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Report on 2015-2016 M.Sc. Program, "Water-related Disaster Management Course of Disaster Management Policy Program"

September 2017

United Nations Educational, Scientific and Cultural Organization

International Centre for Water Hazard and Risk Management
Under the auspices of UNESCO(ICHARM)
Public Works Research Institute (PWRI)

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Report on 2015-2016 M.Sc. Program, "Water-related Disaster Management Course of Disaster Management Policy Program"

By
International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM)
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ICHARM conducted a one-year Master's program entitled the "Water-related Disaster Management Course of Disaster Management Policy Program" from 1st October 2015 to 14th September 2016 in collaboration with JICA and GRIPS. The thirteen students were mainly technical officials, engineers or researchers in the field of river management or water-related disasters in developing countries.

This course aims to foster solution-oriented practitioners with solid theoretical and engineering bases who can serve for planning and practices of flood management within the framework of integrated river basin management at all levels from nations to localities.

In the first half of the course, the students mainly attended lectures and exercises; in the second half, they worked on their individual studies, this enabling them to prepare and complete their master's theses and to visit numerous locations across Japan over the course of several field trips in order to learn about up-to-date flood control countermeasures in action.

This report details the course activities and the achievements thereof and aims to contribute improvements in the next year.

Key Words: Training, Master's program, Disaster prevention, Flood disaster

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Congratulatory Address
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Congratulatory address
By Prof. Koike, Director, ICHARM

Congratulatory address
By Prof. Ando, GRIPS

Address by participant representative
Mr. KHAN Irfan Ullah

Welcome Meeting (October 6, 2015)

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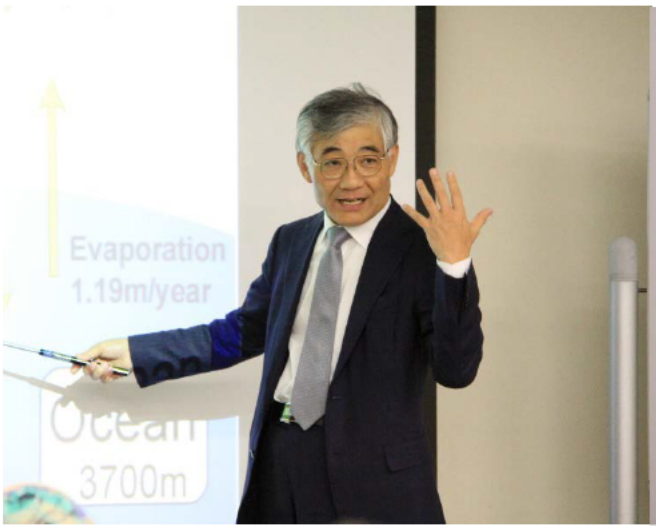
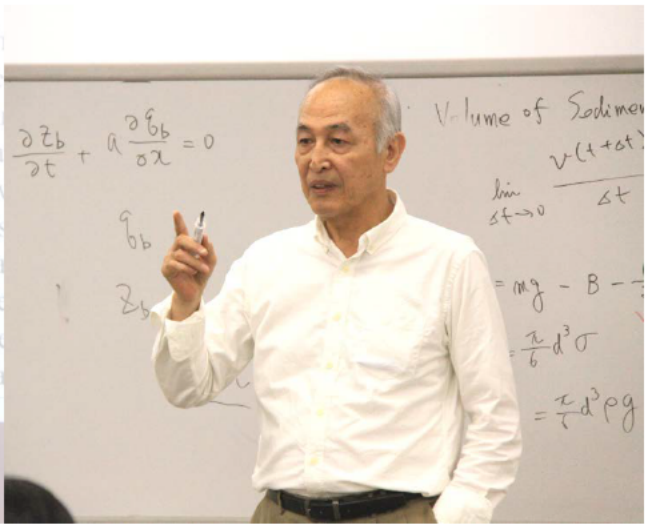
Lecturers (1)



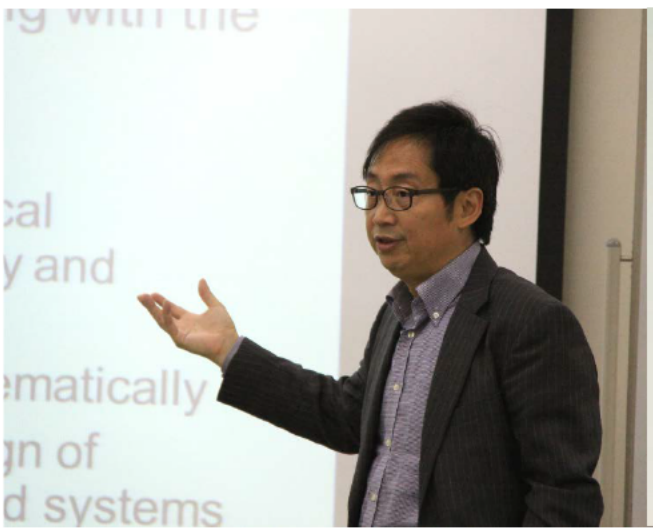
Prof. Koike, ICHARM

Prof. Takeuchi, ICHARM

Prof. Fukuoka, Chuo University



Prof. Egashira, ICHARM



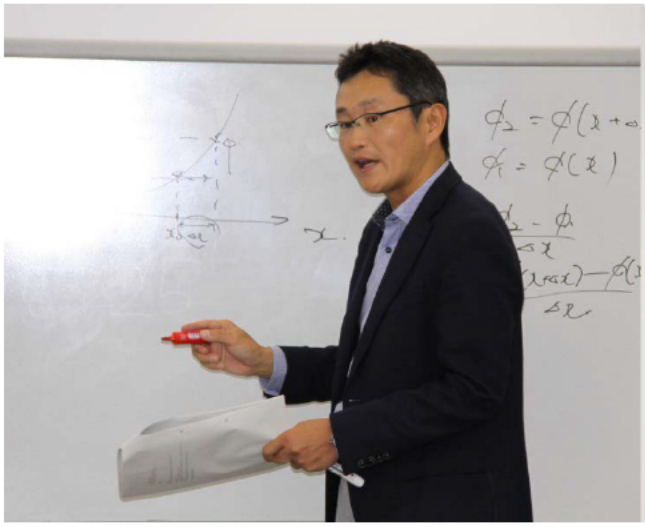
Prof. Huang, Sophia university

Prof. Tanaka, Kyoto University

Lecturers (2)

Prof. Kondo,
Sabo and Landslide Technical Center

Assoc. Prof. Ohara, ICHARM



Assoc. Prof. Yorozuya, ICHARM

Assoc. Prof. Ushiyama, ICHARM

Assoc. Prof. Sayama, Kyoto University

Assoc. Prof. Rasmy, ICHARM

Lecturers (3)

Prof. Hayashi, President of National Institute for Earth Science and Disaster Resilience

Prof. Oki, The University of Tokyo

Prof. Sasahara, Kouchi university

Specially Appointed Prof. Osanai, Hokkaido university

Dr. Yasuda, Executive Chief Engineer, Japan Dam Engineering Center

Dr. Tsunaki,
Sabo and landslide Technical Center

Lecturers (4)

Dr. GUSYEV, ICAHRM

Dr. Kwak, ICAHRM

Dr. Hasegawa, ICHARM

Dr. Tsuda, ICHARM

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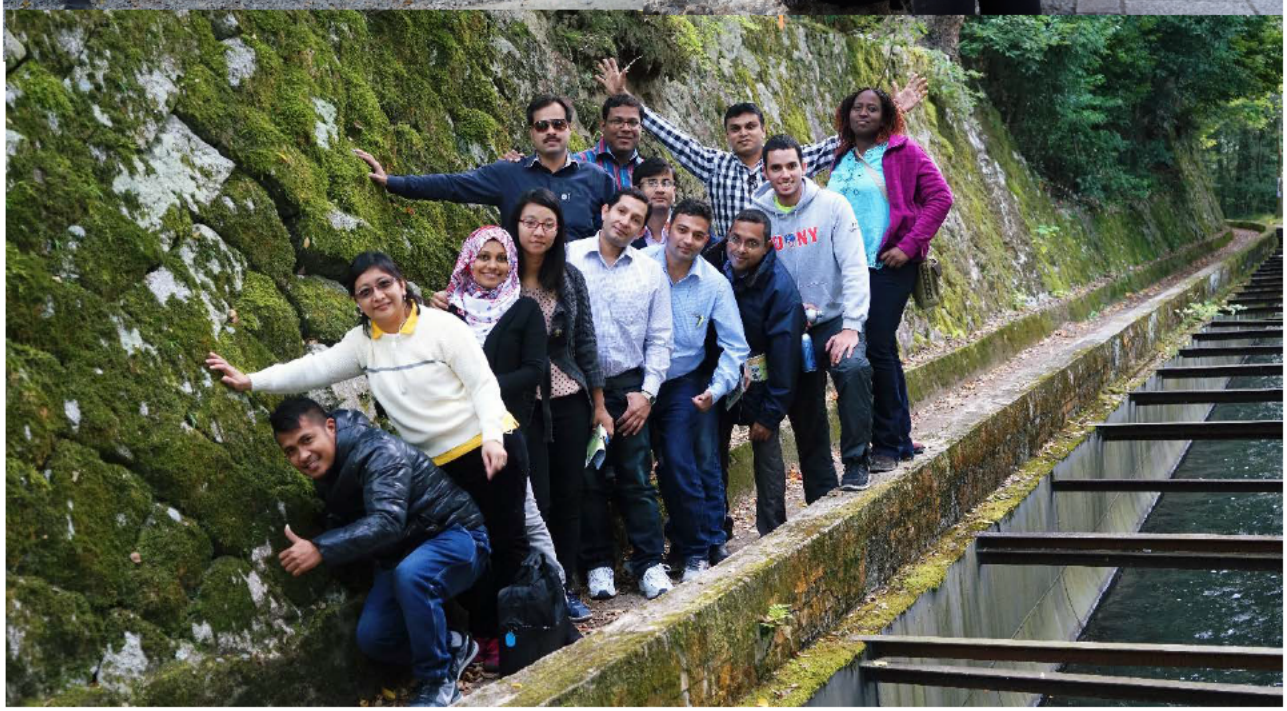

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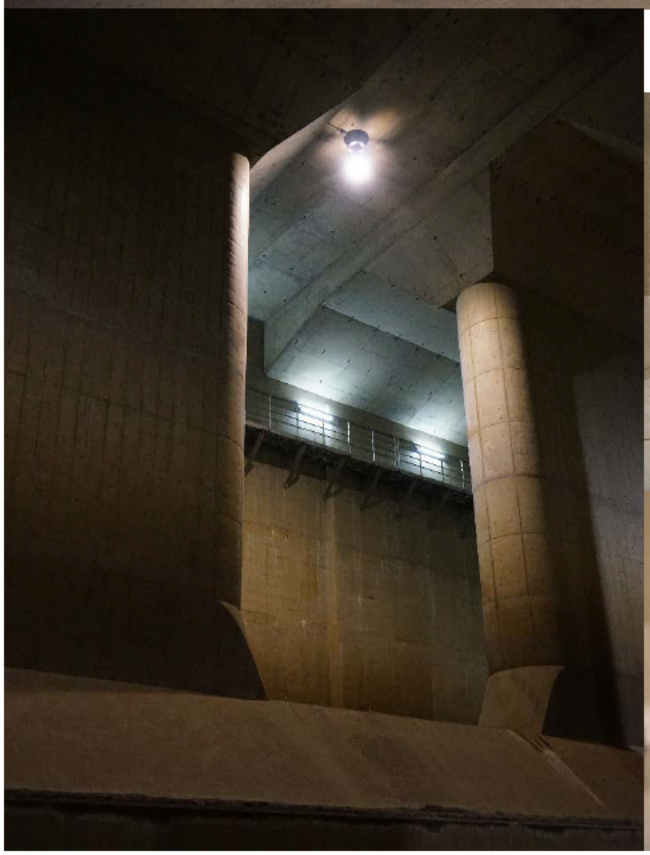

Metropolitan Area Outer Underground Discharge Channel (November 25)

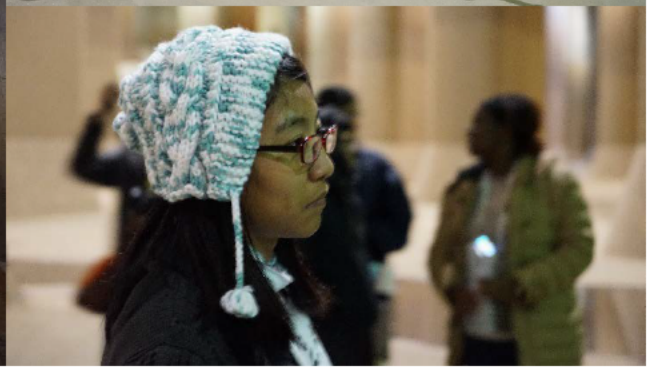

Photo 14

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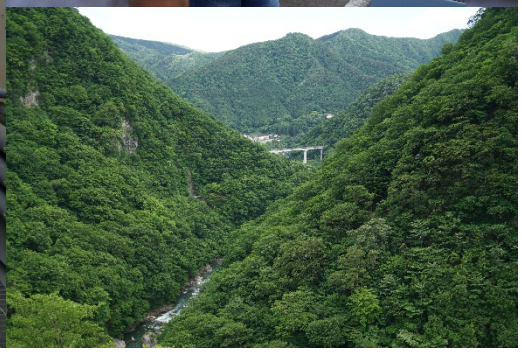
Kinu-gawa Dam Integrated Dam Control Office（June 2）

Kawaji Dam（June 2）



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Site Visit
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Photo 23

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Final Presentation (1) (August 10)

Mr. AHMED Tanjir Saif

Mr. HOWLADER Md Mamun

Mr. SAIA ALMEIDA LEITE Francisco

Ms. MOOSA Fathimath Shaushan

Ms. Myo Myat Thu

Mr. SHARMA Gopal

Final Presentation　(2) (August 10)

Mr. BILAL Rashid

Mr. KHAN Irfan Ullah

Ms. JACELDONE Catherine Guevarra

Mr. BABARANDE GURUGE Thanura Lasantha

Mr. SINNAPPOO Kokularamanan

Final Presentation (3) (August 10)

Mr. DE ARAUJO Antonio

Ms. RUKARWA Lorraine

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Closing Ceremony (September 13, 2016)

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Closing Ceremony (September 13, 2016)

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Graduation Ceremony at GRIPS (September 14, 2016)

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Graduation Ceremony at GRIPS (September 14, 2016)

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Chapter 1: Background and Objectives of this Course

1.1 Background of this Course

Natural disasters cause human tragedy and economic loss, and hamper the development of the countries where they occur. In particular, due to recent urbanization in developing countries, there is a tendency for the poor to be forced to settle in buildings and areas that are vulnerable to natural disasters. This significantly increases vulnerability to natural disasters in developing countries.

During natural disasters, particularly the mitigation of water-related damage from floods and droughts is a major challenge that needs to be overcome through the cooperation of the international community in order to ensure development of sustainable human societies and alleviation of poverty. The number of devastating disasters have been increasing around the world, and particularly so in Asia and Africa (Figure 1-1). According to a UN population projection (UN World Urbanization Prospects 2005), urban population will continue growing in size and proportion across the world, and most of the growth will be seen in developing countries. For example, between 2000 and 2030, the urban population in Asia and Africa is projected to increase rapidly, growing from 1.36 to 2.64 billion and 294 to 742 million, respectively (Figure 1-2). Projections show that, even in the next 10 years, rapid population growth will occur in major waterfront cities in Asia, e.g., Dhaka (Bangladesh), Mumbai (India) and Jakarta (Indonesia). If appropriate measures are not taken to protect these cities, their vulnerability to major water-related disasters, such as floods, storms and tsunamis, is likely to become increasingly high (Figure 1-3).

Asia alone accounts for over 80% of worldwide fatalities due to water-related disasters (Figure 1-4). Looking ahead, it is predicted that precipitation and its patterns of distribution will change due to climate change, and this may exacerbate the intensity and frequency of water-related disasters. Sea level is expected to rise worldwide due to global warming, which in turn will worsen the water-related disaster risk of coastal areas, delta areas in the lower reaches of rivers, and small islands.

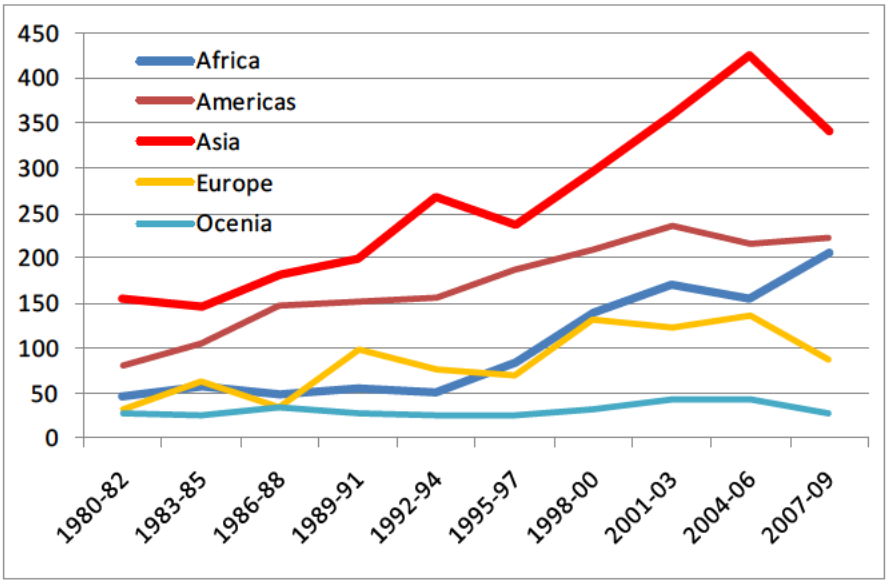


Figure 1-1 Annual variation in the number of water-related disasters by region

(Prepared by ICHARM based on CRED EM-DAT)

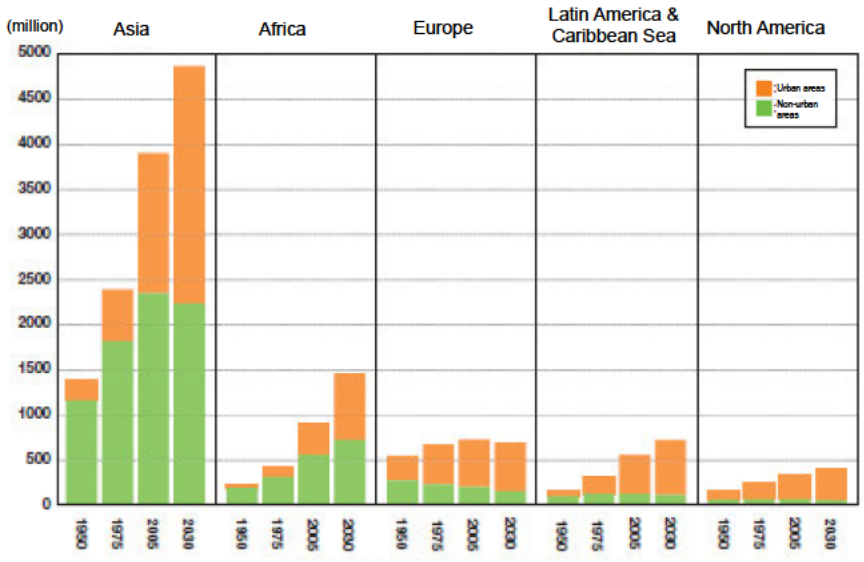


Figure 1-2 Demographic change in urban and non-urban areas by region

(Prepared by ICHARM based on World Urbanization Prospects:
2005 Revision by the Population Division, Department of Economic and Social Affairs, UN)

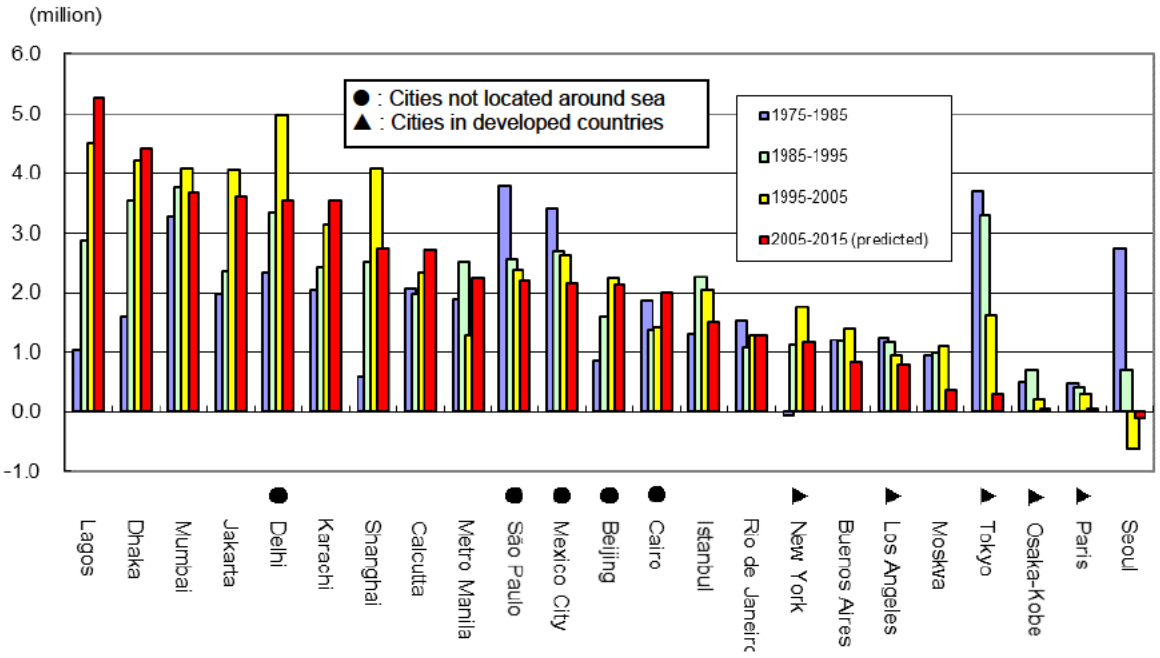


Figure 1-3 Demographic changes in major cities worldwide between 1975 and 2015

(Prepared by ICHARM based on World Urbanization Prospects:
2005 Revision by the Population Division, Department of Economic and Social Affairs, UN)

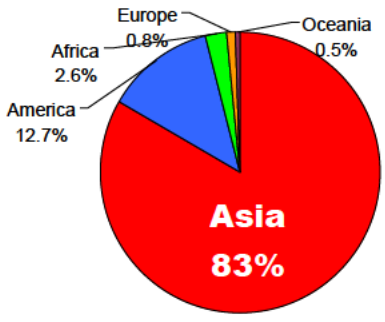


Figure 1-4
Distribution of fatalities due to water-related disasters (1980–2006)

(Prepared by ICHARM based on CRED EM-DAT)

In order to reduce the impact of natural disasters, well-coordinated risk management to be executed before, during, and after disasters must be established in a multi-disciplinary manner. Such management needs to be based on both structural measures such as dams and levees and non-structural measures such as flood warning systems, risk maps, and hazard maps, and both types of measures should be planned and implemented by employing the expertise in psychology, engineering, and other areas. To achieve this management, disaster management experts must be created through professional education and training so that they will be able to develop practical disaster management policies and technologies based on local conditions and needs, and exchange various information with local residents in order to raise awareness of disaster prevention in local communities.

