

**Format for Biennial Reports by UNESCO's Water-related Centres on activities related to the IHP in the period (June 2012- May 2014)**

**1. Basic information on the centre**

Name of the Centre		International Centre for Water Hazard and Risk Management (ICHARM)
Name of Director		Prof. Kuniyoshi Takeuchi
Name and title of contact person (for cooperation)		Dr. Katsuhiko MURASE
E-mail		icharm@pwri.go.jp
Address		1-6 Minamihara, Tsukuba, Ibaraki, 305-8516, Japan
Website		<a href="http://www.icharm.pwri.go.jp/">http://www.icharm.pwri.go.jp/</a>
Location of centre		city/town: Tsukuba, country: Japan
Geographic orientation *		<input checked="" type="checkbox"/> global <input type="checkbox"/> regional
Region(s) (for regional centres)		
Year of establishment		2006
Year of renewal assessment		2011
Signature date of most recent Agreement		July 2013
<b>Themes of activities during reporting period</b>	Focal Areas ♦	<input type="checkbox"/> groundwater <input type="checkbox"/> urban water management <input type="checkbox"/> rural water management <input type="checkbox"/> arid / semi-arid zones <input type="checkbox"/> humid tropics <input type="checkbox"/> cryosphere (snow, ice, glaciers) <input checked="" type="checkbox"/> water related disasters (drought/floods) <input checked="" type="checkbox"/> Erosion/sedimentation, and landslides <input checked="" type="checkbox"/> ecohydrology/ecosystems <input type="checkbox"/> water law and policy <input type="checkbox"/> social/cultural/gender dimension of water <input type="checkbox"/> transboundary river basins/ aquifers <input checked="" type="checkbox"/> mathematical modelling <input type="checkbox"/> hydroinformatics <input checked="" type="checkbox"/> remote sensing/GIS <input type="checkbox"/> IWRM <input type="checkbox"/> Watershed processes/management <input checked="" type="checkbox"/> global and change and impact assessment <input type="checkbox"/> mathematical modelling <input checked="" type="checkbox"/> water education <input type="checkbox"/> water quality <input type="checkbox"/> nano-technology <input type="checkbox"/> waste water management/re-use <input type="checkbox"/> water/energy/food nexus <input type="checkbox"/> water systems and infrastructure <input type="checkbox"/> other: (please specify) _____
	Scope of Activities ♦	<input type="checkbox"/> vocational training <input checked="" type="checkbox"/> postgraduate education <input type="checkbox"/> continuing education <input type="checkbox"/> public outreach <input checked="" type="checkbox"/> research <input checked="" type="checkbox"/> institutional capacity-building <input checked="" type="checkbox"/> advising/ consulting <input checked="" type="checkbox"/> software development <input type="checkbox"/> data-sets/data-bases development

\* check on appropriate box

♦ check all that apply

	<input type="checkbox"/> other: (please specify) _____
Support bodies <sup>1</sup>	Ministry of Land Infrastructure and Transport and Tourism
Hosting organization <sup>2</sup>	Public Works Research Institute
Sources of financial support <sup>3</sup>	National Budget
Existing networks and cooperation <sup>4</sup>	IFI,
Governance	<input checked="" type="checkbox"/> director and governing board <input type="checkbox"/> other: (please specify) _____ Link to election of board members to the IHP Intergovernmental Council (IGC) and hosting country IHP National Committee _____ Frequency of meetings: once every 2__year(s) <input checked="" type="checkbox"/> Existence of UNESCO presence at meetings
Institutional affiliation of director	
Number of staff and types of staff	total number of staff (full-time, or equivalent) : 51 _____ number of staff who are water experts: 31 _____ number of visiting scientists and postgraduate students: _____
Annual turnover budget in USD	4.5 million

## 2. Activities undertaken in the framework of IHP in the period June 2012 – May 2014

- 2.1 Educational activities (i.e., those with accreditation) that directly contributed to the IHP-VII/VIII (Appendix-1 and 2) and WWAP  
*Please include here those activities which led to accreditation of degrees, or those held in formal school settings.*

ICCHARM offered the following educational activities as shown in the table;

Category	Course title	Duration	Num. of Participant	Collaboration
Ph.D. Program (3 years)	Disaster Management	2010.10-2013.9	1	GRIPS (National Graduate Institute for Policy Studies)
		2011.10-2014.9	3 (2 were dropped out)	
		2012.10-2015.9	2	
		2013.10-2016.9	3	
M.Sc. Program (1 year)	Water-related Disaster Management Policy Program	2011.10-2012.9	19	JICA (Japan International Cooperation Agency),
		2012.10-2013.9	12	

<sup>1</sup> please specify bodies that cover the operational costs of the centre, and other essential costs such as salaries and utility bills, and that provide institutional support to ensure centre's sustainability

<sup>2</sup> if different from support bodies

<sup>3</sup> please specify sources of main budgetary and extrabudgetary funds to implement projects

<sup>4</sup> please write international networks, consortiums or projects that the centre is part of, or any other close links that the centre has with international organizations or programmes, which are not already mentioned above

		2013.10- 2014.9	12	GRIPS
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### Ph.D. Program

In October 2010, ICHARM and GRIPS jointly launched the Ph.D. program. This was the first and challenging attempt since PWRI establishment. The broad aim of the program is to nurture professionals who can train researchers and take leadership in planning and implementation of national and international strategies and policies in the field of water-related risk management.

This program is planning to accept one to three students per year. The program examines and selects candidates who have motivation and capabilities for doctoral level work, and are willing to take the lead for implementing water-related risk management learned at ICHARM after completion of this program. Until now, one Japanese student has graduated, and six students are in the program.

