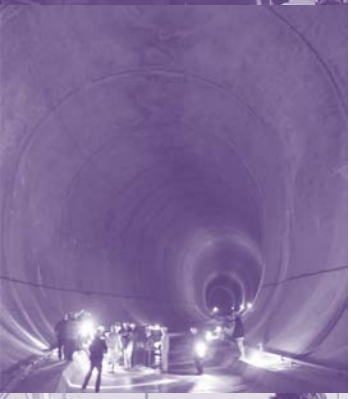

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Technical Note of PWRI No. 4340

ICHARM Publication No.32

Report on 2014-2015 M.Sc. Program, "Water-related Disaster Management Course of Disaster Management Policy Program"

September 2016

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 2014-2015 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)
Shinji Egashira, Training and Research Advisor
Katsuhito Miyake, Chief Researcher
Katsuichi Tadokoro, Administrative head
Takashi Shirai, Chief staff

Masahiko Ohkubo (Proofreading)

ICHARM conducted a one-year Master's program entitled the "Water-related Disaster Management Course of Disaster Management Policy Program" from 3rd October 2014 to 17 September 2015 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

Contents of Report on 2014-2015 M.Sc. program, "Water-related Disaster Management Course of Disaster Management Policy Program"

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Positions are as of the time the picture was taken

JICA Opening Ceremony (October 4)

Cngratulatory address
By Mr. Kimura, Director, JICA Tsukuba

Congratulatory address
By Prof. Takeuchi, ICHARM Advisor

Congratulatory address
By Prof. Ando, GRIPS

Address by participant representative
Mr. Kirushnarupan

Photo 1

Welcome Meetinig (October 4)

Lectures (1)

Prof. Koike, ICHARM

Prof. Takeuchi, ICHARM

Prof. Fukuoka, Chuo University

Prof. Egashira, ICHARM

Prof. Huang, Sophia University

Prof. Kondo,
Sabo and Landslide Technical Center

Lectures (2)

Asso. Prof. Sayama, ICHARM

Asso. Prof. Yorozuya, ICHARM

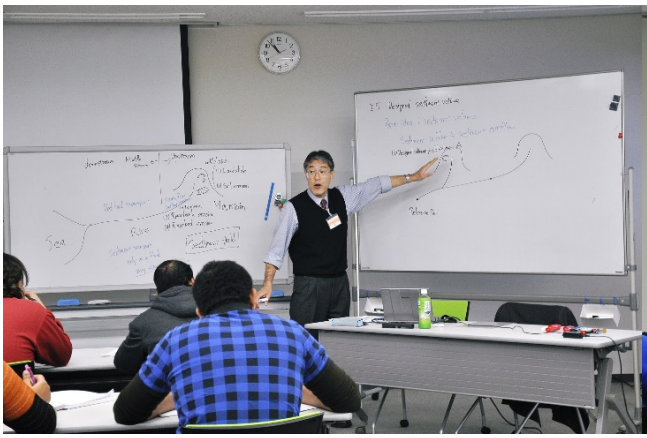
Asso. Prof. Kibler, ICHARM

Prof. Oki, The University of Tokyo

Mr. Watanabe, International Institute for Social Development and Cooperation

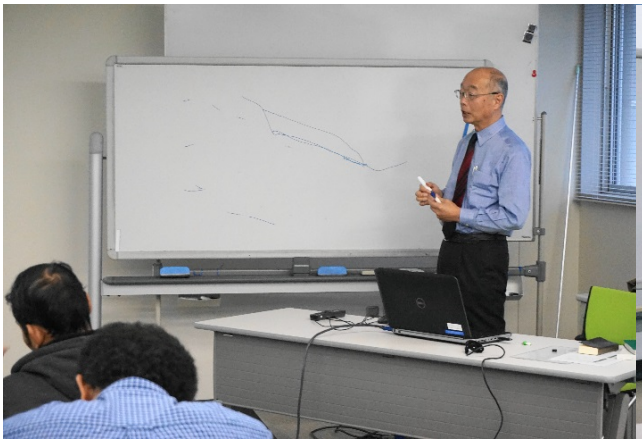
Prof. Hayashi, Kyoto university

Lectures (3)



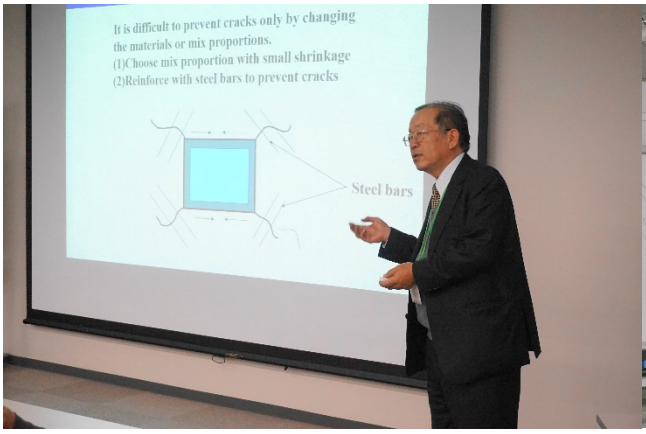
Prof. Sasahara, Kouchi university

Prof. Sugai, The University of Tokyo



Dr. Tsunaki,
Sabo and landslide Technical Center

Dr. Takanashi, Asia Air Survey Co., Ltd.

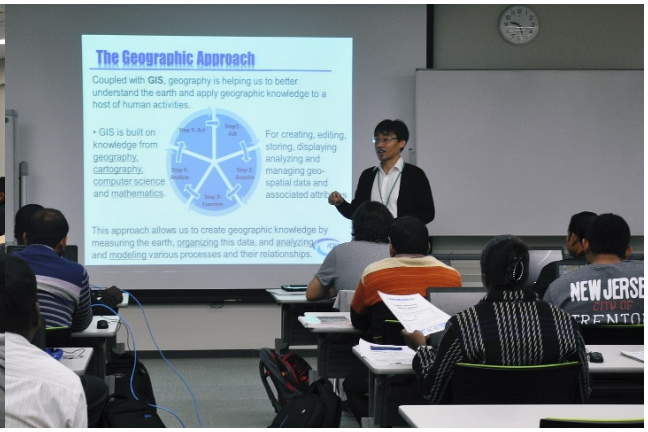


Prof. Uomoto, PWRI

Dr. Osanai, PWRI

Lectures (4)

Dr. Ushiyama, ICHARM



Dr. Kwak, ICHARM

Dr. GUSYEV, ICHARM

Dr. Hasegawa, ICHARM

Dr. Shrestha, ICHARM

Hydraulics exercise held at an experiment station in Tsukuba city (Dec. 9)

Photo 7

Exercise on Project Cycle Management (Jan. 6, 7 and 8)

Photo 8

Discharge observation exercise at Asahi bridge over Shinano river (April 24)

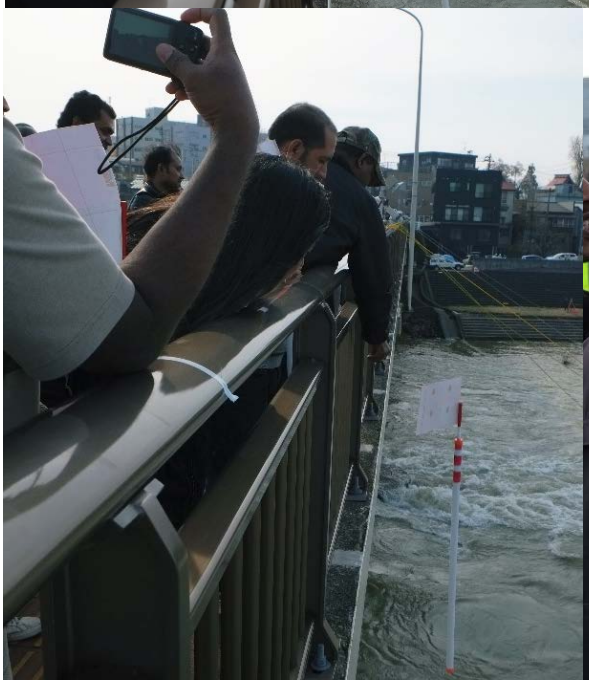


Photo 9

Site Visit

Geospatial Information Authority of Japan (Nov. 27)

National Research Institute for Earth Science and Disaster Prevention (Jan. 23)

GSI

NIED

Photo 10

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Oct. 29
Tone Canal
Tone Canal Management and Construction Office of Japan Water Agency

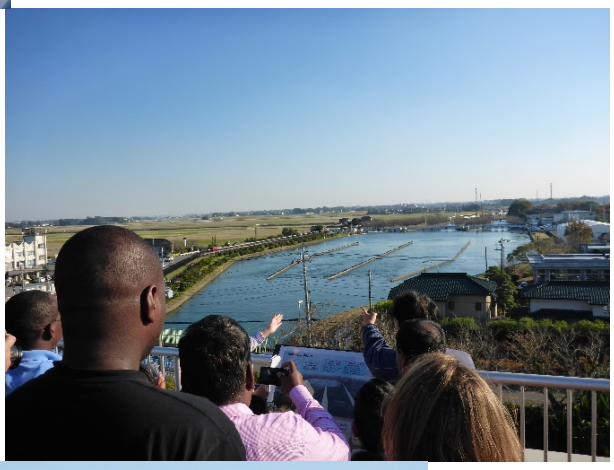

Photo 11

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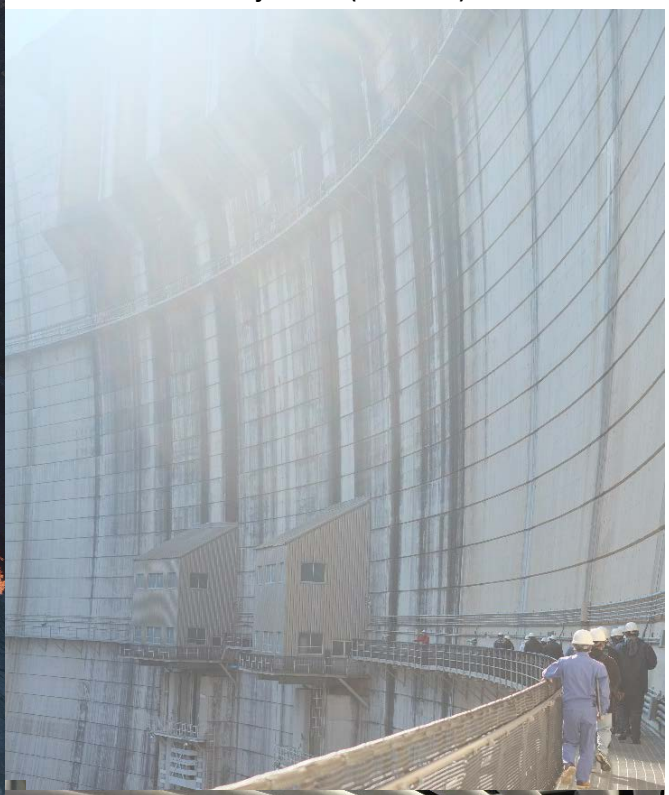


Photo 12

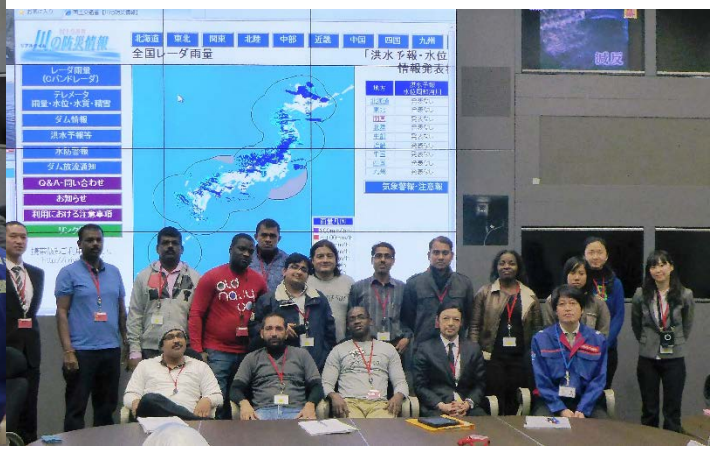
Site Visit to
Tone River Basin (Oct. 29, 30 and 31)

Inarigawa Sabo Works (Oct. 31)

Ashio Sabo Works (Oct. 31)

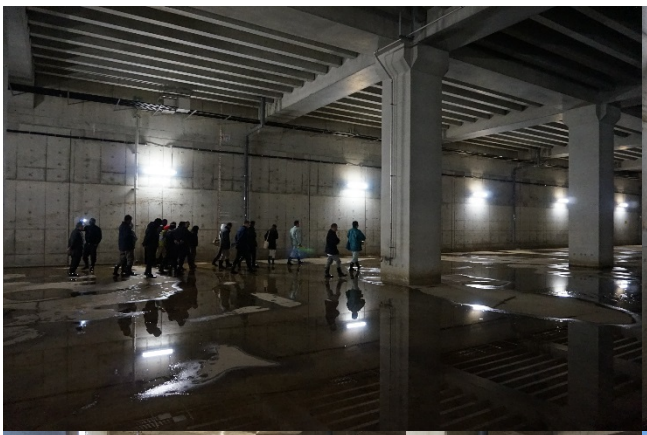
Site Visit
Urban River in Japan (Dec. 17, 18 and 19)

