About KnowledgeHubs

KnowledgeHubs, the ***Asia-Pacific Water Forum's*** network of regional water knowledge hubs, is a family of internationally recognized institutions committed to generating and sharing water knowledge and building capacity in the Asia-Pacific region. Each hub takes the lead in networking with clients and partners on a priority water topic such as urban water management, water quality in river basins, flood management, river basin organizations and management, water and climate change adaptation, hydro informatics, irrigation service reform, water governance, and more.

The establishment and initial activities of KnowledgeHubs have been supported by:

- PUB Singapore
- UNESCO
- UNESCO-IHE
- ADB

What is Asia-Pacific Water Forum?

The Asia-Pacific Water Forum is an independent, non-profit, non-partisan, and non-political network dedicated to improving sustainable water management by championing best practices, boosting investments, building capacity, and enhancing cooperation in the water sector.

KnowledgeHubs Mission and Vision

- *KnowledgeHubs'* mission is to deliver state-of-the-art, knowledge-based products and services that meet the practical needs of water organizations like utilities, river basin organizations, ministries, and planning agencies.
- Committed to transparency and continuous quality improvement, *KnowledgeHubs* aims to improve the water sector's performance by promoting effective solutions and developing local capacity in organizations around the region.

Operating Structure

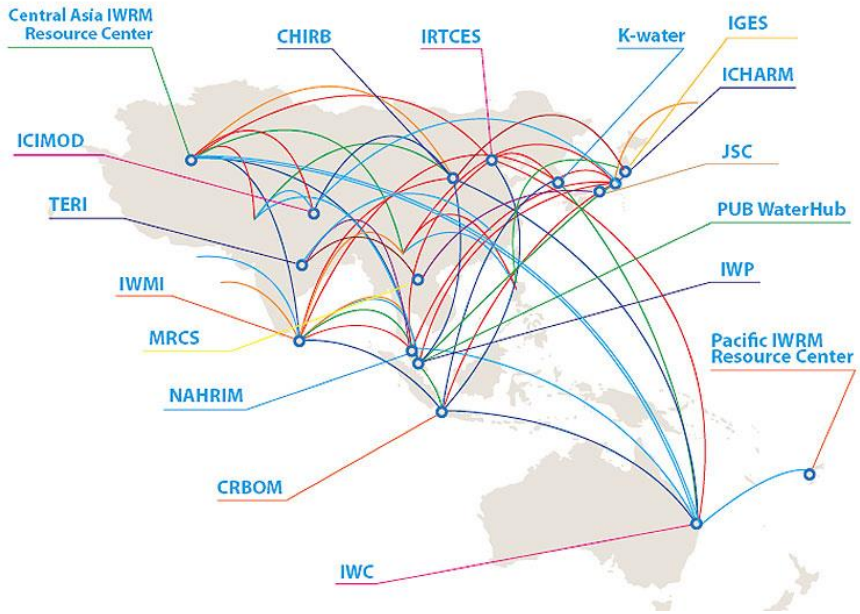
- Each hub works autonomously and is guided by 10 key operating principles for quality assurance
- Candidate organizations can become hubs through a peer-review procedure that considers the relevance of their proposed topic, their expertise, and their leadership and capacity in their knowledge domain.
- *KnowledgeHubs* contributes to the Asia Pacific Water Forum's (APWF) work and oversight is conducted by the APWF Governing Council
- While the *KnowledgeHubs* work together as needed, each hub is entirely responsible and accountable for its own services an resources

Key Operating Principles for Regional Water *KnowledgeHubs*

1. Vision and leadership for achieving results in the hub's priority topic
2. A focus on meeting client needs with relevant and feasible solutions
3. An inclusive attitude to knowledge networking with clients and partners
4. An (international) team of experienced specialists working at the hub
5. A stimulating research environment at the hub, including internships
6. Generation, identification and dissemination of state-of –the-art knowledge
7. Regular comparative analysis of progress in countries across the region
8. Excellent products and services for knowledge and capacity development
9. Adequate human and financial resources to develop the hub's excellence
10. An entrepreneurial approach to developing a sustainable business model

Overview of Regional Water Knowledge Hubs

As of June 30, 2010 there are already 17 confirmed water hubs that meet regularly to discuss and add value to each other's work and to improve the networking capacity of the Regional Water Knowledge Hubs.



Confirmed Hubs

1. **Urban Water Management:** PUB WaterHub, Singapore http://www.pub.gov.sg

Expertise

PUB, Singapore's national water agency, is in charge of planning, managing, and safeguarding Singapore's water resources. From sourcing, collecting, purifying, and supplying drinking water to treating used water and turning it into NEWater, PUB manages the entire water loop with the aim of

ensuring an effi cient, adequate, and sustainable water supply for the country. To accomplish this, PUB has adopted a proactive partnership approach, collaborating with the 3P sectors (public, private, and people) on a range of programs, events, and activities. Today, PUB has extended its reach to the global community, working with international partners, aid agencies, and international organizations to share expertise, create awareness, and pursue water sector business opportunities through collaborative research and development and capacity-building programs.

PUB WaterHub, launched in 2004, is a center of excellence committed to building a professional and competent workforce for both PUB and the water industry at large. Bringing technology, learning, and networking all under one roof, WaterHub signifi es PUB's continual commitment to Singapore's development as a hub for water-related services and technologies. Through WaterHub, PUB aims to equip water sector personnel with the knowledge, expertise, and skills required to engage the new frontiers of a rapidly evolving water industry.

Services

As the regional water knowledge hub for urban water management, PUB WaterHub assists government agencies, nongovernment organizations, regional organizations, and others by:

- **Catalyzing** growth and expanding the technology spectrum of the Asia-Pacific region's water sector by collaborating on research and development, participating in technology information exchanges and acting as a regional test bed;
- **Enhancing the professionalism** of the water sector workforce through specialist initiatives, capacity-building programs in integrated water resources management (IWRM), and other training and leadership projects;
- **Connecting** partners to best practices, the most up-todate water sector information and analyses, state-of the-art water expertise, and a standard of excellence for products and services;
- **Sharing** up-to-date information and analyses of urban water management trends in countries across the Asia-Pacific region;
- **Granting** access to PUB WaterHub's knowledge database so that partners may assess and compare urban water management strategies worldwide;
- **Organizing** an annual Regional Water Leaders Summit, Singapore International Water Week (SIWW), dialogues, and joint seminars;
- **Leveraging** on PUB WaterHub's vast network of local and international organizations, development partners, government agencies, nongovernment organizations, research institutes, and academic institutions;
- **Offering** a comprehensive range of structured and customized water and used water resources management training programs, accredited operators' training courses, and professional competency and leadership development programs;