ICHARM/PWRI employed some Ph.D. students for ICHARM Research Assistant positions. This provides an excellent opportunity for them to learn and experience the practical work of ICHARM while they carry out their own research.

### M.Sc. Program

In 2007, ICHARM launched a one-year master's course "Water-related Disaster Management Course of Disaster Management Policy Program" in collaboration with GRIPS and JICA. This program was designed to provide trainees from developing countries with the mastery of knowledge and technology on flood-related disasters. A Master's degree in disaster management is granted after the completion of the program. The program consists of lectures and practical assignments in the first semester, and the completion of Master's thesis concerning their flood disaster mitigation projects in the second. Field surveys are included in each semester.

From October 2011 to September 2013, ICHARM implemented two batches of the program and 31 students in total have conferred a Master's degree. Training programs has been improved annually. Based on the results of the post-training evaluation by students, the 2012-2013 course was the most satisfying of all conducted in the past five years. Now 12 students are studying in ICHARM.

### Follow-up activity

Follow-up activities of ICHARM are intended to encourage ex-students to promote their water-related risk management projects. Especially, follow-up seminars allow ex-trainees to update their knowledge about advanced technologies in the field, to visualize issues they may face in their daily work, and discuss them among the participants.

Follow-up activities allow ICHARM to disseminate information about future training opportunities at ICHARM and to recruit new students to ICHARM training programs.

List of conducted follow-up activities

Date	Follow-up activity	Venue
Feb. 13-14, 2013	Seminar on Sediment Hydraulics and River Management	Dhaka, Bangladesh
Mar. 10-13, 2014	Follow up session and meeting	Kuala Lumpur, Malaysia

### Internship

ICHARM has been actively accepting college students for short-term internship and researchers from overseas institutes, providing opportunities for them to deepen their research interests intensively. A total of 10 students and researchers used these opportunities between June 2012 and May 2014.

#### List of Internship

Duration	Number, Nationality	Research Theme
July 2012	1 from Japan	Rainfall analysis
Aug 2012	1 from Japan	Observed data collection by ADCP
Oct 2012	2 from Thailand	Flood simulation
Nov 2012	2 from the Philippines	Flood inundation analysis
Apr. to July 2013	1 from Guatemala	Japanese flood countermeasures
Sep. 2013	1 from the Philippines	RRI model
Oct. 15 to Nov. 9, 2013	1 from Iran	BTOPMC
Nov. 5 to 15, 2013	1 from Vietnam	RRI model

## 2.2 Research activities that directly contributed to the IHP-VII and/or IHP-VIII activities

*Please include research/applied projects outputs such as publications that directly contributed to the IHP-VII/VIII and WWAP objectives*

### 1. Overview of ICHARM research activities

The basic policy for ICHARM's research activities is to reduce damage induced by water-related disasters around the world.

More specifically, it has prioritized research needed to implement water-related risk management in developing countries. When the center was first established, the focus was more on research to understand rainfall and runoff characteristics, which is essential to assess flood risk. In recent years, however, it has been expanding the research scope covering assessment of flood damage risk and risk management including development and implementation of effective countermeasures.

The following describes main research achievements of ICHARM.

## 2. Development and dissemination of Integrated Flood Analysis System (IFAS)

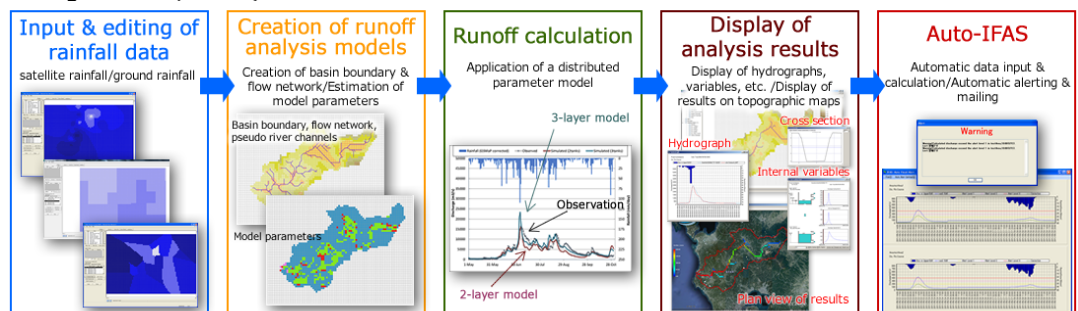


Figure: Calculation flow of IFAS

The Integrated Flood Analysis System (IFAS) is designed to help create a runoff analysis model easily by using topographic and land-use data which cover almost the entire globe and are available free of charge via the Internet.

With IFAS alone, users can conduct a series of tasks necessary for runoff analysis including data acquisition, model creation, rainfall-runoff analysis and result display. With an additional module named Auto-IFAS, the system is capable of executing automatic functions such as downloading satellite rainfall information, loading ground rainfall information, performing runoff calculation, issuing a warning, etc. With these automatic functions, users can build a real-time flood forecasting and warning system though the functions are minimal as a device for such a purpose.

IFAS with this additional module is very useful even in areas with limited Internet access. It can perform calculation while collecting data regularly according to a predetermined time schedule. In this way, the network and the computer can avoid being overloaded with information processing, which thus enables fast runoff calculation and quick flood forecasting and warning.

The IFAS execute file is downloadable free of charge on the ICHARM website at <http://www.icharm.pwri.go.jp/Research/ifas/>

Since the official launch in December 2008, the traffic to this download site has been increasing every year as IFAS has gone through several upgrades.