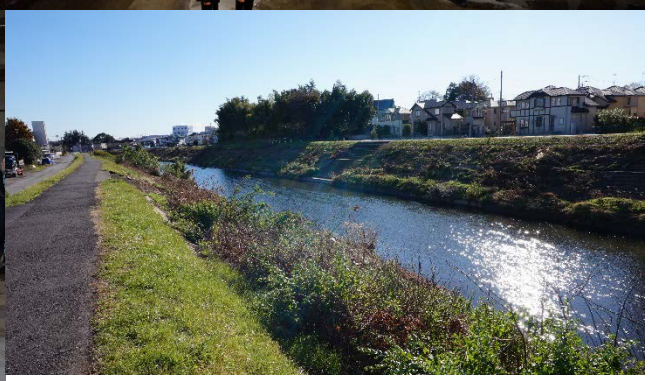
Kanto Regional Bureau of MLIT (Dec. 17)



Tsurumi River Basin Center (Dec.18)

Site Visit
Urban River in Japan (Dec. 17, 18 and 19)



Kawawa Retarding Basin (Dec. 18)

Onmawashi Park Underground Reservoir (Dec. 18)

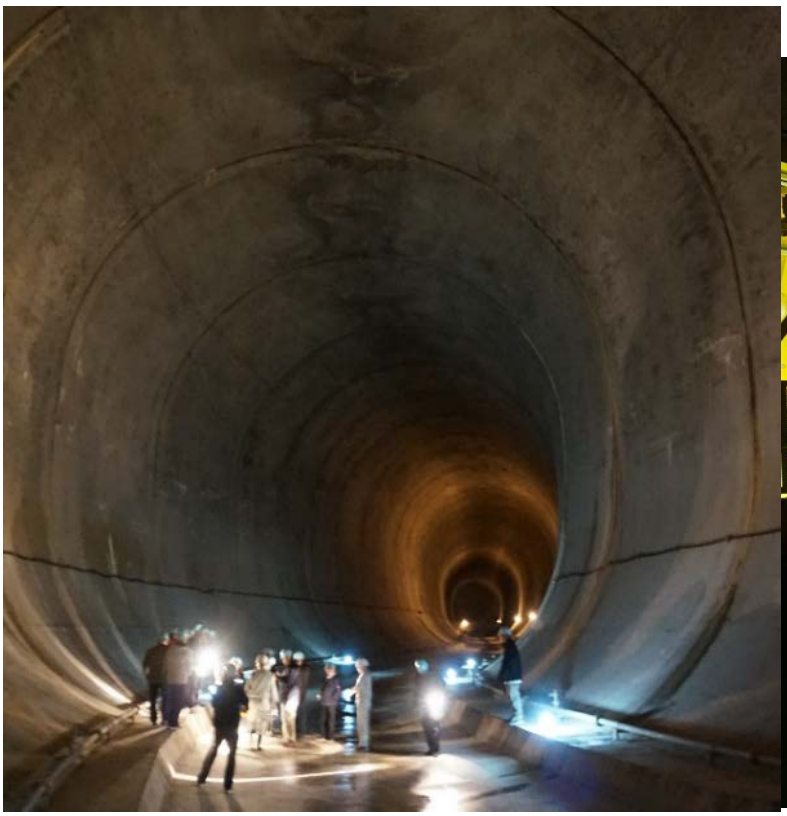
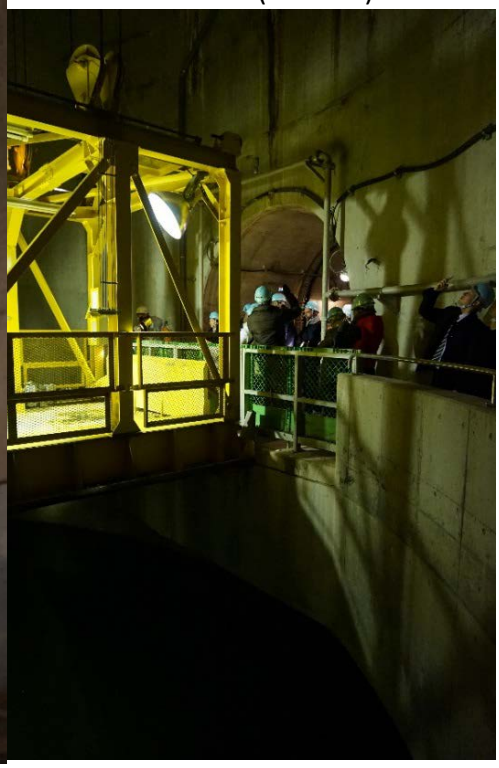



Photo 15

Site Visit to
Urban River in Japan (Dec. 17, 18 and 19)

Japan Meteorological Agency (Dec. 19)

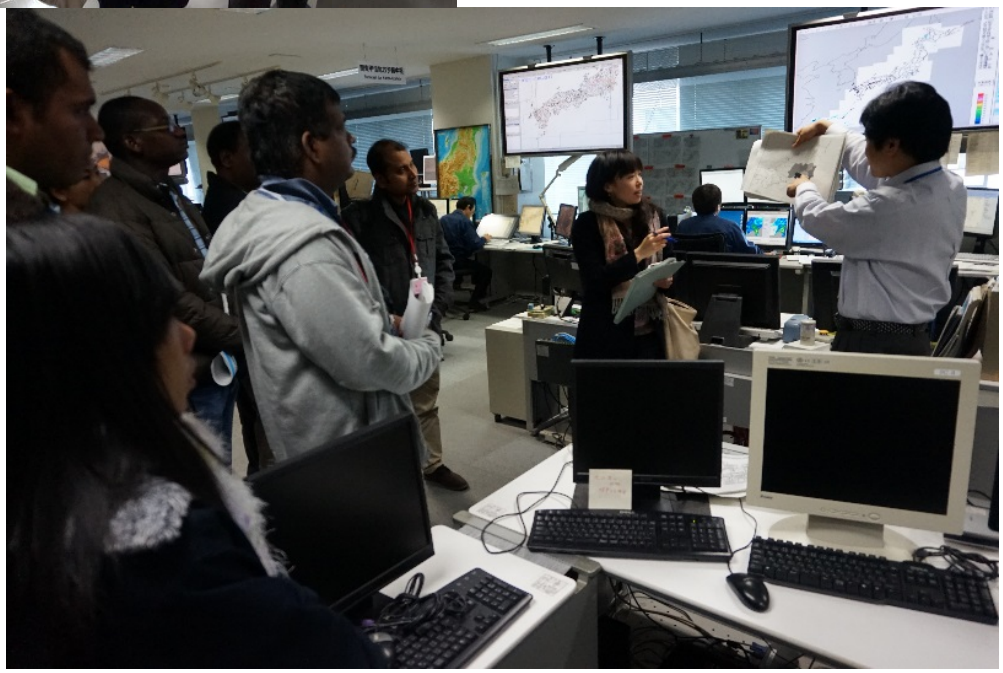


Photo 16

UN World Conference on Disaster Risk Reduction in Sendai on March 14

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The Restoration of the Tohoku Region (Ishinomaki city) (Mar. 14)





Photo 18

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Fukuoka Weir （April 3）

Photo 19

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Shinano River Basin （April 23, 24 and 25）

Shinano River Downstream Work Office, MLIT
（April 23）

Museum of Ohkouzu Diversion Channel（April 23）

Photo 20

Site Visit
Shinano River Basin （April 23, 24 and 25）

Sagurigawa Dam, MLIT（April 24）

Photo 21

Site Visit
Yodo River Basin (May 27, 28, 29 and 30)

Kinki Regional Development Bureau, MLIT

Yodo River Museum（May 28）

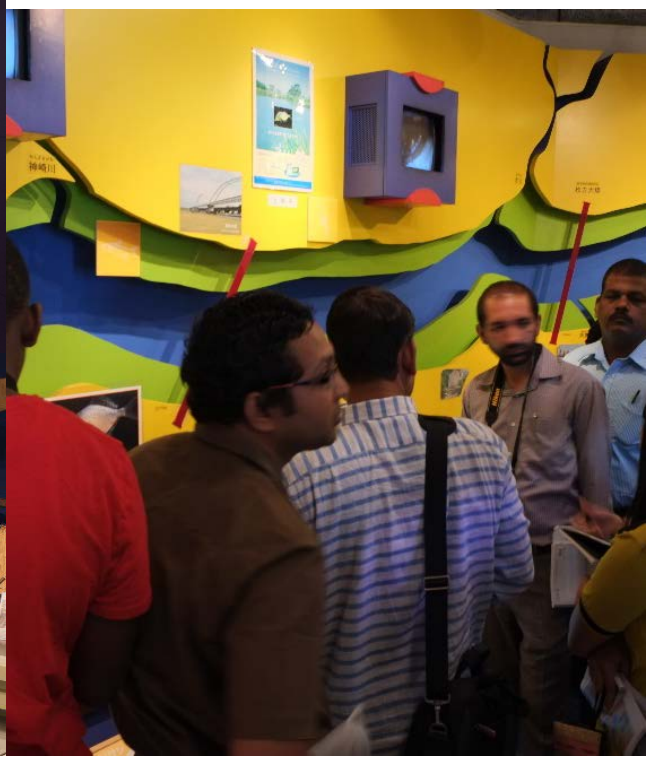


Photo 22

Site Visit
Yodo River Basin (May 27, 28, 29 and 30)

Arashiyama District（May 28）

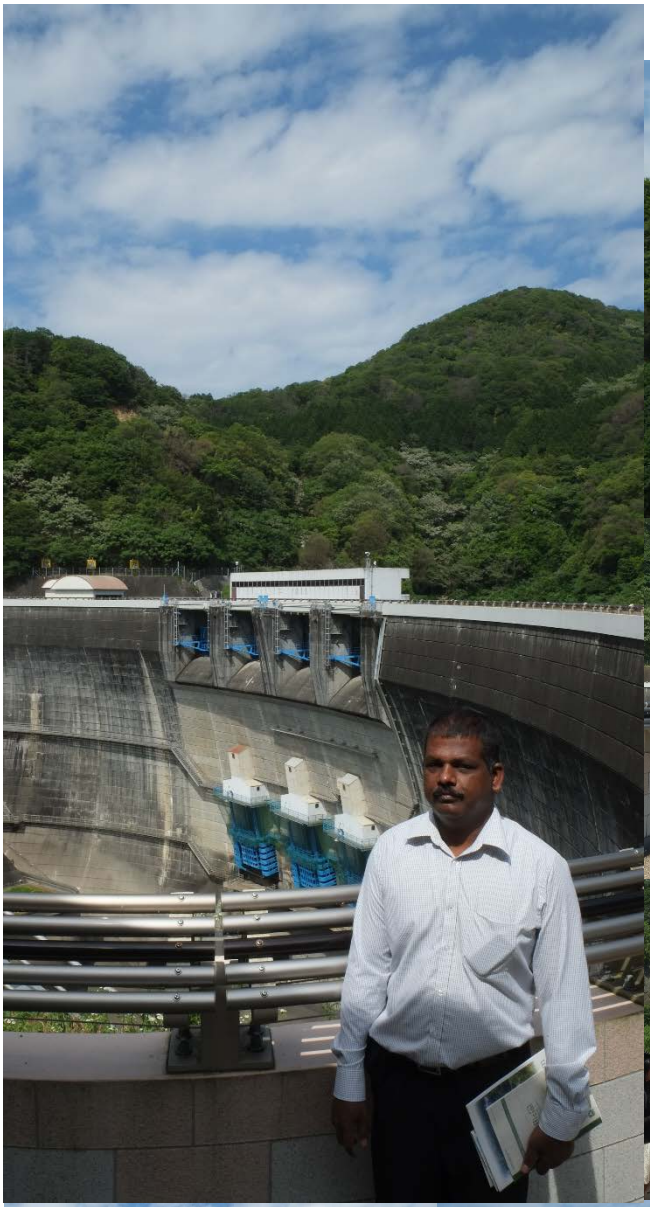
Photo 23

Site Visit
Yodo River Basin (May 27, 28, 29 and 30)

Yodogawa River Integrated Dam
Control Office (May 29)

Photo 24

Site Visit
Yodo River Basin (May 27, 28, 29 and 30)



Amagase Dam, MLIT（May 29）

Photo 25

Site Visit
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The Lake Biwa Canal (May 30)

Photo 26

Site Visit
Hakojima Anti-Flood Pond (Jun 12)

Photo 27

Final Presentation （1）

（ August 12）

Mr. BHUAYAN Md Abu Baker Siddique

Mr. GONZALEZ ROJAS Jorge Andres

Mr. NAWAI Josefa

Mr. SHARMA Sanjay Kumar

Mr. SYED Mohd Faiz
(Best Research Award)

Mr. VIRK Muhammad Irfan

Final Presentation (2)

(August 12)

Mr. CHEEMA Sohail Babar

Ms. Aye Aye Naing

Mr. OTIENO George Chilli
(Best Research Award)

Ms. BARASA Betty Namulunda

Mr. COLLINS Otieno Odhiambo

Final Presentation (3)

(August 12)

Mr. NAVARATHINAM Kirushnarupan

Mr. VALLIPURAM Thavakkumar

Photo 30

Closing Ceremony
（Sept. 16）

Photo 31

Closing Ceremony
（Sept. 16）

Photo 32

Graduation Ceremony at GRIPS (Sept. 17)

Photo 33

Graduation Ceremony at GRIPS (Sept. 17)

Celebration

Photo 34

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. Such devastating disasters have not only been statistically increasing, but also expanding especially 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 exposure of coastal areas, delta areas in the lower reaches of rivers, and small islands.