- **Building** networks that include international organizations, aid agencies, and municipal water agencies throughout the region.
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Knowledge Partners

PUB WaterHub facilitates regional networking with a range of institutions. Together they develop capacity-building programs and training tie-ups; share information, knowledge, and expertise; officer water-related services; and collaborate on technology development and exchange. Interested parties from the private and the public sector are invited to join PUB WaterHub's network of local and international partners from the following types of organizations:

- International development partners
- Government agencies at the national, regional, and local levels
- Non-government organizations
- Overseas municipalities
- Local agencies
- Research institutes, corporate research and development centers, and academic institutions throughout the Asia-Pacific region

2. **Disaster Risk Reduction and Flood Management**: International Center for Water Hazard and Risk Management (ICHARM), Japan
http://www.icharm.pwri.go.jp

Expertise

ICHARM was established in March 2006 under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Hosted by the Public Works Research Institute of Tsukuba, Japan, ICHARM is a center of excellence in the area of water-related disaster risk management. ICHARM's mission is to provide localities, nations, regions, and the globe with the best practicable strategies for managing the risk of water-related disasters and help them implement those strategies to enhance professional capacity and promote local advancement, particularly in the case of developing countries.

Services

ICHARM is focusing the initial phase of its mission on risk management of flood-related disasters, such as flash floods, continental floods, landslides, debris flows, storm surges, and tsunamis. ICHARM bases its operations on three pillars of activity: research, training, and information networking. ICHARM collaborates closely with organizations throughout the world to ensure that the solutions it proposes reflect local geographical and societal conditions. As the regional water knowledge hub for disaster risk reduction and flood management, ICHARM can assist central and local government agencies, local communities, and others by:

- **Sharing** up-to-date information on integrated fl ood risk management;

- **Promoting** research collaboration in the region;
- **Conducting** research activities on diverse subjects related to water-related disasters, such as satellite-based flood forecasting and early warning systems, hazard mapping for community preparedness, local studies to determine appropriate flood risk management measures, and flood risk assessment and adaptation strategies in preparation for possible global climate change;
- **Educating** trainees from around the region in flood hazard mapping, water-related risk management, and other subjects;
- **Raising** political and public awareness and encouraging actors to commit to reducing risk;
- **Mobilizing** an international research work force and organizing workshops, symposia, and conferences that promote communication and capacity building;
- **Training** clients from multifaceted social, economical,institutional, and cultural backgrounds in integrated risk management techniques, including avoidance, reduction,transference, and acceptance; and
- **Maximizing** and integrating advanced technology,indigenous knowledge, and other kinds of information to create eff ective disaster-reduction techniques tailored to local needs.

Knowledge Partners

ICHARM acts as Secretariat of the International Flood Initiative (IFI), an international collaborative scheme among leading international organizations committed to promoting integrated flood management. These organizations include UNESCO; the World Meteorological Organization (WMO); the United Nations University (UNU); the International Strategy for Disaster Reduction (ISDR); the International Association of Hydrological Sciences (IAHS); and the International Association of Hydraulic Engineering and Research (IAHR). ICHARM also acts as a partner in the World Water Assessment Programme (WWAP) and promotes cooperative activities with a number of related organizations and programs, such as:

- The world-wide network of UNESCO water centers
- Institute of Water Resources and Hydropower Research (IWHR), People's Republic of China
- Korea Institute of Construction Technology (KICT), Republic of Korea
- Mekong River Commission (MRC), Lao People's Democratic Republic
- Asian Disaster Preparedness Center (ADPC)
- Asian Disaster Reduction Centre (ADRC)
- International Flood Network (IFNet)
- Network of Asian River Basin Organizations (NARBO)
- UNESCAP/WMO Typhoon Committee (TC)
- University of California, Davis (UC Davis), United States
- U.S. Army Engineer Institute for Water Resources (IWR), United States
- U.S. Geological Survey (USGS), United States

3. **Water and Climate Change Adaptation in South East Asia:** National Hydraulic Research Institute of Malaysia (NAHRIM) http://www.nahrim.gov.my

Expertise

NAHRIM was established by the Government of Malaysia in response to the country's increasing number of water-related challenges, including floods, drought events, deteriorating water quality in rivers and coastal bodies, competing users, erosion, accretion, sedimentation, and not least, the impending anticipated impacts of climate change on water. Operating under the direction of NAHRIM's Research Centre for Water Resources, the regional water knowledge hub for water and climate change adaptation in Southeast Asia has building capacity in areas of water management impacted by climate change due to global warming as its goal.

Services

The main priority of the regional water knowledge hub for climate change adaptation is to develop well-informed personnel in relevant agencies around the region to help it brace itself for the impacts of climate change. More specifi cally, the hub will:

- **Develop** and off er courses and training programs in the areas required and specific to the region that are relevant and self-sustaining;
- **Assess** the impacts of global climate change and land use change on water balances and water quality in Southeast Asia through regional interactive climate, hydrology, and water quality models, such as NAHRIM's Regional Environmental Hydroclimate Model (RegEHCM), part of which is already completed;
- **Train** technical personnel from interested agencies around the region in the use of state-of-the-art data and technology from regional environmental hydroclimate models and water resources systems models designed to assist in assessing the impact of climate change in the region;
- **Help** develop clients' and partners' awareness of waterrelated issues in agricultural, coastal resource, biodiversity, forestry, public health, energy, and socio-economic planning, drawing on the expertise of regional and international teaching personnel;
- **Create** feasible policies for the optimal management of the region's water resources and the mitigation of the potential impacts of climate change against a variety of likely future water demand and land use scenarios;
- **Develop** a simulation model for water resources systems at the regional, country, and watershed scales that will include both water balances and water quality conditions (water temperature, dissolved oxygen, turbidity, nutrient loads, etc.) under global climate change and future urbanâ€“industrialâ€“agricultural water demand and land use scenarios; and
- **Predict** possible scenarios of land use change and urbanâ€“industrialâ€“agricultural water demands in Southeast Asia in the 21st century at a fi ne space (grid resolution ~3kilometers) and time (hourly/daily).resolution.