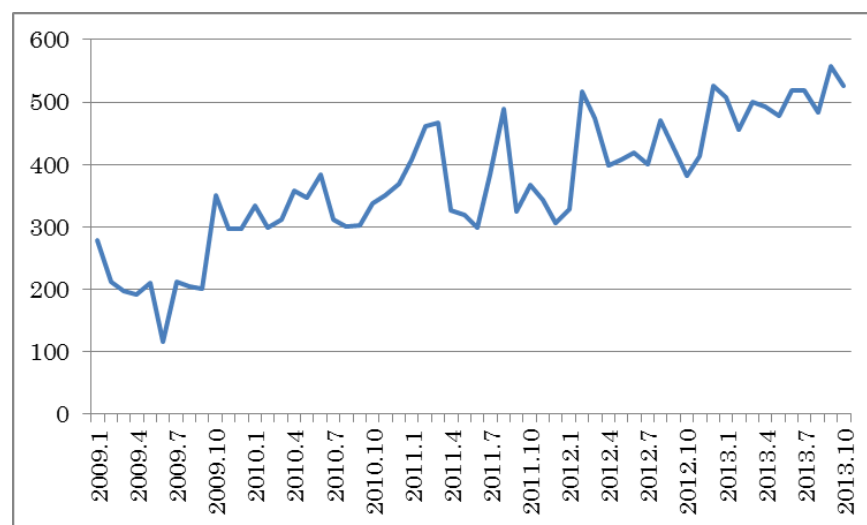


Figure: Changes in the number of access to the IFAS website

### 3. Development of RRI model

Conventional flood prediction models, which mainly focus on rainfall-runoff processes in mountainous areas, have difficulties in simulating floods on low-lying areas with large-scale inundations, such as the 2010 Pakistan and 2011 Thailand floods. In addition, although it is important to quickly simulate a large-scale behavior of floodwaters in global-scale flood risk assessment and large-scale flood prediction, conventional models are not capable of quickly estimating river discharge and flooding from rainfall information. They can only predict river discharge. To overcome this disadvantage, ICHARM has been developing a new numerical model called the Rainfall-Runoff-Inundation (RRI) model. The model simulates various hydrologic processes including rainfall-runoff, stream-flow propagation, and inundation over floodplains in an integrated manner.

By using the RRI model, we can assess future flood risks for different regions under different climate conditions including climate change. The model may also be applied to large-scale flood prediction on a near real-

time basis by using satellite-based topography, land-use and rainfall information in a similar manner to the IFAS procedure.

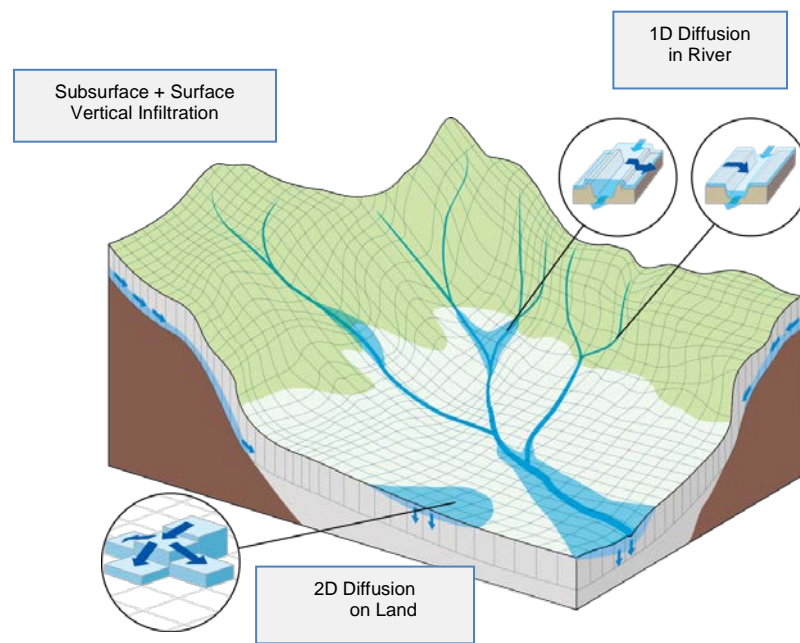


Figure: Schematic diagram of RRI Model

#### 4 Contribution to MEXT research program "SOUSEI"

The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) has launched the Program for Risk Information on Climate Change (SOUSEI program), which carries on the work of the previous program. This project began in FY2012 and will continue for five years. The aim of this program is to generate information to evaluate the probability of the occurrence of the extreme climate changes and the risk of various scenarios, disasters, damage, etc., and to play a role in risk management.

The project's specific research is divided into five themes. ICHARM is a member institute of Theme D: Precise impact assessments on climate change. ICHARM's subject is the "Development of risk assessment and adaptation strategies for water-related disaster in Asia."

This will eventually lead to the development of a methodology for socio-economic impact assessment, which will include methods for the global- and basin-scale assessment of flood and drought hazards as well as for the assessment of social vulnerability to those hazards. Coupled with multiple scenarios of the fifth-generation CMIP and GCM-based climate projections, the methods will make such assessments viable by improving previously-developed technologies for bias correction, global flood runoff analysis and inundation hazard analysis.

#### 5 River discharge measurement

ICHARM is developing and disseminating a next-generation discharge measurement system that ensures highly reliable measurements while requiring less labor and cost. The system under development is unique in that automated measurement using fixed current meters such as non-contact current meters (radio current meters) is combined with an acoustic Doppler current profiler (ADCP) for accuracy control. Through observational experiments, the system has been proven applicable even to severe flow regimes,



typically seen in Japanese steep rivers. We are further exploring methods to observe river bed fluctuations by use of this advanced automated system.

## **6 Development of Water and Energy Transfer Processes (WEP) model**

The Water and Energy Transfer Processes (WEP) model was originally developed as a basin-scale water cycle model. Responding to the recent need for the management of nutrient load and runoff in closed water bodies, ICHARM has been further improving the WEP model into a basin-scale water/material cycle model by adding the function of simulating the behavior of nitrogen and phosphorus in both dissolved and particulate forms.