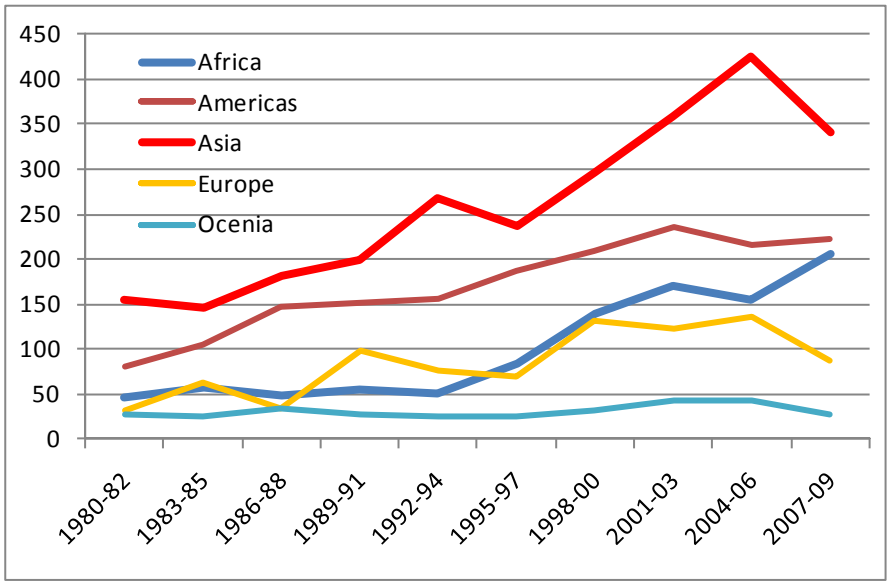


Figure 1-1 Annual variation in the number of water-related disasters by region

(Prepared by ICHARM based on CRED EM-DAT)

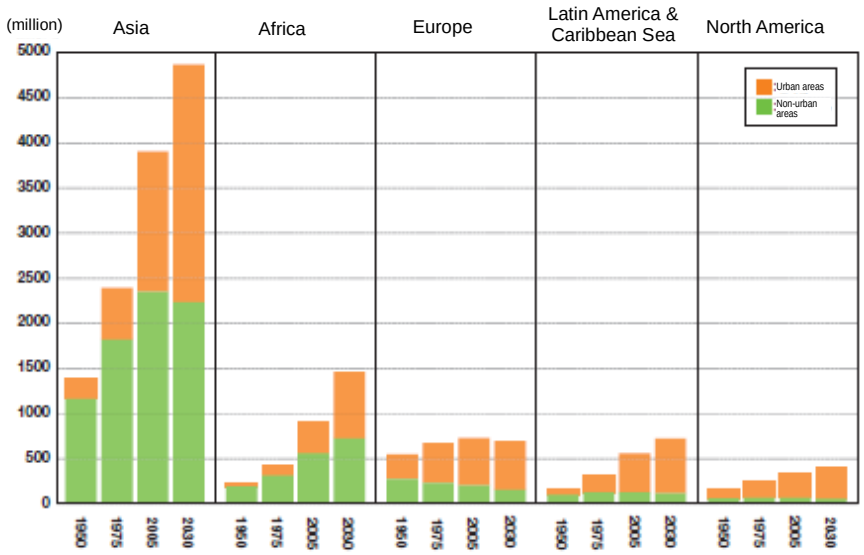


Figure 1-2 Demographic change in urban and non-urban areas by region

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

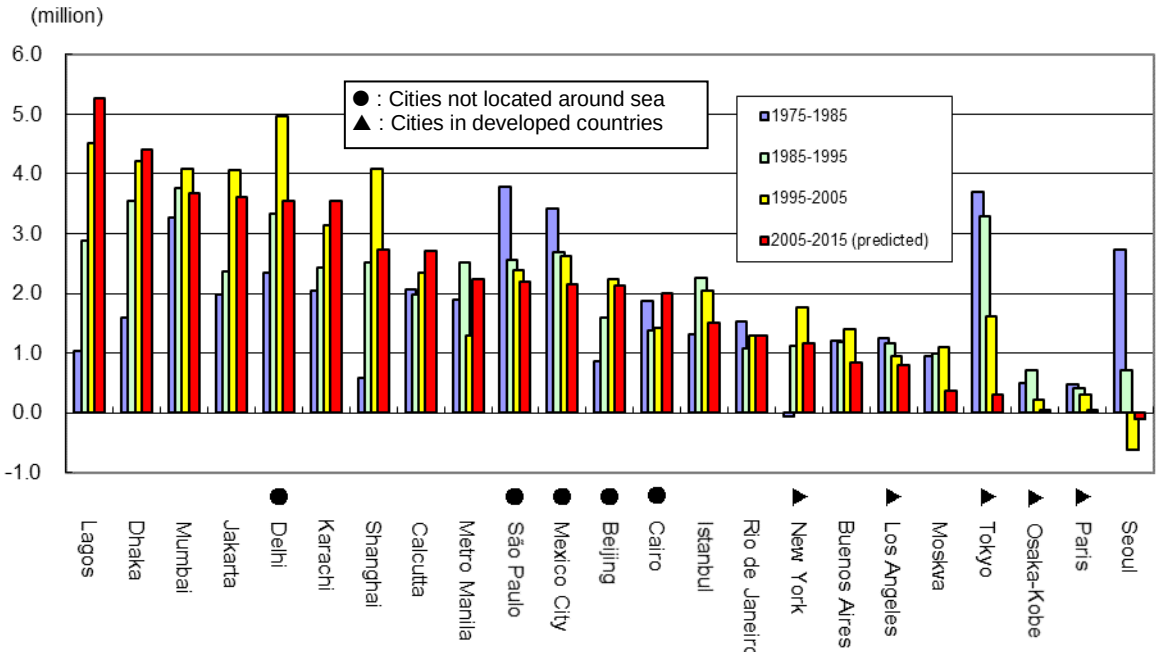


Figure 1-3 Demographic changes in major cities worldwide between 1975 and 2015

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

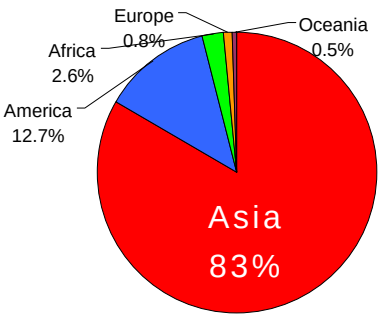


Figure 1-4
Distribution of fatalities due to water-related disasters (1980–2006)

(Prepared by ICHARM based on CRED EM-DAT)

In order to reduce the impact of natural disasters, well-balanced risk management before, during, and after disasters must be established in a multi-disciplinary manner, covering measures that involve infrastructure such as dams and levees, measures that involve non-infrastructure such as flood warning systems, risk-map/hazard-map and social psychology. To meet this need, disaster management experts must be created through professional education and training so that they can develop appropriate disaster management policies and techniques 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 eighth 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 assistance for establishing legislation, institutions and systems, as well as human resource development, and lists concrete measures including human resource development, training, exercise and technology transfer for disaster risk reduction policy planning and emergency disaster relief (both domestic and international).

The intent of this part of the initiative precisely matches the goal of the 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, we have set the final goals and objectives of the course to be as follows.

<Overall Goal>

The damage of water-related disasters is reduced by planning and implementing the countermeasures of water-related disasters in their countries.

<Program Objective>

The participant's capacity to practically manage the problems and issues concerning water-related disasters is developed for contributing to mitigation of water-related disasters in their countries.

1.3 Outputs of this Course

Participants are expected to achieve the following outputs;

(1) To be able to explain basic concept and theory on generation process of water-related disasters, water-related hazard risk evaluation, disaster risk management policy and technologies.

(2) To be able to explain basic concept and theory on flood countermeasures including landslide and debris flow.

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

1.4 Features of this Course

The course is characterized by the three following points:

I. "Problem Solving-Oriented" course

In order to manage major disasters, it is essential to develop disaster management capabilities at the level of the organization as well as the abilities of the individuals within that organization, 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 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 then proactively study in order to solve them. Moreover, it will produce results which are effective for solving the issues faced by the respective students' organizations.

Based on this course philosophy, this course is designed not to be one in which students are, in some way, forced to study but one in which they think independently and find solutions to issues that are of interest to them. One of the requirements for graduation from this course is to write a master's thesis on an issue which each student identifies and to which they find their own solution. Such assignments help students develop the ability to formulate integrated flood mitigation plans, and help them address other issues at home.

II. "Practical" rather than "Theoretical"

To make the course solution-oriented, lectures and exercises which are practical rather than theoretical are provided on the course in order to enable students to work effectively in actual situations. For this reason, field trips are an essential part of the course.

III. 1 year master's course

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

1.5 Qualification for this Course

There are two methods for attendance of this course. In the first, trainees of the JICA training program "TRAINING FOR EXPERT ON FLOOD-RELATED DISASTER MITIGATION," who were recruited and selected by overseas JICA offices, participate as GRIPS students. In the second, students apply directly and are accepted for GRIPS. For the former, the overseas JICA offices in each country determine course participation once they have checked and understood the needs of participation with the relevant organizations in that country in advance, which means that students from countries for which participation has not been determined are unable to participate.

1.5.1 Application as JICA Trainee

According to the preliminary participation needs survey, the candidate countries, eligible organizations, and requirements for applicants were as follows.

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 Organization:

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 year of experience in the field of flood management in governmental organizations.
(* Basically, researcher in the University (ex: professor, etc.) are excluded.)

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

(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

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

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

4) must 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) must 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. The committee consisted of the following members:

- Prof. Shoichi Ando, Director of Disaster Management Policy Program, GRIPS
- Prof. Hitoshi Ieda, Tokyo University; also Deputy Director of Disaster Management Policy Program, GRIPS
- Senior Prof. Shigeru Morichi, GRIPS
- Prof. Ikuo Shimomura, GRIPS
- Prof. Hideo Fukui, GRIPS
- Dr. Toshiaki Yokoi, director, IISEE, BRI
- Dr. Tatsuya Azuhata, Chief Research Scientist, IISEE, BRI
- Dr. Kuniyoshi Takeuchi, Director, ICHARM
- Special Prof. Hiroshi Ikeya, GRIPS
- Prof. Fumio Takeda, GRIPS

As a result of deliberations among program committee members, a total of 13 students were selected. Annex 1-1 shows the list of students. Please note that for this academic year, the 13 students will be participating as JICA trainees.

1.6 Organization of Course Teaching Personnel

The course uses the following organizational structure for teaching personnel. 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)	Takahiro Sayama
Collaborating Associate Professor (Senior Researcher)	Miho Ohara
Collaborating Associate Professor (Researcher)	Atsuhiro Yorozuya
Collaborating Associate Professor (Research Specialist)	Kelly Kibler

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

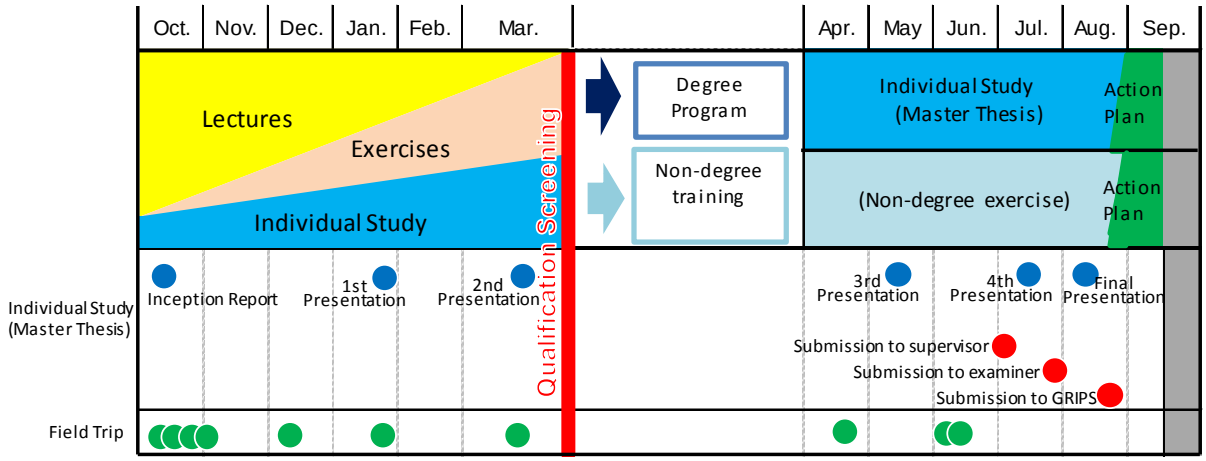


Figure 2-1 Conceptual figure of course schedule

The course was conducted over a period of around one year, from October 1, 2014 (date of arrival in Japan) to September 18, 2015 (departure date). The opening ceremony at GRIPS was held on October 2, 2014, and the graduation ceremony on September 17, 2015.

Figure 2-1 shows a course schedule.

The first half of the course (October to March) consists mainly of “Lectures” (10 subjects) and “Exercises” (3 subjects). Several “Site Visit (1 subject)” are also conducted 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, students are required to attend some ICHARM R&D Seminars held with invited experts.