Knowledge Partners

NAHRIM facilitates regional networking with partners throughout the Asia-Pacific region to share knowledge, develop capacity, and coordinate services. NAHRIM's current national and local partners include government agencies and municipalities in charge of managing water resources and water quality conditions and/or land use and land cover in Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar, Philippines, Singapore, Thailand, and Viet Nam. NAHRIM's international partners and clients consist of global research agencies and training institutions, development agencies, and financing agencies that address water resources development and environmental issues. Possible partners of the regional water knowledge hub for climate change adaptation in Southeast Asia include the following:

- Local and national agencies and governments at risk of being affected by climate change
- The Asian Institute of Technology (AIT), Thailand
- United Nations University (UNU)
- California Hydrologic Research Laboratory (CHRL), the United States
- Institute of Water Modelling (IWM), Bangladesh
- UK Climate Impacts Programme (UKCIP), University of Oxford, the United Kingdom
- Caribbean Community Climate Change Centre (CCCCC)
- Forest Research Institute of Malaysia (FRIM), Malaysia
- Malaysian Agricultural Research and Development Institute (MARDI), Malaysia
- Academy of Sciences Malaysia (ASM), Malaysia
- Network of Asian River Basin Organizations (NARBO)

4. **River Basin Organizations and Management**: Center for River Basin Organizations and Management (CRBOM), Indonesia http://www.crbom.go.id

Expertise

CRBOM is a newly created alliance of agencies of the Government of Indonesia, composed of the Ministry of Public Works' Directorate General of Water Resources, the Ministry's Research and Development Agency, and two corporate-type river basin organizations—Jasa Tirta Public Corporations I and II. These entities have decades of experience establishing and operating public-utility-type and corporate-type river basin organizations; planning and developing water resource use and conservation; managing technical, fi nancial, and management issues associated with river basin organizations and management; operating and maintaining water resource infrastructure; managing watersheds and river environments; and conducting research and development in hydrology, hydraulic structures and geotechnical engineering, river engineering, and sediment management. CRBOM's activities will be implemented through the Network of Asian River Basin Organizations (NARBO) in collaboration with NARBO secretariat partners—Japan Water Agency (JWA), Asian Development Bank (ADB), and ADB Institute. CRBOM will be assisted by JWA through the

Dissemination Unit for Water Resources Management and Technology, a JWA and Japan International Cooperation Agency project to improve water resources management in Indonesia, and by ADB through a regional technical assistance project entitled, "Managing Water in Asia's River Basins: Charting Progress and Facilitating Investment." CRBOM welcomes further partnerships through NARBO to complement these collaboration initiatives.

Services

CRBOM aims to provide local, regional, and national-level government agencies; river basin organizations; water service providers; and others with the most reliable, eff ective, and practical information; analysis; advice; and capacity-development services in the fi eld of river basin organizations and management. More specifi cally, the regional water knowledge hub will:

- **Assist** clients in establishing river basin organizations and river basin management systems that integrate up-todate quality management systems;
- **Identify** best practices in river basin organizations and management, and disseminate those practices throughout the region;
- **Conduct** applied research and development on river environments, hydrology, hydraulic structures and geotechnical engineering, river engineering, sediment management (sabo technology), coastal areas and swamps, and irrigation;
- **Prepare** norms, standards, procedures, guidelines, and manuals for optimal river basin organization and management;
- **Train** personnel from universities and other institutions in river basin organization and management, and create educational materials for wider distribution;
- **Instruct** water sector personnel in the use of ISO 9001 standards for the design, operation, and maintenance of water resources and infrastructure;
- **Educate** clients in dam safety and the use of remote sensing and geographic information system (GIS) in water resources management;
- **Advise** clients on the provision of permits for the preparation, allocation, use, and exploitation of water resources in river basins;
- **Act** as an information clearinghouse by conducting seminars and workshops, publishing a journal on river basin organizations and management, and facilitating the face-to-face and electronic exchange of river basin related information; and
- **Provide** consulting services to river basin organizations in the areas of technology, policies, and management.

Knowledge Partners

CRBOM's knowledge partners will include local, national, regional, and international research institutions; water knowledge institutions; and networks dedicated to contributing information and sharing best practices and lessons learned to develop knowledge and capacity in river basin organizations and management. Institutions expected to join the network of partners of the regional water knowledge hub on river basin organizations and management are:

- Indonesian Water Partnership (INA-WP), Indonesia

- Collaborative Knowledge Network Indonesia (CKNet-INA), Indonesia
- Indonesian Association of Hydraulic Engineer (HATHI), Indonesia
- Infrastructure Development Institute (IDI), Japan
- Capacity Building Network for Integrated Water Resources Management (Cap-Net)
- Global Water Partnership
- World Bank Institute

5. **Water Quality Management in River Basins:** K-water, Republic of Korea
   http://english.kwater.or.kr

K-water's Expertise

K-water has more than 40 years' experience managing water resources and regional water supply systems. ISO9001/14001-certified and a member of the United Nations Global Compact, K-water is committed to environmental responsibility and transparent and ethical governance as means of optimizing its long-term performance and finding new ways to maximize water resource utilization through efficient management and the development of core technologies. As K-water's research and development arm, the Korea Institute of Water and Environment (KIWE) is the Republic of Korea's leading water specialized research institute. From developing state-of-the-art water management techniques to inventing new processes of water treatment and desalination, KIWE is dedicated to the development of clean and safe water supply systems in Korea and abroad.

Services

A government-owned corporation, K-water develops and manages a host of facilities and programs designed to provide the best water supply and water quality available:

- Water resource facilities: K-water operates 12 multipurpose dams, an estuary barrage, and other facilities that satisfy national requirements for flood control, water supply, and hydropower generation. For each river system involved, K-water has implemented an integrated water management system that ensures water quality and the protection of ecosystems.
- Multiregional water supply systems: To remedy regional water shortages and address emergency situations, K-water's multiregional water supply system uses strategically designed water treatment facilities and large-scale pipelines to share drinking water equitably and efficiently throughout a given region.
- Training programs: The K-water Academy conducts both domestic training programs for K-water staff and government officials, as well as international trainings and technical cooperation and exchange programs

for water sector professionals and government officials from Afghanistan, Nepal, Sri Lanka, Viet Nam, and other developing countries.

- Overseas projects: K-water has served Cambodia, Equatorial Guinea, Iraq, Mongolia, Viet Nam, and other overseas clients in the areas of wastewater rehabilitation, hydropower development, new water supply systems for housing developments, water resource infrastructure expansion, procurement services, and more. K-Water has recently undertaken a collaborative project with Indonesia and Network of Asian River Basin Organization (NARBO) to improve water quality in the Citarum river basin.
- Water quality expertise: K-water's Water Analysis and Research Center is an internationally accredited water quality analysis institution and Korea's first center for the testing of viruses in drinking water. It promotes international technical cooperation and knowledge exchanges with partner institutions abroad.