## **7 Flood Risk Assessment**

Risk assessment is generally conducted through a series of analyses on possible hazards, vulnerability to and countermeasures for the hazards. ICHARM carries out risk assessment, based on one of the most important institute principles: localism. We started the process with thorough local investigation in each target basin to understand its physical, social and economic conditions, while also using advanced hydrological and hydraulic modeling technology. We then assess the impact of socioeconomic risk on a basin and propose effective countermeasures to cope with such risk.

## **8 ICHARM Research & Development (R&D) Seminars**

The ICHARM R&D Seminar is a series of seminars irregularly held to improve ICHARM's activities and update the expertise of its research staff.

As many as 8 R&D seminars were organized from June 2012 to March 2014.

### **2.3 Training activities that directly contributed to the IHP-VII/VIII and WWAP objectives**

In the duration from June 2012 to May 2014, ICHARM offered the following training activities as shown in the table;

Course title	Duration	Num. of Participant	Collaboration
Capacity Development for Integrated Flood Risk Management in Pakistan	2012.5	6	UNESCO
	2013.5	5	
Capacity Development for Flood Risk Management with IFAS	2012.7-8	13	JICA
	2012.12	7	
	2013.7-8	16	
IFAS Local Workshop	2012	255	
	2013	114	

### **Short-term training/workshop program**

Short-term training programs were mainly conducted jointly with JICA. Participants learnt knowledge and technologies relevant to water-related disaster risk management for a period of several weeks. ICHARM has made efforts to recognize the latest water-related problems in developing countries and improve course contents and teaching staff to meet the needs of trainees.

## **1 JICA training program "Capacity Development for Flood Risk Management with IFAS" (JFY2012- JFY2014)**

The program was designed to enhance individual flood-coping capacities and eventually to contribute to flood damage mitigation in their countries. To create as great synergy as possible with JICA's current and future local flood projects, the following two conditions were considered:

- The target basins were those also selected for JICA local projects.
- The target participants were selected from three categories of responsible personnel (meteorologists, river administrators, disaster management officials for public evacuation) who are currently working at organizations involved in the JICA local projects.

## **2 Short-term workshop "Capacity Development for Integrated Flood Risk Management in Pakistan" (JFY2012 and JFY2013)**

The workshop was originally organized as part of a project, "Strategic Strengthening of Flood Warning and Management Capacity of Pakistan," which was launched in response to the 2010 severe flood event in Pakistan. The project was funded by the Japanese government through UNESCO. In 2012 and 2013, ICHARM welcomed totally 11 participants of middle- to high-ranking officials of the Pakistani government.

The participants praised the workshop for its excellent contents and organization. They were particularly impressed with river management in Japan, including how steadily plans are put into action. They also commented that retarding basins like the one they saw at Watarase retarding basin should be effective for flood control in the Indus River basin.

## **3 IFAS Local Workshop**

ICHARM has been conducted not only IFAS development, but also its dissemination throughout the world on several occasions. In the duration from June 2012 to May 2014, ICHARM trained IFAS to 369 participants all over the world.

## **3. Collaboration and linkages**

- 3.1 Participation in major international networks, programmes, partnerships with other UN or other International Agencies, media and professional bodies

### **1 International Flood Initiative (IFI)**

IFI is a framework to promote collaboration in flood management among international organizations such as UNESCO, WMO, UNU and UNISDR. IFI focuses on research, information networking, education and training, community empowerment, and technical assistance in various areas including integrated flood management.

ICHARM has been serving as its secretariat since its establishment.

### **2 Contribution to UNSGAB**

The United Nations Secretary General's Advisory Board on Water and Sanitation (UNSGAB) is an independent body established in March 2004 by United Nations Secretary-General, Mr. Kofi Annan, to give him advice as well as to galvanize action on water and sanitation issues.

Mr. Kenzo Hiroki, ICHARM principal and a member of the UNSGAB, has contributed to the activities jointly with MLIT. As a part of the activities, on March 6, 2013, ICHARM supported a special high-level session on water and disasters, convened by the UN Secretary-General H.E. Mr. Ban Ki-moon. This event marked the first high-level UN thematic event discussing issues at the nexus of water and disasters.



### 3 Asia-Pacific Knowledge hub

In June 2008, the Asia-Pacific Water Forum (APWF) officially acknowledged ICHARM as a Knowledge Hub with particular focus on disaster risk reduction and flood management.

As a Knowledge Hub, ICHARM is expected to promote local application of high value-added know-how and research results in order to realize water security in the Asia-Pacific region under the framework of the APWF.

### 4 Typhoon committee

The Typhoon Committee is an inter-governmental body organized under the joint auspices of the Economic and Social Commission for Asia and the Pacific (ESCAP) and the World Meteorological Organization in 1968 in order to promote and coordinate the planning and implementation of measures required for minimizing the loss of life and material damage caused by typhoons in Asia and the Pacific.

Mr. Minoru Kamoto, chief researcher of ICHARM, took a role of the chairperson of the hydrology working group.

ICHARM implemented a project of the Flood Disaster Preparedness Indices (FDPI), which can measure the capacity of disaster preparedness by communities, and reported in 2012.

### 5 Agreement with organizations

Since its establishment, ICHARM has signed a research partnership agreement with 13 overseas institutes to make collaborative efforts to address water issues around the world. In 2013, to include droughts and other water issues in cold regions, it concluded such an agreement with research institutes in Iran and Russia.