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

In the second half of the course (April to September), students conducted Individual Study (1 subject), consulting with their supervisors (ICHARM researchers, etc.) as they proceeded to complete their master’s theses. To check progress on master’s theses, individual students are given opportunities of Interim Presentations of around ten minutes about once every one to two months. In these presentations, students receive advice from other students and supervisors as necessary. After submitting their master’s theses, students, who are accepted through the JICA recruitment procedure, start creating Action Plans for activities that they will perform after they return 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 year

Red: Thesis related, Blue: Site visit

Date		Event
2014 October	 2nd (Thu) 3rd (Fri) 10th (Fri) 17th (Fri) 29th (Wed) 31st (Fri)	 Entrance Guidance & Orientation at GRIPS Ph.D. & M.Sc. Joint Opening Ceremony at ICHARM Visit to Urban Renaissance Agency Presentation on Inception Report Site Visit to Nikko (Watarase Retarding basin, Kinu River and Kawaji Dam)
November	 10th (Mon) 19th (Wed)	 Joint Class (Public Works Research Institute and Building Research Institute) Introduction of ICHARM research activities
December	 17th (Wed) -19th (Fri)	 Site Visit to Urban River (Kanto Regional Bureau of MLIT, Tsurumi River Basin Information Center and JMA)
2015 January	 6th (Tue) -8th (Thu) 23th (Fri) 26th (Mon)-	 Exercise on Project Cycle Management (PCM) 1st Interim Presentation Lectures at GRIPS
February	 -6th (Fri)	 Lectures at GRIPS
March	 14th(Sat) -15th(Sun) 27th (Fri)	 The 3rd World Conference on Disaster Risk Reduction in Sendai 2nd Interim Presentation

Date		Event
April	17th (Fri) 23rd (Thu)-25th (Sat)	ICHARM Open Day Site Visit to Shinano River, (Exercise on river discharge measurement in Uono River)
May	13th(Wed) 27th (Wed)-30th (Sat)	3rd Interim Presentation in ICHARM Auditorium Site Visit to Yodo River Basin
June	12th (Fri)	Site Visit to Hakojima Retarding Basin
July	3rd (Fri) 5th (Sun) 8th (Wed) 24th (Fri)	Deadline of the 1st draft thesis to ICHARM Supervisor Flood Fighting Drill in Joso City 4th Interim Presentation in ICHARM Auditorium Deadline of the 2nd draft thesis to ICHARM Supervisor
August	12th (Wed) 31st (Mon)	Final Presentation in ICHARM Auditorium Deadline of final thesis
September	9th (Wed) 16th (Wed) 17th (Thu)	Presentation on Action Plan at ICHARM Closing Ceremony at JICA Graduation Ceremony at GRIPS

2.2 Course Curriculum

2.2.1 Lectures and Exercises

The course 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 studies and exercises involving actual applications.

Table 2-2 shows the list of course classes. Overall, the course consists of 15 subjects in three categories: I. Required Course, II. Recommended Course and III. Elective Course. In the main, lecture-oriented courses are Recommended Course, and exercise-oriented courses are Elective Course.

Each subject consists of 15 periods. All the Recommended Courses are compulsory (lectures: two credits), all the Elective Courses 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 Recommended Courses. Students are awarded a master's degree on "Disaster Management" after having earned the necessary credits and passing the thesis review. Students on this master's course do not have to take all subjects to earn the necessary credits, 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

Lecturers for this course include not only ICHARM researchers but also many professionals invited from PWRI, National Institute for Land and Infrastructure Management (NILIM) and universities, etc., so that students can learn the latest knowledge and technologies. As shown in Table 2-3, a total of 39 lecturers were involved in this course from outside and inside ICHARM: 10 from universities, 8 from incorporated government agencies, foundations, research institutes of private corporations, 2 from PWRI, and 19 from ICHARM.

With respect to the implementation of lectures, exercises, and individual studies on this course, the ICHARM staff and responsible lecturers are also contracted to provide supervision as GRIPS coordinating instructors.

2.2.3 Field Trips and Lectures conducted by officials related to Disaster Prevention Administration

This course includes field trips to retarding basins, diversion channels, dams, and sediment control and landslide prevention works in addition to lectures and exercises at ICHARM so students can learn by experiencing the actual local conditions related to Japan's flood control measures for themselves. Students also visit Regional Bureaus of the Ministry of Land, Infrastructure, Transport and Tourism and local government offices to listen to lectures given by disaster prevention officials whose work involves direct interaction with local residents. These officials give explanations of the flood information transmission systems and flood hazard maps used in Japan so that students can enhance their understanding of the problems actually encountered by Japanese disaster prevention authorities. Table 2-4 shows the list of field trip sites. The field trip sites were carefully selected so that students can actually observe the flood prevention facilities described in lectures and see representative flood prevention facilities in Japan. To ensure that they are not simply enjoyed in the manner of leisure excursions, students are required to submit reports after field trips so as to enhance their understanding of the relevant issues. Annex 2-4 shows the itineraries of the field trips.

Table 2-2 List of courses

Category	Course No.	Course Title	Instructor	Term	Credit	Required/Provided
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 Building 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 (IFRM)	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	
	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	
	DMP3870E	River Ecohydraulics	Kibler	Fall through Winter	2	
III Elective Courses	DMP1800E	Computer Programming	Sayama	Fall through Winter	1	30/34
	DMP2890E	Basic Practice on Flood Forecasting & Inundation Analysis	Sayama	Fall through Spring	1	
	DMP3802E	Advanced Practice on Flood Forecasting & Inundation Analysis	Yorozuya	Fall through Spring	1	
	DMP3900E	Site Visit of Water-related Disaster Management Practice in Japan	Kibler	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
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. Haruo Hayashi 林 春男	Disaster Prevention Research Institute, Kyoto University	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	River Ecohydraulics
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	Japan Sabo Association	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
Cabinet Office, NILIM, PWRI		
Dr. Taketo Uomoto 魚本 健人	Public Works Research Institute (PWRI)	Special Lecture
Dr. Nobutomo Osanai 小山内 信智	Public Works Research Institute (PWRI)	Control Measures for Landslide & Debris Flow

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
Mr. Minoru Kamoto 加本　実	Urban Flood Management and Flood Hazard Mapping, Master's Thesis
Mr. Yoichi Iwami 岩見　洋一	River Ecohydraulics
Assoc. Prof. Takahiro Sayama 佐山　敬洋	Computer Programming, Basic Practice on Flood Forecasting & Inundation Analysis, Advanced Practice on Flood Forecasting & Inundation Analysis, Master's Thesis
Assoc. Prof. Atsuhiro Yorozuya 萬矢　敦啓	Hydraulics, Basic Practice on Flood Forecasting & Inundation Analysis, Advanced Practice on Flood Forecasting & Inundation Analysis, Master's Thesis
Assoc. Prof. Kelly Kibler	River Ecohydraulics, Site Visit of Water-related Disaster Management Practice in Japan,
Dr. Kwak Young Joo 郭　栄珠	Basic Practice on Flood Forecasting & Inundation Analysis, Advanced Practice on Flood Forecasting & Inundation Analysis, Master's Thesis
Dr. Akira Hasegawa 長谷川　聡	Computer Programming, Master's Thesis
Dr. Tomoki Ushiyama 牛山　朋來	Computer Programming, Master's Thesis
Dr. GUSYEV　MAKSYM	Basic Practice on Flood Forecasting & Inundation Analysis, Advanced Practice on Flood Forecasting & Inundation Analysis, Master's Thesis
Dr. Shrestha Badri Bhakta	Basic Practice on Flood Forecasting & Inundation Analysis, Advanced Practice on Flood Forecasting & Inundation Analysis
Dr. Yoshihiro Shibuo 渋尾　欣弘	Site Visit of Water-related Disaster Management Practice in Japan, Master's Thesis
Assoc. Prof. Miho Ohara 大原　美保	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 10th (Fri)	Office of Urban Renaissance Agency (Takezono, Tsukuba-city), In and around Tsukuba Science City	Infiltration and storage facilities in Tsukuba	Project Planning Team, Project Department, Ibaraki Branch Office, Tokyo Metropolitan Area New Town Office, Urban Renaissance Agency
October 29th (Wed)	Tone Water Transfer Canal System Reconstruction and Management Office, Japan Water Agency	Roles of Tone Ozeki Weir	Tone Transfer Canal System Reconstruction and Management Office, Japan Water Agency
October 30th (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	
	Yunishigawa Dam	Observation of concrete gravity dam	
October 31st (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
November 27th (Thu)	Geospatial Information Authority of Japan (GSI)	Disaster management projects by GSI Basic map information Digital national base map	Geospatial Information Authority of Japan
December 17th (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
December 18th (Thu)	Kawawa Retarding Basin	Flood countermeasures in Kanagawa Prefecture (integrated flood control project)	River Division 1, Yokohama Kawasaki Flood Control Office, Kanagawa Prefectural Government

	Onmawashi Park Regulating Reservoir		Engineering Division, Kawasaki Flood Control Center, Yokohama Kawasaki Flood Control Office, Kanagawa Prefectural Government
December 19th (Fri)	Japan Meteorological Agency (JMA)	Meteorological services of Japan, etc.	Japan Meteorological Agency (JMA)
January 23rd (Fri)	National Research Institute for Earth Science and Disaster Prevention (NIED)	Disaster prevention research by NIED	National Research Institute for Earth Science and Disaster Prevention (NIED)
March 15th (Sat)	Ishinomaki City	Progress in restoration and rehabilitation from Great East Japan Earthquake	
April 23rd (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 24th (Fri)	Sagurigawa Dams	[Observation] Structure of rockfill dams Roles of Sagurigawa Dam in flood control	Sagurigawa Dam Control Office, Hokuriku Regional Development Bureau, MLIT
May 27th (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
May 28th (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.	
	Katsura River (Koga Bridge), Arashiyama (Togetsukyo Bridge)	[Observation] Damaged spots due to Typhoon No. 18	

May 29th (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	
	Lake Biwa River Office	Description of work contents and observation of overfall weir, Otsu Diversion Channel and Aqua Biwa	Lake Biwa River Office, Kinki Regional Development Bureau, MLIT
June 12th (Fri)	Kokai River, Hakojima Retarding Basin, Kuroko Station	Visit to the retarding basin and water-level observation station	Planning Section of Shimodate River Office, Kanto Regional Development Bureau, MLIT

2.2.4 Studying and Living Environment

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 is usual in universities, lesson time is divided into credits of 90 minutes. Table 2-5 shows the daily timetable. Students stay at JICA Tsukuba (Kouyadai, Tsukuba, Ibaraki) and commute to classes on the JICA bus.

As was the case last year, in the first half of the course from October to March there is an "Nicchoku" (officer-of-the-day) system, with the students participating in turn; the student assigned as the Nicchoku for the day performs tasks 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 results on a "Nicchoku Sheet" (one page of A4 sized paper). In the second half of the course, from April to September, which mainly consists of individual study, students take turns on a weekly basis, checking attendance and producing a weekly summary report.

2.3 Master's Thesis

As mentioned above, this course is characterized by its "Problem Solving-Oriented" nature, which aims to allow students think and solve problems rather than forcing them to study. In accordance with this objective, students are required, for their master's thesis on this course, to study themes related to solving problems in their own countries. We hope to develop people with the ability to create comprehensive plans for the reduction of damage from water-related disasters and to promote problem solving in the home countries of our students when they return there.

Therefore, immediately after the course starts, we held an "Inception Report" presentation in which students explained the water related problems in their home countries, gave information concerning the areas in which they were planning to study for their master's theses, and described the tasks required for the performance of projects. Following this, ICHARM supervisors and students discussed themes for study, and students started working on their own study themes even before they had completed most of their lectures and exercises. The deadline for submitting master's theses was late August 2015, and submission was followed by acceptance examinations in GRIPS to determine whether master's degrees could be awarded.

Chapter 3: 2014–2015 Activity Report

Group photo taken at the GRIPS
(September 17, 2015)

(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 2, 2014, to September 17, 2015, 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 on a local level and to eventually contribute to socioeconomic or environmental improvement at a national level.

The course has several specific features, as follows. 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 actual tasks rather than theory.

There were 13 students this year: one each from Bangladesh, Columbia, Fiji, and Myanmar, two each from India, Pakistan, and Sri Lanka, and three from Kenya. These 13 students all successfully passed their thesis examinations, earned their master’s degree in Disaster Management, and returned to their home countries.

The course formally started on October 1, 2014, with a course orientation meeting held at JICA.

On October 2, the entrance ceremony was held by GRIPS at the GRIPS building in Roppongi, Tokyo. On October 3, the opening ceremony was held at PWRI with the attendance of officials from PWRI (Vice President Fujisawa, Director of General Affairs Department Umehara), ICHARM (Director

Takeuchi, Deputy Director Suzuki, Chief Researcher Kamoto, Head Tadokoro, Chief Staff Shirai), JICA Tsukuba (Director General Kimura, Director Kikuchi, former Director Kawasumi, Officer Suzuki, Training Coordinator Yamada) and GRIPS (Prof. Ando). Welcome speeches were made by participants, and Mr. NAVARATHINAM Kirushnarupan 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 a long period working on their individual studies. The students also went on field trips in order to learn from the actual locations where Japan's flood countermeasures are implemented.

The instructors on the 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 the students took included the Basic Concepts of Integrated Flood Risk Management (IFRM), which is indispensable knowledge for students of a master's course learning how to cope with flood disasters. 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., lectured the students on the basic concepts of flood disaster control and global warming.

At the same time, lectures on Hydraulics were delivered to teach the students the basics of hydraulics, which is also an essential subject for the course. Associate Prof. Atsuhiro Yorozuya of ICHARM delivered a refresher course on calculus, and Prof. Huang Guangwei of Sophia University delivered basic lectures. Then, hydraulic exercises and discharge observation exercises were conducted by Assoc. Prof. Yorozuya.

In addition, Professor Shoji Fukuoka of Chuo University and gave lectures under the title "Flood Hydraulics and River Channel Design" teaching the basic principles of flood flow and sediment transport. These lectures were followed by lectures on "Mechanics of Sediment Transportation and River Changes" by Professor Shinji Egashira of ICHARM.