Knowledge Partners

K-water facilitates regional networking with partners throughout the Asia-Pacific region to share knowledge, develop capacity, and coordinate services. K-water is a proud member of the Asian Development Bank-Global Water Partnership (ADB-GWP)'s Water Operators Partnership program. Public and private sector organizations interested in joining the regional water knowledge hub on water quality management in river basins are invited to join K-water's network of international and local partners, including the following key knowledge institutions:

- Asian Development Bank (ADB)
- International Commission on Large Dams (ICOLD)
- Department of International Cooperation, Science and Technology, Ministry of Water Resources People's Republic of China
- Japan Water Agency (JWA), Japan
- United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
- UNESCO-IHE Institute for Water Education
- Universities in the Asia-Pacific region and elsewhere
- Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
- NARBO
- Perum Jasa Tirta (PJT) I and II, Indonesia

6. **Decision Support Systems for River Basin Management (Hydroinformatics):** Center for Hydroinformatics in River Basins (CHIRB), People's Republic of China http://www.yellowriver.gov.cn/eng

Expertise

CHIRB is hosted by the Yellow River Conservancy Commission (YRCC), an agency of the Ministry of Water Resources of the People's Republic of China (PRC) mandated to sustainably manage the PRC's great Yellow River, the mother of all Chinese rivers and the water source upon which the lives of over 100 million people depend. More than 60 years of remarkable achievements in flood management, water allocation, watershed rehabilitation, and erosion and pollution control have made YRCC into one of the world's leading knowledge centers for river basin management. Specialized in policy making, institutional management, research, public participation, and the development of new technologies, YRCC has recently implemented the Digital Yellow River Project, an integrated water resource management system comprising hydro-informatics tools such as a geographic information system (GIS) database; a global positioning system (GPS); remote sensing technology; and the best hydrodynamic, sediment transportation, and water quality models available. Through this project, YRCC has developed a range of policies, techniques, and tools for modern river basin management that address the growing and complex nature of today's needs

Services

As the regional water knowledge hub for hydroinformatics in river basins, CHIRB can help local and regional governments, water sector agencies, communities, and organizations by:

- Providing technical advisory services and a mechanism for the exchange of scientifi -c and technical information in the fi eld of hydroinformatics;
- Organizing regional and international training courses, symposia, workshops, study tours, and lectures on hydroinformatics and integrated river basin management;
- Advising government agencies on development and conservation policies, regulations, and investments related to river basins;
- Identifying, generating, and exchanging best practices and the most up-to-date information on hydroinformatics through a network of knowledge institutions, experts, and champions;
- Furnishing geological surveys, a GIS-based database, customized information management and decision support systems, and other products;
- Coordinating, executing, and reviewing regional projects for eff ective river basin management that integrate technology and science as well as demographic, economic, and social considerations;

- Training technical personnel from agencies around the region in the use of state-of-the-art hydroinformatics systems;
- Developing a simulation model for water resources systems at the regional, country, and watershed scales that consider future urban-industrial-agricultural water demand and land use scenarios.

Knowledge Partners

CHIRB's host organization, YRCC, has several decades' experience working with partners from around the world to address the challenges of sustainable and productive river basin management. As a result, YRCC has developed a broad network of international, regional, and local institutions; agencies; educational establishments; and companies engaged in knowledge generation and knowledge sharing, capacity building, and the provision of water sector services. Every 2 years, the International Yellow River Forum provides a platform where these partners exchange and cooperate to promote integrated river basin management and hydroinformatics in their area and beyond. Interested parties are welcome to join the ranks of the knowledge hub's partners, which include the following:

- Tsinghua University, PRC
- Chinese Academy of Sciences, PRC
- Rijkswaterstaat, the Netherlands
- UNESCO-IHE Institute for Water Education
- Deltares (formerly WL | Delft Hydraulics), the Netherlands
- Danish Hydraulic Institute (DHI), Denmark
- University of Mississippi, United States
- International WaterCenter (IWC), Australia
- Global Water Partnership (GWP)
- World Wildlife Fund (WWF)
- Consultative Group on International Agricultural Research (CGIAR)

7. **Water Governance:** Institute of Water Policy (IWP), Lee Kuan Yew School of Public Policy (LKYSPP), Singapore http://www.spp.nus.edu.sg

Expertise

Established in 2004, the National University of Singapore's LKYSPP is dedicated to educating and training future Asian policy makers and leaders and raising governance standards in the region. Recognizing Asia's urgent need for more integrated water policies and better governance in the water sector, LKYSPP founded the IWP in 2008 with the mission of developing capacity and sharing knowledge in these areas. Overseen by an international advisory board comprised of internationally renowned water sector experts, IWP will conduct

research and off er education and training in water policies and legislation, project-management tools and procedures, integrity and anticorruption measures, government-corporate-society partnerships, and related topics.

Services

As the regional water knowledge hub for water governance, IWP will be available to host regional and international conferences, workshops, training programs, and summits on water governance. It will also develop, test, and monitor water governance indicators for countries and organizations around the region, and off er research opportunities, graduate education programs, and consultants' services in the following areas:

- Structural, macro, and long-term water policy issues
- Global and regional water policy trends
- Legislative, regulatory, and governance frameworks for water management
- Links between water, energy, food, and environment policies
- Water, poverty alleviation, and environmental conservation
- Economic instruments for water management
- Governance of water service delivery
- Governance of water resources management
- Comparative analyses of the water governance performance of urban water utilities

IWP will support its mission with scholarships, commissioned research projects, internships, a visiting/distinguished research fellow program, and student exchanges with international universities with top-ranked water programs. It will also run an executive program for managers of urban water utilities.

Knowledge Partners

A member of the prestigious Global Public Policy Network, LKYSPP off ers double and dual degrees with some of the most highly-regarded universities in the world. IWP will follow in this tradition by seeking strategic partnerships with the following kinds of entities:

- The water resource programs of universities in the Asia-Pacifi c region and beyond
- Water research centers and public policy institutions working on water resource management
- Nongovernment organizations with an interest in water issues
- Water sector networks
- Development partners that have programs for water policy and governance

IWP is also a strategic partner to Singapore International Water Week (SIWW), helping to develop the program, preparing white papers, and organizing panels and forums on water policy issues and solutions. As the regional water knowledge hub on water governance, IWP is committed to adding to its strategic partnerships and invites all interested public and private sector organizations to join its network in the region and beyond.