Given these circumstances, in order to enhance the capabilities of experts in developing countries to cope with water-related disasters, ICHARM, the National Graduate Institute for Policy Studies (GRIPS), and the Japan International Cooperation Agency (JICA) jointly launched a master's degree program called the "Water-related Disaster Management Course of Disaster Management Policy Program" (afterwards referred to as "the course") in 2007. JICA also internally calls it "Group and Region-Focused Training: FLOOD DISASTER MITIGATION." The course marked its ninth year.

In March 2015, Japan hosted the third United Nations World Conference on Disaster Reduction in Sendai, Japan, and the government of Japan announced the Sendai Cooperation Initiative for Disaster Risk Reduction. In this initiative, as a country advanced in disaster risk reduction, Japan declares to provide non-structural assistance such as support for establishing social systems and enhancing human resources, and lists concrete measures including human resource development, training, and technical transfer to assist other countries in planning disaster risk reduction policies and emergency disaster relief efforts (both domestic and international).

The intent of this part of the initiative precisely matches the goal of this course, which is capacity development for disaster management policy planning. In step with the spirit of the Sendai Cooperation Initiative, the significance of the course is higher than ever before.

1.2 Objectives of this Course

Against this background described in the previous section, the final goals and objectives of the course are set as follows:

<Overall Goal>

To reduce damage from water-related disasters by planning and implementing countermeasures for water-related disasters in the countries of participants in this course.

<Program Objective>

To develop the participant's capacity to practically manage problems and issues concerning water-related disasters so as to contribute to the mitigation of water-related disaster damage in their countries.

1.3 Outputs of this Course

Participants are expected to develop the abilities to:

(1) Explain the basic concepts and theories on the generation processes of water-related disasters, water-related hazard risk evaluation, disaster risk management policies and technologies.

(2) Explain the basic concepts and theories on countermeasures for water-related disasters such as floods, landslides, and debris flows.

(3) Formulate countermeasures to solve problems and issues concerning water-related disasters in their countries by applying technologies and knowledge acquired through the program.

1.4 Features of this Course

The course is characterized by the following three points:

I. "Problem Solving-Oriented"

In order to manage major disasters, it is essential to develop disaster management capabilities at the organizational level as well as at the individual level, since there is always a limit on what each individual can achieve.

JICA training programs in recent years have shifted their focus to "problem solving-oriented training," which aims to improve the ability of organizations to deal with relevant problems and situations. This shift of the course emphasis is based on the idea that such training delivers a dual benefit. First, the training will be more effective and efficient for each student if they first identify water issues specific to their countries and study proactively in order to solve them. Moreover, the training will produce results which are practical to solve the issues faced by organizations of respective students.

Based on this philosophy, the course is designed to motivate students to find, analyze, and solve problems independently, rather than to instruct them to do so. One of the requirements for graduation from this course is to write a master's thesis on an issue that students find critical to their country. Such assignments help students develop the ability to formulate integrated flood mitigation plans, and help them learn how to address other issues at home.

II. "Practical" rather than "Theoretical"

To make the course problem solving-oriented, lectures and exercises put an emphasis on practicality rather than theory in order to enable students to work effectively in actual situations. For this reason, field trips are also provided an essential part of the course as opportunity for students to actually see disaster management at work.

III. One- year master's course

This master's course is intended for personnel working in administrative organizations. For this reason, it is designed for them to be able to earn a master's degree within a single year rather than usual two years so that they do not have to be absent from work for an excessively long period.

1.5 Qualifications for this Course

There are two ways to participate in this course. In one way, students are recruited and selected by overseas JICA offices as trainees of the JICA training program, "GROUP AND REGION-FOCUSED TRAINING ON FLOOD DISASTER MITIGATION," and they are accepted as GRIPS students. In the other way, students apply directly to GRIPS and are accepted by GRIPS. In the former way, a local JICA office first consults relevant organizations of the country where the office is located regarding whether they would like to send their personnel to this program. If the organizations show no interest, no students will participate from them.

1.5.1 Application as JICA Trainees

A preliminary participation needs survey identified the candidate countries listed below along with eligible organizations and requirements for applicants.

Target Regions or Countries: 24 countries

Republic of Albania, People's Republic of Bangladesh, Republic of Colombia, Federal Democratic Republic of Ethiopia, Grenada, Republic of Haiti, Malaysia, Republic of Moldova, Mongolia, Republic of Mozambique, Republic of the Union of Myanmar, Lao People's Democratic Republic, Federal Democratic Republic of Nepal, Federal Republic of Nigeria, Republic of the Philippines, Saint Vincent and the Grenadines, Kingdom of Saudi Arabia, Republic of Serbia, Solomon Islands, Republic of South Africa, Kingdom of Thailand, The Democratic Republic of Timor-Leste, Bolivarian Republic of Venezuela, Socialist Republic of Viet Nam

Eligible/Target Organizations:

Governmental organizations concerning river management or water-related disasters

Nominee Qualifications:

Applicants should;

(1) be nominated by their governments.

(2) be technical officials, engineers or researchers who have three (3) or more years of experience in the field of flood management in governmental organizations.
(*In principle, researchers in universities (e.g., professor) are excluded.)

(3) be university graduates, preferably in civil engineering, water resource management, disaster mitigation, or related departments.

(4) be proficient in basic computer skills.

(5) be proficient in English with a minimum TOEFL score of Internet-Based Test (iBT) 79 (Paper-Based Test 550), IELTS 6.0 or its equivalent.

(6) be in good health, both physically and mentally, to participate in the program in Japan.

(7) be over twenty-five (25) and under forty (40) years of age.

(8) not be serving any form of military service.

1.5.2 Direct Application to GRIPS

Requirements for direct application to GRIPS were as follows:

To be eligible for admission to this master's program, an applicant must:

1) hold a bachelor's degree or its equivalent from a recognized/accredited university of the highest standard in the field of civil engineering, water resource management, or disaster mitigation.

2) have working knowledge of civil engineering, especially of hydraulics and hydrology.

3) be familiar with mathematics such as differentiation and integration techniques.

4) satisfy the English language requirements with a minimum TOEFL score of Internet-Based Test (iBT) 79 (Paper-Based Test 550), IELTS 6.0 or its equivalent.

5) be in good health.

1.5.3 Final Decision on Acceptance of Students

After recruiting students through 1.5.1 and 1.5.2, the committee of the Disaster Management Policy Program, directed by Professor Shoichi Ando of the National Graduate Institute for Policy Studies, made the final decision on the enrollees to the program.

As a result of deliberations among the program committee members, a total of 13 students were selected. Annex 1-1 shows the list of the students. For the academic year 2015-2016, the 13 students participated as JICA trainees.

1.6 Organization of Faculty

The course uses the following organizational structure for the teaching staff. Please note that all instructors were appointed as collaborative faculty by GRIPS.

International Centre for Water Hazard and Risk Management (ICHARM), PWRI

Collaborating Professor (Director)	Toshio Koike
Collaborating Professor (Advisor)	Kuniyoshi Takeuchi
Collaborating Professor (Research and Training Advisor)	Shinji Egashira
Collaborating Associate Professor (Senior Researcher)	Miho Ohara
Collaborating Associate Professor (Senior Researcher)	Abdul Wahid Mohamed RASMY
Collaborating Associate Professor (Researcher)	Atsuhiro Yorozuya
Collaborating Associate Professor (Research Specialist)	Tomoki Ushiyama
Collaborating Associate Professor (Research Specialist)	Yoshihiro Shibuo

In accordance with the research themes of the students, ICHARM researchers in the relevant fields provided instructions whenever necessary.

Chapter 2: Course Content

2.1 Course Schedule

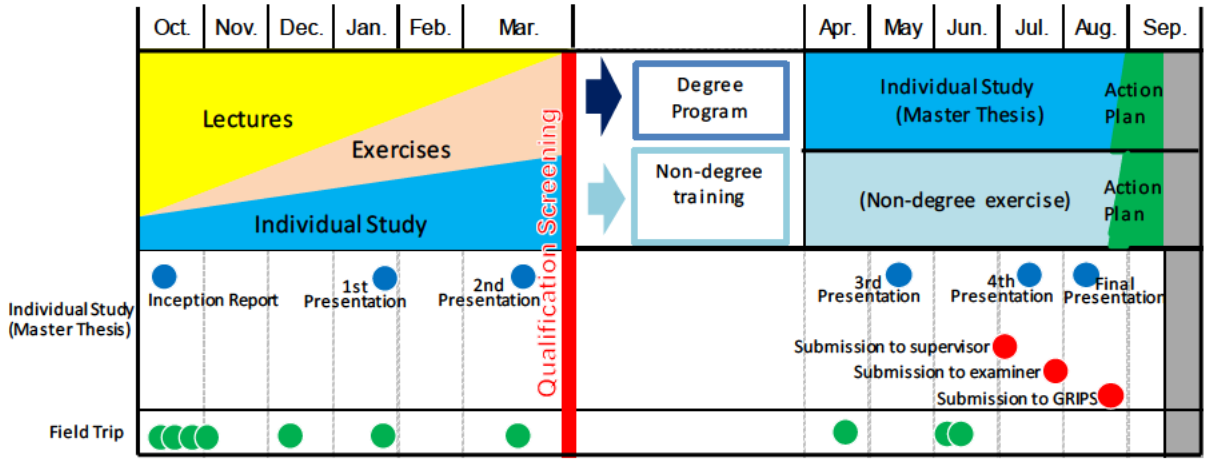


Figure 2-1 Conceptual figure of course schedule

The course was conducted over a period of around one year, from October 1, 2015 (date of arrival in Japan) to September 15, 2016 (departure date). The opening ceremony at GRIPS was held on October 5, 2015, and the graduation ceremony on September 14, 2016.

Figure 2-1 shows the course schedule.

The first half of the course (October to March) consisted mainly of "Lectures" (10 subjects) and "Exercises" (3 subjects). "Site Visit (1 subject)" was also conducted several times throughout the year to enhance the students' understanding of the content of the lectures. In addition, in order to provide opportunities for students to learn about the latest knowledge and trends regarding water-related disasters, they were required to attend ICHARM R&D Seminars held with invited experts.

In late March, the Qualification Screening was held, in which the ICHARM faculty determined whether the students had reached the level of knowledge required to write a master's thesis.

In the second half of the course (April to September), the students started working exclusively on their master's theses as "Individual Study (1 subject)", while consulting with their supervisors (ICHARM researchers, etc.). To report progress in master's theses, the students had to make a ten-minute presentation in the "Interim Presentations" session about once every one to two months. In this session, they received advice from other students and supervisors as necessary. After submitting their master's theses, the students who were accepted through the JICA recruitment procedure started creating "Action Plans" for activities that they would perform after they returned to their home countries.

Table 2-1 shows a summary of the year's course schedule. In addition, the overall course timetable is described in detail in Annex 2-1.

Table 2-1 Main schedule for the year

Red: Thesis related, Blue: Site visit

Date		Event
2015 October	5th (Tue) 6th (Wed) 21st (Wed) 27th (Tue) 28th (Wed)-31st (Sat)	Entrance Guidance & Orientation at GRIPS Opening Ceremony at ICHARM Presentation on Inception Report Introduction of ICHARM research activities Site Visit to Yodo River Basin
November	25th (Wed)-27th	Site Visit to Urban River in Kanto Region
December	7th (Mon)-18th (Fri)	Lectures at GRIPS
2016 January	6th (Wed)-8th (Fri) 27th (Fri)	Exercise on Project Cycle Management (PCM) 1st Interim Presentation
February	17th (Wed)	Site Visit to JAXA
March		

Date		Event
April	4th (Mon)	2nd Interim Presentation
	22nd (Fri)	ICHARM Open Day
	27th (Thu)-29th (Sat)	Site Visit Shinano River
May	18th (Wed)	3rd Interim Presentation in ICHARM Auditorium
June	1st (Wed)–3rd (Sat)	Site Visit to Nikko (Watarase Retarding basin, Kinu River and Kawaji Dam)
July	1st (Fri)	Deadline of the 1st Draft Thesis to ICHARM Supervisor
	3rd (Sun)	Flood Fighting Drill in Yachiyo city
	6th (Wed)	4th Interim Presentation in ICHARM Auditorium
	22nd (Fri)	Deadline of the 2nd Draft Thesis to ICHARM Supervisor
August	10th (Wed)	Final Presentation in ICHARM Auditorium
	19th (Fri)	Deadline of Final Thesis
	31st (Wed)-	Site Visit to Kobe/Tokushima
September	-3rd (Sat)	Site Visit to Kobe and Tokushima
	13th (Tue)	Closing Ceremony at JICA
	14th (Wed)	Graduation Ceremony at GRIPS

2.2 Course Curriculum

2.2.1 Lectures and Exercises

This master's program is oriented towards problem solving and focuses on application to actual tasks. Therefore, in addition to basic studies on water hazard risk management, it is characterized by heavy emphasis on study and practice application of knowledge and technology to actual problems.

Table 2-2 shows the list of classes in this master's program. Overall, the program consists of 15 subjects in three categories: I. Required Course, II. Recommended Course, and III. Elective Course. Lecture courses are in the second category, and exercise courses are in the third category.

Each subject consists of 15 periods. All subjects in the Recommended Course are compulsory (lectures: two credits), all subjects in the Elective Course are optional (exercises: one credit),

and the Individual Study counts as ten credits. To be awarded a master's degree, students must earn at least 30 credits, 16 credits of which must be from the subjects in the Recommended Course. Students are awarded a master's degree in "disaster management" after having earned the necessary credits and passing the thesis review. Students in this program do not have to take all subjects to earn the credits required for graduation, but they usually do.

Annex 2-2 lists the curriculum for each course, and Annex 2-3 gives the syllabus for each subject.

2.2.2 Lecturers

The faculty for this master's program consists of not only ICHARM researchers but also many professionals invited from PWRI, the National Institute for Land and Infrastructure Management (NILIM), universities and other institutes, so that students can learn the latest knowledge and technologies. As shown in Table 2-3, a total of 40 lecturers joined the faculty this year from outside and inside ICHARM: 12 from universities, 9 from government agencies, foundations, research institutes of private corporations, 1 from PWRI, and 18 from ICHARM.

With respect to the implementation of lectures, exercises, and individual studies, the ICHARM educational staff and thesis supervisors are also contracted as GRIPS coordinating instructors to provide supervision for students.

2.2.3 Field Trips and Lectures Conducted by Officials Related to Disaster Prevention Administration

Field trips are also conducted for students to study disaster management structures in place, such as retarding basins, diversion channels, dams, and sediment control and landslide prevention works, in addition to lectures and exercises at ICHARM. Students also visit the regional bureaus of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and local government offices to listen to lectures given by disaster prevention officials whose work involves direct interaction with local residents. These officials explain flood information transmission systems and flood hazard maps used in Japan, which helps students enhance their understanding of the problems actually encountered by Japanese disaster prevention authorities. Table 2-4 shows the list of the field trip destinations this year. Such destinations are carefully selected for students to be able to observe flood prevention facilities they learned in lectures and see representative flood prevention facilities in Japan. To ensure that the field trips will not end up with a mere leisure activity, students are required to submit reports after each field trip so as to increase their understanding of effective practice in disaster management. Annex 2-4 shows the itineraries of the field trips.

Table 2-2 List of courses

Category	Course No.	Course Title	Instructor	Term	Credit	
I Required Courses	DMP4800E	Individual Study		Winter through Summer	10	
II Recommended Courses	DMP2000E	Disaster Management Policies A: from Regional and Infrastructure Aspect	Ieda	Winter	2	16/20
	DMP2010E	Disaster Management Policies B: from Urban and Community Aspect	Ando	Winter	2	
	DMP2800E	Hydrology	Koike	Fall through Winter	2	
	DMP2810E	Hydraulics	Huang	Fall through Winter	2	
	DMP2820E	Basic Concepts of Integrated Flood Risk Management (FRM)	Takeuchi	Fall through Winter	2	
	DMP2870E	Urban Flood Management and Flood Hazard Mapping	Tanaka	Fall through Spring	2	
	DMP3810E	Flood Hydraulics and River Channel Design	Fukuoka	Fall through Winter	2	30/34
	DMP3820E	Mechanics of Sediment Transportation and Channel Changes	Egashira	Fall through Winter	2	
	DMP3840E	Control Measures for Landslide & Debris Flow	Kondo	Fall through Winter	2	
	DMP2900E	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management	Ohara	Fall through Spring	2	
III Elective Courses	DMP1800E	Computer Programming	Ushiyama	Fall through Winter	1	
	DMP2890E	Practice on Flood Forecasting and Inundation Analysis	Sayama	Fall through Spring	1	
	DMP3802E	Practice on GIS and Remote Sensing Technique	Yorozuya	Fall through Spring	1	
	DMP3900E	Site Visit of Water-related Disaster Management Practice in Japan	Shibuo	Fall through Summer	1	
		* Selected Topics in Policy Studies I -IV				

Notes:

1. Graduation Requirements: Students must complete a minimum of 30 credits, 16 of which must come from Category II.

2. Courses offered in the Program are subject to change.

3. * Course Number, Instructor, and Term for the course will be announced later when the course is offered.

Table 2-3 List of Lecturers (positions as of that time)

Lecturer	Affiliation	Lecture
University		
Prof. Shoichi Ando 安藤　尚一	GRIPS	Disaster Management Policies B: from Urban and Building Aspect
Prof. Hitoshi Ieda 家田　仁	GRIPS	Disaster Management Policies A: from Regional and Infrastructure Aspect
Prof. Guangwei Huang 黄　光偉	Sophia University	Hydraulics
Assoc. Prof. Takahiro Sayama 佐山　敬洋	Kyoto University	Practice on Flood Forecasting and Inundation Analysis
Prof. Taikan Oki 沖　大幹	University of Tokyo	Basic Concepts of IFRM
Prof. Shigenobu Tanaka 田中　茂信	Kyoto University	Urban Flood Management and Flood Hazard Mapping
Prof. Toshihiko Sugai 須貝　俊彦	University of Tokyo	Urban Flood Management and Flood Hazard Mapping
Prof. Shoji Fukuoka 福岡　捷二	Chuo University	Flood Hydraulics and Sediment Transport
Prof. Katsuo Sasahara 笹原　克夫	Kochi University	Control Measures for Landslide & Debris Flow
Prof. Tetsuya Sumi 角　哲也	Kyoto University	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
Dr. Nobutomo Osanai 小山内　信智	Hokkaido University	Control Measures for Landslide & Debris Flow
Mr. Akira Kodaka 小高　暁	Tokyo University	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
National Research and Development Agency		
Prof. Haruo Hayashi 林　春男	Disaster Prevention Research Institute, Kyoto University	Urban Flood Management and Flood Hazard Mapping
Private sectors, and others		
Mr. Masayuki Watanabe 渡辺　正幸	Institute for international, social development & cooperation	Basic Concepts of IFRM
Mr. Masahiro Imbe 忌部　正博	Association for Rainwater Storage and Infiltration Technology	Urban Flood Management and Flood Hazard Mapping
Dr. Koichi Kondo 近藤　浩一	Sabo Technical Center	Control Measures for Landslide & Debris Flow
Dr. Yoshihumi Hara 原　義文	CTI Engineering Co., Ltd.	Control Measures for Landslide & Debris Flow
Dr. Kazuyuki Takanashi 高梨　和行	Asia Air Survey Co., Ltd.	Control Measures for Landslide & Debris Flow
Dr. Ryosuke Tsunaki 綱木　亮介	Sabo Technical Center	Control Measures for Landslide & Debris Flow

Dr. Tadahiko Sakamoto 坂本　忠彦	NIPPON KOEI CO., LTD.	Dam Special Lecture
Dr. Nario Yasuda 安田　成夫	Japan Dam Engineering Center	Dam Special Lecture
PWRI		
Dr. Taketo Uomoto 魚本　健人	Public Works Research Institute (PWRI)	Special Lecture
ICHARM		
Prof. Toshio Koike 小池　俊雄	Hydrology, Master's Thesis	
Prof. Kuniyoshi Takeuchi 竹内　邦良	Basic Concepts of IFRM, Master's Thesis	
Prof. Shinji Egashira 江頭　進治	Mechanics of Sediment Transportation and River Change, Master's Thesis	
Assoc. Prof. Miho Ohara 大原　美保	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management Master's Thesis	
Mr. Minoru Kamoto 加本　実	Urban Flood Management and Flood Hazard Mapping, Master's Thesis	
Mr. Yoichi Iwami 岩見　洋一	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management	
Mr. Hisaya Sawano 澤野　久弥	Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management	
Assoc. Prof. Atsuhiro Yorozuya 萬矢　敦啓	Hydraulics, Practice on GIS and Remote Sensing Technique Master's Thesis	
Dr. Kwak Young Joo 郭　栄珠	Practice on GIS and Remote Sensing Technique Master's Thesis	
Dr. Akira Hasegawa 長谷川　聡	Computer Programming, Master's Thesis	
Assoc. Prof. Tomoki Ushiyama 牛山　朋來	Computer Programming, Master's Thesis	
Dr. GUSYEV　MAKSYM	Practice on Flood Forecasting and Inundation Analysis Master's Thesis	
Dr. Morimasa Tsuda 津田　守正	Practice on Flood Forecasting and Inundation Analysis	
Assoc. Prof. Yoshihiro Shibuo 渋尾　欣弘	Site Visit of Water-related Disaster Management Practice in Japan, Master's Thesis	
Assoc. Prof. Abdul Wahid Mohamed RASMY	Master's Thesis	
Dr. Mamoru Miyamoto 宮本　守	Master's Thesis	
Dr. PERERA Duminda	Master's Thesis	
Dr. LIU Tong	Master's Thesis	

Table 2-4 List of field trip sites

Date	Site	Details	Cooperating office
October 21st (Thu)	Geospatial Information Authority of Japan (GSI)	Disaster management projects by GSI Basic map information Digital national base map	Geospatial Information Authority of Japan
October 28th (Wed)	Kinki Regional Development Bureau	Damage from and response to Typhoon No. 18 Flood forecasting	River Planning Division, River Department, Kinki Regional Development Bureau, MLIT
October 29th (Thu)	Yodogawa Museum	Outline of the Yodo River Basin	Yodo River Office, Kinki Regional Development Bureau, MLIT
	Field visit in the Yodo River	Super levee, machines for disaster countermeasures, etc.	
	Arashiyama (Togetsukyo Bridge)	[Observation] Damaged spots due to Typhoon No. 18	
October 30th (Fri)	Yodogawa Integrated Dams Control Office	Outline of dams under the jurisdiction	Yodogawa Integrated Dams Control Office, Kinki Regional Development Bureau, MLIT
	Amagase Dam	Dam operation at the time of Typhoon No. 18	
November 25th (Wed)	The Metropolitan Area Outer Underground Discharge Channel	Flood control measures in urban area	Edo River Office, Kanto Regional Development Bureau, MLIT
November 26th (Thu)	Kawawa Retarding Basin	Flood countermeasures in Kanagawa Prefecture (integrated flood control project)	River Division 1, Yokohama Kawasaki Flood Control Office, Kanagawa Prefectural Government
November 27th (Fri)	Japan Meteorological Agency (JMA)	Meteorological services of Japan, etc.	Japan Meteorological Agency (JMA)
April 27th(Thu)	Shinanogawa-Karyu (Shinano River Downstream) River Office	Outline of flood disasters and past disasters in the Shinano River Basin (torrential rain in July 2011, torrential rain in July 2004, etc.)	Shinanogawa-Karyu (Shinano River Downstream) River Office, River Planning Division, River Department, Hokuriku Regional Development Bureau, MLIT

	Ohkouzu Diversion Channel	[Observation] Ohkouzu Museum, Ohkouzu Movable Weir, mouth of the diversion channel	Shinano River Office, Hokuriku Regional Development Bureau, MLIT
April 28th (Fri)	Sagurigawa Dams	[Observation] Structure of rockfill dams Roles of Sagurigawa Dam in flood control	Sagurigawa Dam Control Office, Hokuriku Regional Development Bureau, MLIT
June 1st (Wed)	Wide Area Water Control Office/ Disaster Management Office, Kanto Regional Development Bureau	• Flood forecast/warning systems in Japan • Collection and communication of flood information	River Department/ Planning Department, Kanto Regional Development Bureau, MLIT
June 2nd (Thu)	Kinugawa Integrated Dam Control Office	Dam network in the upper Kinugawa River	Kinugawa Integrated Dam Control Office, Kanto Regional Development Bureau, MLIT
	Kawaji Dam	Observation of arch dam	
June 3rd (Fri)	Sabo project in the Inari River (Nikko)	Sabo project in the Inari River (Nikko)	Nikko Sabo Office, Kanto Regional Development Bureau, MLIT
	Sabo project in Ashio	Sabo project in Ashio	Watarase River Office, Kanto Regional Development Bureau, MLIT
September 1st (Thu)	ISHII Disaster Prevention Station in Tokushima Prefecture	Exercise of flood-fighting methods	Tokushima River and Road Office, Shikoku Regional Development Bureau, MLIT
September 2nd (Fri)	JICA Kansai	The BOKOMI, voluntary disaster preparedness activities by local Kobe residents	Prevention Division, Kobe Municipal Fire Department

2.2.4 Studying and Living Environment

As is usual in universities, classes were held 90 minutes each. Table 2-5 shows the daily timetable. The students stayed at JICA Tsukuba (Kouyadai, Tsukuba, Ibaraki) and commuted to ICHARM for classes on a JICA bus.