Table: List of ICHARM partners

1	Korea	Korea Disaster Prevention Association(KDPA)
2	U.S.A.	Bureau of Reclamation of the Department of the Interior of the United States of America
3	Netherlands	UNESCO-IHE Institute for Water Education(UNESCO-IHE)
4	Iran	Regional Centre on Urban Water Management(RCUWM-TEHRAN)
5	Philippines	Flood Control and Sabo Engineering Center (FCSEC)
6	Japan	Yamanashi University
7	CHINA	International Research and Training Center on Erosion and Sedimentation (IRTCES)
8	Brazil	HydroEx
9	Indonesia	Tsunami & Disaster Mitigation Research Center (TDMRC)
10	Japan	Kyoto University
11	Lao PDR	Mekong River Commission (MRC)
12	Iran	The Iran water and power resources development company(IWPC), Ministry of Energy, Tehran, I.R. IRAN
13	Russia	State Hydrological Institute (SHI)

- 3.2 Participation in meetings related to the IHP and UNESCO (e.g., the UNESCO General Conference, the UNESCO Executive Board, the IHP Intergovernmental Council and/or other meetings organized by IHP)

#### **The 20th session of the Intergovernmental Council (June 2012)**

The 20th session of the Intergovernmental Council of the International Hydrological Programme (IHP) was held at the UNESCO Headquarters in Paris from 4 to 7 June 2012. Eight delegates from Japan, including ICHARM Deputy Director Shigenobu Tanaka and Chief Researcher Toshio Okazumi, attended the session.

Council members discussed the strategic plan for the eighth phase of IHP (IHP-VIII, 2014-2021) and other proposals such as the establishment of new category II centers.

The IHP Secretariat reported the progress of the project entitled "Strategic Strengthening of Flood Warning and Management Capacity of Pakistan", which is now being implemented by ICHARM and other relevant organizations. Deputy Director Tanaka expressed his gratitude for the support provided by the IHP Secretariat and the determination to produce expected output for the country.

In the discussion on the strategic plan for the eighth phase of IHP, Okazumi pointed out that it will become more important to apply remote sensing technology such as IFAS to water issues in developing countries.

UNESCO evaluates ICHARM as the most active among the existing category II centres, and moreover, the IHP Secretariat sometimes referred to ICHARM as "Star Centre" during the session.

ICHARM will continue to promote various activities in accordance with the IHP strategic plan to mitigate flood damage in the world.

#### **UNESCO Strategic and High-Level Meeting on Water Security and Cooperation (September 2013)**

Within the framework of the International Year of Water Cooperation 2013, UNESCO IHP organized a strategic and high-level meeting on water security and cooperation followed by the IHP implementation strategy meeting at the Kenya School of Monetary Studies in Nairobi on September 11-13, 2013. ICHARM Director Kuniyoshi Takeuchi and four researchers attended the conference from ICHARM. This meeting was divided into three segments:

- (1) The High-level panels on Water Cooperation and Security in Africa was held on Day 1, which focused on the state of cooperation on freshwater in the African region/continent, and highlighted existing modalities of cooperation, opportunities and barriers, as well as its linkages with water security. ICHARM hosted a plenary session entitled the "Water Science, Education and Governance for the Future We Want," and provided the chance to discuss current views regarding the water components of the post-2015 agenda. As a keynote speaker, Director Takeuchi pointed out emerging consensus from the water community for the post-2015 development agenda, highlighted the need for a stand-alone water goal, and stressed the importance of IHP-VIII to frame goals around water security.
- (2) The IHP-VIII implementation was central to discussions on Day 2. UNESCO Regional hydrologists and the vice-chairpersons of the International Hydrological Program Intergovernmental Council (IHP-IGC) were invited to input regional implementation challenges and success stories. IHP-VIII task force coordinators then introduced the IHP-VIII strategic plan and collected feedback. Finally, all participants were requested to attend parallel sessions on six IHP-VIII themes and identify areas of priority to which they would like to contribute. ICHARM joined Theme 1 (Water Related Disasters and Hydrological Changes) and made the IFI flagship project (the project to support benchmarking flood risk reduction at global, national and local levels) included in the list.

(3) On Day 3, interactive discussions were held on how IHP-VIII should be addressed in collaboration with UNESCO's water family. Hence, participants made various opinions including ongoing problems, strategies, education programs, and cooperation modalities.

Aside from official events, ICHARM invited 15 C2C representatives to an informal lunch meeting on Day 2. Takeuchi advocated launching active collaboration among C2C and introduced the IFI and its first flagship project launched in last March as an opportunity for collaborative

- 3.3 Collaboration and networking with other UNESCO category 1 or 2 institutes/centres
  - 3.3.1 cross-appointment of directors of the category 1 or 2 institutes or centres on the governing board
  - 3.3.2 exchange of information on activities such as training/educational materials, and funding opportunities
  - 3.3.3 exchange of staff, most notably professionals and students
  - 3.3.4 implementation of joint activities, such as workshops, conferences, training programmes, joint projects, field visits, software and data sharing, knowledge exchange and publications

ICHARM and UNESCO-IHE are now renewing the existing memorandum of Understanding.

- 3.4 Relationships with the UNESCO field and regional office whose jurisdiction covers the country of location  
(Nothing special)
- 3.5 Relationship with the UNESCO National Commission and the IHP National Committee in the country of location and with other organizations of other countries  
(Nothing special)
- 3.6 Relationship with other UNESCO-related networks, such as UNESCO Clubs, ASPnet, and UNESCO chairs

(Nothing special)

#### 4. Communication

4.1 Communication and knowledge dissemination activities undertaken in the framework of IHP

(Nothing special)

4.2 Policy documents and advice

(Nothing special)

#### 5. Update on Centre Operations

5.1 Membership of the Board of Governors between designated period

Based on the renewed agreement between the UNESCO and the Government of Japan on ICHARM, the Governing Board was established to examine and adopt ICHARM's program and work plan.