8. **Irrigation Service Reform:** International Water Management Institute (IWMI), Sri Lanka http://www.iwmi.org

Expertise

IWMI is a nonprofit international research organization that strives to improve water and land resources management. A world leader in irrigation management policies, techniques, tools, and performance assessment, IWMI has helped government institutions, water user associations, farmer communities, and private sector organizations manage the impacts of irrigation on livelihoods, food security, health, the environment, and gender. Headquartered in Sri Lanka, IWMI has regional offices in 12 countries across Africa and Asia and more than 20 years' experience developing water-related solutions in South and Southeast Asia.

Services

As the regional water knowledge hub for irrigation service reform, IWMI assists government agencies, nongovernment organizations, regional organizations, and others to:

- **Share** up-to-date information and analyses of irrigation management trends in countries across the Asia-Pacific
- **Evaluate** irrigation performance using IWMI's benchmarking tool and upgrade technology and management practices with first-class research and development;
- **Inform** professionals and students in a stimulating research and networking environment that takes advantage of the tacit and explicit knowledge of IWMI, its partners, and its clients;
- **Use** IWMI's Data Storehouse Pathway to assess and compare irrigation in river basins, nations, and regions worldwide;
- **Draw** lessons from IWMI's Knowledge Sharing Initiative, an inventory of best practices in productive, sustainable irrigation, and achieve higher value agriculture;
- **Collaborate** on research projects and join IWMI-initiated communities of practice;
- **Integrate** irrigation with livestock, fishery, and forest management, and build capacity for groundwater governance;
- **Select** from a menu of tested pro-poor programs for interventions, policies, and investment models in irrigated agriculture;
- **Determine** how climate change, energy issues, and changing waterscapes will aff ect irrigation, and manage the impacts of irrigation on livelihoods, the environment, health, gender, and food security;
- **Design** sustainable water sector development policies with the help of IWMI's cross-functional, multidisciplinary, and multicultural teams;
- **Learn** how local irrigation aff ects global conditions and vice versa, and access premier drought research and monitoring tools; and
- **Organize** consultations with governments, water sector professionals, and civil society.

Knowledge Partners

IWMI facilitates regional networking with partners throughout the Asia-Pacific region to share knowledge, develop capacity, and coordinate services. Interested

public and private sector organizations are invited to join IWMI's network of more than 80 international and local partners, including such key knowledge institutions as:

- The irrigation modernization program of the Food and Agriculture Organization (FAO)
- Ratan Tata International (RTI), India
- International Rice Research Institute (IRRI), Philippines
- Center for Economic and Social Studies, India
- Khon Kaen University, Thailand
- Other universities in Asia
- Stockholm Environment Institute, Sweden and Thailand
- National Water Commission, Australia
- Commonwealth Scientifi c and Industrial Research Organization (CSIRO), Australia
- Network of Asian River Basin Organizations (NARBO)
- Indian Council of Agricultural Research (ICAR), India
- International Development Enterprises (IDE)
- Agence Francaise de Developpement (AFD) - Agency of Phnom Penh, Cambodia
- Institut de recherche pour le développement (IRD), France
- Mekong River Commission (MRC), Lao People's Democratic Republic
- Ministry of Water Resources and Meteorology (MOWRAM), Cambodia
- International Union for Conservation of Nature (IUCN) - Asia Regional Office, Thailand
- Global Water Partnership (GWP)
- Interstate Commission for Water Coordination (ICWC), Central Asia
- Department of Irrigation, Nepal
- Pakistan Agricultural Research Council (PARC), Pakistan
- Pakistan Council of Research in Water Resources (PCRWR), Pakistan
- Punjab Irrigation and Drainage Authority (PIDA), Pakistan

9. **Integrated Water Resources Management in Central Asia:** Central Asia IWRM Resource Center, Uzbekistan http://www.sic.icwc-aral.uz

Expertise

The Central Asia IWRM Resource Center is an arm of the Scientific-Information Center of the Interstate Commission for Water Coordination of Central Asia (SIC ICWC). ICWC is a nonprofit association of national water authorities from five regional states committed to the cooperative management of trans-boundary water resources in the Aral Sea Basin. Founded in 1996, SIC ICWC initiates and coordinates integrated water resource management projects and research with parties working at different levels of Central Asia's water, agriculture, and energy sectors. SIC ICWC's mission is to coordinate regional cooperation in the water sphere; improve the exchange of information between ICWC member states; build capacity; promote the effective use of natural resources; and enhance growth, security, and sustainable development in the area. The Central Asia IWRM Resource Center comprises SIC ICWC's Training Center and its Regional

Information Center. SIC ICWC is located in Tashkent, Uzbekistan and has branches in Kazakhstan, Kyrgyz Republic, and Tajikistan.

Services

As the regional water knowledge hub for integrated water resources management in Central Asia, the Central Asia IWRM Resource Center offers local, national, and regional authorities; higher education institutions, public and private sector corporations; specialized water sector institutes; and others the following services:

- **Knowledge exchange** through SIC ICWC's unique CAWater-Info web-portal, a user-friendly database on water use, water energy, water and land resources, and water-related economic matters in the Aral Sea Basin
- strong>Historical data and predictions of water consumption in transboundary rivers and river basin fl ow dynamics from 1980 onwards
- **Real-time data** on water withdrawals in the Amudarya and Syrdarya river basins
- **Estimates of future water consumption** and future water and land productivity in the region
- **Identification of hydropower development** scenarios and water use and disposal options for the medium term (2025) and long term (2055)
- **Access to SIC ICWC's E-Library** of SIC partner publications, national and international laws, international conventions, water planning models, a best practices inventory, and more
- **Links** between the international water community and the Russian-speaking audience
- **Geographic information system** (GIS)-based services, such as maps of irrigation and drainage networks, maps of changes in cropping patterns and landscapes, and more
- **Coordination**, co-execution, and review of regional projects for eff ective water resource use and conservation, and the adoption of common water management policies and guidelines
- **Interactive professional training** of high- and mid-level specialists in water and land management, irrigation and drainage, and environmental protection
- **Regular round tables** for regional interstate dialogue on water use and management

Knowledge Partners

SIC ICWC facilitates regional networking with partners within and outside of the Central Asian region to share knowledge, develop capacity, and coordinate services. Interested public and private sector organizations are invited to join SIC ICWC's network of international and local partners, which include such principal regional institutions as:

- Asia-Pacific Water Forum (APWF)
- Global Water Partnership for Caucasus and Central Asia (GWP CACENA)
- The national ministries of agriculture and water resources of Central Asian countries
- Executive Committee of the International Fund for saving Aral Sea
- Executive Agency of the International Fund for Saving the Aral Sea for implementation of the GEF and ASBP Projects, Uzbekistan

- Basin water organizations “Amudarya” and “Syrdarya”
- Coordination Metrological Centre ICWC
- International Commission on Irrigation and Drainage (ICID)
- UNEP/GRID-Arendal
- World Water Council
- International Network of Basin Organizations (INBO)
- Kazakhstan Institute for Strategic Studies
- Scientifi c Information Centre of the Interstate Commission on Sustainable Development, Turkmenistan
- Coordination Regional Dispatch Centre "Energy," Uzbekistan
- Institute of Water Problems, Hydropower, and Ecology of the Academy of Sciences, Tajikistan
- NGO Ecoforum, Uzbekistan
- Regional Environmental Centre for Central Asia (CAREC), Kazakhstan
- Socio-Economic Studies Centre, Uzbekistan
- State Water Inspection, Uzbekistan
- Kazakhstan Su Arnasy
- Kazakhstan Electricity Grid Operating Company (JSC) (KEGOC)

10. Integrated Water Resources Management in the Pacific: Pacific IWRM Resource Centre, Fiji Islands http://www.pacificwater.org

Expertise

The Pacific IWRM Resource Centre supports the Pacific Partnership Initiative on Sustainable Water Management, which is a voluntary partnership of regional water and wastewater stakeholders dedicated to achieving sustainable water and wastewater management in the Pacific. The Pacific IWRM Resource Centre’s mission is to provide technical assistance to Pacific island countries for the development and implementation of national Integrated Water Resources Management (IWRM) plans, and to help coordinate regional water sector support programs with partner organizations. Hosted by the Pacific Islands Applied Geo-science Commission (SOPAC), the Pacific IWRM Resource Centre aims to develop and promote best practices and conduct training programs that build capacity at the local, national, and regional levels.

Services

As the regional water knowledge hub for integrated water resources management in the Pacific, the Pacific IWRM Resource Centre will assist communities, catchment areas, government agencies, non-government organizations, regional organizations, and others by:

- Identifying and documenting existing small island IWRM practices at different scales and facilitating the transfer of best practices from one island to another;

- Sourcing expertise and support from SOPAC, other members of the Pacific Water Partnership, and IWRM specialists worldwide;
- Establishing multi-stakeholder and multi-sectoral, government-civil society partnerships at the catchment, national, and regional scales as a prerequisite to sustainable IWRM planning and implementation;
- Facilitating regional coordination on IWRM topics and advocating for small island developing states/IWRM issues on the global agenda;
- Using short-term political and public priorities to highlight the relevance of IWRM, keeping the initial focus on extreme catchment events (droughts, floods, and related landslides) to demonstrate the economic, social, and environmental benefi ts of IWRM;
- Helping partners at all levels develop long-term integrated water policies and shorter-term solutions to priority catchment issues (e.g., flood mitigation);
- Linking clients to the development partner community and facilitating technology transfers;
- Maintaining the Pacific Water Action Matrix, a database of actions, institutions, and initiatives for water management in the Pacific, and publishing a quarterly newsletter and calendar of events;
- Serving clients through SOPAC experts and programs specialized in water safety planning, water and sanitation, water quality, hydrology, water governance, water use efficiency, and other water-related areas; and
- Assisting country water partnerships to develop formal and endorsed IWRM policies and water use efficiency plans through multi-stakeholder participatory consultations.

Knowledge Partners

The Pacific IWRM Resource Centre works closely with partner organizations on a wide range of water and wastewater support programs that provide a basis for exchanging lessons learned, developing guidelines, and building capacity. These programs cover the priority actions of the Pacific Partnership Initiative's Regional Action Plan on Sustainable Water Management, and include a Pacific hydrological cycle observing system, climate information and adaptation strategies, rainwater harvesting, wastewater management, water quality monitoring, water demand management, water safety planning, water supply, sanitation and hygiene, water governance, and IWRM. The Pacific IWRM Resource Centre's implementing organizations and active or potential partners include among others:

- Council of Regional Organisations in the Pacific (CROP) agencies
- Foundation of the Peoples of the South Pacific International (FSPI)
- Gender and Water Alliance (GWA)
- Global Water Partnership (GWP)
- International WaterCentre (IWC), Australia

- Live & Learn Environmental Education (LLEE), Australia
- Pacific Water Association (PWA)
- United Nations Development Programme (UNDP)
- United Nations Environment Programme (UNEP)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- University of the South Pacific (USP)
- World Health Organization (WHO)
- World Meteorological Organization (WMO)

11. Erosion and Sedimentation in River Basins: International Research and Training Center on Erosion and Sedimentation (IRTCES), People's Republic of China http://www.irtces.org

Expertise

Founded in 1984 under the auspices of United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Government of the People's Republic of China (PRC), IRTCES is devoted to research, training, and information sharing on erosion and sedimentation in rivers and river basins. IRTCES has conducted more than 100 research and consulting programs, 43 training courses, and 130 technical tours on erosion and sedimentation; and has sponsored or co-sponsored 90 symposia, conferences, and workshops. After more than 20 years of operation, IRTCES has garnered the recognition and the respect of sediment and erosion experts around the world and is one of UNESCO's most important Chinese partners.

Services

As the regional water knowledge hub for erosion and sedimentation in river basins, IRTCES aims to promote the international exchange of knowledge and cooperation in this field. To do this, IRTCES trains sediment engineers and other water sector professionals in sediment management, erosion control, and the environmental and ecological protection of watersheds. It also off ers consulting services to local, regional, and national government entities; professional associations; water agencies; and research and educational institutions. In addition, IRTCES:

- **Promotes** scientific research on erosion and sedimentation (including sediment transport theory, fluvial/coastal and reservoir sedimentation, sedimentation engineering, soil erosion, soil and water conservation, and the environmental and ecological impacts of sedimentation);
- **Provides** technical advisory services and a mechanism for the exchange of scientific and technical information among regional experts in the field;
- **Coordinates** region-wide cooperative research activities;
- **Provides** regional experts with laboratory facilities, field work opportunities, and access to IRTCES' three research and training bases in the PRC;

- **Organizes** regional and international training courses, symposia, workshops, study tours, and lectures on erosion and sedimentation-related subjects;
- **Serves** as Secretariat to the World Association for Sedimentation and Erosion Research (WASER), and as Permanent Secretariat of the International Symposium on River Sedimentation (a triennial conference);
- **Advises** government agencies on development and conservation policies, regulations, and investments related to sediment management;
- **Publishes** the International Journal of Sediment Research and other documents relevant to the field;
- **Develops** sediment information databases at the local, national, and regional levels; and
- **Acts** as Secretariat to the International Sediment Initiative (ISI), a global initiative to assess the impacts of erosion and sediment transport, and maintains ISI's Information System, a repository of data from case studies of rivers and river basins with signifi cant sediment problems.