Table 2-5 Daily timetable

1st period	9:00–10:30
2nd period	10:45–12:15
3rd period	13:15–14:45
4th period	15:00–16:30

As was the case last year, in the first half of the course from October to March, class chores were managed by the "*Nicchoku*" system, in which students took turns being a *nicchoku*, or a person in charge of class chores for the day. The *nicchoku* person performed chores such as taking attendance, cleaning whiteboards after classes, making sure doors and windows are locked and lights are turned off, and writing a simple report on the day's activities on a "Nicchoku Sheet" (one page of A4 sized paper). In the second half of the course, from April to September, which mainly consisted of individual study, students took turns on a weekly basis, checking attendance and producing a weekly summary report.

2.3 Master's Thesis

As mentioned above, this master's program is designed to develop the students' problem-solving capabilities and encourage their independent learning instead of the faculty always leading the way for them. In accordance with this objective, students are required, for their master's thesis, to study themes related to problems they identify in their countries. They are expected to become trained professionals with the ability to create comprehensive plans for the reduction of damage from water-related disasters and contribute to solving problems in their home countries when they return there.

Therefore, immediately after the course started, the "Inception Report" presentation was held, in which the students explained water-related problems in their countries, presented information concerning possible study areas for their master's theses, and described tasks required for the implementation of disaster management projects. ICHARM researchers also introduced their research to the students so that it would be easier for both sides to find a right match for supervision. Once each student found a supervisor from ICHARM researchers, they started discussing themes for master's theses and then began working on the theme even before they had completed lectures and exercises in the first half of the program. The deadline for submitting master's theses was late August 2016, and the submission was followed by a thesis review meeting by the faculty at GRIPS to determine whether the students should be awarded with a master's degree.

Chapter 3: 2015–2016 Activity Report

Group photo taken at the GRIPS
(September 14, 2016)

(See the attachment for more photos. Position titles are effective as of the date when each photo was taken.)

ICHARM implemented the Water-related Disaster Management Course of Disaster Management Policy Program (JICA training name "FLOOD DISASTER MITIGATION") over a period of around one year from October 6, 2015, to September 14, 2016, as a joint program with the Japan International Cooperation Agency (JICA) and the National Graduate Institute for Policy Studies (GRIPS).

The goal of this course is to improve participants' capability to practically manage problems related to water-related disasters at a local level and to eventually contribute to socioeconomic or environmental improvement at a national level.

The course has several specific features. Students can earn a master's degree in one year. The training is oriented toward problem solving in order to improve the students' ability to propose solutions to actual problems in their home countries. The course focuses on practice rather than theory.

There were 13 students this year: one each from Brazil, Maldives, Myanmar, Nepal, Philippines, Timor-Leste and Zimbabwe, and two each from Bangladesh, Pakistan, and Sri Lanka. These 13 students all successfully passed their thesis examinations, earned a master's degree in disaster management, and returned to their home countries.

The course formally started on October 2, 2015, with a course orientation meeting held at JICA.

On October 5, the entrance ceremony was held by GRIPS at the GRIPS building in Roppongi, Tokyo. On October 6, the opening ceremony was held at PWRI with the attendance of officials from ICHARM (Director Koike, Advisor Takeuchi, Chief Researcher Kamoto, JICA Tsukuba (Vice Director General Uemura, Director Shibusawa, Officer Yamaguchi, Training Coordinator Yamada) and GRIPS (Prof. Ando). Following welcome speeches by the directors, Mr. KHAN Irfan Ullah of Sri Lanka spoke in return on behalf of the students.

The first half of this one-year course consisted mainly of lectures and exercises related to water-related disasters, and in the second half, students spent most of the time working on their individual studies. The students also went on field trips in order to learn from actual locations where Japan's flood countermeasures had been implemented.

The instructors for this course included not only researchers at ICHARM but also those at PWRI, NILIM, and universities in Japan involved in leading edge research in various fields of study connected with water-related disasters.

<Lectures/Exercises (October to December)> (positions as of that time)

Lectures included the Basic Concepts of Integrated Flood Risk Management (IFRM) to provide indispensable knowledge on flood disaster management and global warming for master's course students. Prof. Kuniyoshi Takeuchi of ICHARM, Prof. Taikan Oki of the University of Tokyo, and Mr. Masayuki Watanabe, president of the Institute for International Development and Peace, Inc., were lecturers for this subject.

Hydraulics was another essential subject to teach the students the basics of hydraulics. Associate Prof. Atsuhiro Yorozuya of ICHARM delivered a refresher course on calculus, and Prof. Huang Guangwei of Sophia University lectured about the basic hydraulic concepts. Assoc. Prof. Yorozuya also conducted hydraulic exercises and discharge observation exercises.

Professor Shoji Fukuoka of Chuo University gave lectures on the basic principles of flood flow and sediment transport in his class entitled "Flood Hydraulics and River Channel Design," and Professor Shinji Egashira of ICHARM lectured on "Mechanics of Sediment Transportation and River Changes."

Prof. Toshio Koike of ICHARM also conducted a class, "Hydrology," from October to February, teaching basin-wide water circulation/hydrological processes, field observations/remote sensing, and water resources management.

As lectures shifted to more practical ones, "Urban Flood Management and Flood Hazard Mapping" was provided. Prof. Shigenobu Tanaka of Kyoto University and Chief Researcher Minoru Kamoto of ICHARM lectured on disaster management in Japan, including Japanese disaster prevention systems, river information systems and evacuation. Furthermore, Prof. Haruo Hayashi of the National Research Institute for Earth Science and Disaster Resilience provided a lecture on disaster psychology, and Prof. Toshihiko Sugai of University of Tokyo gave a lecture on geomorphology, an important topic for understanding flood-prone areas.

In addition to the lectures, the students started learning the operation of models and analyses.

In the "Basic Practice on Flood Forecasting & Inundation Analysis" exercise, the students were provided with lectures and exercises on the following topics: GIS by Research Specialist Young Joo Kwak of ICHARM, the Rainfall-Runoff-Inundation model (RRI model) by Assoc. Prof. Takahiro Sayama of Kyoto University, the Integrated Flood Analysis System (IFAS) by Researcher Badri Bhakta Shrestha of ICHARM, and the BTOP model by Research Specialist Maksym Gusyev of ICHARM.

In the "Advanced Practice on Flood Forecasting & Inundation Analysis" exercise, the students engaged in exercises for more advanced GIS operations based on what they had learned in "Basic Practice on Flood Forecasting & Inundation Analysis." After the series of exercises, each student selected a model necessary for his/her master's thesis from RRI, IFAS or BTOP, and studied it intensively.

In the “Computer Programming” exercises, Assoc. Professor Tomoki Ushiyama, Research Specialist Akira Hasegawa and Assoc. Professor Abdul Wahid Mohamed RASMY, all from ICHARM, provided instructions on numerical solutions using FORTRAN.

Special lectures on dams were provided by Dr. Tadahiko Sakamoto of NIPPON KOEI CO., LTD., who was once the president of PWRI, and Dr. Nario Yasuda of the Japan Dam Engineering Center, who was once the deputy director of ICHARM, in order for the students to learn the basics of dams before visiting the Yodo River basin in late October.

In late October, when the students became used to the content of the study, chief researchers of ICHARM introduced to them ongoing research tasks in relation to projects conducted under their management. This was intended to provide an opportunity for the students to have general ideas on research tasks ICHARM was currently engaged in. It was also to help the students set a proper theme for their master’s theses and encourage them to consult ICHARM researchers to find out more about research tasks.

In the two weeks from December 7 to 18, intensive lectures, “Disaster Management Policies A: from Regional and Infrastructure Aspect” and “Disaster Management Policies B: from Urban and Building Aspect,” were delivered mainly by Prof. Hitoshi Ieda of the University of Tokyo and GRIPS and Prof. Shoichi Ando of GRIPS. During this time, the students also took a study trip to Nagoya.

<Lectures/Exercises (January to May)> (positions as of that time)

On January 20, they visited a hydraulic experiment facility of the Tsukuba Research Center of Pacific Consultants Co., Ltd. in Sakutani, Tsukuba city, to learn the basics of hydrology under the guidance of Assoc. Prof. Atsuhiro Yorozuya. The students conducted hydraulic experiments in groups.

From February to March, a series of lectures on the latest trends and technologies in erosion control were delivered in “Control Measures for Landslide & Debris Flow.” by Prof. Koichi Kondo, director of the Sabo Technical Center, Prof. Katsuo Sasahara of Kochi University, Mr. Yoshifumi Hara, adviser of the Technology Control Headquarters of CTI Engineering Co., Ltd., Mr. Ryosuke Tsunaki, manager of the Sabo Technical Center, Mr. Kazuyuki Takanashi, consultant of Asia Air Survey Co., Ltd., and Mr. Nobutomo Osanai, group leader of PWRI.

In “Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management” Assoc. Prof. Miho Ohara of ICHARM, Prof. Tetsuya Sumi of Kyoto University, Chief Researcher Yoichi Iwami of ICHARM and Chief Researcher Hisaya Sawano of ICHARM delivered lectures on socio-economic impacts of disasters and the impacts of dams and river ecosystems on the river environment.

In March, a special lecture was provided by PWRI President Taketo Uomoto on “Importance of Maintenance for Sustainable Concrete Structures.”

On April 28 during our visit to the midstream area of the Shinano River, acoustic Doppler current profilers (aDcp), flow observation equipment, were introduced to the students. They performed exercises on discharge observation in groups using the float observation method and a radio current meter in the Shinano River near the Shinanogawa Riverside Park, located in Ojiya City, Niigata Prefecture, under the guidance of Assoc. Prof. Atsuhiro Yorozuya and Researcher Shun Kudo of ICHARM. Although it was the first observation for many of the students and the exercise was conducted in cold temperatures, each group showed a keen interest in the exercise.

<Field trips and exercises>

With the support of local offices of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and local governments, there were field trips to various flood control facilities in Japan in the hope that the students would find clues to solve problems caused by water-related disasters in their countries.

On October 6, they visited the Ninomiya Sontoku Museum in Moka city, Tochigi prefecture. This visit was very beneficial for them because understanding Sontoku's philosophy of "Hotoku Shiso" helped them realize the importance of developing an affluent society through the cooperation of many people and the importance of self-help, mutual support, and public assistance. Every year, ICHARM offers the "ICHARM Sontoku Award" to honor a student selected through mutual voting among the students for his/her outstanding contribution to fellow students and this course.

From October 28 to 31, they took a study tour to the Kinki region to see flood control measures in the Yodo River Basin, whose basin area had been developed over years owing to abundant water resources from Lake Biwa. The tour was also to learn about the impact of Typhoon No.18 and administrative responses to the event, which brought record rainfall in September 2013. First, they visited the Kinki Regional Development Bureau of MLIT, to get an overview of the typhoon and damage caused within its jurisdiction. The students learned that though Typhoon No.18 brought record precipitation and wreaked enormous damage on many parts of Japan, quite a few areas in the jurisdiction were able to avert damage thanks to measures implemented after the typhoon damage in 2004. Expansion of damage was also avoided through collaborative operations of dams in the Yodo River system and the timely operation of the Setagawa Weir. On the following two days, they visited the bureau's field offices and areas damaged by the typhoon and were provided with detailed descriptions. Throughout this study tour, the students attended the observations enthusiastically and asked the personnel on site a number of questions, some of which were related to their master's theses.

From November 25 to 27, another study tour was conducted with primary emphasis on flood control in urban rivers. On the first day, the students visited an overwhelmingly huge underground structure called the Metropolitan Area Outer Underground Discharge Channel, which is also nicknamed "a temple in the underground." On December 26, they went to observe comprehensive flood control measures in an urban river basin with the help and guidance from Executive Director Masahiro Imbe of the Association for Rainwater Storage and Infiltration Technology and the Kanagawa prefectural government. They visited the Tsurumi River Retarding Basin, the Kawawa Retarding Basin and the houses of local residents who had installed rainwater infiltration systems on their properties. Since the area along the Tsurumi River was rapidly urbanized after the Second World War, learning about the flood measures implemented there was thought to be useful in planning flood control measures in major Asian cities as their populations are still increasing. In particular, in the Kawawa Retarding Basin, the students learned that there is a storage facility underneath a subway line depot. This facility strongly reminded them of the importance of intersectional collaboration, for example between rivers and railroads, when implementing flood control measures in urban areas where there is scarcity of land for structural measures. There are growing concerns about the recent frequent occurrence of localized short-term heavy rainfall caused by global warming, and the students understood the importance of providing storage facilities in urban areas to cope with such sudden rainfall events. On November 27, they visited the Japan Meteorological Agency (JMA) and were given an overview of the meteorological services and methods of forecasting, and then they moved on to the forecasting room. They were informed that JMA, MLIT and prefectural governments work closely together to forecast river floods.

On April 3, they visited the Fukuoka Weir. It was built to secure irrigation water, so this visit provided an opportunity to learn about irrigation technologies in addition to those for flood control. During the visit, the students also enjoyed the beautiful nature of Japan as the sakura season was in full swing.

From April 27 to 29, the students visited the midstream area of the Shinano River and conducted discharge observation exercises. On the 27th, they were given an overview of flood control measures at the Shinanogawa-Karyu River Office of MLIT, and then moved to the Ohkouzu Diversion Channel, where they learned the history of floods and countermeasures implemented in the Shinano River and observed the new and old movable weirs to understand the roles of the Ohkouzu Diversion Channel, a key flood measure in the Shinano River. On the 29th, they visited the Sagurigawa Dam. After a lecture on the structure of a rockfill dam, they observed the dam body. Finally they participated in discharge observation in the Shinano River near the Shinanogawa Riverside Park in Ojiya city.

From June 1 to 3, the students visited a few sites in the river basins of the Tone River and the Kinu River to observe examples of flood control measures in non-urban areas, especially dams, which are considered a flood control technology taking advantage of the topographical features of a rapid river. They were first given lectures at the Kanto Regional Development Bureau on flood forecasting and warning and on X-band MP radars in comparison with C-band radars. They were also given an explanation on the damage by the Kinu River flood due to Typhoon No.18 in September 2015, the weather conditions at that time, the response efforts by MLIT, and the emergency rehabilitation. In the afternoon, the Shimodate River Work Office of MLIT guided us to a site where rehabilitation works were underway.

On the following day, June 2, the students went on a field trip to learn about the effective operation of dams in the Kanto region with the cooperation of the Kinugawa Integrated Dam Control Office, MLIT. After they received the outline of the four dams in the upstream area of the river and their operational coordination at the Office, they went to the Kawaji Dam. It was a valuable visit as they were able to observe inside the dam body. On the 3rd, they visited erosion control sites in the Inari River and the Ashio area with the cooperation of the Nikko Sabo Office and the Watarase River Office. At a site in the Inari River, they were able to get very close to historical erosion control structures and learned the history of Japan’s civil engineering firsthand. In the Ashio area, after being welcomed by one of Japan’s largest erosion control weirs, they listened to a lecture on sediment control works with mock-up display models at the Akagane Shinsui Park and then visited an actual site where hillside works were being carried out. Additionally, they went to the Ashio Environment Study Center, where they learned that pollution originating in the Ashio copper mine was once a very serious social and environmental issue in the area, and that Japan’s prosperity today has resulted from overcoming such problems. The trip was a great opportunity for the students to realize the importance of erosion control projects.

On July 5, the students observed the flood fighting drill organized by the city government of Tsukuba. The students observed a variety of flood fighting methods and were amazed at the fact that such a drill is performed every year.

After submitting the thesis, the students went to Tokushima and Hyogo prefectures. In Tokushima Prefecture, they learned practical rope works. They visited the Kobe City Fire Department to learn “BOKOMI”, the scheme of disaster mitigation community that the Kobe local government has been trying to expand and reinforce after the Kobe-Awaji Great Earthquake.

Additional study tours were made to research institutes in Tsukuba city. On October 21, the students visited the Geospatial Information Authority of Japan, where they were given an overview of their activities and research results related to the Great East Japan Earthquake. On February 17, they received a lecture about GSMaP by a researcher of JAXA and then visited JAXA to learn more about meteorological satellites.

<Master's thesis>

In principle, each student selected a theme for their master's thesis while considering what research can contribute to solving issues regarding water-related disasters in their country. ICHARM researchers also provided individual consultation for them in this decision-making process, trying to maximize research results based on their decisions. The process started on October 21 with the presentation of inception reports by each student. After the presentation, the students and the researchers spent the next two months trying to match the research interest of each student and the expertise of each ICHARM researcher in order for the students to conduct research under appropriate supervision. Through several discussions with the researchers, the students narrowed down their research themes.

For three days from January 6 to 8, a lecturer from the GLM Institute was invited to conduct a session on "Project Cycle Management." This subject aimed to teach students to illustrate a problem in a tree structure, analyze it, identify measures to be taken, and develop a roadmap for their implementation. This is a very useful exercise as it helps students objectively analyze problems faced by each student's home country and to determine the direction of their thesis research.

A total of four interim thesis presentations were scheduled throughout the course: the first on January 27, followed by the three ensuing on April 4, May 18 and July 6. These interim presentations not only provided the students with opportunities to receive advice from ICHARM researchers but also allowed them to see their fellow students' progress, which motivated them to work harder on their own. At the final presentation on August 10, Prof. Hiroki Sunohara of GRIPS also joined and commented on each student's achievement.

<Graduation and other events>

The students were also encouraged to participate in ICHARM R&D Seminars occasionally conducted by inviting experts on issues in the field of water-related disasters. The master's program offered them many opportunities to learn about the latest trends and knowledge related to water disasters in both Japan and the world.

On March 30, a cherry blossom viewing party was held in the premises of PWRI for the students to experience a Japanese culture. They were enchanted by the view of cherry blossoms beautifully in bloom.

The closing ceremony was held at JICA Tsukuba on September 13. During the ceremony, JICA Tsukuba Director Haga, PWRI President Uomoto and GRIPS Prof. Ando made congratulatory remarks, after which JICA awarded the students with their program completion certificates. The Best Research Award, an award established jointly by GRIPS and PWRI for students who wrote a quality master's thesis, was given to Ahmed Tanjir Saif of Bangladesh and Babarande Guruge Thanura Lasantha of Sri Lanka. Then, the ICHARM Sontoku Award, an award for students selected through mutual voting among the students for their outstanding contribution to fellow students and this course, was presented to Mr. Sinnappoo Kokularamanan of Sri Lanka by Advisor Takeuchi. Representing the students, Mr. Gopal Sharm of Nepal shared a few words of thanks to conclude the ceremony.

On September 14, the graduation ceremony was held at GRIPS. Prof. Ando, the program director, read out the name of each student, and the Dean of GRIPS presented a diploma to each of them on the stage. The students then firmly shook hands with Prof. Koike, holding their diplomas in the other hand—the fruit of their year's study—showing great satisfaction on their faces.

The Dean's Award was given to Gopal Sharm of Nepal this year.

Over the following days, the students left Japan for their respective homes.

Chapter 4: Master's Thesis

As noted above, Table 4-1 shows the main schedule relating to the master's theses this year.