Lectures on "Hydrology" by Prof. Toshio Koike (ICHARM) were given from October to December, and the students were lectured on basin-wide water circulation/hydrological processes, field observations/remote sensing, and water resources management.

In addition, lectures under the title "Urban Flood Management and Flood Hazard Mapping" were given as more practical lessons. Specifically, Prof. Shigenobu Tanaka (Kyoto University) and Chief Researcher Minoru Kamoto (ICHARM) lectured on Japanese disaster prevention systems, river information systems and evacuation. Furthermore, Prof. Haruo Hayashi (Kyoto University) provided a lecture on disaster psychology, and Prof. Toshihiko Sugai (University of Tokyo) gave a lecture on geomorphology, an important topic for understanding flood-prone areas.

Also, ICHARM researchers started offering various exercises.

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, rainwater runoff inundation model (RRI model) by Assoc. Prof. Takahiro Sayama, Integrated Flood Analysis System (IFAS) by Researcher Badri Bhakta Shrestha, and BTOP model by Research Specialist Maksym Gusyev.

In the “Computer Programming” exercises, Assoc. Professor Takahiro Sayama, Research Specialist Tomoki Ushiyama, and Research Specialist Akira Hasegawa provided instruction on numerical solutions using FORTRAN.

In mid November, when the students became used to the content of the study, chief researchers of ICHARM introduced to them possible research topics related to the projects for which they were responsible. This was intended to ensure that participants’ understanding of ICHARM’s research projects triggers them to begin thinking about the theme of own master’s thesis and their questions to researchers of ICHARM about the research content. On November 10, joint lectures were held for the students of this course and those of the Earthquake Course and Tsunami/Earthquake Course of the Disaster Management Program along with field trips. In the morning, the students listened to a lecture by ICHARM Director Kuniyoshi Takeuchi at PWRI and then they visited the facilities of the dam hydraulic laboratory and river model experiment facility. In the afternoon, they moved to the Building Research Institute to see some experiment facilities and listen to another lecture.

On December 9, they visited a hydraulic experiment facility in Sakutani, Tsukuba city (Tsukuba Research Center of Pacific Consultants Co., Ltd.) to learn the basics of hydrology hands-on under the guidance of Assoc. Prof. Atsuhiro Yorozuya. The students conducted hydraulic experiments in groups.

Special lectures on dams were provided by Dr. Sakamoto (NIPPON KOEI CO., LTD.), who was once the president of PWRI, and Dr. Nario Yasuda (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 Tone River basin in late October.

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

In the two weeks from January 26 to February 6, intensive lectures on “Disaster Management Policies A: from Regional and Infrastructure Aspect” and “Disaster Management Policies B: from Urban and Building Aspect” were delivered mainly by Prof. Ieda (the University of Tokyo, GRIPS) and Prof. Ando (GRIPS). During this time, the students also took a study trip to Osaka and Kyoto.

From February to March, the lectures “Control Measures for Landslide & Debris Flow” were delivered.

In “Control Measures for Landslide & Debris Flow,” Prof. Koichi Kondo (Director, Sabo Technical Center), Prof. Katsuo Sasahara (Kochi University), Permanent Councilor Yoshifumi Hara (Japan Sabo Association), Manager Ryosuke Tsunaki (Sabo Technical Center), Lecturer Kazuyuki Takanashi (Consultant, Asia Air Survey Co., Ltd.), and Group Leader Nobutomo Osanai (PWRI) gave lectures on the latest trends and technologies in erosion control.

In “River Ecohydraulics,” Asso. Prof. Kelly Kibler (ICHARM), Prof. Tetsuya Sumi (Kyoto University) and Chief Researcher Yoichi Iwami (ICHARM) delivered lectures on river ecosystems and the impact of dams on river environments.

In the “Advanced Practice on Flood Forecasting & Inundation Analysis” exercise, the students engaged in exercises with more advanced content about GIS based on what they had learned from the exercises for “Basic Practice on Flood Forecasting & Inundation Analysis.” In addition, each student selected the model that is closest in content to his/her master’s thesis from among RRI, IFAS or BTOP, and intensively studied the selected model.

On April 24 during our visit to the midstream area of the Shinano River, the students were introduced to aDcp (acoustic Doppler current profilers) observation equipment, and performed exercises on discharge observation using the float observation method and a radio current meter in the Shinano River near Shinanogawa Riverside Park, located in Ojiya City, Niigata Prefecture, under the guidance

of Asso. Prof. Yorozuya and Researcher Kudo (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.

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

<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 enabling students to acquire clues to solving the problems presented by water-related disasters in their various countries.

On October 10, the students visited a newly developed area in Tsukuba city to observe storm water storage and infiltration facilities. With the cooperation of the Ibaraki Branch Office of the Urban Renaissance Agency, after being given an overview at the office, we visited a reservoir and an infiltration facility in the vicinity of Tsukuba Science City. From October 29 to 31, we visited a few sites in the river basins of the Tone River and Kinu River to observe case examples of flood countermeasures in non-urban areas, especially dams to which flood control technologies are applied using the topographical feature of a rapid river. On the 29th, with the cooperation of the Tone Canal Management and Construction Office of Japan Water Agency, the students took a close look at the Tone Barrage, which were built to supply irrigation water for areas in the middle reach of the Tone River and purify the Sumida River water. They were curious about river water purification and asked questions. On the following day, October 30, we 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 explanations of the outline of the four dams in the upstream area of the river and their operational coordination at the Office, they were brought to the Kawaji Dam and Yunishigawa Dam. It was a valuable visit as they were able to observe inside the dam body. On the last day of the 31st, we visited erosion control sites in the Inari River and Ashio area with the cooperation of the Nikko Sabo Office and Watarase River Office. They were awestruck by the grandeur of the slit-type erosion control facility in the Inari River when they were able to go down very close to the facility. In the Ashio area, after being welcomed by Japan’s largest class of erosion control weir, they heard a lecture on the sediment control works with mock-up display models at the Akagane Shinsui Park and then visited an actual site where hillside works are 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 students appeared to realize the importance of erosion control projects all over again after the course of this one day.

Over the period from December 16 to 18, a study tour was conducted with primary emphasis on flood control in urban rivers. The students were first given lectures at the Kanto Regional Development Bureau on flood forecasting/warning and on X-band MP radar with an explanation on differences between it and C-band. On December 17, they went on a field trip to observe the comprehensive flood control measures in an urban river basin with the help and guidance of Executive Director Masahiro Imbe of the Association for Rainwater Storage and Infiltration Technology and the Kanagawa prefectural government. Specifically, we visited the Tsurumi River Retarding Basin, the Kirigaoka Retarding Pond, the Kawawa Retarding Basin, Onmawashi Park Underground Reservoir, and the houses of local residents who had installed rainwater infiltration systems on their properties. The area along the Tsurumi River was rapidly urbanized after the war; learning about the flood measures

implemented there was thought to prove useful in implementing flood control measures in major Asian cities where populations are still increasing. In particular, in the Kawawa Retarding Basin, we learned that there is a storage facility underneath a subway line depot. We were strongly reminded of the importance of intersectoral collaboration, such as 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 rainfall attacks. On December 18, they visited the Japan Meteorological Agency (JMA) and were given an overview of the meteorological services and methods of forecasting, and then they visited the forecasting room. They were informed of the fact that JMA, MLIT and prefectural governments work closely together to forecast river floods.

On March 15, the students went on a study tour to Ishinomaki city, which suffered tremendous damage from the Great East Japan Earthquake. The city has been cleaned of rubble from the disaster, but it was a precious experience for them to actually be at a disaster site and think about how fierce the tsunamis were and how the survivors acted during the catastrophe, in addition to reading articles by survivors and watching documentary videos beforehand.

On April 3, we 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. We were also able to show the students the beautiful nature of Japan as the sakura season was in full swing.

From April 23 to 25, we visited the midstream area of the Shinano River and conducted discharge observation exercises. On the 23rd, the students were given an overview of the flood countermeasures at the Shinanogawa-Karyu River Office of MLIT, and then they moved to the Ohkouzu Diversion Channel where they learned the history of the floods and countermeasures in the Shinano River and observed the new and former movable weirs to understand roles of the Ohkouzu Diversion Channel, a key facility for flood countermeasures in the Shinano River. On the 24th, we visited the Sagurigawa Dam, and after hearing a lecture on the structure of a rockfill dam, the students observed the dam body. As mentioned earlier, the students participated in discharge observation in the Shinano River near the Shinanogawa Riverside Park in Ojiya city.

Over the period from May 27 to 30, a study tour to the Kinki region was conducted. Its purpose was for students to learn about flood control measures in the Yodo River Basin, which has developed over the years using abundant water resources derived from Lake Biwa, and to learn about the impact of and administrative bodies' response to Typhoon No. 18 which brought record rainfall in September 2013. First, we visited the Kinki Regional Development Bureau of MLIT, to get an overview of the typhoon and damages within the jurisdiction. It was explained to the students that even though Typhoon No. 18 brought record precipitation and wreaked enormous damage on every corner of Japan, quite a few areas were able to avert damage thanks to countermeasures constructed after the typhoon damage in 2004, and expansion of damage was able to be avoided through collaborative operations of a group of dams in the Yodo River system and operation of the Setagawa Weir. On the following two days, we visited the field offices and areas damaged by the typhoon and were provided with detailed descriptions. On the final day, the students visited the Lake Biwa Museum and the Lake Biwa Canal Museum to learn about the rich culture in the Yodo River Basin. During this study tour, the students enthusiastically attended the observation program and actively asked questions to the personnel on site, of which some were related to the themes of their own master's theses.

On June 12, the students visited the Hakojima Retarding Basin of the Kokai River to learn the roles and functions of a retarding basin in general. They were also led to the Kuroko station and given a short lecture about how to measure water levels. In the afternoon, 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" helps them realize the importance of

developing an affluent society through the cooperation of many people and the importance of self-help, mutual help, and public help. Every year, ICHARM offers the “ICHARM Sontoku Award” through mutual voting among the students to honor the student who has contributed the most to fellow students and this course. On July 5, we observed the Flood Fighting Drill sponsored 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.

Additional study tours were made to research institutes in Tsukuba city. On Novemeber 27, 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 January 23, they visited the National Research Institute for Earth Science and Disaster Prevention, where they learned about satellite rainfall observation technology using X-band MP radars and took a close look at a large laboratory for rainfall experiments.

<Master’s thesis>

For students writing their master’s thesis, ICHARM researchers interviewed each of the students individually to find out which aspects they wished to research and supported them in what paths to take in their research in order to resolve water–related disasters in their respective countries. First of all, on October 17, the students presented their inception reports. Then, the students and the researchers discussed the process of the students’ master thesis research to determine which ICHARM researcher each student should work with on their own thesis research and they narrowed down their research themes.

For three days from January 6 to 8, we invited a lecturer from the GLM Institute to provide a practice session on “Project Cycle Management.” This subject aimed to teach students to illustrate a problem in a tree structure, analyze it and prepare and set the schedule for measures against it. This is a very useful exercise as it helps students objectively analyze the problems faced by each student’s home country and to determine the direction of their thesis research.

With the students’ first interim thesis presentation being on January 23, they had a total of four presentations to give including the three ensuing on March 27, May 13 and July 8. These interim presentations not only provided the students with the opportunity to receive advice from ICHARM researchers, it also allowed them to see their fellow students’ progress which motivated them to prepare theses of their own. On the final presentation day, August 12, Prof. Shoichi Ando (GRIPS) also attended the presentation and commented on each student’s achievement in the past year.

The students in this course are also encouraged to deliver presentations and submit papers for journals as often as possible.

In this respect, the 3rd United Nations World Conference on Disaster Risk Reduction, held in March 2015, was a great opportunity for the students to present their research results. In fact, three students of this course, Mr. GONZALEZ ROJAS Jorge Andres of Columbia, Mr. SYED Mohd Faiz of India, and Mr. OTIENO George Chilli of Kenya, spoke in a public forum organized by GRIPS.

In this way, we intend to actively provide students with opportunities to present their research findings in order to motivate them in their work on their master’s theses.

<Others>

Students actively participated in the “ICHARM R&D Seminar” presented by water disaster area specialists invited by ICHARM. Students were given a large number of opportunities to learn about the most recent trends and knowledge related to water disasters in both Japan and the wider world.

On April 6, a cherry blossom viewing party was held in the ICHARM facility grounds to help the students experience Japanese culture. They were enchanted by the view of the cherry blossoms beautifully in bloom.

On September 9, the Action Plans, which report how the results of training will be used once the students return home and what students will be involved with, were announced.

The closing ceremony for JICA training was held at JICA Tsukuba on September 16. During the ceremony, JICA Tsukuba Director Kimura, 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 the best master’s theses, was given to Mr. OTIENO George Chilli of Kenya and Mr. SYED Mohd Faiz of India. Then, the ICHARM Sontoku Award, an award decided through mutual voting among the students that is granted to the student who has contributed the most to fellow students and this course, was presented to Mr. NAVARATHINAM Kirushnarupan of Sri Lanka by Advisor Takeuchi. Representing the students, Mr. VIRK Muhammad Irfan of Pakistan shared a few words of thanks to conclude the ceremony.

On September 17, 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 stage. The students then firmly shook hands with Prof. Takeuchi, taking their diplomas—the fruit of their year’s study—with expressions on their faces showing great satisfaction.

