Yuji Masutomi
National Institute for Environmental Studies, Japan

Subramaniam Moten
Malaysian Meteorological Department, Malaysia (Retired)

Fredolin Tangang
Universiti Kebangsaan Malaysia, Malaysia

Juan Pulhin
University of the Philippines Los Baños, Philippines

Sangam Shrestha
Asian Institute of Technology, Thailand



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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
Website: www.apn-gcr.org