Table 4-1 Schedule relating to master's thesis

2015	21st October	Presentation on Inception Report
2016	6th – 8th January	Project Cycle Management exercise
	27th January	1st Interim Presentation
	4th April	2nd Interim Presentation
	18th May	3rd Interim Presentation
	1st July	Deadline of submission of the 1st draft thesis
	6th July	4th Interim Presentation
	22nd July	Deadline of submission of the 2nd draft thesis
	10th August	Final Presentation
	19th August	Submission to GRIPS

As this is a one-year master's course, students selected their thesis themes from October to November, immediately after arriving in Japan and while attending lectures and exercises. In principle, each student were assigned to an appropriate ICHARM teaching faculty member after ample time was taken to consider the various research areas of each ICHARM research specialist. A student and a supervisor were matched carefully. First, ICHARM researchers were divided into groups by area of research, the students were assigned to one of the groups according to their research interest. Then, a supervisor was selected for each student after thorough discussions.

The students performed their subsequent thesis writing while receiving individual supervision frequently.

There were four interim presentations in which students presented their own research in order to receive advice from ICHARM faculty and other students. Each presentation meeting was also a good opportunity for them to see the progress of other students and then keep a good level of motivation for their work. Another aim was to improve the presentation skills of the students by giving them several opportunities to speak in front of other people.

The students worked on their master's theses with the assistance of Ms. Natsuko Suezawa, an English proofreader who intensively checked English in the master's theses during the two weeks in the middle of August, and finally submitted their master's theses to their supervisors and assistant supervisors on August 19. After their papers had been evaluated, all 13 students were successfully awarded a master's degree in disaster management.

Table 4-2 lists the names of the students with the titles of their master's theses and their main supervisor and assistant supervisors. Note that a synopsis of each thesis is planned to be collected in a separate report by GRIPS.

Working on their master's theses allows students not only to increase their knowledge but to build a closer relationship with ICHARM staff, which is an important first step to ensure smooth communication channels between the agencies to which students belong and ICHARM. Such channels will be reciprocally beneficial in conducting research and projects, such as sharing research data with

each other. Establishing this sort of international network through students will be a great asset for future ICHARM initiatives.

Table 4-2 List of master's theses

No.	Name	Thesis Title	Teaching Staff
1	Mr. AHMED Tanjir Saif アハメド タンジール サイフ	Sedimentation and its countermeasure at the off-take area of New Dhaleswari river	**Egashira** Yorozuya Kuribayashi
2	Mr. HOWLADER Md Mamun ハウラダー エムディー マムン	Study on Proactive Breach of Submersible Embankment for Its Sustainable Maintenance in Haor Area	**Shibuo** Egashira Miyake
3	Mr. SAIA ALMEIDA LEITE Francisco サイア アルメイダ レイテ フランシスコ	Evaluation of flood control countermeasures considering Climate Change - Case of Study: Itajaí River Basin, BRAZIL -	**Ohara** Hasegawa Kwak
4	Ms. MOOSA Fathimath Shaushan ムーサ ファスマス シャウシャン	Water Scarcity Management and Adaptation to Climate Change in Maldives	**Takeuchi** Hasegawa Tsuda
5	Ms. Myo Myat Thu ミョー ミアット テュ	ANALYSIS OF FLOODS AND DROUGHTS IN THE BAGO RIVER BASIN, MYANMAR UNDER CLIMATE CHANGE	**Gusyev** Hasegawa Miyamoto
6	Mr. SHARMA Gopal サルマ ゴパル	Method for Predicting Sediment Runoff Processes and Channel Changes During Floods in West Rapti River, Nepal	**Yorozuya** Egashira Hasegawa
7	Mr. BILAL Rashid ビラル ラシッド	TRANSBOUNDARY FLOOD FORECASTING THROUGH DOWNSCALING OF GLOBAL WEATHER FORECASTING AND RRI MODEL SIMULATION	**Ushiyama** Rasmy Tsuda
8	Mr. KHAN Irfan Ullah カン イルファン ウラー	INCORPORATION OF SNOW & GLACIERMELT PROCESSES IN RRI MODEL FOR ESTIMATING PEAK RIVER DISCHARGES & INUNDATION ANALYSIS IN NEELUM RIVER BASIN	**Rasmy** Koike Liu
9	Ms. JACELDONE Catherine Guevarra ハセルドネ キャサリン グエバアラ	Sediment Transport Processes in Mountain Area of Kinugawa River	**Yorozuya** Egashira Miyamoto
10	Mr. BABARANDE GURUGE Thanura Lasantha ババランデ グルゲ サヌラ ラサンテ	Integrated Water Resources Management for Eastern Dry Zone of Sri Lanka Study of Mundani River Basin	**Rasmy** Koike Duminda
11	Mr. SINNAPPOO Kokularamanan シナッポ コークララマン	Development of flood forecasting and data dissemination system for Kalu river basin, Sri lanka	**Rasmy** Koike Duminda
12	Mr. DE ARAUJO Antonio デ アロージョ アントニオ	Flood Risk Index Analysis for Cuha River Basin, TIMOR-LESTE	**Ohara** Shibuo Egashira
13	Ms. RUKARWA Lorraine ルカーワ ローライン	Flood and Drought Risk Assessment In the Manyame River Basin of Zimbabwe under Climate Change	**Gusyev** Hasegawa Shibuo

Chapter 5: Course Evaluation and Issues for Future Improvement

5.1 Course Evaluation

In order to identify points for improvement, this section analyzes the results of questionnaires on “Course Design,” which deals with the course period and design, and “Course Contents,” which asks about lectures and exercises.

For “Course Design,” we analyzed the results from a questionnaire survey given to the students during the JICA Evaluation Session on the final day of the course. For the “Course Contents,” we analyzed the results from the questionnaire survey carried out in April 2017 by ICHARM.

5.1.1 Course Design

This year was the ninth year for the course, which began in 2007. Since the second year, a questionnaire with the same questions has been given to students every year; therefore it is possible to see the changes in students’ evaluation on this course over the past eight years, from the second year to the ninth. Although various questions were asked in the questionnaire, the analysis focused on the following six questions:

1. Do you find the design of the program appropriate for you (your organization) to achieve the Program Objective?
2. Is the quality of lectures good enough for you to understand clearly?
3. Are you satisfied with the textbooks and materials used in the program?
4. Do you find the period of the program appropriate?
5. Do you find the number of participants in the program appropriate?
6. Do you think the knowledge and experience you have acquired through the program in Japan are useful?

Tables 5-1 to 6 in the following pages show the evaluation results with breakdowns on the above six items in the past eight years.

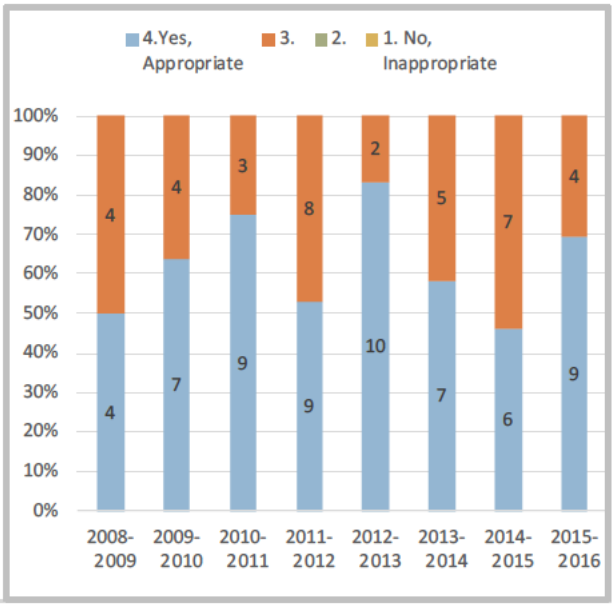
1. あなたもしくは所属組織が案件目標を達成する上で、プログラムのデザインは適切であると思いますか。

Do you finde the dedsing of the program appropriate for you (your organization) to achieve the Program Objective?

表5-1 Table 5-1

	4.Yes, Appropriate	3.	2.	1. No, Inappropriate
2008-2009	4	4	0	0
2009-2010	7	4	0	0
2010-2011	9	3	0	0
2011-2012	9	8	0	0
2012-2013	10	2	0	0
2013-2014	7	5	0	0
2014-2015	6	7	0	0
2015-2016	9	4	0	0

図5-1Figure 5-1



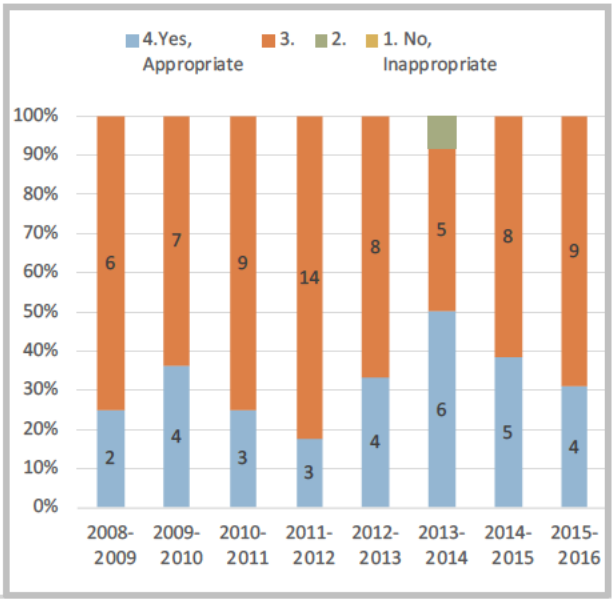
2. 講義の質は高く、理解しやすかったですか。

Is the quality of lectures good enough for you to understand clearly?

表5-2 Table 5-2

	4.Yes, Appropriate	3.	2.	1. No, Inappropriate
2008-2009	2	6	0	0
2009-2010	4	7	0	0
2010-2011	3	9	0	0
2011-2012	3	14	0	0
2012-2013	4	8	0	0
2013-2014	6	5	1	0
2014-2015	5	8	0	0
2015-2016	4	9	0	0

図5-2Figure 5-2



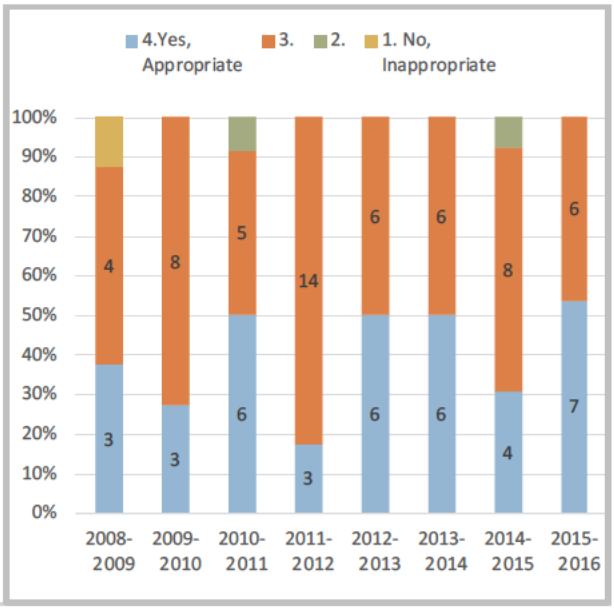
3. テキストや研修教材は満足するものでしたか。

Are you satisfied with the textbooks and materials used in the program?

表5-3 Table 5-3

	4.Yes, Appropriate	3.	2.	1. No, Inappropriate
2008-2009	3	4	0	1
2009-2010	3	8	0	0
2010-2011	6	5	1	0
2011-2012	3	14	0	0
2012-2013	6	6	0	0
2013-2014	6	6	0	0
2014-2015	4	8	1	0
2015-2016	7	6	0	0

図5-3Figure 5-3



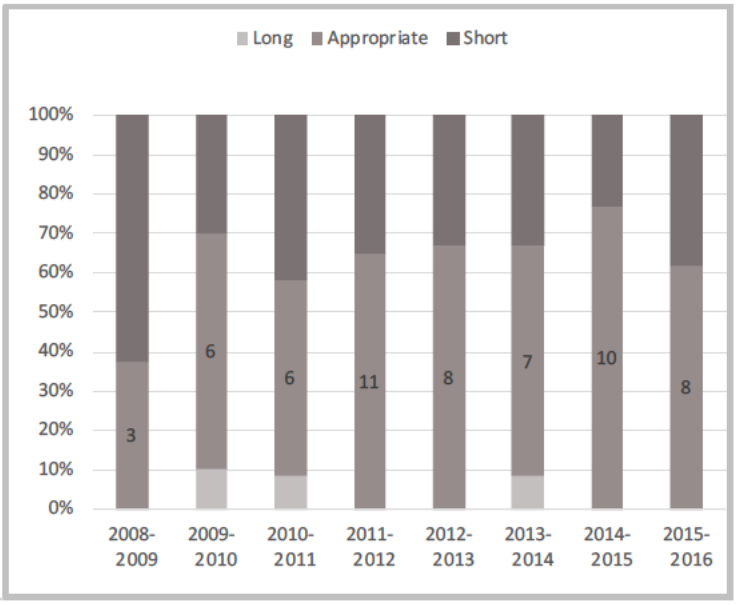
4. 研修期間は適切でしたか。

Do you find the period of the program appropriate?

表5-4 Table 5-4

	Long	Appropriate	Short
2008-2009	0	3	5
2009-2010	1	6	3
2010-2011	1	6	5
2011-2012	0	11	6
2012-2013	0	8	4
2013-2014	1	7	4
2014-2015	0	10	3
2015-2016	0	8	5

図5-4Figure 5-4



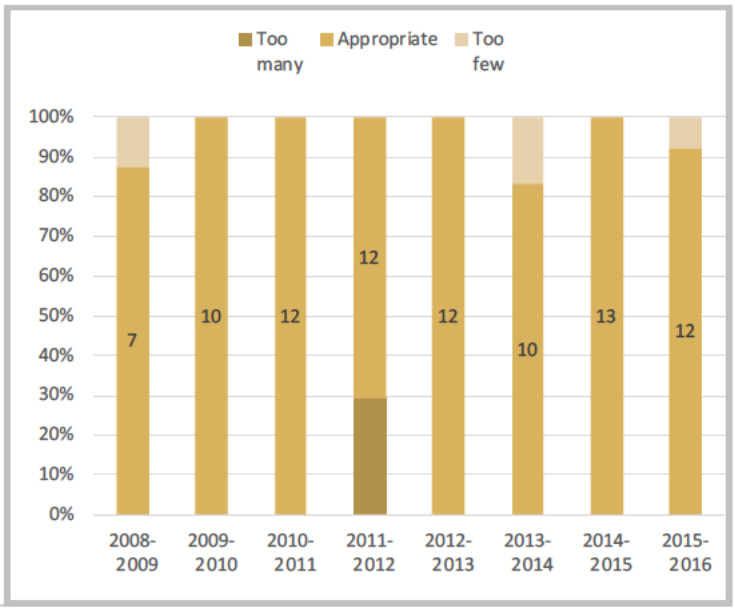
5. 本研修の参加者人数は適切と思いますか。

Do you find the number of participants in the program appropriate?

表5-5 Table 5-5

	Too many	Appropriate	Too few
2008-2009	0	7	1
2009-2010	0	10	0
2010-2011	0	12	0
2011-2012	5	12	0
2012-2013	0	12	0
2013-2014	0	10	2
2014-2015	0	13	0
2015-2016	0	12	1

図5-5Figure 5-5



6. 本邦研修で得た日本の知識・経験は役立つと思いますか？

Do you think the knowledge and experience you acquired throught the program in Japan?

表5-6 Table 5-6

	A. Yes, it can be directly applied to work	B. It cannnot be directly applied, but it can be adaptable to work	C. It cannnot be directly applied or adapted, but it can be of reference to me.	D. No, it was not useful at all
2008-2009	2	6	0	0
2009-2010	3	5	2	0
2010-2011	3	9	0	0
2011-2012	8	9	0	0
2012-2013	6	5	1	0
2013-2014	4	8	0	0
2014-2015	3	10	0	0
2015-2016	8	5	0	0

図5-6Figure 5-6

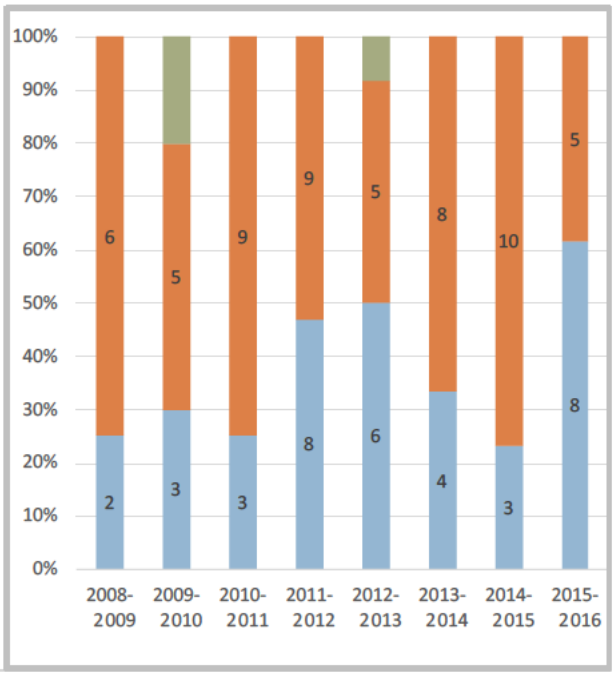


Table 5-1 and Figure 5-1 indicate an upward trend in the number of participants positively evaluating the design of the program over the period between the 2nd and 6th year. The positive evaluation for the 7th and 8th years declined from the highest mark for the 6th year. However, more people evaluated the program positively in the 9th year than in the previous year. The results suggest that the program has been improved to meet the participants' needs although further effort is required.

Table 5-2 and Figure 5-2 show, on the one hand, that the ratio of the answer "4. Yes, Appropriate" stays around the average value. Although we have been working on this issue since the start of the program, we have not made much progress. This program is intended for officials at the working level and thus more focused on practical aspects than theoretical aspects of disaster management; however, because the participants are recruited from two different areas, civil engineering and meteorology, it has been difficult for the curriculum to be practical for both areas. Moreover, since the participants are from different countries, it is only natural that they face different issues to cope with and thus need different technologies and knowledge. These complex factors make it more difficult to prepare a curriculum that satisfies every participant. We will continue developing and improving curriculum, carefully communicating with students and accommodating global needs in the field.

Table 5-3 and Figure 5-3 show that the evaluation given to the course texts and teaching materials this year marks the highest in the past nine years. The main reason for this improvement probably lies in how they are given to students. In the past, many classes did not use textbooks provided beforehand but use handouts distributed in class. Because of that, students had difficulty capturing an overall image of what they were supposed to learn. To solve this problem, we have asked lecturers to cooperate in compiling teaching materials in a book form and distributing them in advance. The effort has improved the situation gradually, and we are now able to have more materials compiled in a book form and provide them prior to classes.

Table 5-4 and Figure 5-4 indicate that the students this year are mostly satisfied with the course period. This master's course is intended for officials of an administrative body at the working level, and therefore, is designed for them to acquire a master's degree within a year so that they can resume their duties without a long absence and apply what they have learned in Japan to their jobs. The course is so designed, on the other hand, that it demands hard work from the students. Nevertheless, many of them evaluated the length of the course as "Appropriate," which implies that the students understand the intention of this compact yet intensive course.

Table 5-5 and Figure 5-5 indicate that almost all the students considered the number of participants (13) to be "Appropriate." Past questionnaire results, also in terms of scheduling lecturers, suggest that 10 to 12 students are considered to be manageable. This number is also regarded to be proper in terms of site visits and other aspects of the course on the organizer's part.

Lastly, the results in Table 5-6 and Figure 5-6 show the responses to the most important question about the practicality of this course in relation to issues faced by the students' home countries. More students this year gave positive evaluation to the course than ever before. The objective of this master's course, i.e., acquisition of practical knowledge and experience, is achieved. Looking ahead, it is necessary to continue improving the training so that it can satisfy all students who spend a full year away from their families and home.

In conclusion, the master's course this year received one of the good evaluations over the past nine years. We need to continue improving every aspect of this course in consideration of students' needs and global trends in the field.

5.1.2 Course Contents

A questionnaire survey was conducted by ICHARM in April 2016, when most lectures were completed, and the students answered a series of questions anonymously.

The questionnaire asked open-ended questions to obtain feedback from them, and the comments considered especially important were categorized and summarized in Table 5-7 on the following pages with responses from ICHARM. It happens every year that many students request more time for the practical exercises.

Probably due to the continuous effort made by ICHARM to improve the conditions of daily life of students, there weren't many comments made about this aspect again this year.

Table 5-7 Feedback from students and ICHARM's proposed improvement in response to them.

Q1. The structure of the course curriculum (Schedule, Lecture to add, etc.)

(1) It lacks to recall basic portions about hydraulics, etc. We have left academic activity for a long time. Moreover, our academic background and major are various.

=> *Instructor of "Hydraulics" is supposed to change. New Instructors are considering the new syllabus. In the lecture they intake the basic portion.*

(2) Some courses seem to have similar topics, for instance
"Hydraulics" and "Flood Hydraulics and River Channel Design",
These subjects may be combined and expanded.
In addition that, it is better that "Flood hydraulics and River Channel Design" follows "Hydraulics".

=> *"Hydraulics" will be redesigned. Then such an overlap of the contents will be resolved. Regarding the order of the lecture we will consider.*

(3) "Disaster Management Policies" and "Basic Concepts of Integrated Flood Risk Management (IFRM)". These subjects may be combined and expanded.

=> *Even if both of lectures sometime pick up similar topics, we think that each viewpoint is different.*

(4) It was very difficult to follow the lectures of programming language. I would recommend to have some extra care from the ICHARM.

=> *We are thinking that the lecture term should be changed from Fall to Winter in order to spare the time more. At the beginning of the course lecture schedule is very tight. We can take enough time in winter term*

(5) Maybe it's good to have a final exam to subjects' right after every subject.

=> *In principle the exam is scheduled at the last lecture hour. However, sometimes schedule of exam changes with considering the balance of overall curriculum, e.g., to avoid multiple exams take place at once.*

(6) I recommend the addition of tsunami and high tide as that will help in the control of floods induced by such phenomena.

=> *We need to ask the student for further opinion in detail and we'll discuss this issue.*

Q2. Lecture (If you have any request or comment, fill out for each lecture.)

1. Disaster Management Policies A: from Regional and Infrastructure Aspect (Prof. Ieda)
2. Disaster Management Policies B: from Urban and Community Aspect (Prof. Ando)

(1) The course was very well taught as it focused not only Japanese cases, but also different cases from other disaster prone countries were included.

(2) I recommend to add more Disaster Management Policies being practiced in different developed countries in the World.

=> *We'll share the feedback with lecturers.*

3. Hydrology (Prof. Koike)

(1) It will be better if we have the textbook of this lecture. (Two opinions)

=> *We'll share the feedback with lecturers.*

4. Hydraulics (Prof. Huang)

(1) Some of the topics of this course are similar to that of Flood Hydraulics and River Channel Design.

(2) It will be very helpful if more introductory material about hydraulics be added in the course.