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

2014	17th October	Presentation on Inception Report
2015	6th–8th January	Project Cycle Management exercise
	23rd January	1st Interim Presentation
	27th March	2nd Interim Presentation
	13th May	3rd Interim Presentation
	3rd July	Deadline of submission of the 1st draft thesis
	8th July	4th Interim Presentation
	24th July	Deadline of submission of the 2nd draft thesis
	12th August	Final Presentation
	21st August	Submission to GRIPS

This project is a one-year master's course, and as such students select their thesis themes in October or November, immediately after arriving in Japan and without waiting for the lectures and exercises to be completed. The principle of the project was for each student to be assigned 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 and also to allow them to get a sense of the other students' state of progress and foster an appropriate level of tension. One of our aims was also to improve the presentation skills of students by giving them several opportunities to stand up and present 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 or assistant supervisors on August 21. After their papers had been marked, all 13 students had successfully acquired a Master of Disaster Management.

Table 4-2 shows the title of each master's thesis and his or her main supervisor and assistant supervisor. Note that a synopsis of each thesis is planned to be collected in a separate report by GRIPS.

Working on their master's thesis allows students to not only increase their knowledge but to deepen their relationship with ICHARM, a process which serves to smooth communication channels between the agencies to which the students belong and ICHARM's research activities, thereby making research

data easier to obtain. Establishing this sort of international network through students will greatly assist future ICHARM initiatives.

Table 4-2 List of master's these

Name (Call Name)	Topic	Teaching Staff
Mr. BHUAYAN Md Abu Baker Siddique	Prediction of Morphological Changes in Jamuna River near Bahadurabad Area	Prof. Egashira Asso. Prof. Yorozuya Mr. Kamoto
Mr. OTIENO George Chilli	Prediction of Sediment Transport processes in Nzoia River Using Rainfall Runoff Model	
Mr. GONZALEZ ROJAS Jorge Andres	Flood Forecasting in Colombia Using Numerical Weather Prediction from WRF (ARW)	Dr. Ushiyama Dr Gusyev Dr. Shibuo
Mr. NAWAI Josefa	Flood and Drought Risk Assessment on Effectiveness of Proposed Infrastructures for Ba River Basin, Fiji	Prof Takeuchi Dr. Gusyev Dr. Hasegawa Dr. Perera*
Mr. ODHIAMBO Collins Otieno	Flood and Drought Management by Dams and Retardation Basin: A Case Study of Upper Ewaso Ngiro North River Basin	
Mr. NAVARATHINAM Kirushnarupan*	Assesment of the Proposed Dam for Flood and Drought Mitigation in the Lower Malwathoya Basin, Sri Lanka	
Mr. SHARMA Sanjay Kumar	Sensitivity for Hydrological Simulation from Topographic Data in Kulsi River Basin, India	Asso. Prof. Ohara Asso. Prof. Sayama Asso. Prof. Rasmy Dr. Perera Dr. Kwak Dr. Shibuo
Mr. SYED Mohd Faiz	Comparative Analysis of Flood Forecasting Techniques Using RRI, HEC-RAS & Gauge-to-Gauge Correlation Method for Delhi, India	
Ms. BARASA Betty Namulunda	Assessing Impacts of Land Use Changes on Flood Occurrence in Sosiani River Basin, Kenya	
Ms. Aye Aye Naing	Flood Inundation Analysis for Chindwin River Bansin by Using RRI Model, Myanmar	
Mr. CHEEMA Sohail Babar	Improvement of Applicability of Snow Hydrological Model by Using Correction Factor for Gilgit Basin, Pakistan	Prof. Koike Dr. Rasmy Dr. Tsuda Dr. Liu
Mr. VIRK Muhammad Irfan	Applicability of Satellite Rainfall Observation for Flood Forecasting in a Trans Boundary Basin Pakistan	
Mr. VALLIPURAM Thavakkumar	Development of Comprehensive Flood Control Operation with Incorporated Inflow by Cascaded Small Tanks to Pavatkulam Reservoir, Sri Lanka	Dr. Miyamoto Asso. Prof. Rasmy Mr. Kamoto

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 “the Course in General,” which deals with the course period and design, and “the Course Specifics,” which asks about lectures and exercises.

For the “Course in General,” we analyzed the results of a questionnaire given to students during the JICA Evaluation Session on the final day of the course. For the “Course Specifics,” we analyzed the results of questionnaires sporadically carried out by ICHARM.

5.1.1 Course in General

This year is the eighth 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 allowing us to analyze the changes in students’ evaluation over the past seven years, from the second year to the eighth. Although we pursued various questions in the questionnaire, our 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 for the above six items in the past seven years, while the breakdowns are shown in Figures 5-1 to 6.

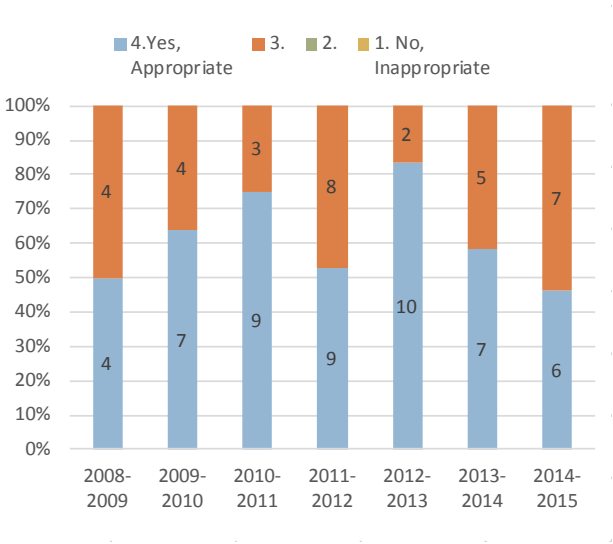
1. あなたもしくは所属組織が案件目標を達成する上で、プログラムのデザインは適切であると思いますか。

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**

図5-1Figure 5-1



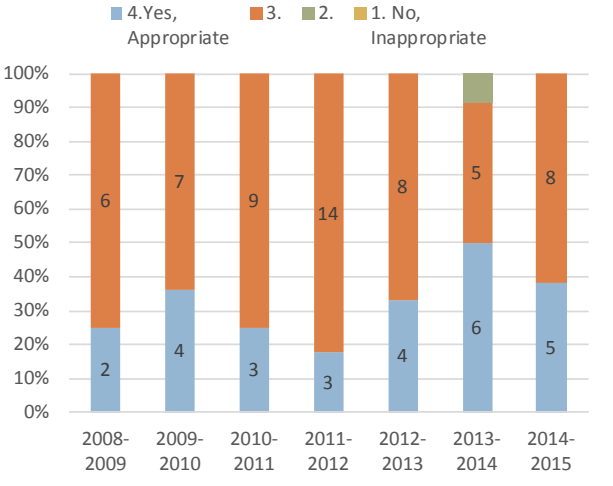
2. 講義の質は高く、理解しやすかったですか。

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**

図5-2Figure 5-2



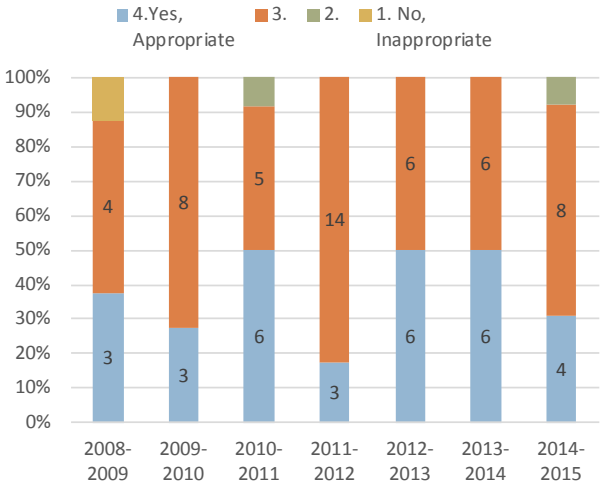
3. テキストや研修教材は満足するものでしたか。

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**

図5-3Figure 5-3



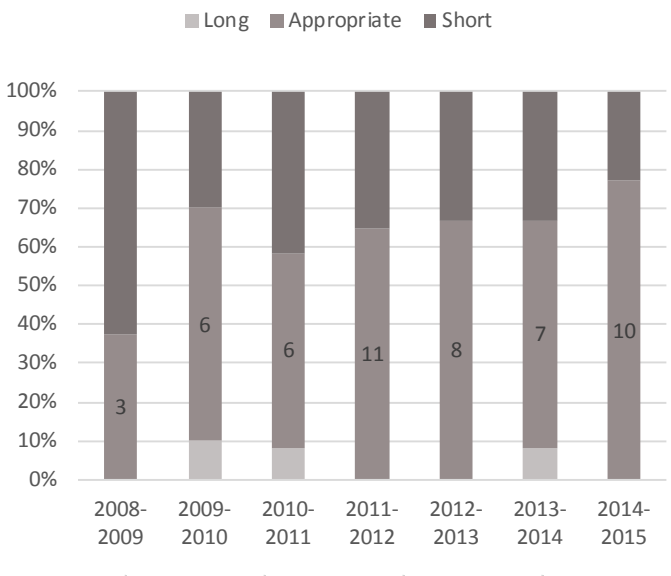
4. 研修期間は適切でしたか。

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**

図5-4Figure 5-4



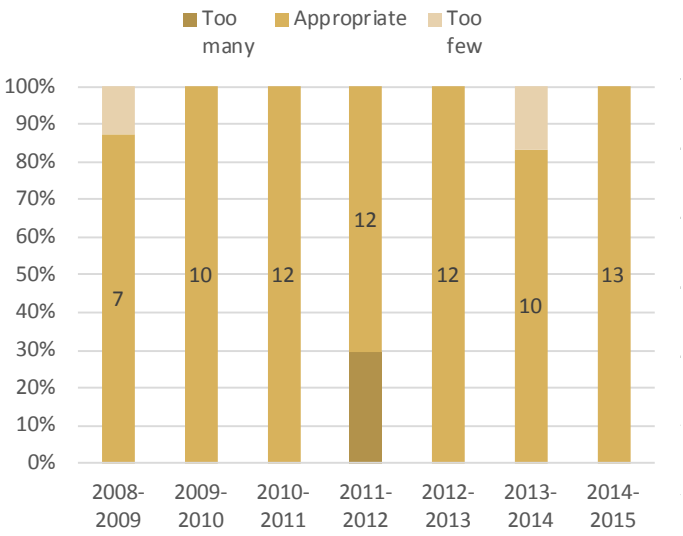
5. 本研修の参加者人数は適切と思いますか。

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**

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**

図5-6Figure 5-6

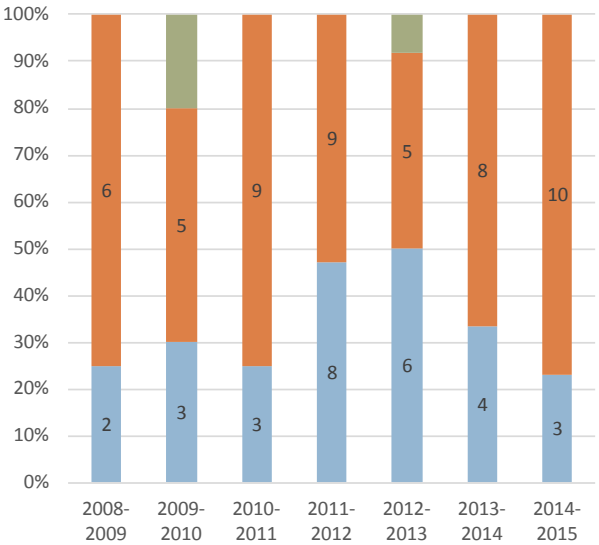


Table 5-1 and Figure 5-1 indicate an upward trend overall in participants giving improved evaluations of the design of the entire program over the period between the 2nd and 6th year, and that the evaluation for the 7th and 8th years slightly declined from the highest mark for the 6th year. The results of the questionnaire survey suggest that further improvement is required.

Table 5-2 and Figure 5-2 show that, on the one hand, the ratio of the answer "4. Yes, Appropriate" reached a high mark also this year, following the record high last year. This probably results from curriculum improvement every year. Intended for officials at the working level and not entirely focused on conceptual theories, this training course aims to provide a valuable curriculum for practical operations, but the participants work in the two different and specialized fields of civil engineering and meteorology. Also, applicable technologies and knowledge depend on the country. Given this background, the difficulty in establishing a practically useful curriculum stood out. 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 show a slight decline from that of last year and the year before which was the highest in the past seven years. The main reason for this decline probably lies in how they are given to students. The texts and other materials are usually provided not in a book form but in a class-by-class style. Because learning materials are given to students in each class, they may have some difficulty capturing an overall image of what they need to learn, particularly in the initial stage. Since materials provided in this course are all high quality, we should improve the way they are given to students, such as given to them in a book form.

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, with a system established for students to acquire a master's degree as quickly as possible, the course is designed for them to resume their duties as soon as possible so they can apply what they have learned in Japan to their jobs. As such, this one-year master's course is very tough on students. Nevertheless, many of them evaluated it as "Appropriate," a fact that implies that the students understand why the master's course is designed like it is.

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

Lastly, the results are shown in Table 5-6 and Figure 5-6 for the most important question for this course as its emphasis is placed on application in the students' home countries: "Do you think the knowledge and experience you have acquired through the program in Japan are useful?" All participants chose either "A. Yes, it can be directly applied to work" or "B. Not directly, but it should prove useful," giving favorable evaluations to the course. The objective of this master's course for acquisition of practically useful knowledge and experience is considered to be by and large achieved. Looking ahead, it is necessary to continue to improve the training so that it can satisfy all students who spend a full year away from their families and home.