Following members are designated as the Governing Board Members from Feb 25th 2014 to the next board meeting;

Takashi Shiraishi,  
President, National Graduate Institute for Policy Studies (GRIPS)

Johannes Cullmann,  
Chairperson, International Hydrological Programme  
Intergovernmental Council

Margareta Wahlström,  
Special Representative of the Secretary-General for Disaster Risk  
Reduction (ISDR)

Akihiko Tanaka,  
President, Japan International Cooperation Agency (JICA)

Toshiyuki Adachi,  
Vice Minister for Engineering Affairs, Ministry of Land,  
Infrastructure, Transport and Tourism (MLIT)

Taketo Uomoto (Chairperson),  
Chief Executive, Public Works Research Institute (PWRI)

Irina Bokova,  
Director-General, United Nations Educational, Scientific and  
Cultural Organization (UNESCO)

5.2 Key decisions made

The Governing Board, which was held on February 25, 2014, examined and adopted the "Rule of Procedure", examined the "ICHARM Activity Report" dated from October, 2010 to March, 2014 (including the plan for February and March, 2014), and examined and adopted the "ICHARM Long-term (around 10 years) and Mid-term (around 5 years) Programmes" and examined and adopted the "ICHARM Work Plan (From April 2014 to March 2016)" that describes the detail of activity plan.

The comments from the members include "clarify the priority of the fields in the broad scope of future activities and achieve the goals by utilizing limited resource effectively", "as a previously established UNESCO center, expecting ICHARM's contribution for cooperation and support with the other UNESCO center (especially for a center in Mexico)", and a suggestion for development of the road map to clarify the achievement of the programme from the member of the ICHARM Governing Board.

#### 6. Evidence of the Centre's Impacts

6.1 Science Impacts (Major contributions to the science, technology, education, and regional and/or international cooperation in the field of water)

**RRI Model Receives the 15th Infrastructure Technology Development Award 2013**

ICHARM/PWRI was awarded on July 5, 2013, with the 15th Infrastructure Technology Development Award for the recent development of the Rainfall-Runoff-Inundation (RRI) Model. ICHARM Director Kuniyoshi Takeuchi, representing PWRI, and Senior Researcher Takahiro Sayama, who has developed the technology, participated in the awarding ceremony, and were presented with an award certificate and a crystal plaque by Minister of Land, Infrastructure, Transport and Tourism Akihiro Ota.

The award is established to recognize excellent technologies that have recently developed and put into practice in relation to housing and social infrastructure or land management including a wide range of categories such as planning and design, construction, maintenance and management, materials and products, machinery, electronics and communications, and applications of traditional techniques. The RRI Model has been recognized for its novelty and practical application to a JICA project called "Project on a Comprehensive Flood Management Plan for the Chao Phraya River Basin (flood management system development assistance)". The project was to provide assistance for Thai government to respond to 2011 Chao Phraya River flood where ICHARM started flood simulation to predict the progress of flood, holistically considering the effects of discharge and inundation with the RRI model during emergency response.

## 6.2 Knowledge Transfer Impacts (Major achievements in the dissemination of knowledge and technology transfer)

### **World handbook on local disaster management experiences**

#### **Disaster Management Handbook Published**

ICHARM published a booklet entitled "World Handbook on Local Disaster Management Experiences" in March 2013. The handbook illustrates 14 natural hazards, such as tsunami, earthquake, flood and tornado, with many pieces of advice and photos collected from cooperative researchers all over the world.

The handbook is getting worldwide attention. In March 2013, it was used for science teachers in Indonesia to learn disaster management. A total of 400 copies were given out to conference participants of the European Geoscience Unions held at Vienna in April and those of the UN Global Platform for Disaster Risk Reduction held at Geneva in May.

To make it available for people in other countries, foreign researchers at ICHARM are now translating it into Spanish, Russian, and some other languages. The handbook is also downloadable in PDF form. It has been downloaded 635 times in the last one month. In addition, we are discussing more useful ways to use the handbook with UNESCO and the UN Human Settlements Programme.

## 6.3 Policy Impacts (advice sought by government and other bodies and evidence of inputs into policy arena)

### **1 Outline**

ICHARM has participated in local projects organized by ADB and UNESCO and implemented activities in cooperation with local administrative and research organizations in order to test applicability of several models developed by ICHARM to local basins. Those projects have been successfully implemented despite difficulties in arrangement with local offices and problems in the actual implementation process. The following describes the outline of each project.

### **2 United Nations Special Thematic Session on Water & Disasters**

ICHARM, as a member of the High-Level Expert Panel on Water and Disasters (HLEP/ UNSGAB), supported a special high-level session on water and disasters, convened by the UN Secretary-General H.E. Mr. Ban Ki-moon on March 6, 2013. This event marked the first high-level UN thematic event discussing issues at the nexus of water and disasters. His

Imperial Highness the Crown Prince of Japan and His Royal Highness the Crown Prince of Orange of the Netherlands presented keynote addresses to the assembled audience of 500 experts and officials from UN member states, international organizations, private sector, and civil society.

Overall messages from the Special Session reflected the consensus that water-related disasters, increasing in frequency and severity as the climate and human demographics shift, are a significant barrier to sustainable development and that linkages between water disasters and poverty are undeniable. Speakers and panelists agreed that integrated and holistic approaches to policy-making are necessary to address water and disasters, and that the international community can do much to guide concrete actions for reducing disaster risk. Many discussed upcoming opportunities to integrate water disaster risk reduction into the post-2015 development agenda, as negotiations are underway to craft policies and goals to succeed the Millennium Development Goals (MDGs), the Kyoto Protocol on Climate Change, and the Hyogo Framework for Action (HFA), all ending in 2015. In particular, inclusion of water and disasters in Sustainable Development Goals (SDGs), a central pillar of the post-2015 agenda, will frame much of the UN's work for decades to come.