=> *We'll share the feedback with lecturers.*

5. Basic Concepts of Integrated Flood Risk Management (IFRM) (Prof. Takeuchi)

6. Urban Flood Management and Flood Hazard Mapping (Prof. Tanaka)

(1) The course could be very useful if a numerical based portion regarding Gumbel probability plotting and other topics may be added before teaching Mathematica.

=> *We'll share the feedback with lecturers.*

7. Flood Hydraulics and River Channel Design (Prof. Fukuoka)

(1) Some of us are not civil engineers. So, it should be reconsidered in the coming year.

=> *We'll share the feedback with lecturers. However students should not limit the subjects to learn within his own back ground. We provide subjects that are required for the course.*

8. Mechanics of Sediment Transportation and Channel Changes (Prof. Egashira)

(1) Some of us are not civil engineers. So, it should be reconsidered in the coming year.

=> *We'll share the feedback with lecturers. However students should not limit the subjects to learn within his own back ground. We provide subjects that are required for the course.*

9. Control Measures for Landslide & Debris Flow (Prof. Kondo)

(1) There was a kind of repetition of the same topics during most of the lectures.

=> *We'll share the feedback with lecturers. In the meantime it may be also valuable to learn the same topic from different aspects.*

10. Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management (Assoc. Prof. Ohara)

(1) If lecturer adds the explanation and comparison of sustainability initiatives taken up around the world, I would appreciate more.

(2) This subject can be move at the start of the course.

=> *We'll share the feedback with lecturers.*

11. Computer Programming (Assoc. Prof. Ushiyama)

(1) More time for FORTRAN/programming subject.

=> *Reorganization of lectures is now ongoing.*

12. Practice on Flood Forecasting and Inundation Analysis (Assoc. Prof. Sayama)

(1) The number of lectures were not enough. RRI-CUI was also not covered.

=> *We'll share the feedback with lecturers. During the lecture introduction of models are given. Extra class like workshop is now planned for model application to thesis work.*

13. Practice on GIS and Remote Sensing Technique (Assoc. Prof. Yorozuya)

(1) It should have, the more lecture time than now.

=> *Students are encouraged to closely communicate with lecturers.*

(2) If the lecture notes were there it would have been very easy for us to follow.

=> *We'll share the feedback with lecturers.*

14. Site Visit of Water-related Disaster Management Practice in Japan (Assoc. Prof. Shibuo)

(1) It is very important in case of technology transfer and knowledge, so the frequency of site visit should be increased.

=> *We'll share the feedback with lecturers.*

Q3. Daily Life in ICHARM/ PWRI

(1) The addition of extra-curricular activities on weekends or during holidays may also be beneficial. (Two opinions)

=> We can give the information an event information around Tsukuba.

(2) Some are vegetarian. So this type of variations is also very important for arrangement. (Four opinions)

=> We deliver the request to the cafeteria. Moreover, we also consult with the grocery store.

(3) The life in ICHARM is tough during the first 6 months, when there are lectures all the day. But it was good for us as we finished our lectures and exam to focus on our thesis work.

Q4. Individual Study

(1) For the individual study, it is good to inform for student before departing from their country about tentative study and related data type. Otherwise, students may suffer from lack of data availability. (Two opinions)

=> We are planning to present the synopsis written by past students to the public. The candidate could check the synopsis, and then, they can imagine their thesis theme.

(2) Most of the individual study is mainly software base. Some lab/practical base study should be included in individual study for developing clear concept which will create a future effective research and innovative things.

=> We try to find out a solution.

Q5. Other request to ICHARM or JICA

(For ICHARM)

(1) At the end of the course, may we request for some CD's/copies of the programs.

=> We try to give it to students, according to the condition of the software or the policy of PWRI

(For TBIC)

(1) As I'm a vegetarian, food in TBIC did not have much choice. (Three opinions)

(2) If the laptops are given to them permanently, they will be able to continue their work from the point up to which they have already progressed. (Tow opinions)

=> It's impossible based on JICA policy. JICA doesn't allow to purchase such a durable equipment. Even ICHARM isn't allowed to purchase laptops. Furthermore, it's difficult for JICA to allow to purchase to give the PCs to students in view of public opinion in Japan.

(3) Please, buy more weights for gym and, if possible, more equipment. Remove pool table from GYM room.

(4) Wi-Fi connection is not good in JICA. (Six opinions)

=> (1), (3) and (4) We'll share the feedback with JICA.

5.1.3 This year's points for improvement

<Appropriate number of students>

The number of students this year was 13. With this number of students attending classes, exercises and field trips, lecturers and staff giving explanations were better able to pay attention to all the members, which helped refine and enrich the contents of the course. As previously mentioned, according to past questionnaires, students also agree that the number is appropriate, and empirically speaking, the class size of 10 to 12 students is appropriate for this course in terms of course design, contents, instruction and supervision.

<Change in the number of subjects>

The contents and number of subjects are revised every year according to the evaluation from students. Figure 5-7 shows changes in types and numbers of subjects in the past seven years. The total number of subjects remained at 19 from the 2nd to 4th year, then reduced by two to 17 in the 5th year, further reduced by three to 14 in the 6th year. In the 7th year, with an additional subject, the total number of subjects became 15. In the 8th year, "Sustainable Reservoir Development & Management" was taken off the curriculum with the total back to 14. This year, the total became 15 again with an addition of "Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management." This subject was added to the curriculum to introduce to the students an approach to evaluate disasters and their risk management from socio-economic and environmental perspectives. This approach was expected to be another analytical tool for students to look into disasters from multiple perspectives.

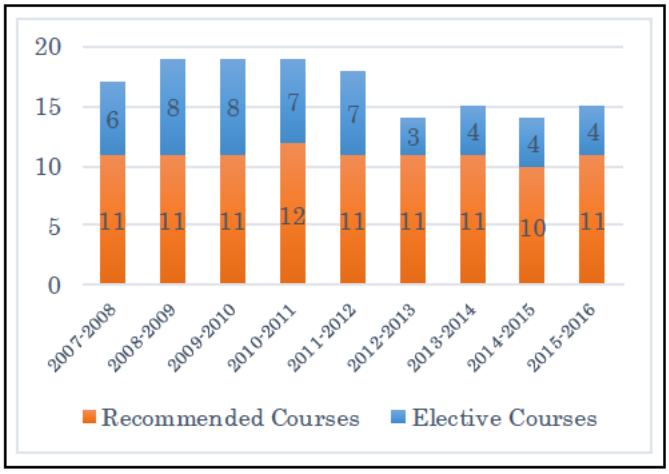


Figure 5-7 Changes in the number of subjects of the course

Special lectures were also provided, as necessary, regarding issues on dams, the service life extension of public infrastructure, and disaster statistics.

<Master's thesis proofreading editor>

Some of the students were not familiar with writing papers in English. English proofreading was provided intensively with an English proofreader hired for this purpose for about three weeks from the beginning of August prior to the submission of the theses. GRIPS directly employed Ms. Suezawa as an English proofreader. The students were given many opportunities to consult with the proofreader face to face, and efficient guidance tuned to the characteristics of each student's English was successfully provided.

5.2 Future Issues

In this course, some of the subjects are provided in omnibus form. Because these subjects involve several lecturers with very different schedules, it is sometimes difficult to hold classes on a regular basis. When classes are far apart in time, it becomes difficult for students to make an association of contents between classes. To solve this problem, we asked the lecturers for cooperation in planning the class schedule so that classes can be held as regularly as possible. Also, an overall picture of a subject was explained at the first class for students to understand

how lectures by different experts fit together. Thanks to the lecturers, the situation was better this year. We have also been working on systematic organization and compilation of teaching and learning materials prepared by different lecturers into a book form to guarantee students an easy access to the content, and this effort should be continued.

In the ninth year, the subjects related to computer programming and operation. In the past years, those subjects were provided as “basic programming” or “advanced programming.” This year, they were grouped by type of model. This change was made to help students learn the content more easily, for they can consistently learn a series of knowledge and skill required to operate a certain model. The level of programming skill varies widely among individuals with different backgrounds. To accommodate this gap, we understand that additional classes and the use of recorded classes may be necessary. Recorded classes are probably useful for other reasons such as reviewing past classes and viewing advanced programming techniques.

Since this course is a one-year master’s course, the first six months are particularly hard for students to handle all the requirements. This is something inevitable considering the nature of the course, we should continue making improvements to help students not to be overwhelmed by too much work; for example, the number of classes per day should be kept three as much as possible instead of four.

Chapter 6: Conclusion

At ICHARM, training is regarded as one of three main pillar activities, along with research and information networking.

Now that the ninth year of the course has been successfully completed, ICHARM has accumulated more know-how on planning and management of training programs. By assisting students in working on their master's theses, we have also contributed to solving water-related problems in the corresponding countries. These activities have given momentum to "localism," one of the keywords for ICHARM activities.

This course also makes a considerable contribution to information networking activities. That is to say, connections with the students' home organizations have been becoming stronger each year, and this has improved our understanding of local situations in many respects. This worldwide information networking through students will definitely be helpful to other ICHARM activities, and we need a system allowing us to keep close contact with the students even after they have graduated.

A year may seem like a long time but is in fact quite short. However, if at least some of what the students have learned during this yearlong master's course is of use in their work, that means that through them, we will be able to contribute to reducing water-related disaster damage in their home countries. It may take several years or a few decades, but, through the implementation of this course, we expect to make a steady contribution to the mitigation of damage due to water-related disasters in our students' home countries.

- Acknowledgment -

This course has now completed its ninth year. Over the last nine years, we have revised the overall schedule and curriculum based on experiences and worked to enhance both the educational content and environment for students. There is, however, still room left for more improvement, and we would appreciate any opinions and suggestions from a diverse range of individuals.

Finally, we would also like to express our gratitude to instructors and administration officials who devoted themselves to providing lectures and exercises for this course, and to the MLIT offices, local government officials, and local governments that kindly accepted our requests on the field trips.

LIST OF PARTICIPANTS IN "Flood Disaster Mitigation" (J15-04098)

2015年度JICA課題別研修「洪水防災」研修員リスト

October 1,2015 ～ September 15, 2016

No.	Photo	Country	Name (Call Name)	Organization
1		BANGLADESH バングラデシュ	Mr. AHMED Tanjir Saif ｱﾊﾒﾄﾞ **ﾀﾝｼﾞｰﾙ** ｻｲﾌ	Assistant Engineer,Directorate of Planning - 1,Bangladesh Water Development Board
2		BANGLADESH バングラデシュ	Mr. HOWLADER Md Mamun ﾊｳﾗﾀﾞｰ ｴﾑﾃﾞｨｰ **ﾏﾑﾝ**	Sub-Divisional Engineer,Sunamganj O & M Division,Bangladesh Water Development Board
3		BRAZIL ブラジル	Mr. SAIA ALME DA LEITE Francisco ｻｲｱ ｱﾙﾒｲﾀﾞ ﾚｲﾃ **ﾌﾗﾝｼｽｺ**	Infrastructure Analyst,Drainage and Waste Management,Ministry of Cities
4		MALDIVES モルディブ	Ms. MOOSA Fathimath Shaushan ﾑｰｻ ﾌｧｽﾏｽ **ｼｬｳｼｬﾝ**	Senior Administraive Officer,Disaster Risk Reduction (DRR),National Disaster Management Center
5		MYANMAR ミャンマー	Ms. Myo Myat Thu ﾐｮｰ ﾐｱｯﾄ **ﾃｭ**	Senior Observer, Hydrological Div.,Department of Meteorology and Hydrology,Ministry of Transport
6		NEPAL ネパール	Mr. SHARMA Gopal **ｻﾙﾏ** ｺﾞﾊﾟﾙ	Engineer,Department Office,Department of Water Induced Disaster Prevention
7		PAKISTAN パキスタン	Mr. B LAL Rashid **ﾋﾞﾗﾙ** ﾗｼｯﾄﾞ	Meteorologist,Aviation Division,Pakistan Meteorological Department
8		PAKISTAN パキスタン	Mr. KHAN Irfan Ullah ｶﾝ **ｲﾙﾌｧﾝ** ｳﾗｰ	Deputy Director (M&E) / Coordinator,Building /Reconstruc ion / PHE (North) Muzz,Physical Planning & Housing Dept. Govt. of AJ&K
9		PHILIPPINES フィリピン	Ms. JACELDONE Catherine Guevarra ﾊｾﾙﾄﾞﾈ **ｷｬｻﾘﾝ** ｸﾞｴﾊﾞﾗ	Engineer II,Planning and Design Division,Department of Public Works and Highways
10		SRI LANKA スリランカ	Mr. BABARANDE GURUGE Thanura Lasantha ﾊﾞﾊﾞﾗﾝﾃﾞ ｸﾞﾙｹﾞ ｻﾇﾗ **ﾗｻﾝﾃ**	Divisional Irrigation Engineer,Kadulla Division,Irrigation Department
11		SRI LANKA スリランカ	Mr. S NNAPPOO Kokularamanan ｼﾅｯﾎﾟ **ｺｰｸﾗﾗﾏﾝ**	Senior Irriga ion Engineer,Water Management Branch,Irriga ion Department
12		TIMOR-LESTE 東ティモール	Mr. DE ARAUJO Antonio ﾃﾞ ｱﾛｰｼﾞｮ ｱﾝﾄﾆｵ **(ﾄﾆｰ)**	Supervisor,Nat. Dir. of RBFC,Ministry of Public Works, Transport and Communications
13		ZIMBABWE ジンバブエ	Ms. RUKARWA Lorraine ﾙｶｰﾜ **ﾛｰﾗｲﾝ**	Irrigation Engineer,Irrigation Mashonaland West Province,Ministry of Agriculture, Mechanisation & Irrigation Development

Annex 2

Annex 3

2015-2016 Water-related Disaster Management Course Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)
(2) Flood Hydraulics and River Channel Design
(3) Hydrology
(4) Hydraulics
(5) Urban Flood Management and Flood Hazard Mapping
(6) Mechanics of Sediment Transportation and Channel Changes
(7) Control Measures for Landslide & Debris Flow
(8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
(9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
(10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

P(01) Computer Programming
P(02) Practice on Flood Forecasting and Inundation Analysis
P(03) Practice on GIS and Remote Sensing Technique
P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

October

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	9/27	9/28	9/29	9/30	10/1	10/2	10/3
1st period 9 00-10 30 2nd period 10 45-12 15 3rd period 13 15-14 45 4th period 15 00-16 30					Arrival to Japan	Briefing at JICA Tsukuba	
	10/4	10/5	10/6	10/7	10/8	10/9	10/10
1st period 9 00-10 30 2nd period 10 45-12 15 3rd period 13 15-14 45 4th period 15 00-16 30		Entrance Guidance and Orientation at GRIPS	Opening Ceremony Orientation at ICHARM 13 30-16 30 Sontoku Museum	(1)-1 Introduction: What is natural disaster? Risk, Hazard and Vulnerability Prof. Takeuchi (1)-2 PAR Model (1) Root causes progress of dynamic pressure and unsafe conditions Prof. Takeuchi (4)-1 Basic mathematics fundamental equations in Hydraulics Asso. Prof. Yorozuya (4)-2 Flow resistance in open channel. Asso. Prof. Yorozuya	(2)-1 Characteristics and management of Japanese rivers. Prof Fukuoka (2)-2 Characteristics of flood flows Prof Fukuoka Self Study (4)-3 Basics of water surface profiles of open channel flow, Basics of flood wave Asso. Prof. Yorozuya	Guidance Self Study Self Study (5)-4 Flood control structure Mr. Kamoto	
	10/11	10/12	10/13	10/14	10/15	10/16	10/17
1st period 9 00-10 30 2nd period 10 45-12 15 3rd period 13 15-14 45 4th period 15 00-16 30		National Holiday	(2)-3 Hydrograph propagation of water level and discharge in flood flows Prof Fukuoka (2)-4 Flow resistance in rivers with compound channels Prof Fukuoka P(01)-1 Introduction of Computer Programming with Fortran90 Asso. Prof. Ushiyama P(01)-2 Variables Asso. Prof. Rasmy	Self Study Self Study Self Study Self Study	(2)-5 Prediction method of flow resistance in compound channels Prof Fukuoka (2)-6 Effects of channel vegetations on flood propagation Prof Fukuoka P(01)-3 Arithmetic Calculation Asso. Prof. Rasmy P(01)-4 Program Structure (if) Dr. Hasegawa	P(01)-5 Program Structure (if) Dr. Hasegawa P(01)-6 I/O statement Dr. Hasegawa	
	10/18	10/19	10/20	10/21	10/22	10/23	10/24
1st period 9 00-10 30 2nd period 10 45-12 15 3rd period 13 15-14 45 4th period 15 00-16 30		8 30-13 00 Medical check for Ph.D. by GRIPS 13:00- DMP:Medical check for M.Sc. by JICA	(2)-7 Quasi-tw -dimensional analysis of flood flows in rivers with vegetations Prof Fukuoka (2)-8 Relationsh p between dimens onless width depth and discharge in rivers - Learning from natural rivers Prof Fukuoka P(01)-7 Program Structure (do loop) Dr. Hasegawa P(01)-8 Program Structure (do loop) Dr. Hasegawa	09:30-1100 Site Visit Self Study Inception Report ICHARM Open Space	(2)-9 Channel design harmonizing the flood control and river environment Prof Fukuoka (2)-10 Flood flow behavior in dam reservoirs Prof Fukuoka P(01)-9 Quiz (1) Dr. Hasegawa P(01)-11 Arrays Asso. Prof. Ushiyama	(4)-6 Systematic classification of water surface profiles Prof Huang (4)-7 Hydraulic jump and its application Prof Huang Dam Special Lecture Mr Sakamoto Auditorium Prof Yasuda	
	10/25	10/26	10/27	10/28	10/29	10/30	10/31
1st period 9 00-10 30 2nd period 10 45-12 15 3rd period 13 15-14 45 4th period 15 00-16 30		(3)-1 Water properties and their roles in climate system Prof. Koike (3)-2 Characteristics of moist air and precipitation Prof. Koike P(01)-12 Arrays Asso. Prof. Ushiyama P(01)-10 Hydrologic Application Exercise (1) Asso. Prof. Rasmy	(1)-3 PAR Model (2) Concrete examples Prof. Takeuchi (1)-4 ACCESS Model Prof. Takeuchi Introduction of ICHARM research Activity		P(04) Yodo River Dr. Shibuo		

Annex II

Annex 4

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)
(2) Flood Hydraulics and River Channel Design
(3) Hydrology
(4) Hydraulics
(5) Urban Flood Management and Flood Hazard Mapping
(6) Mechanics of Sediment Transportation and Channel Changes
(7) Control Measures for Landslide & Debris Flow
(8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
(9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
(10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

P(01) Computer Programming
P(02) Practice on Flood Forecasting and Inundation Analysis
P(03) Practice on GIS and Remote Sensing Technique
P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

November

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	11/1	11/2	11/3	11/4	11/5	11/6	11/7
1st period 9 00-10 30		Self Study	National Holiday	P(01)-15 Hydrologic Application Exercise (1) Asso. Prof. Rasmy	(1)-5 Disaster management cycle; Hyogo Framework for Action Prof. Takeuchi	(2)-11 Flows and bed variations in channels -Ishikari River case Prof Fukuoka	
2nd period 10 45-12 15		(1)-14 Future Issues of IFRM Adaptation Aging society Depopulation Social Capital Mr Watanabe		Self Study	(1)-6 IFRM and traditional FRM; IFRM as part of IWRM Prof. Takeuchi	(2)-12 Hi-i river diversion channel design from viewpoints of flow and bed variation. Prof Fukuoka	
3rd period 13 15-14 45		P(01)-13 Procedures and Structured Programming (subroutine, function) Asso. Prof. Ushiyama		(1)-12 Global trends (1) Impact of climatic change *Prof. Oki*	P(03)-1 Geographic Information System (GIS) (1) Basic concept Dr. Kwak	1/3 Quiz	
4th period 15 00-16 30		P(01)-14 Quiz (2) Asso. Prof. Ushiyama		(1)-13 Global trends (2) International actions *Prof. Oki*	P(03)-2 GIS (2) Understanding GIS data structures Dr. Kwak	P(03)-3 GIS (3) Working with ArcGIS Dr. Kwak	
	11/8	11/9	11/10	11/11	11/12	11/13	11/14
1st period 9 00-10 30		P(03)-4 GIS (4) ArcGIS Data management Dr. Kwak	(2)-13 Design method of Watarase retarding basin in Tone river system Prof Fukuoka	Self Study	(2)-15 Summary of "Flood Hydraulics and River Channel Design" Prof Fukuoka	(1)-7 Concept of IWRM (1): Agenda 21, Global Water Partnership Prof. Takeuchi	
2nd period 10 45-12 15		P(03)-5 GIS (5) ArcGIS Data processing Dr. Kwak	(2)-14 Design method of Consolidation Work in the Shinano River Prof Fukuoka	Self Study	(5)-1 Laws for flood risk management in Japan Prof. Tanaka	p(02)-2 Rainfall-runoff-inundation modeling (1) Data preparation Asso.Prof. Sayama	
3rd period 13 15-14 45		Self Study	(4)-8 Numerical solution of the gradually-varied flow equation Prof Huang	(4)-9 Unsteady flow models Prof Huang	(5)-2 Local disaster management plan Prof. Tanaka	p(02)-3 Rainfall-runoff-inundation modeling (2) Running model Asso.Prof. Sayama	
4th period 15 00-16 30		Self Study	Self Study	(4)-10 Numerical methods for unsteady flow simulation (1) Prof Huang	p(02)-1 Basics of Flood Hazard Models Asso.Prof. Sayama	Self Study	
	11/15	11/16	11/17	11/18	11/19	11/20	11/21
1st period 9 00-10 30		Self Study	(4)-11 Numerical methods for unsteady flow simulation (2) Prof Huang	p(02)-4 Rainfall-runoff-inundation modeling (3) Parameter setting Asso.Prof. Sayama	*10 : 30-17 : 00* *Visit to Tamatsukuri Technical High School*	(1)-8 Concept of IWRM (2): Guideline for IWRM at basin scale Prof. Takeuchi	
2nd period 10 45-12 15		Self Study	(4)-12 Channel design Prof Huang	p(02)-5 Rainfall-runoff-inundation modeling (4) Analys s of simulation results Asso.Prof. Sayama		(1)-9 Japanese experiences (1) Flood damages and flood control investment Prof. Takeuchi	
3rd period 13 15-14 45		Self Study	Self Study	Discussion of Thesis		Self Study	
4th period 15 00-16 30		Self Study	(6)-1 Introduction (1) Prof. Egashira			Self Study	
	11/22	11/23	11/24	11/25	11/26	11/27	11/28
1st period 9 00-10 30		National Holiday	(6)-2 Introduction (2) Prof. Egashira		P(04) Tsurumi River Dr. Shibuo		
2nd period 10 45-12 15			(6)-3 Mechanics of sediment transportation (1) Prof. Egashira		(5)-5 Case study of comprehensive flood control measures - Tsurumi river- Mr. Imbe		
3rd period 13 15-14 45			Discussion of Thesis				
4th period 15 00-16 30							