In conclusion, this year's evaluation fall short in reaching last year's, which is the highest level in the past seven 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 Specifics

An anonymous questionnaire survey was taken of the students by ICHARM in April when most lectures were completed.

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

A possible outcome of the effort made by ICHARM to improve the conditions of daily life of students every year, there weren’t many comments made about this aspect again this year.

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

Q1. Structure of the course curriculum (Schedule, Lecture to add, etc.)		
	Feedback from M.Sc. Students	Response by ICHARM
1	Appropriate (11 students responded)	
2	The Structure of the course curriculum is quite exhaustive and intensive (hectic). (3 students)	It is inevitable, because this is a one-year master course. We need to finish the lectures within 6 months.
3	Some more course regarding to computer language should be introduce. (2 students)	We are planning to restructure the classes of programming.
4	The FORTRAN language has been given little time for learning.	
5	A brief introduction on ArcGIS would have been helpful since it was my first time using it.	
6	RRI, IFAS, BTOP & GIS may be scheduled before individual study and continuous classes. (2 students)	
7	We need more lecture time on the modeling. (2 students)	
8	Additional time to be allocated for GIS Class	
9	The introduction to other flood modelling software like HEC HMS and Mike Flood will be beneficial for the participants along with RRI and IFAS as most of the countries have purchased those software without expertise of operating them. (2 students)	
Q2. Lecture (If you have any request or comment, fill out for each lecture.)		
1.	**Disaster Mitigation (blank) Recovery Policy (Prof. Ieda)**	
2.	**Disaster Risk Management (Prof. Ando)**	

3.	**Hydrology (Prof. Koike)**	
4.	**Hydraulics (Prof. Huang)**	
	Feedback from M.Sc. Students	Response by ICHARM
1	Most of the reference books referred to are not available at the PWRI and JICA libraries.	We can arrange the reference book. When we contract with JICA, we can negotiate with JICA for the purchase.
5.	**Basic Concepts of Integrated Flood Risk Management (IFRM) (Prof. Takeuchi)**	
6.	**Urban Flood Management and Flood Hazard Mapping (Prof. Tanaka)**	
	Feedback from M.Sc. Students	Response by ICHARM
1	The classes are too scattered in the timetable. It is difficult to understand which units apply to the unit when they are spread out months apart. The units need to be consolidated together so that the flow of knowledge is easier.	We have tried to arrange the lectures regularly. However, it is difficult to coordinate the subject conducted by many lecturers because the timetable of lecture depends on lecturer's schedule.
7.	**Flood Hydraulics and River Channel Design (Prof. Fukuoka)**	
	Feedback from M.Sc. Students	Response by ICHARM
1	Hopefully once his book is published it will be easier for the next students.	It is worth for us considering.
8.	**Mechanics of Sediment Transportation and Channel Changes (Prof. Egashira)**	
9.	**Control Measures for Landslide & Debris Flow (Prof. Kondo)**	
	Feedback from M.Sc. Students	Response by ICHARM
1	The classes are too scattered in the timetable. It is difficult to understand which units apply to the unit when they are spread out months apart. The units need to be consolidated together so that the flow of knowledge is easier.	We have tried to arrange the lectures regularly. However, it is difficult to coordinate the subject conducted by many lecturers because the timetable of lecture depends on lecturer's schedule.

10.	**River Ecohydraulics (Asso. Prof. Kibler)**
11.	**Computer Programming (Asso. Prof. Sayama)**
12.	**Basic Practice on Flood Forecasting & Inundation Analysis (Asso. Prof. Sayama)**
13.	**Advanced Practice on Flood Forecasting & Inundation Analysis (Asso. Prof. Yorozuya)**
14.	**Site Visit of Water related Disaster Management Practice in Japan (Asso. Prof. Kibler)**

	Feedback from M.Sc. Students	Response by ICHARM
1	Will appreciate if along the site visit the famous places of Japan are also shown.	The priority of visit to famous places of Japan is low. We go to the site to learn the Japanese engineering and countermeasures to disasters.

Q3. Daily Life in ICHARM/PWRI

	Feedback from M.Sc. Students	Response by ICHARM
1	It would have been nice to find out what types of activities the researchers are working on at the institution just to broaden our perspective on research work.	At the beginning of the course, prospective supervisors gave a presentation to students. And students can access the profile on the ICHARM webpage. If students need further information, students can contact the prospective supervisors in person.

Q4. Individual Study

	Feedback from M.Sc. Students	Response by ICHARM
1	They need to be more flexible so as to allow individuals make use of both the resources at JICA and at ICHARM. The 9am to 5pm timeframe does not allow us extensive use of the JICA library yet several of the reference materials could only be found there. The same applies for the thesis work.	If you consult with us, we could give some advice to you.

Q5. Other requests to ICHARM or JICA

	Feedback from M.Sc. Students	Response by ICHARM
1	In the cafeteria, the menu is written by only Japanese. Therefore, it is difficult for us to enjoy the meal. We would like some Japanese people to help choose a menu.	We might be more considerate toward this issue. We can seek the person who take you to cafeteria voluntary.
2	The gender ratio is not so balanced.	We must agree with the feedback. However, basically, applicants' gender is not balanced. In addition, we must take into account of applicants' capacity. The balancing is difficult.
3	If one or two Japanese students joint with us, it is useful for enjoying japan life.	ICHARM must agree with the feedback. We are sure that Japanese students will stimulate this course.

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, when there were 10 to 13 students, all of them considered the number to be appropriate, and it would seem that empirically the right number of students for the design, specifics and method of instruction of the course is 10 to 12.

<Change in the number of subjects>

The contents and number of subjects are revised every year to respond to requests from students. Changes made to subjects in the past seven years are shown in Figure 5-7. The number of subjects remained at 19 from the 2nd to 4th year, after which the subjects were reduced by two in the 5th year to 17, and in the the 6th year, with a reduction of three subjects, the total was 14 subjects. In the seventh year, the total number of subjects became 15 with the addition of River Ecohydraulics.

This year, "Sustainable Reservoir Development & Management" was taken off the curriculum with the total back to 14. This subject on dam development and management was terminated because there are always some students who are from countries with no dams. We decided that it was just too much work for those students to study the subject as a requirement.

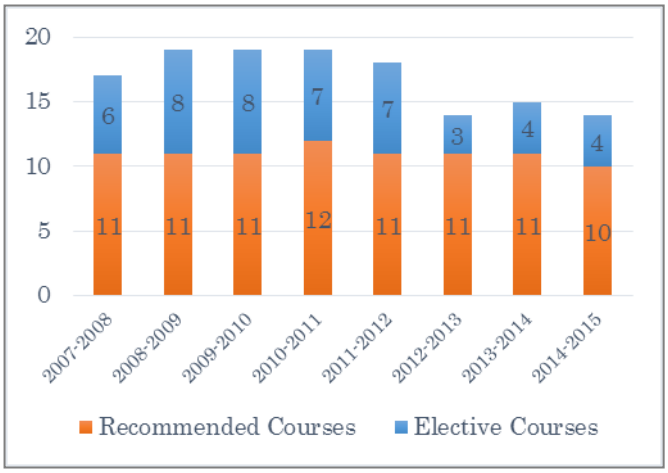


Figure 5-7 Changes in the number of subjects of the course

Instead, special lectures on dams were provided, considering the needs of other students who are from countries with dams. These lectures were given right for all students before a study tour to dams in Japan.

As a result, the number of subjects this year was 14, which is the lowest and the same as that for the 2012-2013 period.

<Master's thesis proofreading editor>

Some of the students weren't familiar with writing papers in English. English proofreading was conducted intensively with an English proofreader hired for this purpose in the approximate three-week period from the beginning of August prior to submission of theses. GRIPS directly employed Ms. Suezawa as an English proofreader. Students were given ample 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 they involve a plurality of 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 them. One possible solution for this is to explain an overall picture of a subject beforehand for students to understand how lectures by different experts fit

together. Another solution may be to compile materials prepared by different lecturers into a book form to guarantee students an easy access to the content.

For the ninth year, we have restructured the subjects related to computer programming and operation. In the past years including this year, those subjects were provided as “basic programming” or “advanced programming,” for example. For the coming year, we have grouped them by type of model. This change is expected 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.

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 eighth year of the course has been successfully completed, ICHARM has accumulated more know-how on training planning and administration. With students 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 are becoming stronger each year, and this provides better visibility of local situations in numerous ways. 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 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 year-long master's course is of use in their work, then by extension it will have contributed to reducing water-related 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 eighth year, over which we revised the overall schedule and curriculum based on past experiences and have worked to enhance both the educational content and environment for the students. There is, however, room for still more improvement, and we appreciate your opinions and suggestions.

Finally, we would also like to express our gratitude to instructors and administration officials who devoted their valuable time to providing lectures and exercises on this course, and to the MLIT offices, local government officials, and local government who warmly welcomed our field trips.

LIST OF PARTICIPANTS IN "Flood Disaster Mitigation" (J14-04015)

Annex I

2014年度JICA課題別研修「洪水防災」研修員リスト

September 30, 2014 ～ September 18, 2015

No.	Photo	Country	Name (Call Name)	Organization
1		BANGLADESH バングラデシュ **D1403067**	Mr. BHUAYAN Md Abu Baker Siddique ブヤン エムディ アブ ベイカー シッディキ	Sub-Divisional Engineer, Jamalpur O&M Division, Bangladesh Water Development Board
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4		INDIA インド **D1403225**	Mr. SHARMA Sanjay Kumar シャルマ サンジェイ クマー	Scientist 'B', Centre for Flood Management Studies, National Institute of Hydrology
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6		KENYA ケニア **D1405396**	Ms. BARASA Betty Namulunda バラサ ベティ ナムルンダ	Assistant Technical Co-ordinator Manager, Technical, Water Resources Management Authority
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10		PAKISTAN パキスタン **D1404204**	Mr. VIRK Muhammad Irfan バーク ムハマド イルファン	Meteorologist, Flood Forecasting Division Lahore, Pakistan Meteorological Department
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12		SRI LANKA スリランカ **D1403081**	Mr. NAVARATHINAM Kirushnarupan ナバラシナム キルスナルパン	Irrigation Engineer, Design Branch, Head Office, Ministry of Irrigation and Water Resources Management
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2014-2015 Water-related Disaster Management Course　Time Table

Lecture (Lecturer)

(1) Basic Concepts of Integrated Flood Risk management (IFRM)	(6) Mechanics of Sediment Transportation and River Changes
(2) Flood Hydraulics and River Channel Design	(7) Control Measures for Landslide & Debris Flow
(3) Hydrology	(8) River Ecohydraulics
(4) Hydraulics	(9) Disaster Mitigation - Recovery Policy
(5) Urban Flood Management and Flood Hazard Mapping	(10) Disaster Risk Management

Excercise (Lecturer)

P(01) Computer Programming	P(3) Advanced Practice on Flood Forecasting & Inundation Analysis
P(02) Basic Practice on Flood Forecasting & Inundation Analysis	P(04) Site Visit of Water-related Disaster Management Practice in Japan

October

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
	9/28	9/29	9/30	10/1	10/2	10/3	10/4
1st period 9:00-10:30						9:00-9:30 Opening Ceremony (M.Sc) at ICHARM 9:45-11:00 Course Orientation 11:00-11:40 PWRI tour 11:45-12:35 Welcome meeting	
2nd period 10:45-12:15					Entrance Ceremony at GRIPS		
3rd period 13:15-14:45						(1)-1 Introduction: What is natural disaster? Risk, Hazard and Vulnerability — Prof. Takeuchi (ICHARM)	
4th period 15:00-16:30						Self Study	
	10/5	10/6	10/7	10/8	10/9	10/10	10/11
1st period 9:00-10:30		Self Study	Self Study	(1)-2 PAR Model (1) Root causes, progress of dynamic pressure and unsafe conditions — Prof. Takeuchi (ICHARM)	(1)-4 ACCESS Model — Prof. Takeuchi (ICHARM)	P(04)-1 Lecture by Urban Renaissance Agency — Site Visit	
2nd period 10:45-12:15		P(01)-1 Introduction of Computer Programming with Fortran90 — Asso.Prof. Sayama (ICHARM)	P(01)-2 Variables — Asso.Prof. Sayama (ICHARM)	(1)-3 PAR Model (2) Concrete examples — Prof. Takeuchi (ICHARM)	Self Study	P(04)-1 — Site Visit	
3rd period 13:15-14:45		Self Study	(5)-4 Flood control structure — Mr. Kamoto	Self Study	Self Study	Self Study	
4th period 15:00-16:30		Self Study	Self Study	Self Study	Self Study	Self Study	
	10/12	10/13	10/14	10/15	10/16	10/17	10/18
1st period 9:00-10:30			(2)-1 ● Outlines of characteristics and management of Japanese rivers. — Prof. Fukuoka	10:40-12:50 JICA event	(2)-3 ● Propagation of hydrographs of water level and discharge in flood flows. — Prof. Fukuoka	Self Study	
2nd period 10:45-12:15			(2)-2 ● Occurrence of flood flows. — Prof. Fukuoka		(2)-4 ● Flow resistance in rivers with compound channels. — Prof. Fukuoka	Self Study	
3rd period 13:15-14:45			(3)-1 Water properties and their roles in climate system — Prof. Koike (ICHARM)		(1)-5 Disaster management cycle; Hyogo Framework for Action — Prof. Takeuchi (ICHARM)	Inception report	
4th period 15:00-16:30			(3)-2 Characteristics of moist air and precipitation — Prof. Koike (ICHARM)	Self Study	Self Study	Inception report	
	10/19	10/20	10/21	10/22	10/23	10/24	10/25
1st period 9:00-10:30		P(01)-3 Arithmetic Calculation — Asso.Prof. Sayama (ICHARM)	(2)-5 ● Prediction method of flow resistance in compound channels and application to river channel design. — Prof. Fukuoka	P(02)-1 Geographic Information System (GIS) (1) — Dr. Kwak (ICAHRM)	(2)-7 ● Effects of Channel Vegetations on Flood Propagation — Prof. Fukuoka	(4)-6 ● Hydraulics — Prof. Huang	
2nd period 10:45-12:15		Self Study	(2)-6 ● Quasi-two dimensional analysis of flood flows in rivers with vegetations. — Prof. Fukuoka	Self Study	(2)-8 ● Relationship between dimensionless width, depth and discharge in rivers - Learning from natural rivers — Prof. Fukuoka	(4)-7 ● Hydraulics — Prof. Huang	
3rd period 13:15-14:45		12:30-17:00 Medical Checkup by JICA	(3)-3 Global energy and water cycle — Prof. Koike (ICHARM)	(4)-1 Hydraulics — Asso. Prof. Yorozuya (ICHARM)	(1)-6 IFRM and traditional FRM; IFRM as part of IWRM — Prof. Takeuchi (ICAHRM)	●Special Lecture by Mr. Sakamoto	
4th period 15:00-16:30			(3)-4 River basin hydrological processes — Prof. Koike (ICHARM)	(7)-1 ● Outline of sediment-related disasters and Sabo projects — Prof. Kondo	Self Study	●Spesial Lecture by Prof. Yasuda	