Knowledge Partners

More than 20 years collaborating and consulting on erosion and sedimentation research programs, technical information sharing, and capacity building have led IRTCES to develop valuable partnerships and participate in cooperative networks at the local, regional, national, and international levels. Public and private sector organizations interested in erosion and sedimentation are invited to join the knowledge hub's network of local, national, regional, and international partners, which include the following:

- UNESCO
- Farmer-centered Agricultural Resources Management Programme (UNDP/FAO/UNIDO)
- Participatory Watershed Management Training in Asia Program, Food and Agriculture Organization (FAO)
- World Association for Sedimentation and Erosion Research (WASER)
- International Association of Hydraulic Engineering and Research (IAHR)
- World Association of Soil and Water Conservation (WASWC)
- Pakistan Council of Research in Water Resources (PCRWR), Pakistan
- National Hydroelectric Power Corporation Ltd. (NHPC), India
- University of Technology MARA (UiTM), Malaysia
- Royal Forest Department, Thailand
- Environmental and Water Research Center, Iran
- National Center for Computational Hydroscience and Engineering, University of Mississippi (NCCHE), United States
- Universities in the PRC, Italy, Japan, Russia, South Africa, and the United Kingdom
- Network of Asian River Basin Organizations (NARBO)
- Various Chinese research institutes: China Institute of Water Resources and Hydropower Research, Nanjing Hydraulic
- Research Institute, Changjiang River Scientific Research Institute, Yellow River Institute of Hydraulic Research and
- Pearl River Hydraulic Research Institute

12. **Healthy Rivers and Aquatic Ecosystems:** International WaterCentre (IWC), Australia http://www.watercentre.org

Expertise

The International WaterCentre (IWC) is dedicated to providing the most advanced education and training, applied research and consulting activities to develop capacity and promote whole-of-water cycle approaches to water management around the world.

The IWC is a joint venture of four leading Australian universities - The University of Queensland, Griffith University, Monash University and The University of Western Australia, as well as the Healthy Waterways Partnership and International Riverfoundation. The IWC is supported by The Queensland Government.

Services

As the regional water knowledge hub for healthy rivers and aquatic ecosystems, IWC collaborates with government entities, water sector agencies, nongovernment organizations, communities, regional organizations, public and private corporations, and others to:

- **Identify**, generate, and exchange best practices and the most up-to-date information related to the protection and restoration of rivers and aquatic ecosystems through a network of knowledge institutions, experts, and champions;
- **Provide** training and postgraduate courses in integrated water resource management that cut across all aspects of the water cycle;
- **Foster** a stimulating, collaborative, and innovative research environment that produces relevant and feasible knowledge solutions to the threats that face rivers and aquatic ecosystems;
- **Develop** and share a framework for monitoring and evaluating the health of rivers and aquatic ecosystems using a regional scorecard and a global, cross-catchment/watershed accounting system that help decision makers prioritize which waterways to protect, restore, and sustainably manage;
- **Offer** a master's program and postgraduate student exchange scholarships that train water sector professionals in the environmental, social, and economic aspects of water resource management, as well as in the technical and scientific aspects;
- **Create** a pool of experts, water leaders, and champions with the knowledge, skills, and passion to protect and restore rivers and aquatic ecosystems;
- **Furnish** government entities, water sector agencies, and others with access to leading water industry researchers who bring the biophysical sciences and social and economic disciplines together to address the health of rivers and aquatic ecosystem; and
- **Train** and mentor water agencies and communities around the Asia-Pacific region in comprehensive water resource management and development strategies.

Knowledge Partners

IWC is committed to developing its network of existing partners from around the Asia-Pacific region to further share knowledge, develop capacity, and coordinate services in the water sector. Public and private sector organizations interested in healthy rivers and aquatic ecosystems are invited to join IWC's network of key knowledge partners that include the following institutions:

- Ministry of Water Resources, PRC
- Yellow River Conservancy Commission, PRC
- Network of River Basin Organizations (NARBO)
- eWater Cooperative Research Centre, Australia
- National Water Commission, Australian Government
- Department of Environment, Water, Heritage and the Arts, Australian Government
- Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia
- Australian Agency for International Development (AusAID)
- South East Queensland Healthy Waterways Partnership, Australia
- International Riverfoundation
- The University of Queensland
- Griffith University, Queensland
- Monash University, Melbourne
- University of Western Australia

13. **Water Resources Management in Mountainous Areas:** International Centre for Integrated Mountain Development (ICIMOD), Nepal
http://www.icimod.org

Expertise

Established in 1983, ICIMOD is a regional knowledge, capacity development, learning and enabling center dedicated to supporting and promoting sustainable mountain development in the Hindu Kush-Himalayas. The river basins of the 10 transboundary rivers originating in the Himalayas provide water-related services to about 1.3 million people downstream. But while the water sourced from these mountains is essential to agriculture, drinking water, hydropower, and ecosystem maintenance, it also threatens populations with hazards such as flash floods, riverine floods, and landslides. Furthermore, global climate change is expected to lead to extreme events and water scarcity, affecting farming, energy generation, and ecosystem services. Serving Afghanistan, Bangladesh, Bhutan, the People's Republic of China (PRC), India, Myanmar, Nepal, and Pakistan, ICIMOD works through three key strategic and programmatic thrusts: integrated water and hazard management, environmental change and ecosystem services, and sustainable livelihoods and poverty reduction, to help clients balance the priorities of highland and lowland communities, plan for and adapt to climate change impacts, and apply effective integrated land and water resources management strategies.