Annex II

Annex 5

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

- (1) Basic Concepts of Integrated Flood Risk management (IFRM)
- (2) Flood Hydraulics and River Channel Design
- (3) Hydrology
- (4) Hydraulics
- (5) Urban Flood Management and Flood Hazard Mapping
- (6) Mechanics of Sediment Transportation and Channel Changes
- (7) Control Measures for Landslide & Debris Flow
- (8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
- (9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
- (10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

- P(01) Computer Programming
- P(02) Practice on Flood Forecasting and Inundation Analysis
- P(03) Practice on GIS and Remote Sensing Technique
- P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

December

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	11/29	11/30	12/1	12/2	12/3	12/4	12/5
1st period 9 00-10 30		Self Study	(6)-4 Mechanics of sediment transportation (2) Prof. Egashira	Self Study	(1)-10 Japanese experiences (2) Pollution and ground subsidence control Prof. Takeuchi	(1)-11 Japanese experiences (3) Comprehensive flood management measures and policy evolution from river to basin Prof. Takeuchi	
2nd period 10 45-12 15		2/3 Quiz	(6)-5 Mechanics of sediment transportation (3) Prof. Egashira	(2)-16 Examination Prof Fukuoka	(6)-6 Mechanics of sediment transportation (4) Prof. Egashira	Self Study	
3rd period 13 15-14 45		(3)-3 Global energy and water cycle Prof. Koike	Discussion of Thesis	Self Study	Self Study	(6)-7 Mechanics of sediment transportation (5) Prof. Egashira	
4th period 15 00-16 30		Self Study		Self Study	Self Study	(6)-8 Mechanics of sediment transportation (6) Prof. Egashira	
	12/6	12/7	12/8	12/9	12/10	12/11	12/12
1st period 9 00-10 30		GRIPS	GRIPS	GRIPS	GRIPS	GRIPS	
2nd period 10 40-12 10							
3rd period 13 20-14 50							
4th period 15 00-16 30							
	12/13	12/14	12/15	12/16	12/17	12/18	12/19
1st period 9 00-10 30		GRIPS	GRIPS	GRIPS	GRIPS	GRIPS	
2nd period 10 40-12 10							
3rd period 13 20-14 50							
4th period 15 00-16 30							
	12/20	12/21	12/22	12/23	12/24	12/25	12/26
1st period 9 00-10 30		(3)-4 River basin hydrological processes Prof. Koike	P(03)-6 GIS (6) ArcGIS Spatial analysis Dr. Kwak	National Holiday	Self Study	Self Study	
2nd period 10 45-12 15		(3)-5 Atmosphere-land interaction Prof. Koike	P(03)-7 GIS (7) ArcGIS Hydrology analysis Dr. Kwak		Self Study	Self Study	
3rd period 13 15-14 45		Examination Prof. Takeuchi	(6)-9 Mechanics of debris flow (1) Prof. Egashira		Self Study	Self Study	
4th period 15 00-16 30		Self Study	(6)-10 Mechanics of debris flow (2) Prof. Egashira		Self Study	Self Study	

Annex II

Annex 6

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)
(2) Flood Hydraulics and River Channel Design
(3) Hydrology
(4) Hydraulics
(5) Urban Flood Management and Flood Hazard Mapping
(6) Mechanics of Sediment Transportation and Channel Changes
(7) Control Measures for Landslide & Debris Flow
(8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
(9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
(10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

P(01) Computer Programming
P(02) Practice on Flood Forecasting and Inundation Analysis
P(03) Practice on GIS and Remote Sensing Technique
P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

January

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	1/3	1/4	1/5	1/6	1/7	1/8	1/9
1st period 9 00-10 30		Thesis Work	(5)-3 Flood control planning Prof. Tanaka	PCM	PCM	PCM	
2nd period 10 45-12 15		Thesis Work	(5)-6 Flood frequency analysis(1) Prof. Tanaka				
3rd period 13 15-14 45		Thesis Work	(5)-7 Flood frequency analysis(2) Prof. Tanaka				
4th period 15 00-16 30		Thesis Work	(5)-8 Flood frequency analysis(3) Prof. Tanaka				
	1/10	1/11	1/12	1/13	1/14	1/15	1/16
1st period 9 00-10 30		National Holiday	(6)-11 Bed forms and flow resistance (1) Prof. Egashira	(5)-9 Flood hazard map Prof. Tanaka	Thesis Work	(6)-13 Prediction of channel changes (1) Prof. Egashira	
2nd period 10 45-12 15			(6)-12 Bed forms and flow resistance (2) Prof. Egashira	(5)-10 Evacuation Plan with Flood Forecast Prof. Tanaka	Thesis Work	(6)-14 Prediction of channel changes (2) Prof. Egashira	
3rd period 13 15-14 45			3/3 Quiz	(3)-6 Soil moisture and ground water Prof. Koike	Thesis Work	p(02)-6 Runoff analysis with IFAS (1) Basic concept Dr. Tsuda	
4th period 15 00-16 30			Self Study	(3)-7 Runoff Prof. Koike	Thesis Work	p(02)-7 Runoff analysis with IFAS (2) Data preparation Dr. Tsuda	
	1/17	1/18	1/19	1/20	1/21	1/22	1/23
1st period 9 00-10 30		(3)-8 River basin hydrological modelling Prof. Koike	Self Study	(4)-13 **Onsite flow measurement (1)** Asso. Prof. Yorozuya	Self Study	Self Study	
2nd period 10 45-12 15		(3)-9 Electromagnetic theory as a basis of remote sensing Prof. Koike	(4)-4 Experimental study of flow resistance and water surface profiles (1) Asso. Prof. Yorozuya		Self Study	(6)-15 Method to predict sediment transport process in drainage basins Prof. Egashira	
3rd period 13 15-14 45		P(03)-8 GIS (8) ArcGIS Model builder Dr. Kwak	Self Study	(4)-14 **Onsite flow measurement (2)** Asso. Prof. Yorozuya	p(02)-8 Runoff analysis with IFAS (3) Running model Dr. Tsuda	Self Study	
4th period 15 00-16 30		P(03)-9 Remote Sensing (1) Basic principles of satellite image Dr. Kwak	Self Study		p(02)-9 Runoff analysis with IFAS (4) Parameter setting Dr. Tsuda	Self Study	
	1/24	1/25	1/26	1/27	1/28	1/29	1/30
1st period 9 00-10 30		(3)-10 Ground-based remote sensing - radar Prof. Koike	Self Study	Self Study	Self Study	Thesis Work	
2nd period 10 40-12 10		(3)-11 Space-based remote sensing – satellite Prof. Koike	(4)-5 Experimental study of flow resistance and water surface profiles (2) Asso. Prof. Yorozuya	Self Study	Self Study	Thesis Work	
3rd period 13 15-14 50		Self Study	P(03)-10 RS (2) Preparation of satellite images Dr. Kwak	1st Interim Presentation Auditorium	p(02)-10 Runoff analysis with IFAS (5) Analysis of simulation results Dr. Tsuda	Thesis Work	
4th period 15 00-16 30		Self Study	P(03)-11 RS (3) Image analysis with tutorial data with ArcGIS Dr. Kwak		p(02)-11 Large-scale Runoff analysis with BTOP (1) Basic concept Dr. Gusyev	Thesis Work	

Annex II

Annex 7

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)
(2) Flood Hydraulics and River Channel Design
(3) Hydrology
(4) Hydraulics
(5) Urban Flood Management and Flood Hazard Mapping
(6) Mechanics of Sediment Transportation and Channel Changes
(7) Control Measures for Landslide & Debris Flow
(8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
(9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
(10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

P(01) Computer Programming
P(02) Practice on Flood Forecasting and Inundation Analysis
P(03) Practice on GIS and Remote Sensing Technique
P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

February

		Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
		1/31	2/1	2/2	2/3	2/4	2/5	2/6
1st period	9 00-10 30		(3)-12 Frequency and time series analysis Prof. Koike	Thesis Work	Self Study	Self Study	GRIPS	GRIPS
2nd period	10 40-12 10		(3)-13 Cost-benefit analysis and optimization Prof. Koike	Thesis Work	Self Study	Self Study		
3rd period	13 15-14 50		Self Study	Thesis Work	(4)-15 Examination Prof Huang	p(02)-12 Large-scale Runoff analysis with BTOP (2) Data preparation Dr. Gusyev		
4th period	15 00-16 30		Self Study	Thesis Work	Self Study	p(02)-13 Large-scale Runoff analysis with BTOP (3) Running model Dr. Gusyev		
		2/7	2/8	2/9	2/10	2/11	2/12	2/13
1st period	9 00-10 30		(3)-14 Climate change impact assessment and adaptation Prof. Koike	JICA Event Visit to Miho Special School 08:45-14:30	Thesis Work	National Holiday	Thesis Work	
2nd period	10 45-12 15		(3)-15 Prof. Koike		Thesis Work		Thesis Work	
3rd period	13 15-14 45		P(03)-12 RS (4) Application of image analysis with ArcGIS Dr. Kwak		Thesis Work		Thesis Work	
4th period	15 00-16 30		P(03)-13 Remote Sensing for Inundation Mapping (1) Case study (1) Dr. Kwak	Thesis Work	Thesis Work		Thesis Work	
		2/14	2/15	2/16	2/17	2/18	2/19	2/20
1st period	9 00-10 30		Thesis Work	(5)-12 Geomorphology around rivers and alluvial plain (1) Prof. Sugai	Thesis Work	Self Study	Self Study	
2nd period	10 45-12 15		Thesis Work	(5)-13 Geomorphology around rivers and alluvial plain (2) Prof. Sugai	Site Visit to JAXA	p(02)-14 Large-scale Runoff analysis with BTOP (4) Parameter setting Dr. Gusyev	Self Study	
3rd period	13 15-14 45		Thesis Work	Self Study	13:30-14:30 Special Lecture by Dr. Kachi	Fire Evacuation Drill	(6)-16 Examination Prof. Egashira	
4th period	15 00-16 30		Thesis Work	P(03)-14 Remote Sensing for Inundation Mapping (2) Case study (2) Asso. Prof. Yorozuya	Thesis Work	p(02)-15 Large-scale Runoff analysis with BTOP (5) Analysis of simulation results Dr. Gusyev	Self Study	
		2/21	2/22	2/23	2/24	2/25	2/26	2/27
1st period	9 00-10 30		Self Study	Self Study	(7)-2 Sediment yield, transport and deposition in a river basin Prof Sasahara	(8)-5 Example of risk assessment *Mr. Sawano*	JICA Event Visit to Kohoku high school 0830-12:30	
2nd period	10 45-12 15		Self Study	Self Study	(7)-3 Sabo planning and control of sediment transport Prof Sasahara	(5)-14 Developments in social sciences on peoples reactions and responses to disasters Prof Hayashi		
3rd period	13 15-14 45		(8)-1 Outline of Socio-economic and environmental aspects *Asso. Prof. Ohara*	Self Study	(7)-4 Planning and design of Sabo facilities Prof Sasahara	(8)-3 Socio-economic impacts of disasters(2) *Asso. Prof. Ohara*	Self Study	
4th period	15 00-16 30		(8)-2 Methodology of risk assessment *Asso. Prof. Ohara*	(7)-1 Outline of sediment-related disasters and Sabo Projects Prof. Kondo	Self Study	(8)-4 Socio-economic impacts of disasters(1) *Asso. Prof. Ohara*	Self Study	

Annex II

Annex 8

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

- (1) Basic Concepts of Integrated Flood Risk management (IFRM)
- (2) Flood Hydraulics and River Channel Design
- (3) Hydrology
- (4) Hydraulics
- (5) Urban Flood Management and Flood Hazard Mapping
- (6) Mechanics of Sediment Transportation and Channel Changes
- (7) Control Measures for Landslide & Debris Flow
- (8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
- (9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
- (10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

- P(01) Computer Programming
- P(02) Practice on Flood Forecasting and Inundation Analysis
- P(03) Practice on GIS and Remote Sensing Technique
- P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

		Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
March		2/28	2/29	3/1	3/2	3/3	3/4	3/5
	1st period 9 00-10 30		Self Study	Self Study	Self Study	(8)-6 Impacts of information dissemination(1) *Asso. Prof. Ohara*	Self Study	
	2nd period 10 45-12 15		Self Study	(7)-5 Restoration of vegetation on wasteland and its effects Prof. Osanai	(7)-7 Introduction of landslides Dr. Tsunaki	(8)-7 Impacts of information dissemination (2) *Mr. Kodaka*	(7)-9 Permanent measures for landslide damage reduction Dr. Tsunaki	
	3rd period 13 15-14 45		Self Study	(7)-6 Countermeasures for natural Dams Prof. Osanai	(7)-8 Survey and emergency response for landslides Dr. Tsunaki	(8)-8 ICT application for risk management *Asso. Prof. Ohara*	Self Study	
	4th period 15 00-16 30		Self Study	Self Study	Self Study	Self Study	Self Study	
		3/6	3/7	3/8	3/9	3/10	3/11	3/12
	1st period 9 00-10 30		Self Study	Self Study	Self Study	Thesis Work	(8)-9 Land use control for risk reduction *Asso. Prof. Ohara*	
	2nd period 10 45-12 15		Self Study	(7)-10 Warning and evacuation system for sediment-related disasters Dr. Hara	(7)-11 Hazard mapping for sediment-related disasters Dr Takanashi	Thesis Work	(8)-11 Concept of "Build Back Better" *Asso. Prof. Ohara*	
	3rd period 13 15-14 45		Self Study	Self Study	(7)-12 Training of hazard mapping for sediment-related disasters (1) Dr Takanashi	Thesis Work	Thesis Work	
	4th period 15 00-16 30		Special Lecture (1) by President of PWRI	Self Study	(7)-13 Training of hazard mapping for sediment-related disasters (2) Dr Takanashi	Thesis Work	(8)-10 Environmental impacts of dams *Mr. Iwami*	
		3/13	3/14	3/15	3/16	3/17	3/18	3/19
	1st period 9 00-10 30		Self Study	Thesis Work	Thesis Work	Thesis Work	(8)-12 Environmental impacts of dams *Prof. Sumi*	
	2nd period 10 45-12 15		Self Study	Thesis Work	Thesis Work	Thesis Work	(8)-13 Sediment management in reservoirs *Prof. sumi*	
	3rd period 13 15-14 45		Self Study	Thesis Work	Thesis Work	Thesis Work	(8)-14 Sediment management in reservoirs *Prof. sumi*	
	4th period 15 00-16 30		Special Lecture (2) by President of PWRI	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
		3/20	3/21	3/22	3/23	3/24	3/25	3/26
	1st period 9 00-10 30		National Holiday	Thesis Work	Self Study	Thesis Work	(5)-15 Examination Prof. Tanaka	
	2nd period 10 45-12 15			Thesis Work	(7)-14 Application of Sabo/landslide projects to other countries (1) Prof. Kondo Dr. Osanai	Thesis Work	Self Study	
	3rd period 13 15-14 45			Thesis Work	(7)-15 Application of Sabo/landslide projects to other countries (2) Prof. Kondo Dr. Osanai	Thesis Work	Self Study	
	4th period 15 00-16 30			Thesis Work	Self Study	Thesis Work	Self Study	

Annex II

Annex 9

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

- (1) Basic Concepts of Integrated Flood Risk management (IFRM)
- (2) Flood Hydraulics and River Channel Design
- (3) Hydrology
- (4) Hydraulics
- (5) Urban Flood Management and Flood Hazard Mapping
- (6) Mechanics of Sediment Transportation and Channel Changes
- (7) Control Measures for Landslide & Debris Flow
- (8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
- (9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
- (10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

- P(01) Computer Programming
- P(02) Practice on Flood Forecasting and Inundation Analysis
- P(03) Practice on GIS and Remote Sensing Technique
- P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

		Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
April		3/27	3/28	3/29	3/30	3/31	4/1	4/2
	AM							
	PM 15:00-		P(03)-15 15:00 Remote Sensing for Inundation Mapping (3) Case study (3) Asso Prof Yorozuya Dr Kwak	Thesis Work	(3) -16 9:00 Examination Prof. Koike	Thesis Work	Thesis Work	
		4/3	4/4	4/5	4/6	4/7	4/8	4/9
	AM			Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM		2nd Interim Presentation					
		4/10	4/11	4/12	4/13	4/14	4/15	4/16
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	(8)-15 Examination *Asso. Prof. Ohara*	
	PM							
		4/17	4/18	4/19	4/20	4/21	4/22	4/23
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Openday	
	PM							
		4/24	4/25	4/26	4/27	4/28	4/29	4/30
	AM		Instruction for Exercise at Shinano river by Asso. Prof. Yorozuya	Thesis Work		P(04) Shinano River Dr. Shibuo		
	PM							
May		5/1	5/2	5/3	5/4	5/5	5/6	5/7
	AM		Thesis Work	National Holiday	National Holiday	National Holiday	Thesis Work	
	PM							
		5/8	5/9	5/10	5/11	5/12	5/13	5/14
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		5/15	5/16	5/17	5/18	5/19	5/20	5/21
	AM		Thesis Work	Thesis Work		Thesis Work	Thesis Work	
	PM				3rd Interim Presentation			
		5/22	5/23	5/24	5/25	5/26	5/27	5/28
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
June		5/29	5/30	5/31	6/1	6/2	6/3	6/4
	AM		Thesis Work	Thesis Work		P(04) Kinu River Dr. Shibuo		
	PM							
		6/5	6/6	6/7	6/8	6/9	6/10	6/11
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		6/12	6/13	6/14	6/15	6/16	6/17	6/18
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		6/19	6/20	6/21	6/22	6/23	6/24	6/25
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							

Annex II

Annex 10

2015-2016 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)
(2) Flood Hydraulics and River Channel Design
(3) Hydrology
(4) Hydraulics
(5) Urban Flood Management and Flood Hazard Mapping
(6) Mechanics of Sediment Transportation and Channel Changes
(7) Control Measures for Landslide & Debris Flow
(8) Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management
(9) Disaster Management Policies A: from Regional and Infrastructure Aspect (GRIPS)
(10) Disaster Management Policies B; from Urban and Community Aspect (GRIPS)

Excercise (Lecturer)

P(01) Computer Programming
P(02) Practice on Flood Forecasting and Inundation Analysis
P(03) Practice on GIS and Remote Sensing Technique
P(04) Site Visit of Water-related Disaster Management Practice in Japan

As of 2017/2/12

		Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
July		6/26	6/27	6/28	6/29	6/30	7/1	7/2
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Deadline of the 1st Submission of a draft Thesis	
	PM							
		7/3	7/4	7/5	7/6	7/7	7/8	7/9
	AM	(5)-11 Flood-control operation		Thesis Work	4th Interim Presentation	Thesis Work	Thesis Work	
	PM							
		7/10	7/11	7/12	7/13	7/14	7/15	7/16
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		7/17	7/18	7/19	7/20	7/21	7/22	7/23
	AM		National Holiday	Thesis Work	Thesis Work	Thesis Work	Deadline of the Submission of a draft Thesis	
	PM							
		7/24	7/25	7/26	7/27	7/28	7/29	7/30
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
August		7/31	8/1	8/2	8/3	8/4	8/5	8/6
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		8/7	8/8	8/9	8/10	8/11	8/12	8/13
	AM		Thesis Work	Thesis Work	Final Presentation	National Holiday	Thesis Work	
	PM							
		8/14	8/15	8/16	8/17	8/18	8/19	8/20
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Dead line of the thesis	
	PM							
		8/21	8/22	8/23	8/24	8/25	8/26	8/27
	AM							
	PM							
Sept.		8/28	8/29	8/30	8/31	9/1	9/2	9/3
	AM					Site visit to Kobe and Tokushima		
	PM							
		9/4	9/5	9/6	9/7	9/8	9/9	9/10
	AM							
	PM							
		9/11	9/12	9/13	9/14	9/15	9/16	9/17
	AM		Special Lecture of Disaster Statictics by Prof. Ono of Tohoku university at JICA Headquarters	Closing Ceremony	Graduation Ceremony at GRIPS	Return to home country		
	PM							

Annex II

Curriculum (Recommended course)

Lecture	Hydrology		Hydraulics		Basic Concepts of Integrated Flood Risk management (IFRM)	
Number	DMP2800E		DMP2810E		DMP2820E	
Instructor	Prof. Toshio KOIKE		Prof. Guangwei HUANG		Prof. Kuniyoshi TAKEUCHI	
Period	Fall through Winter		Fall through Winter		Fall through Winter	
	Lecture	Lecturer	Lecture	Lecturer	Lecture	Lecturer
1	Water properties and their roles in climate system	Prof Koike, ICHARM/ Tokyo Univ	Basic mathematics and fundamental equations in Hydraulics	Asso Prof Yorozuya ICHARM	Introduction What is natural disaster? Risk, Hazard and Vulnerability	Prof Takeuchi, ICHARM
2	Characteristics of moist air and precipitation	Prof Koike, ICHARM/ Tokyo Univ	Flow resistance in open channel, Flow resistance calculation in engineering practice	Asso Prof Yorozuya ICHARM	PAR Model (1) Root causes, progress of dynamic pressure and unsafe conditions	Prof Takeuchi, ICHARM
3	Global energy and water cycle	Prof Koike, ICHARM/ Tokyo Univ	Basics of water surface profiles of open channel flow, Basics of flood wave	Asso Prof Yorozuya ICHARM	PAR Model (2) Concrete examples	Prof Takeuchi, ICHARM
4	River basin hydrological processes	Prof Koike, ICHARM/ Tokyo Univ	Experimental study of flow resistance and water surface profiles (1)	Asso Prof Yorozuya ICHARM	ACCESS Model	Prof Takeuchi, ICHARM
5	Atmosphere-land interaction	Prof Koike, ICHARM/ Tokyo Univ	Experimental study of flow resistance and water surface profiles (2)	Asso Prof Yorozuya ICHARM	Disaster management cycle: Hyogo Framework for Action	Prof Takeuchi, ICHARM
6	Soil moisture and ground water	Prof Koike, ICHARM/ Tokyo Univ	Systematic classification of water surface profiles	Prof Huang, Sophia Univ	IFRM and traditional FRM: IFRM as part of IWRM	Prof Takeuchi, ICHARM
7	Runoff	Prof Koike, ICHARM/ Tokyo Univ	Hydraulic jump and its application	Prof Huang, Sophia Univ	Concept of IWRM (1) Agenda 21, Global Water Partnership	Prof Takeuchi, ICHARM
8	River basin hydrological modelling	Prof Koike, ICHARM/ Tokyo Univ	Numerical solution of the gradually-varied flow equation	Prof Huang, Sophia Univ	Concept of IWRM (2) Guideline for IWRM at basin scale	Prof Takeuchi, ICHARM
9	Electromagnetic theory as a basis of remote sensing	Prof Koike, ICHARM/ Tokyo Univ	Unsteady flow models	Prof Huang, Sophia Univ	Japanese experiences (1) Flood damages and flood control investment	Prof Takeuchi, ICHARM
10	Ground-based remote sensing - radar	Prof Koike, ICHARM/ Tokyo Univ	Numerical methods for unsteady flow simulation (1)	Prof Huang, Sophia Univ	Japanese experiences (2) Ground subsidence control	Prof Takeuchi, ICHARM
11	Space-based remote sensing – satellite	Prof Koike, ICHARM/ Tokyo Univ	Numerical methods for unsteady flow simulation (2)	Prof Huang, Sophia Univ	Japanese experiences (3) Comprehensive flood control measures and focus expansion from river to basin	Prof Takeuchi, ICHARM
12	Frequency and time series analysis	Prof Koike, ICHARM/ Tokyo Univ	Channel design	Prof Huang, Sophia Univ	Global trends (1) Impact of climatic change	Prof Oki, Tokyo Univ
13	Cost-benefit analysis and optimization	Prof Koike, ICHARM/ Tokyo Univ	On site flow measurement (1)	Asso Prof Yorozuya ICHARM	Global trends (2) International actions	Prof Oki, Tokyo Univ
14	Climate change impact assessment and adaptation	Prof Koike, ICHARM/ Tokyo Univ	On site flow measurement (2)	Asso Prof Yorozuya ICHARM	Application of Sabo Works and landslide countermeasures to overseas countries	Mr Watanabe
15	Examination		Examination		Examination	