ICHARM additionally co-hosted a Side Event to the Special Thematic Session on Water & Disasters on March 5, 2013, bringing together approximately 100 experts from 30 countries and organizations. The objective of the Side Event was to deepen discussions related to water and disasters and to facilitate common understanding and shared vision on key topics leading up to the UN Special Session.

### **3 ADB Project: Technical Assistance No. 7276, Supporting Investments for Water-Related Disaster Management**

Signing a collaborative agreement with ADB in November 2009, ICHARM conducted a project, "Regional Technical Assistance (RETA) 7276: Supporting Investment in Water-Related Disaster Management (TA7276)," which ended in March 2013. This project was planned to build an environment to encourage investment in disaster management in developing countries.

In this project, ICHARM was involved in the following five projects:

- 1) Bangladesh: Development of a basic plan for a new flood forecasting and warning system
- 2) Indonesia: Implementation of a satellite-based flood forecasting system in the Solo River
- 3) Cambodia: Development of a flood vulnerability assessment method for the Mekong flood plain
- 4) Philippines: Implementation of flood management training using a satellite-based runoff model in the Pampanga and Cagayan rivers.
- 5) Development of the prototype of flood risk assessment indices for the Asian region

Projects 1 to 4 are efforts to contribute to national flood risk reduction while Project 5 contributes to regional flood risk reduction.

The results of TA7276 are very promising, for the technologies and concepts produced for the projects can be applied to other river basins with some technological customization based on local basin characteristics.

In March 2013, the chief executive of PWRI and the director of ICHARM visited the ADB Regional and Sustainable Development Department to report the results of the TA7276 project. Mr. Chander expressed deep gratitude and highly praised ICHARM for its achievements and hoped for its involvement in future projects as well.

### **4 UNESCO-Pakistan project**

In late July 2010, the monsoon brought a record rainfall over northern Pakistan and caused the worst flood in the past 80 years. The flood had serious damage on the area, affecting 20.3 million people in total, killing 1,985 and damaging or destroying 19 million houses.

As a part of the restoration effort from this flood disaster, UNESCO started a project called "Strategic Strengthening of Flood Warning and

Management Capacity of Pakistan” in July 2011. This comprehensive project consisted of three components, and ICHARM was assigned to two of these components: technical assistance and capacity development.

In the first component, for local customization of advanced technology in partnership with local practitioners, ICHARM assisted local engineers in flood control by implementing Indus-IFAS in collaboration with the Meteorological Agency of Pakistan and other local agencies with support from UNESCO. Indus-IFAS was specifically designed to fit the conditions and needs of the Indus River basin by combining IFAS and the RRI model.

In the other component, ICHARM provided the opportunity to participate in its M.Sc. program and short-term training programs for 11 government administrators such as the Pakistan Meteorological Department, the Pakistan Space and Upper Atmosphere Research Commission and other agencies.

**7. Future activities that will contribute directly to IHP and/or to WWAP**

- 7.1 Operational Plan (attach if available)
- 7.2 Strategic Plan linked with IHP-VIII (Appendix 2)  
(attach strategic plan if available)

ICHARM shall contribute to the IHP-VIII activities based on the ICHARM's program and work plan which were examined and adopted by the ICHARM Governing Board.

**8. Strategic Alignment with IHP-VIII**

- 8.1 Focal areas within IHP-VIII the centre plans to contribute to and specific actions the centre will undertake to align its activities with the strategic plan for IHP-VIII (Please see Appendix-2)

9. Annexes

9.1 List of publications released by the centre (there can be overlap with those listed in 2.3 above)

ICHARM has been active in trying to disseminate research results or new findings through various channels, such as submission of papers to internationally recognized journals, contribution to book chapters, and publication of various reports as shown in the following table.

Table: List of Papers

	2013	2012
Book	1	1
Journal	12	4
Paper	12	8
Abstract or Conference	10	18
Articles or Others	4	7
PWRI Technical Note/PWRI research report	2	4
<b>Total</b>	<b>41</b>	<b>42</b>

ICHARM has especially published the following books and leaflets related to water disasters.

Table: List of Publication

<p>IAHS Red Book "Floods: From Risk to Opportunity"</p> 	<p>HANDBOOK on Local Disaster</p> 	<p>Report of the Project on Establishment of Flood Disaster Preparedness Indices (FDPI)</p> 	<p>Large-scale Floods Report</p> 
<p>IAHS Publication No. 357 (2013), ISBN 978-1- 907161-35-3, 480 pages</p>	<p>Leaflet, 2013, 38 Pages</p>	<p>Typhoon Committee, Leaflet, 2012 26 Pages</p>	<p>Book, 2012, 232 Pages</p>
<p>Dr. Ali Chavoshian, Dr. Kuniyoshi Takeuchi, Mr. Minoru Kamoto</p>	<p>Dr. Megumi Sugimoto</p>	<p>Mr. Tadashi Nakasu, Mr. Toshio Okadumi, Mr. Yoshikazu Shimizu</p>	<p>Dr. Ali Chavoshian, Dr. Kuniyoshi Takeuchi</p>