Services

Using a transdisciplinary problem analysis, design, and implementation model, ICIMOD helps clients translate their concerns into operational action by supporting interdisciplinary team work; instituting program monitoring and evaluation measures; and optimizing their use of financial, human, and institutional resources. ICIMOD's programs are committed to integrating crosscutting criteria of policy, governance, equity, and gender, and to mainstreaming principles of information and knowledge management. More specifically, as the regional water knowledge hub for water resource management in mountainous areas, ICIMOD has the working knowledge to:

- **Monitor** and assess ice, snow (glaciers), and water resources, and strengthen national and regional capacities to monitor and assess the cryosphere using satellite-based and field-based investigations;
- **Assess** water-induced disaster risks using risk identification, evaluation, and mapping, and develop regional flood information systems;
- **Create** and hold training courses in disaster risk management and integrated water resource management;
- **Develop** river basin-wide scenarios for climate change impacts and water availability;
- **Scale** down global trends to the Hindu Kush-Himalayan region and synthesize and package the results for multiple audiences;
- **Provide** timely and useable water and environmentrelated data on the Hindu Kush-Himalayas and the Pamir Mountains using ICIMOD's GEO-portal and its Mountain Environment and Natural Resources Information Systems (MENRIS), an internationally recognized resource center for geo-information;
- **Scale** up knowledge development in partnership with regional and international centers of excellence through capacity development and training;
- Through its Himalayan University Consortium initiative, work with academia in promoting improved curricula on environmental change;
- **Exchange**, promote, and support dialogue among partners; disseminate knowledge and information using websites, the geo-data portal, and community-based networks; and organize transboundary knowledge exchange platforms;
- **Share** methodological approaches, technological packages, and policy proposals; and tailor global knowledge to meet regional and national needs.

Knowledge Partners

ICIMOD's goal is to act as an open source and a clearing house for the sharing of water resource management initiatives for mountainous areas within the Hindu Kush-Himalayan region and across the region. As a regional platform where policy makers, water experts, infrastructure planners, and practitioners can meet and exchange ideas and perspectives, ICIMOD facilitates the transfer of knowledge from providers to users, scales down and customizes international knowledge to meet regional needs, and promotes regional cooperation around the management of natural and environmental resources. ICIMOD's key member partners include the following institutions:

- Asian Institute of Technology, Thailand
- Bangladesh Water Development Board
- Chinese Academy of Sciences, PRC
- Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), PRC
- Global Change Impact Studies Centre (GCISC), Pakistan
- Govind Ballabh Pant Institute of Himalayan Environment and Development, India
- Himalayan University Consortium, Nepal
- International Institute for Geo-Information Science, The Netherlands
- International Water Management Institute (IWMI), Sri Lanka
- Ministry of Agriculture, Irrigation and Livestock (MAIL), Kabul, Afghanistan
- Ministry of Energy and Water (MEW), Afghanistan
- National Institute of Disaster Management (NIDM), India
- Nepal Water Conservation Foundation, Nepal
- Department of Hydrology and Meteorology, Nepal
- Tibet Hydrology and Water Resource Bureau, PRC
- University of Salzburg, Austria
- United Nations University, Japan
- Wadia Institute of Himalayan Geology, India
- Water Resources Research Institute, National Agriculture Research Center, Pakistan

14. **Groundwater Management:** Institute for Global Environmental Strategies (IGES), Japan http://www.iges.or.jp/en

Expertise

The Institute for Global Environmental Strategies (IGES) was established in 1998 to conduct pragmatic and innovative strategic policy research to support sustainable development in the Asia-Pacific region. IGES aims to influence the policy-making processes of international organizations as well as national and local governments, and the activities of businesses, NGOs and local citizens. IGES, through its Freshwater (FW) Project, has conducted research on groundwater management since 2004 to develop innovative and practical methods to monitor and improve groundwater quality in urban areas IGES is building expertise for groundwater management in rural areas in collaborating with partners.

Services

IGES research is problem-driven, solution-oriented, multi-dimensional and inter-disciplinary. As the regional water knowledge hub for groundwater management, IGES assists national and local government organizations through research, capacity building and knowledge networking, by:

- Reviewing and sharing of up-to-date information on groundwater and its management in the region
- Conducting comparative studies of groundwater policies and management options in the region
- Assisting clients to prepare, reform or restructure regulatory, legal and institutional framework to improve groundwater management in the region

- Conducting capacity building programs primarily targeted at national and local governmental officials working on groundwater management
- Sharing information and knowledge through international workshops/conferences/meetings targeted at professionals/individuals and institutions working on groundwater management
- Raising political and public awareness on importance of groundwater resources among relevant stakeholders

Knowledge Partners

IGES works closely with more than 48 partner organizations from various national and international organizations, and research and academic institutions to share knowledge, develop capacity, and coordinate services. Interested local, national, regional and international organizations are invited to join the network of clients and partners for groundwater management. Initial knowledge partner organizations include:

- UNESCO-IHE Institute for Water Education, The Netherlands
- International Water Management Institute (IWMI), Sri Lanka
- International Centre of Excellence in Water Resources Management (ICE WaRM), Australia
- National Hydraulic Research Institute of Malaysia (NAHRIM)
- Network of Asian River Basin Organizations (NARBO)
- Asian Development Bank Institute (ADBI)
- Asian Institute of Technology (AIT), Thailand
- University of Tokyo (UT), Japan
- University of Yamanashi (UY), Japan

15. **Transboundary Water Resources Management**: Mekong River Commission Secretariat (MRCS), Lao People's Democratic Republic
http://www.mrcmekong.org

Expertise

The Mekong River Commission (MRC) was formed on 5 April 1995 by an agreement between the governments of Cambodia, Lao PDR, Thailand and Viet Nam. The four countries signed The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin and agreed on joint management of their shared water resources and development of the economic potential of the river. The MRC is an international, country-driven river basin organisation that provides the institutional framework to promote regional cooperation in order to implement the 1995 Agreement. The MRC serves its member states by supporting decisions and promoting action on sustainable development and poverty alleviation as a contribution to the UN Millennium Development Goals.

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16. **Water and Climate Change Adaptation in South Asia**: The Energy and Resources Institute (TERI), India http://www.teriin.org

Expertise

TERI was formally established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to face within in the years ahead

- on account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and
- on account of the existing methods of their use which are polluting

Services

Over the years the Institute has developed a wider interpretation of this core purpose and its application. Consequently, TERI has created an environment that is enabling, dynamic and inspiring for the development of solutions to global problems in the fields of energy, environment and current patterns of development, which are largely unsustainable.

17. **Sanitation**: Japan Sanitation Consortium being formed by the Japan Environmental Sanitation Center, the Japan Sewage Works Association, the Sewerage Business Management Center, and the Japan Educational Center of Environmental Sanitation http://www.sbmc.or.jp/english

Candidate Hubs

Currently, candidate hubs are being considered for four important topics:

- Water Supply for Rural Areas and Small Towns
- Water and Energy
- Watershed Management
- Coastal Zone Management