Lecture	Urban Flood Management and Flood Hazard Mapping		Flood Hydraulics and River Channel Design		Mechanics of Sediment Transportation and River Changes	
Number	DMP2870E		DMP3810E		DMP3820E	
Instructor	Prof. Shigenobu TANAKA		Prof. Shoji FUKUOKA		Prof. Shinji EGASHIRA	
Period	Fall through Spring		Fall through Winter		Fall through Winter	
	Lecture	Lecturer	Lecture	Lecturer	Lecture	Lecturer
1	Laws for flood risk management in Japan	Prof Tanaka, Kyoto Univ	Outlines of characteristics and management of Japanese rivers	Prof Fukuoka, Chuo Univ	Introduction (1) - Characteristics of sediment	Prof Egashira, ICHARM
2	Flood control planning (1)	Prof Tanaka, Kyoto Univ	Occurrence of flood flows	Prof Fukuoka, Chuo Univ	Introduction (2) - Sediment transportation and corresponding channel changes - Methods to evaluate channel changes	Prof Egashira, ICHARM
3	Flood control planning(2)	Prof Tanaka, Kyoto Univ	Propagation of hydrographs of water level and discharge in flood flows	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (1) - Parameters associated with sediment transportation	Prof Egashira, ICHARM
4	Local disaster management plan	Mr Kamoto, ICHARM	Flow resistance in rivers with compound channels	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (2) - Critical condition for initiating bed load	Prof Egashira, ICHARM
5	Case study of comprehensive flood control measures -Tsurumi river-	Mr Imbe, ARSIT	Prediction method of flow resistance in compound channels and application to river course design	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (3) - Bed load formulas	Prof Egashira, ICHARM
6	Flood hazard map	Prof Tanaka, Kyoto Univ	Quasi-two dimensional analysis of flood flows in rivers with vegetations	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (4) - Bed load formulas	Prof Egashira, ICHARM
7	Evacuation Plan with Flood Forecast	Prof Tanaka, Kyoto Univ	Effects of Channel Vegetations on Flood Propagation	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (5) - Extension of bed load formula to non-uniform sediment	Prof Egashira, ICHARM
8	Flood frequency analysis (1)	Prof Tanaka, Kyoto Univ	Relationship between dimensionless width, depth and discharge in rivers - Learning from natural rivers	Prof Fukuoka, Chuo Univ	Mechanics of sediment transportation (6) - Suspended load	Prof Egashira, ICHARM
9	Flood frequency analysis (2)	Prof Tanaka, Kyoto Univ	River cross-sections harmonizing flood control and river environment	Prof Fukuoka, Chuo Univ	Mechanics of debris flow (1) - Constitutive equations - Debris flow characteristics over erodible beds	Prof Egashira, ICHARM
10	Flood frequency analysis (3)	Prof Tanaka, Kyoto Univ	Flow in the dam reservoir during floods	Prof Fukuoka, Chuo Univ	Mechanics of debris flow (2) - A bed load formula derived from constitutive equations	Prof Egashira, ICHARM
11	Emergency operation		Flood flow and Bed variations in the Ishikari River	Prof Fukuoka, Chuo Univ	Bed forms and flow resistance (1) - Geometric characteristics of bed forms - Formative domain of bed forms	Prof Egashira, ICHARM
12	Geomorphology around rivers and alluvial plain (1)	Prof Sugai, Kyoto Univ	Flow and Bed variations in the Hi-river sections before and after the flow diversion	Prof Fukuoka, Chuo Univ	Bed forms and flow resistance (2) - Flow resistance	Prof Egashira, ICHARM
13	Geomorphology around rivers and alluvial plain (2)	Prof Sugai, Kyoto Univ	Effects of the Watarase retarding basin on flood control by in Tone river system	Prof Fukuoka, Chuo Univ	Prediction of channel changes (1) - Governing equations employed in steep areas - Topographic change in steep areas	Prof Egashira, ICHARM
14	Developments in social sciences on people ' s reactions and responses to disasters	Prof Hayashi, Kyoto Univ	Design Method of No 2 Consolidation Work in the Shinano River	Prof Fukuoka, Chuo Univ	Prediction of channel changes (2) - Governing equations employed in alluvial reaches - Topographic change in alluvial reaches	Prof Egashira, ICHARM
15	Examination		Summary of "Flood Hydraulics and River Channel Design"	Prof Fukuoka, Chuo Univ	Method to predict sediment transport process in drainage basins - Sediment management in drainage basin	Prof Egashira, ICHARM

Annex III

Lecture	Lecture	Control Measures for Landslide & Debris Flow		Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management	
Number	Number	DMP3840E		DMP2900E	
Instructor	Instructor	Prof. Koichi KONDO		Asso. Prof. Miho OHARA	
Period	Period	Fall through Winter		Winter through Spring	
		Lecture	Lecturer	Lecture	Lecturer
1	1	Outline of sediment-related disasters and Sabo projects	Prof Kondo, SABO Technical Center	Outline of Socio-economic and environmental aspects	Asso Prof OHARA, ICHARM
2	2	Sediment yield, transport and deposition in a river basin	Prof Sasahara, Kouchi Univ	Methodology of risk assessment	Asso Prof OHARA, ICHARM
3	3	Sabo planning and control of sediment transport	Prof Sasahara, Kouchi Univ	Socio-economic impacts of disasters(1)	Asso Prof OHARA, ICHARM
4	4	Planning and design of Sabo facilities	Prof Sasahara, Kouchi Univ	Socio-economic impacts of disasters(2)	Asso Prof OHARA, ICHARM
5	5	Restoration of vegetation on wasteland and its effects	Dr Osanai, Group Leader, PWRI	Example of risk assessment	Mr SAWANO, ICHARM
6	6	Countermeasures for earthquake-induced natural Dams	Dr Osanai, Group Leader, PWRI	Impacts of information dissemination(1)	Asso Prof OHARA, ICHARM
7	7	Introduction of landslides	Dr Tsunaki, Division chief, SABO Technical Center	Impacts of information dissemination (2)	Mr Akira KODAKA, University of Tokyo
8	8	Survey and emergency response for landslides	Dr Tsunaki, Division chief, SABO Technical Center	ICT application for risk management	Asso Prof OHARA, ICHARM
9	9	Permanent measures for landslide damage reduction	Dr Tsunaki, Division chief, SABO Technical Center	Land use control for risk reduction	Asso Prof OHARA, ICHARM
10	10	Warning and evacuation system for sediment-related disasters	Dr Hara, Advisor, Sabo Technical Center	Environmental impacts of dams	Mr Iwami, ICHARM
11	11	Hazard mapping for sediment-related disasters	Dr Takanashi, Advisor, Asia Air Survey CO ,LTD	Environmental impacts of dams	Prof Sumi, Kyoto Univ
12	12	Training of hazard mapping for sediment-related disasters (1)	Dr Takanashi, Advisor, Asia Air Survey CO ,LTD	Sediment management in reservoirs	Prof Sumi, Kyoto Univ
13	13	Training of hazard mapping for sediment-related disasters (2)	Dr Takanashi, Advisor, Asia Air Survey CO ,LTD	Sediment management in reservoirs	Prof Sumi, Kyoto Univ
14	14	Application of Sabo/landslide projects to other countries (1)	Prof Kondo, Dr Osanai	Concept of "Build Back Better"	Asso Prof OHARA, ICHARM
15	15	Application of Sabo/landslide projects to other countries (2)	Prof Kondo, Dr Osanai	Exam	Asso Prof OHARA, ICHARM

Curriculum (Elective course)

Lecture	Computer Programming		Practice on Flood Forecasting and Inundation Analysis		Practice on GIS and Remote Sensing Technique	
Number	DMP1800E		DMP2860E		DMP3802E	
Instructor	Asso. Prof. Tomoki USHIYAMA		Assoc. Prof. Takahiro SAYAMA		Asso. Prof. Atsuhiro YOROZUYA	
Period	Fall through Winter		Fall through Spring		Fall through Spring	
	Lecture	Lecturer	Lecture	Lecturer	Lecture	Lecturer
1	Introduction of Computer Programming with Fortran90	Asso Prof Ushiyama, ICHARM	Basics of Flood Hazard Models	Asso Prof Sayama, Kyoto University	Geographic Information System (GIS) (1) Basic concept	
2	Variables	Asso Prof Rasmy	Rainfall-runoff-inundation modeling (1) Data preparation	Asso Prof Sayama, Kyoto University	Geographic Information System (GIS) (2) Understanding GIS data structures	
3	Arithmetic Calculation	Asso Prof Rasmy	Rainfall-runoff-inundation modeling (2) Running model	Asso Prof Sayama, Kyoto University	Geographic Information System (GIS) (3) Working with ArcGIS	
4	Program Structure (if)	Dr Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (3) Parameter setting	Asso Prof Sayama, Kyoto University	Geographic Information System (GIS) (4) ArcGIS Data management	
5	Program Structure (if)	Dr Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (4) Analysis of simulation results	Asso Prof Sayama, Kyoto University	Geographic Information System (GIS) (5) ArcGIS Data processing	
6	I/O Statement	Dr Hasegawa, ICHARM	Runoff analysis with IFAS (1) Basic concept	Dr Tsuda, ICHARM	Geographic Information System (GIS) (6) ArcGIS Spatial analysis	
7	Program Structure (do loop)	Dr Hasegawa, ICHARM	Runoff analysis with IFAS (2) Data preparation	Dr Tsuda, ICHARM	Geographic Information System (GIS) (7) ArcGIS Hydrology analysis	
8	Program Structure (do loop)	Dr Hasegawa, ICHARM	Runoff analysis with IFAS (3) Running model	Dr Tsuda, ICHARM	Geographic Information System (GIS) (8) ArcGIS Model builder	
9	Quiz(1)	Dr Hasegawa, ICHARM	Runoff analysis with IFAS (4) Parameter setting	Dr Tsuda, ICHARM	Remote Sensing (1) Basic principles of satellite image	
10	Hydrologic Application Exercise (1)	Asso Prof Rasmy	Runoff analysis with IFAS (5) Analysis of simulation results	Dr Tsuda, ICHARM	Remote Sensing (2) Preparation of satellite images	
11	Arrays	Dr Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (1) Basic concept	Dr Gusyev, ICHARM	Remote Sensing (3) Image analysis with tutorial data with ArcGIS	
12	Arrays	Dr Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (2) Data preparation	Dr Gusyev, ICHARM	Remote Sensing (4) Application of image analysis with ArcGIS	
13	Procedures and Structured Programming (subroutine, function)	Dr Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (3) Running model	Dr Gusyev, ICHARM	Remote Sensing for Inundation Mapping (1) Case study (1)	
14	Quiz(2)	Dr Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (4) Parameter setting	Dr Gusyev, ICHARM	Remote Sensing for Inundation Mapping (2) Case study (2)	
15	Hydrologic Application Exercise (2)	Asso Prof Rasmy	Large-scale Runoff analysis with BTOP (5) Analysis of simulation results	Dr Gusyev, ICHARM	Remote Sensing for Inundation Mapping (3) Case study (3)	

Lecture	Site Visit of Water-related Disaster Management Practice in Japan	
Number	DMP3900E	
Instructor	Dr. Yoshihiro SHIBUO	
Period	Fall through Summer	
	Lecture	Lecturer
1	Diversion channel	MLIT local office
2	Super levee	MLIT local office
3	Wire, Water gate	MLIT local office
4	Disaster management station	MLIT local office
5	River administration in normal time	MLIT local office
6	Awareness enlightening activities for flood (Flood mark, Water level indication tower, etc)	MLIT local office
7	Retarding basin	MLIT local office
8	Metropolitan area outer underground discharge channel	MLIT local office
9	Integrated flood management in Tsurumi River	MLIT local office
10	Dam	MLIT local office
11	Sabo work	MLIT local office
12	Discontinuous levee	MLIT local office
13	Pumping station	MLIT local office
14	(others)	MLIT local office
15	(others)	MLIT local office

Annex 16

Subject: Computer Programming

Course number：DMP1800E
Instructor：Assoc. Prof. Tomoki USHIYAMA, Dr. Akira HASEGAWA, Assoc. Prof. Rasmy MOHAMED
Term / Time：Fall through Winter

1 Course Description

This course provides general knowledge on Fortran90 computer programming and its skills for solving water-related problems covered in Course No. DMP2800E “Hydrology”, No. DMP2810E “Hydraulics”, No. DMP3800E, No. DMP3810E “Flood Hydraulics and Sediment Transport” and No. DMP2860E “Basic Practice on Flood Forecasting & Inundation Analysis”.

2 Course Outline (Course Topics)

Week

1：Introduction of Computer Programming with Fortran90
2：Variables
3：Arithmetic Calculation
4：Program Structure (if)
5：Program Structure (if)
6：I/O Statement
7：Program Structure (do loop)
8：Program Structure (do loop)
9：Quiz(1)
10：Hydrologic Application Exercise (1)
11：Arrays
12：Arrays
13：Procedures and Structured Programming (subroutine, function)
14：Quiz(2)
15：Hydrologic Application Exercise (2)

3 Grading

Quiz (50%), Reports (50%)

If a report is late for the deadline, it will be not evaluated.

4 Textbooks

Reference: Fortran95/2003 for Scientists and Engineers (Third Ed.), by Stephen J. Chapman, McGraw-Hill,

Subject: Practice on Flood Forecasting and Inundation Analysis

Course number：DMP2890E
Instructor：Assoc. Prof. Takahiro SAYAMA
Term / Time：Fall through Spring

1 Course Description

The objective of this course is to introduce the basic technique for undertaking flood forecasting and inundation analysis in poorly-gauged basins using state-of-the-art global information and technologies. The course consists of three components: introduction of Rainfall-Runoff-Inundation (RRI) modeling, practice on Integrated Flood Analysis System (IFAS) and Block-wise use of TOPMODEL (BTOP) for runoff analysis at different scales.

2 Course Outline (Course Topics)

Week

1 ：Basics of Flood Hazard Models
2 ：Rainfall-runoff-inundation modeling (1) Data preparation
3 ：Rainfall-runoff-inundation modeling (2) Running model
4 ：Rainfall-runoff-inundation modeling (3) Parameter setting
5 ：Rainfall-runoff-inundation modeling (4) Analysis of simulation results
6 ：Runoff analysis with IFAS (1) Basic concept
7 ：Runoff analysis with IFAS (2) Data preparation
8 ：Runoff analysis with IFAS (3) Running model
9 ：Runoff analysis with IFAS (4) Parameter setting
10 ：Runoff analysis with IFAS (5) Analysis of simulation results
11 ：Large-scale Runoff analysis with BTOP (1) Basic concept
12 ：Large-scale Runoff analysis with BTOP (2) Data preparation
13 ：Large-scale Runoff analysis with BTOP (3) Running model
14 ：Large-scale Runoff analysis with BTOP (4) Parameter setting
15 ：Large-scale Runoff analysis with BTOP (5) Analysis of simulation results

3 Grading

Reports (100%)

If a report is late for the deadline, it will be not evaluated.

4 Textbooks

4-1 Required

4-2 Others

Material made by the instructors

Subject: Practice on GIS and Remote Sensing Technique

Course number：DMP3802E
Instructor：Adjunct Prof. Atsuhiro YOROZUYA
Term / Time：Fall through Spring

1 Course Description

The objective of this course is to build capacities for undertaking basi tools, which are expecting to be applied in the individual study. This course introduce the basic technique on Geographic Information System (GIS) and Remote Sensing (RS) technique. The course consists of two components: practice on the GIS, introduction of Remote Sensing (RS) for inundation mapping.

2 Course Outline (Course Topics)

Week

1：Geographic Information System (GIS) (1) Basic concept
2：Geographic Information System (GIS) (2) Understanding GIS data structures
3：Geographic Information System (GIS) (3) Working with ArcGIS
4：Geographic Information System (GIS) (4) ArcGIS Data management
5：Geographic Information System (GIS) (5) ArcGIS Data processing
6：Geographic Information System (GIS) (6) ArcGIS Spatial analysis
7：Geographic Information System (GIS) (7) ArcGIS Hydrology analysis
8：Geographic Information System (GIS) (8) ArcGIS Model builder
9：Remote Sensing (1) Basic principles of satellite image
10：Remote Sensing (2) Preparation of satellite images
11：Remote Sensing (3) Image analysis with tutorial data with ArcGIS
12：Remote Sensing (4) Application of image analysis with ArcGIS
13：Remote Sensing for Inundation Mapping (1) Case study (1)
14：Remote Sensing for Inundation Mapping (2) Case study (2)
15：Remote Sensing for Inundation Mapping (3) Case study (3)

3 Grading

Participation (100%)

4 Textbooks

4-1 Required

4-2 Others

Material made by the instructors

Subject: Site Visit of Water-related Disaster Management Practice in Japan

Course number：DMP3900E
Instructor：Yoshihiro Shibuo
Term / Time：Fall through Summer

1 Course Description

This course provides opportunities for students to actually visit and study flood control structures in Japan, which concept can be introduced to other courses. The course shall provide insight of structural measurements, which include but not limited to, river levees, flood retarding basins, dams, and sabo structures. After each study-visit, students will be requested to submit a report comparing the target structures in Japan and those in their countries.

2 Course Outline (Course Topics)

1 ：Diversion channel
2 ：Super levee
3 ：Wire, Water gate
4 ：Disaster management station
5 ：River administration in normal time
6 ：Awareness enlightening activities for flood (Flood mark, Water level indication tower, etc.)
7 ：Retarding basin
8 ：Metropolitan area outer underground discharge channel
9 ：Integrated flood management in Tsurumi River
10 ：Dam
11 ：Sabo work
12 ：Discontinuous levee
13 ：Pumping station

3 Grading

Attendance (60%), Report (40%)

If a report is late for the deadline, it will be not evaluated.

4 Textbooks

4-1 Required - handouts are planned to be provided by corresponding organizations
4-2 Others

Subject: Hydrology

Course number：DMP2800E
Instructor：Prof. Toshio KOIKE
Term / Time：Fall through Winter

1 Course Description

Water is a key which makes a bridge between the socio benefit areas including agriculture and forestry, health, energy and human settlement and the geophysical and bio-geochemical water cycle processes in atmosphere, land and oceans. To establish a physical basis on water cycle, this course aims to introduce important roles of water in climatological and meteorological processes and the basic concepts of hydrology including understanding, observing and modeling of hydrologic processes. Remote sensing and statistic and stochastic approaches are introduced as advanced facets of hydrology.

2 Course Outline (Course Topics)

(1) Climate System and Water Cycle
1) Water properties and their roles in climate system
2) Characteristics of moist air and precipitation
3) Global energy and water cycle

(2) Hydrological Processes, In-situ Observations and Modeling
1) River basin hydrological processes
2) Atmosphere-land interaction
3) Soil moisture and ground water
4) Runoff
5) River basin hydrological modelling

(3) Remote Sensing of Hydrology
1) Electromagnetic theory as a basis of remote sensing
2) Ground-based remote sensing - *radar*
3) Space-based remote sensing – *satellite*

(4) Water Resources Planning and Management
1) Frequency and time series analysis
2) Cost-benefit analysis and optimization
3) Climate change impact assessment and adaptation

3 Grading

Active participation(25%), Short Reports(25%), Final Examination(50%)

4 Reference

(1) Roland B.Stull: An Introduction to Boundary Layer Meteorology, KLUWER ACADEMIC PUBLISHERS.
(2) J.R.Holton: An Introduction to Dynamic Meteorology, Academic Press.
(3) Dingman, R.: Physical Hydrology, Prentice-Hall, Inc.

Subject: Hydraulics

Course number：DMP281E
Instructor：Prof. Guangwei HUANG; Dr. Atsuhiro YOROZUYA
Term / Time：Fall through Winter

1. Course Description

It provides instruction in fundamental concepts and theories for the analysis of open channel flows, and step-by-step guidance for flood wave propagation computation. Besides, laboratory flume experiment and on-site flow measurement training will be conducted to help students better understand the theories and its applications.

Course Goal:

To enable students to conduct professional channel flow analysis and applications and to develop independent learning and problem solving skills. After completing this course, you will be able to…

1. set up systems of equations representing flow through channel systems
2. perform 1-D steady and unsteady flow analysis of open channel systems
3. apply solution approaches to levee design
4. conduct flow discharge measurement
5. present technical information effectively

2. Course Outline (Course Topics)

I. Basic principles of open channel flows

- Mathematics for Hydraulics
- Introduction & Fundamental equations
- Flow resistance in open channel
- Flow resistance calculation in engineering practice
- Basics of water surface profiles of open channel flow
- Basics of flood wave

II. Experimental study

- Experimental study about flow resistance and varied flows

III. Detailed tutorials on open channel flows

- Systematic classification of water surface profiles
- Numerical solution of the gradually-varied flow equation
- Hydraulic jump and its application
- Unsteady flow models
- Preissmann scheme for unsteady flow
- Explicit Forward-Time-Centre-Space scheme for unsteady flow
- Channel design and hydraulic structures
- Practical aspects of 2-D flow simulation

IV. Flow measurement

- Different types of flow measurements
- On site measurement of flow measurement

Final exam

3. Grading:
   Class participation (30%), Quiz and exercise (30%), Examination (40%)

4. Reference books
   Open-channel Hydraulics, Ven Te Chow;
   Practical aspects of computational river hydraulics, J.A. Cunge, F.M. Holly, Jr., A. Verwey.
   Fluid Mechanics and Hydraulics, R. V. Giles, J. B. Evett, and C. Lin.