9.2 List of training courses conducted (there can be overlap with those before in 2.1 above)

Category	Course title	Duration	Num. of Participant	Collaboration
Ph.D. Program (3 years)	Disaster Management	2010.10-2013.9	1	GRIPS
		2011.10-2014.9	3 (2 were dropped out)	
		2012.10-2015.9	2	
		2013.10-2016.9	3	
M.Sc. Program (1 year)	Water-related Disaster Management Policy Program	2011.10-2012.9	19	JICA, GRIPS
		2012.10-2013.9	12	
		2013.10-2014.9	12	
Short Training Course/Workshop (several weeks)	Capacity Development for Integrated Flood Risk Management in Pakistan	2012.5	6	UNESCO
		2013.5	5	
	Capacity Development for Flood Risk Management with IFAS	2012.7-8,	13	JICA
		2012.12	7	
		2013.7-8	16	
	IFAS local workshop	2012	255	
		2013	114	

## Appendix-1

### **Overview of the Core Programme Themes of the Seventh Phase of the IHP (2008-2013) WATER DEPENDENCIES: SYSTEMS UNDER STRESS AND SOCIETAL RESPONSES**

#### **Theme 1: ADAPTING TO THE IMPACTS OF GLOBAL CHANGES ON RIVER BASINS AND AQUIFER SYSTEMS**

Focal area 1.1 - Global changes and feedback mechanisms of hydrological processes in stressed systems

Focal area 1.2 - Climate change impacts on the hydrological cycle and consequent impact on water resources

Focal area 1.3 - Hydro-hazards, hydrological extremes and water-related disasters

Focal area 1.4 - Managing groundwater systems' response to global changes

Focal area 1.5 - Global change and climate variability in arid and semi-arid regions

#### **Theme 2: STRENGTHENING WATER GOVERNANCE FOR SUSTAINABILITY**

Focal area 2.1 - Cultural, societal and scientific responses to the crises in water governance

Focal area 2.2 - Capacity development for improved governance; enhanced legislation for wise stewardship of water resources

Focal area 2.3 - Governance strategies that enhance affordability and assure financing

Focal area 2.4 - Managing water as a shared responsibility across geographical & social boundaries

Focal area 2.5 - Addressing the water-energy nexus in basin-wide water resources

#### **Theme 3: ECOHYDROLOGY FOR SUSTAINABILITY**

Focal area 3.1 - Ecological measures to protect and remediate catchments process

Focal area 3.2 - Improving ecosystem quality and services by combining structural solutions with ecological biotechnologies

Focal area 3.3 - Risk-based environmental management and accounting

Focal area 3.4 - Groundwater-dependent ecosystems identification, inventory and assessment

#### **Theme 4: WATER AND LIFE SUPPORT SYSTEMS**

Focal area 4.1 - Protecting water quality for sustainable livelihoods and poverty alleviation

Focal area 4.2 - Augmenting scarce water resources especially in SIDS

Focal area 4.3 - Achieving sustainable urban water management

Focal area 4.4 - Achieving sustainable rural water management

#### **Theme 5: WATER EDUCATION FOR SUSTAINABLE DEVELOPMENT**

Focal area 5.1: Tertiary water education and professional development

Focal area 5.2: Vocational education and training of water technicians

Focal area 5.3: Water education in schools

Focal area 5.4: Water education for communities, stakeholders and mass-media professionals

## Appendix-2

### Overview of the Core Programme Themes of the Eighth Phase of the IHP (2014-2021) WATER SECURITY: ADDRESSING LOCAL, REGIONAL, AND GLOBAL CHALLENGES

#### **THEME 1: WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE**

- Focal area 1.1 - Risk management as adaptation to global changes
- Focal area 1.2 - Understanding coupled human and natural processes
- Focal area 1.3 - Benefiting from global and local Earth observation systems
- Focal area 1.4 - Addressing uncertainty and improving its communication
- Focal area 1.5 - Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

#### **THEME 2: GROUNDWATER IN A CHANGING ENVIRONMENT**

- Focal area 2.1 - Enhancing sustainable groundwater resources management
- Focal area 2.2 - Addressing strategies for management of aquifers recharge
- Focal area 2.3 - Adapting to the impacts of climate change on aquifer systems
- Focal area 2.4 - Promoting groundwater quality protection
- Focal area 2.5 - Promoting management of transboundary aquifers

#### **THEME 3: ADDRESSING WATER SCARCITY AND QUALITY**

- Focal area 3.1 - Improving governance, planning, management, allocation, and efficient use of water resources
- Focal area 3.2 - Dealing with present water scarcity and developing foresight to prevent undesirable trends
- Focal area 3.3 - Promoting tools for stakeholders involvement and awareness and conflict resolution
- Focal area 3.4 - Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity
- Focal area 3.5 - Promoting innovative tools for safety of water supplies and controlling pollution

#### **THEME 4: WATER AND HUMAN SETTLEMENTS OF THE FUTURE**

- Focal area 4.1 - Game changing approaches and technologies
- Focal area 4.2 - System wide changes for integrated management approaches
- Focal area 4.3 - Institution and leadership for beneficitation and integration
- Focal area 4.4 - Opportunities in emerging cities in developing countries
- Focal area 4.5 - Integrated development in rural human settlement

#### **THEME 5: ECOHYDROLOGY, ENGINEERING HARMONY FOR A SUSTAINABLE WORLD**

- Focal area 5.1 - Hydrological dimension of a catchment– identification of potential threats and opportunities for a sustainable development
- Focal area 5.2 - Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity
- Focal area 5.3 - Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services
- Focal area 5.4 - Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life
- Focal area 5.5 - Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

#### **THEME 6: WATER EDUCATION, KEY FOR WATER SECURITY**

- Focal area 6.1 - Enhancing tertiary water education and professional capabilities in the water sector
- Focal area 6.2 - Addressing vocational education and training of water technicians
- Focal area 6.3 - Water education for children and youth
- Focal area 6.4 - Promoting awareness of water issues through informal water education
- Focal area 6.5 - Education for transboundary water cooperation