   Handouts will be distributed.

Subject: Basic Concepts of Integrated Flood Risk Management (IFRM)

Course number: DMP2820E
Instructor: Kuniyoshi Takeuchi
Term / Time: Fall through Winter

1 Course Description

This course teaches the basic concepts of "Integrated Flood Risk Management (IFRM)" as part of Integrated Water Resources Management (IWRM). The mechanism of forming disaster risk as a combination of natural hazard, exposure of vulnerability and coping capacity will be emphasized. International policy development in the fields of environment, sustainable development, water resources management and disaster risk reduction will be extensively covered. New concepts of IWRM at basin scale will be introduced and, as a concrete example, Japanese flood management experiences will be studied. Adaptation to anticipated climate change and other global changes will also be covered.

2 Course Outline (Course Topics)

1. Introduction: What is natural disaster? Risk, Hazard and Vulnerability
2. PAR Model (1) Root causes, progress of dynamic pressure and unsafe conditions
3. PAR Model (2) Concrete examples
4. ACCESS Model
5. Disaster management cycle; Hyogo Framework for Action
6. IFRM and traditional FRM; IFRM as part of IWRM
7. Concept of IWRM (1): Agenda 21, Global Water Partnership
8. Concept of IWRM (2): Guideline for IWRM at basin scale
9. Japanese experiences (1) Flood damages and flood control investment
10. Japanese experiences (2) Pollution and ground subsidence control
11. Japanese experiences (3) Comprehensive flood management measures and policy evolution from river to basin
12. Global trends (1) Impact of climatic change
13. Global trends (2) International actions
14. Future Issues of IFRM: Adaptation; Aging society; Depopulation; Social Capital;
15. Examination

3 Grading

Active participation(25%), Reports(25%), Final Examination(50%)

4 Textbooks

4-1 Required

1. Ben Wisner, Piers Blaikie, Terry Cannon and Ian Davis, At Risk -natural hazards, people's vulnerability and disasters- (Routledge, London & NY, 2004)
2. UNESCO IWRM guidelines steering committee, IWRM Guidelines at River Basin Level: Part 1-1 Principles, 2-1 Part 2-1 Coordination, 2-2 Flood Management, 2-3 Irrigation. (UNESCO, 2009)

Subject: Urban Flood Management and Flood Hazard Mapping

Course number：DMP2870E
Instructor：Prof. Shigenobu TANAKA
Term / Time：Fall through Spring

1 Course Description

This course is specifically designed to study urban flood management. In the first stage of the course, students will learn about Japanese systems for flood risk management, such as relevant laws, river planning, flood control structures and comprehensive flood control measures for urban areas. The second stage aims to acquire knowledge required to promote early public evacuation with a flood hazard map. Students will also study flood frequency analysis, topography and psychological aspects underlying public behavior during disaster.

2 Course Outline (Course Topics)

Week

１：Laws for flood risk management in Japan	Prof. TANAKA
２：Local disaster management plan	Prof. TANAKA
３：Flood control planning	Prof. TANAKA
４：Flood control structure	Mr. Kamoto
５：Case study of comprehensive flood control measures -Tsurumi river-	Mr. Imbe
６：Flood frequency analysis(1)	Prof. TANAKA
７：Flood frequency analysis(2)	Prof. TANAKA
８：Flood frequency analysis(3)	Prof. TANAKA
９：Flood hazard map	Prof. TANAKA
１０：Evacuation Plan with Flood Forecast	Prof. TANAKA
１１：Emergency operation	
１２：Geomorphology around rivers and alluvial plain (1)	
１３：Geomorphology around rivers and alluvial plain (2)	
１４：Developments in social sciences on people’s reactions and responses to disasters	
１５：Examination	

3 Grading

Final Exam (70%) , Attitude in the class(30%)

4 Textbooks

4-1 Required

"Local Disaster Management and Hazard Mapping" (2009), ICHARM

"Hydrological Frequency Analysis" (2015), Tanaka

4-2 Others

Subject: Socio-economic and Environmental Aspects of Sustainability-oriented Flood Management

Course number: DMP2900E
Instructor: Assoc. Prof. Miho OHARA
Term/Time: Fall through Spring

1. Course Description

This course provides the basic understanding of socio-economic and environmental aspects of flood management. The first stage of the course aims to study how to assess socio-economic impacts of disasters and manage the identified risk. The second stage of the course introduces environmental aspects of flood management.

2. Course Outline(Course Topics)

Week

1. Outline of Socio-economic and environmental aspects
2. Methodology of risk assessment
3. Socio-economic impacts of disasters(1)
4. Socio-economic impacts of disasters(2)
5. Example of risk assessment, Guest lecturer, Mr. Sawano, ICHARM
6. Impacts of information dissemination(1)
7. Impacts of information dissemination (2), Guest lecturer, Mr. Kodaka
8. ICT application for risk management
9. Land use control for risk reduction
10. Environmental impacts of dams, Guest lecturer, Mr. Iwami, ICHARM
11. Environmental impacts of dams, Professor Sumi, Kyoto University
12. Sediment management in reservoirs, Professor Sumi, Kyoto University
13. Sediment management in reservoirs, Professor Sumi, Kyoto University
14. Concept of "Build Back Better"
15. Exam

3.

Grading

60% Assignments and participation

40% Exams and short quizzes

4.

Textbooks

4.1 Required

4.2 Others

Provided by the instructor

Subject: Flood Hydraulics and River Channel Design

Course number：DMP3810E
Instructor：Prof. Shoji FUKUOKA
Term / Time：Fall through Winter

1 Course Description

This course provides the basic knowledge necessary for planning and designing the structural measures for Integrated Flood Risk Management (IFRM). The course first describes the river administration and planning for application of IFRM. Especially the methodology of comprehensive river management will be emphasized that includes planning of flood hydraulics, flood controls, river structures and sediment movement to river channels. This will be followed by specific technologies of channel control and channel improvement.

2. Course Outline (Course Topics)

Week

1. Characteristics and management of Japanese rivers.
2. Characteristics of flood flows.
3. Hydorograph propagation of water level and discharge in flood flows.
4. Flow resistance in rivers with compound channels.
5. Prediction method of flow resistance in compound channels.
6. Effects of channel vegetations on flood propagation.
7. Quasi-two -dimensional analysis of flood flows in rivers with vegetations.
8. Relationship between dimensionless width, depth and discharge in rivers
   - Learning from natural rivers
9. Channel design harmonizing the flood control and river environment
10. Flood flow behavior in dam reservoirs.
11. Flows and bed variations in channels -Ishikari River case
12. Hi-i river diversion channel design from viewpoints of flow and bed variation.
13. Design method of Watarase retarding basin in Tone river system
14. Design method of Consolidation Work in the Shinano River
15. Summary of "Flood Hydraulics and River Channel Design"

3 Grading

Reports (25%) Final examination (75 %)

4 Textbooks

Lecture notes will be distributed to students in the class.

Subject: Mechanics of Sediment Transportation and Channel Changes

Course number：DMP 3820E
Instructor：Prof. Shinji EGASHIRA
Term / Time：Fall through Winter

1 Course Description

Sediment transportation takes place in various forms such as bed-load, suspended load, debris flow, etc. and its spatial imbalance causes river bed degradation and aggradation, side bank erosion, sand bar formation and channel shifting. Such channel changes will be suitable for ecological systems, if they are within an allowable level. However, if these are over some critical level, flood and sediment disasters will happen. This course provides methods for evaluating sediment transportation and associated channel changes with attention focused on basic principles of sediment mechanics. In addition, methods of sediment management are discussed for disaster mitigation as well as for developing a suitable channel condition.

2 Course Outline (Course Topics)

Week

1 : Introduction (1)
- Characteristics of sediment

2 : Introduction (2)
- Sediment transportation and corresponding channel changes
- Methods to evaluate channel changes

3 : Mechanics of sediment transportation (1)
- Parameters associated with sediment transportation

4 : Mechanics of sediment transportation (2)
- Critical condition for initiating bed load

5 : Mechanics of sediment transportation (3)
- Bed load formulas

6 : Mechanics of sediment transportation (4)
- Bed load formulas

7 : Mechanics of sediment transportation (5)
- Extension of bed load formula to non-uniform sediment

8 : Mechanics of sediment transportation (6)
- Suspended load

9 : Mechanics of debris flow (1)
- Constitutive equations
- Debris flow characteristics over erodible beds

10 : Mechanics of debris flow (2)
- A bed load formula derived from constitutive equations

11 : Bed forms and flow resistance (1)
- Geometric characteristics of bed forms
- Formative domain of bed forms

１２：Bed forms and flow resistance (2)
- Flow resistance

１３：Prediction of channel changes (1)
- Governing equations employed in steep areas
- Topographic change in steep areas

１４：Prediction of channel changes (2)
- Governing equations employed in alluvial reaches
- Topographic change in alluvial reaches

１５：Method to predict sediment transport process in drainage basins
-Sediment management in drainage basin

3 Grading

50 points for reports and short quizzes

50 points for the examination at the end of semester

Notice: Either a report or a short quiz is assigned every two weeks, regarding questions illustrated at the end of each chapter in Lecture Note.

4 Textbooks

4-1 Required

- Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes, Lecture Note

4-2 Others

- Sturm, T. W. (2001): Open Channel hydraulics, McGraw-Hill.
- Graf, W. H. (1997): Fluvial Hydraulics, Wiley.
- Julien Pierre: River Mechanics, Cambridge University Press
  (Website: http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521529709)
  (http://www.amazon.co.jp/River-Mechanics-Pierre-Y-julien/dp/0521529700)
- Albert Gyr and Klaus Hoyer: Sediment Transport, A Geophysical Phenomenon, Springer Netherlands
  (http://www.springerlink.com/content/q0x656/)
- Ashida K., Egashira S. and Nakagawa H. (2008), River Morphodynamics for the 21st Century, Kyoto University Press (in Japanese)

Subject: Control Measures for Landslide & Debris Flow

Course number：DMP 3840E
Instructor：Prof. Koichi KONDO
Term / Time：Fall through Winter

1 Course Description

This course provides the necessary knowledge and understanding of landslide and debris flow phenomena and their control measures necessary to exercise the IFRM. The lecture will illustrate the devastating phenomena and the causes of landslides and debris flows and provide the basic concepts of the measures for sediment-related disasters, so-called Sabo Works which is executed in the hill slopes and the channels. It will cover the important role of hazard mapping for sediment-related disasters in both structural and non-structural measures.

2 Course Outline (Course Topics)

Week

1. Outline of sediment-related disasters and Sabo projects	Prof. Kondo
2. Sediment yield, transport and deposition in a river basin	Prof.Sasahara
3. Sabo planning and control of sediment transport	Prof.Sasahara
4. Planning and design of Sabo facilities	Prof. Sasahara
5. Restoration of vegetation on wasteland and its effects	Prof .Osanai
6. Countermeasures for natural Dams	Prof . Osanai
7. Introduction of landslides	Dr. Tsunaki
8. Survey and emergency response for landslides	Dr.Tsunaki
9. Permanent measures for landslide damage reduction	Dr. Tsunaki
10. Warning and evacuation system for sediment-related disasters	Dr.Hara
11. Hazard mapping for sediment-related disasters	Dr. Takanashi
12. Training of hazard mapping for sediment-related disasters (1)	Dr. Takanashi
13. Training of hazard mapping for sediment-related disasters (2)	Dr. Takanashi
14. Application of Sabo/landslide projects to other countries (1)	Prof.Kondo Prof . Osanai
15. Application of Sabo/landslide projects to other countries (2)	Prof.Kondo Prof . Osanai

3 Grading

Class participation (30%) Report and final examination (70%)

4 Textbooks

4-1Required

4-2 Others

Annex 32

Site Visit
Yodo River Basin

28th October (Wed)

8:05 TBIC 8:15 － (JICA Bus) → 8:30 Hitachino-Ushiku Sta. 8:47 → (JR) → 9:53 Tokyo Sta. 10:10 → (Shinkansen Nozomi 23) → 12:40 Shin-Osaka Sta. 12:52 → (JR Tohkaido Honsen) → 12:56 Osaka sta. → (On foot) → Hotel (To leave the belongings and have a lunch) → 14:45 Higashi-umeda Sta. → (Tanimachi line) → 14:49 Tenmabashi Sta.

15:00-16:30	**Lecture by Kinki Regional Development Bureau 90 min.** **(Lecture)** ● Damages caused by typhoon 18 ● Flood Prediction	
		Subway, On foot
Stay in Osaka	Tenmabashi Sta. => (Tanimachi line) => Higashi-umeda Sta.	

29th October (Thu)

Leave at 8:00		
		JICA Bus (45 min.)
9:00-10:00	**Yodogawa museum** **(Yodogawa river office in MLIT)　60 min.** (Lecture 60 min.　: The outline of Yodo basin)	
10:00-11:00	**Site Visit（Yodogawa river office in MLIT）60 min.** ● High-standard levee ● The Machines for countermeasures against natural disaster	
		JICA Bus (70 min.)
12:10	《Lunch at Arashiyama》	京都市公営駐車場嵐山観光駐車場 ¥2,500
13:00-14:00	**Site Visit (Yodogawa river office MLIT)　60 min.** ● The area damaged by typhoon 18 (Togetsu bridge in Arashiyama Area)	
		JICA Bus (30 min.)
15:00-16:00	**Kinkaku-ji**	Entrance fee @400 Parking fee
Stay in Kusatsu		

30th October (Fri)

Leave at 7:45		
		JICA Bus (60 min.)
9:00-10:00	**Yodogawa Integrated Dam Control Office 60 min.** （Lecture : Dam Operation for Typhoon No.18 in 2013）	
		JICA Bus (60 min.)
11:00-12:00	**Amagase Dam 60 min.** **(Site Visit)**	
12:00	Lunch at Amagase Dam	
		JICA Bus (15 min.)
13:30-14:30	**World Heritage Byoudoin**	Entrance fee @600(Outside) Parking fee
		JICA Bus
Stay in Kusatsu		

31st October (Sat)

Leave at 8:00		
		JICA BUS (70 min.)
09:00-10:40	Biwako Canal Memorial Hall～	駐車場は南禅寺を使用する　¥3,000
		on foot
10:50-12:00	Nanzen-ji	
		JICA BUS

Kyoto Sta. 14:05 →（Shinkansen Nozomi 230）→ 16:23 Tokyo Sta. 16:57 →(JR)→ 17:14 Kitasenju 17:26 →（TX）→ 18:09 Tsukuba 18:25 →（Local bas）→ 18:46 TBIC

Site Visit

Urban River in Japan

[25th November (Wed)]

12:30	Leave from ICHARM
	(Move by chartered bus for 60 min.)
14:00-15:00	**The Metropolitan Area Outer Underground Discharge Channel (首都圏外郭放水路)**
	(Move by chartered bus for 90 min.)
17:00	JICA Yokohama

[26th November (Thu)]

Buy your lunch at convenience store

8:45	JICA Yokohama
(On foot)	

Sakuragi-cho Sta. 9:11 => 9:30 Kozukue Sta.

9:50	Tsurumi River Basin Information Center
10:00-11:00	**Lecture on Integrated River Basin Management by Mr. Imbe**
	Urban Flood Management and Flood Hazard Mappig
11:00-12:00	**Site visit at the Information Center**
12:00-12:30	Lunch at the Information Center
	(Move by bus for 30 min.)
13:00-14:00	**Kawawa River Retarding Basin**
	(Under subway train depot, Yokohama-city)
	(Move by bus for 30-60 min.)
15:00-15:30	**Rainwater storage and infiltration system in individual house**
	(Move by bus for 60 min.)
16:30	JICA　Tokyo

[27th November (Fri)]

9:30 JICA Tokyo

(Move by bus)

10:00-11:30 Lecture at JMA

(Move by bus for 10 min.)

12:00 Tokyo sta. (12:25) =>JR Yamanote line=> (12:29) Akihabara sta. (12:33) JR Chuo/Sobu line => (12:37) JR Ryogoku sta.=> On Foot (10min.)

13:00-14:30 Edo Tokyo museum

(On foot)

Ryogoku Sta. 14:45 => TBIC

Niigata(Shinano River)　Schedule

【27rd April (Wed)】

Meeting time: 6:15

TBIC 6:15 -> (on foot) -> Bus stop 6:34 -> (Kantetsu bus) -> Ushiku Sta. 7:06 -> (JR Joban Line) -> 8:08 Ueno Sta. 8:30 -> (Shinkansen "MAX Toki 307") -> 10:31 Niigata Sta.

We are meeting the ICHARM Researchers at Nigata Sta.

(JICA Bus)

11:00-12:00　**Lecture on Outline of Shinano River and Flood in the basin**　信濃川下流河川事務所
(at Shinano River Downstream Work Office, MLIT)

(JICA Bus)

12:30-13:30　Lunch (AEON Niigata Nishi)

(JICA Bus)

14:30-17:00　**Visiting at Ohkouzu Diversion Channel**　大河津資料館

- Museum of Ohkouzu Diversion Channel
- River mouth of the Channel

(JICA Bus)

17:40　Arrival at Hotel in Nagaoka City

【28th April (Thu)】

8:30　Leave from hotel

(JICA Bus)

10:30-12:00　**Sagurigawa Dam, MLIT**　三国川ダム

(JICA Bus)

13:20-14:00　Lunch at the park　Odiya-shi Shinanogawa River Park

14:00-19:00　**Exercise on River Discharge Measurement at Odiya-shi Shinanogawa River park**　小千谷市信濃川河川公園

(JICA Bus)

20:00　Arrival at Hotel (the same hotel)

【29th April (Fri)】

8:30　Leave from hotel

Nagaoka Sta. 8:48 -> (Shinkansen "MAX Toki 310") ->10:22 Ueno Sta. 10:52 -> (JR Joban Line) -> 11:45 Ushiku Sta. 12:05 -> (Kantetsu Bus) -> Bus stip -> (on foot) -> 12:25 TBIC

Visit to Nikko (TONE RIVER BASIN)

Dam, Sabo

[1st June (Wed)]

Gathering time: 7:15

07:30 Leave TBIC

↓ (JICA Bus)

08:00 Tsukuba Center

↓ (JICA Bus)

10:00-11:30 Lecture on disaster of Kinu River **at Kanto Regional Development Bureau (関東地方整備局　さいたま市中央区新都心 2-1 さいたま新都心合同庁舎 2 号館)**

↓ (JICA Bus)

12:35-13:15 Joban Expressway Moriya Service Area: Lunch

↓ (JICA bus)

14:00-15:00 Repair Works Site in Joso city （常総市若宮戸　鬼怒川河川敷）↓

↓ (JICA bus)

17:00 Utsunomiya City (Daiwa Roynet Hotels Utsunomiya)

[2nd June (Thu)]

8:00 Departure from hotel
↓
(JICA bus)
↓

8:30-10:00 Lecture on collaboration of dams along Kinu River at Kinu Gawa Integrated Dam Control Office of MLIT 宇都宮市平出工業団地 14-3)

↓
(JICA bus)
↓

Buy your lunch at a convenience store
(JICA bus) Lunch at Daiya gawa green park　大谷川河川敷

↓
(JICA bus)

↓
13:00-14:30 Site visit at Kawaji Dam

↓
(JICA bus)

↓
15:10-16:30 Site visit at Nikko Toshogu

↓
(JICA bus)
↓

17:30 Utsunomiya City (Daiwa Roynet Hotels Utsunomiya)

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[3rd June (Fri)]

7:30 Depart from the hotel
↓
(JICA bus) Buy your lunch at a convenience store
↓
9:00-11:00 Lecture of Nikko Sabo works 日光砂防事務所 日光市萩垣面 2390

9:30-11:00 Site Visit around Inari-gawa Sabo 日光市萩垣面 2440 付近
↓
(JICA bus) Lunch at Akagane shinsui park
↓
13:30-15:30 Lecture of Ashio Sabo works 銅親水公園
↓
(JICA bus) via ICHARM & Tsukuba sta.
↓
19:15 Arrival at TBIC

Visit to Kobe/Tokushima

Disaster Management

[31st August (Wed)]

09:15 Departure from TBIC
（JICA Bus）
09:30 Hitatino-ushiku sta.

■Ushiku 牛久
｜　Joban Line Special Rapid (For Shinagawa)常磐線特別快速(品川行)
｜　09:40-10:49
｜　970 yen
■Tokyo 東京
■Tokyo 東京
｜Nozomi No.29 (Series N700) (For Hakata)のぞみ 29 号(N700 系)(博多行)
｜11:30-14:22 [172 min]
｜9,500 yen (Reserved Seat / 6,010yen)
Shin-Kobe 新神戸
｜Transfer 乗換
｜14:22-14:34 [Transfer 10 min + Wait 2 min]
Shin-Kobe 新神戸
｜Kobe City Subway-Seishin-Yamate Line (For Seishinchuo) 神戸市営西神・山手線(西神中央行)
｜14:34-14:36 [2 min]
Sannomiya(Kobe-Kosoku)三宮
｜Transfer 乗換
｜14:36-14:45 [Transfer 5 min + Wait 4 min]
Sannomiya(Hyogo)三ノ宮

(Stay at Sanomiya Terminal Hotel)

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[1st Septemer (Thu)]

9:00 Departure from hotel
(Chartered bus, 30min.)
9:30-10:30Akashi Kaikyo bridge exhibition center **〒655－0047 神戸市垂水区東舞子町 4－114**

(Chartered bus, 150 min.)

13:00-15:30 Lecture and Exercise on "Flood fighting methods" at ISHII Water-Disaster Prevention Station (Tokushima-ken, Myōzai-gun, Ishii-chō, Aihata, Nishikakuen)

(Chartered bus, 120min.)
18:00 Kobe

(Stay in Kobe city)

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[2nd September (Fri)]

: Depart from the hotel
(Public transportation)
10:00-12:00 Lecture on "Activity of Disaster Prevention Community" at JICA Kansai

12:00-13:00 Lunch
13:30-15:30 Site Visit at Disaster Reduction and Human Renovation institution
(Public transportation)
: Arrival at Hotel

(Stay in Kobe city)

[3rd September (Sat)]

: Depart from the hotel
(Chartered Bus)
10:00-11:00 Site Visit to Local Disaster Prevention Community
(Chartered bus)
11:30 Shin-Kobe
11:30-12:10 Lunch Time
■Shin-Kobe　新神戸
｜　Nozomi No.20
｜　12:22-15:13
｜　9,290 yen (Reserved Seat / 5,810yen)
■Tokyo　東京

土木研究所資料
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本資料の転載・複写の問い合わせは

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