November		10/26	10/27	10/28	10/29	10/30	10/31	11/1
	1st period 9:00-10:30		P(01)-4 **Program Structure (if)** Dr. Hasegawa (ICHARM)	(2)-9 ● **River cross-sections harmonizing the flood control and river environment** Prof. Fukuoka	Self Study	P(04)-2 **Lecture on collaboration of dams along Kinu River** Site Visit	P(04)-2 **Lecture of Nikko Sabo works** Site Visit	
	2nd period 10:45-12:15		P(02)-2 **Geographic Information System (GIS) (2)** Dr. Kwak (ICAHRM)	(2)-10 ● **Flow in the dam reservoir during floods** Prof. Fukuoka	P(04)-2 Site Visit	P(04)-2 **Site visit at Kawaji Dam** Site Visit	P(04)-2 **Lecture of Ashio Sabo works** Site Visit	
	3rd period 13:15-14:45		P(02)-3 Geographic Information System (GIS) (3) Dr. Kwak (ICAHRM)	(3)-5 **Atmosphere-land interaction** Prof. Koike (ICHARM)	P(04)-2 **Tone Oozeki Barrage JAPAN WATER AGENCY** Site Visit	P(04)-2 **Site visit at Yunishigawa Dam** Site Visit	P(04)-2 Site Visit	
	4th period 15:00-16:30		Self Study	(3)-6 **Soil moisture and ground water** Prof. Koike (ICHARM)	P(04)-2 Site Visit	P(04)-2 Site Visit	P(04)-2 Site Visit	
		11/2	**11/3**	**11/4**	**11/5**	**11/6**	**11/7**	**11/8**
	1st period 9:00-10:30			(2)-11 ● **Flood flow and Bed variations in the Ishikari River** Prof. Fukuoka	(1)-7 **Concept of IWRM (1): Agenda 21, Global Water Partnership** Prof. Takeuchi	P(02)-4 **Geographic Information System (GIS) (4)** Dr. Kwak (ICAHRM)	(1)-9 **Japanese experiences (1) Flood damages and flood control investment** Prof. Takeuchi	
	2nd period 10:45-12:15			(2)-12 ● **Flow and Bed variations in the Hi-i river sections before and after the flow diversion** Prof. Fukuoka	(1)-8 **Concept of IWRM (2): Guideline for IWRM at basin scale** Prof. Takeuchi	Self Study	(1)-10 **Japanese experiences (2) Pollution and ground subsidence control** Prof. Takeuchi	
	3rd period 13:15-14:45			(3)-7 **Runoff** Prof. Koike (ICHARM)	(1)-14 ● **Future Issues of IFRM: Adaptation; Aging society; Depopulation; Social Capital;** Mr. Watanabe	Self Study	Self Study	
	4th period 15:00-16:30			(3)-8 **River basin hydrological modelling** Prof. Koike (ICHARM)	Self Study	Self Study	Self Study	
		11/9	**11/10**	**11/11**	**11/12**	**11/13**	**11/14**	**11/15**
	1st period 9:00-10:30		**Facility tour with PWRI** Joint Tour	(2)-13 ● **Effects of the Watarase retarding basin on flood control by in Tone river system** Prof. Fukuoka	Introduction of ICHARM research Activity Chief Researchers	Self Study	(4)-10 ● **Hydraulics** Prof. Huang	
	2nd period 10:45-12:15		**Fasility tour with PWRI** Joint Tour	(2)-14 ● **Design Method of No.2 Consolidation Work in the Shinano River** Prof. Fukuoka	Introduction of ICHARM research Activity Chief Researchers	(4)-2 **Hydraulics** Asso. Prof. Yorozuya (ICHARM)	(4)-11 ● **Hydraulics** Prof. Huang	
	3rd period 13:15-14:45		**Facility tour with BRI** Joint Tour	P(01)-5 **Program Structure (if)Computer Programming** Dr. Hasegawa (ICHARM)	Self Study	(4)-8 ● **Hydraulics** Prof. Huang	(4)-3 **Hydraulics** Asso. Prof. Yorozuya (ICHAMR)	
	4th period 15:00-16:30		**Facility tour with BRI** Joint Tour	Self Study	Self Study	(4)-9 ● **Hydraulics** Prof. Huang	(6)-1 **Introduction (1)** Prof. Egashira (ICHARM)	
		11/16	**11/17**	**11/18**	**11/19**	**11/20**	**11/21**	**11/22**
	1st period 9:00-10:30		P(01)-6 **I/O Statement** Dr. Hasegawa (ICHARM)	Self Study	Discussion of Thesis	Self Study	(8)-1 **Dynamic equilibrium of rivers and effective discharges for geomorphic work** Asso.Prof. Kibler (ICHARM)	
	2nd period 10:45-12:15		Discussion of Thesis	(1)-12 ● **Global trends (1) Impact of climatic change** Prof. Oki	Self Study	(4)-12 ● **Hydraulics** Prof. Huang	(8)-2 **Physical aquatic habitat of lotic ecosystems** Asso. Prof. Kibler (ICAHRM)	
	3rd period 13:15-14:45		Self Study	(1)-13 ● **Global trends (2) International actions** Prof. Oki	Self Study	Self Study	Self Study	
	4th period 15:00-16:30		Self Study	Self Study	(6)-2 **Introduction (2)** Prof. Egashira (ICHARM)	P(02)-5 **Rainfall-runoff-inundation modeling (1)** Asso.Prof. Sayama (ICHARM)	Self Study	
		11/23	**11/24**	**11/25**	**11/26**	**11/27**	**11/28**	**11/29**
	1st period 9:00-10:30			Thesis Work	(8)-3 **Specialized use of hydraulic habitats by aquatic organisms (I)** Asso.Prof. Kibler (ICHARM)	Self Study	(8)-5 **Natural flow regimes and hydrologic alteration** Asso.Prof. Kibler (ICHARM)	
	2nd period 10:45-12:15			Thesis Work	(8)-4 **Specialized use of hydraulic habitats by aquatic organisms (II)** Asso. Prof. Kibler (ICAHRM)	(6)-4 **Mechanics of sediment transportation (2)** Prof. Egashira (ICHARM)	(8)-6 **Flow restoration and environmental flows** Asso. Prof. Kibler (ICAHRM)	
	3rd period 13:15-14:45			Thesis Work	Self Study	Self Study	P(02)-6 **Rainfall-runoff-inundation modeling (2)** Asso.Prof. Sayama (ICHARM)	
	4th period 15:00-16:30			Thesis Work	(6)-3 **Mechanics of sediment transportation (1)** Prof. Egashira (ICHARM)	P(04)-3 **Geospatical Information Authority of Japan (GSI)** Site Visit	P(02)-7 **Rainfall-runoff-inundation modeling (3)** Asso.Prof. Sayama (ICHARM)	

December

	11/30	12/1	12/2	12/3	12/4	12/5	12/6
1st period 9:00-10:30		Self Study	(3)-10 Ground-based remote sensing - radar — Prof. Koike (ICHARM)	(8)-7 Aquatic-terrestrial ecosystem linkages** — Asso.Prof. Kibler (ICHARM)	(1)-11 Japanese experiences (3) Comprehensive flood management measures and policy evolution from river to basin — Prof. Takeuchi	(8)-9 Hydrogeomorphic interaction: river response to flow and sediment alteration — Asso.Prof. Kibler (ICHARM)	
2nd period 10:45-12:15		P(01)-7 Program Structure (do loop) — Dr. Hasegawa (ICHARM)	P(01)-8 Program Structure (do loop) — Dr. Hasegawa (ICHARM)	(8)-8 Ecosystem disturbance — Asso. Prof. Kibler (ICAHRM)	(1)-15 Lecture — Prof. Takeuchi	(8)-10 Environmental Impacts of Dams Guest Lecturer, Mr. Iwami, ICHARM — Mr.Iwami (ICAHRM)	
3rd period 13:15-14:45		(4)-13 Pre-meething for the exercise — Asso. Prof. Yorozuya	(3)-11 Space-based remote sensing – satellite — Prof. Koike (ICHARM)	P(02)-8 Rainfall-runoff-inundation modeling (4) — Asso.Prof. Sayama (ICHARM)	P(02)-9 Runoff analysis with IFAS (1) — Dr. Shrestha (ICHARM)	P(01)-9 Quiz(1) — Dr. Hasegawa (ICHARM)	
4th period 15:00-16:30		(3)-9 Electromagnetic theory as a basis of remote sensing — Prof. Koike (ICHARM)	(3)-12 Frequency and time series analysis — Prof. Koike (ICHARM)	(6)-5 Mechanics of sediment transportation (3) — Prof. Egashira (ICHARM)	Self Study	Self Study	
	12/7	**12/8**	**12/9**	**12/10**	**12/11**	**12/12**	**12/13**
1st period 9:00-10:30		(3)-13 Cost-benefit analysis and optimization — Prof. Koike (ICHARM)	Self Study	P(01)-10 Hydrologic Application Exercise (1) — Asso.Prof. Sayama (ICHARM)	P(01)-11 Arrays — Dr. Ushiyama (ICHARM)	P(02)-12 Large-scale Runoff analysis with BTOP (1) — Dr. Gusyev (ICHARM)	
2nd period 10:45-12:15		(3)-14 Climate change impact assessment and adaptation — Prof. Koike (ICHARM)	(4)-4 Exercise — Asso. Prof. Yorozuya	(8)-12 ● Environmental Impacts of Dams, Professor Sumi, Kyoto University — Prof. Sumi	P(02)-10 Runoff analysis with IFAS (2) — Dr. Shrestha (ICHARM)	(4)-15 ● **Examination** — Prof. Huang	
3rd period 13:15-14:45		(8)-11 Ecosystem services and river restoration — Asso.Prof. Kibler (ICHARM)	(4)-5 Exercise — Asso. Prof. Yorozuya	(8)-13 ● Sediment management in reservoirs, Professor Sumi, Kyoto University — Prof. Sumi	P(02)-11 Runoff analysis with IFAS (3) — Dr. Shrestha (ICHARM)	Self Study	
4th period 15:00-16:30		(6)-6 Mechanics of sediment transportation (4) — Prof. Egashira (ICHARM)	Self Study	(8)-14 ● Sediment management in reservoirs, Professor Sumi, Kyoto University — Prof. Sumi	(6)-7 Mechanics of sediment transportation (5) — Prof. Egashira (ICHARM)	(6)-8 Mechanics of sediment transportation (6) — Prof. Egashira (ICHARM)	
	12/14	**12/15**	**12/16**	**12/17**	**12/18**	**12/19**	**12/20**
1st period 9:00-10:30		(8)-15 **Examination** — Asso.Prof. Kibler (ICHARM)	(3)-15 Lecture — Prof. Koike (ICHARM)	P(04)-4 — Site Visit	(5)-5 ● Case study of comprehensive flood control measures -Tsurumi river- — Mr. Imbe	P(04)-4 Lecture at JMA — Tokyo	
2nd period 10:45-12:15		P(01)-12 Arrays — Dr. Ushiyama (ICHARM)	P(02)-13 Large-scale Runoff analysis with BTOP (2) — Dr. Gusyev (ICHARM)	P(04)-4 — Tokyo	P(04)-4 Site visit at the Informatinon Center — Tokyo	P(04)-4 — Tokyo	
3rd period 13:15-14:45		P(01)-13 Procedures and Structured Programming (subroutine, function) — Dr. Ushiyama (ICHARM)	P(02)-14 Large-scale Runoff analysis with BTOP (3) — Dr. Gusyev (ICHARM)	P(04)-4 Lecture at Kanto Regional Bureau of MLIT — Tokyo	P(04)-4 Kawawa River Retarding Basin — Tokyo	P(04)-4 — Tokyo	
4th period 15:00-16:30		Self Study		P(04)-4 — Tokyo	P(04)-4 Kirigaoka Regulating Pond — Tokyo	P(04)-4 — Tokyo	
	12/21	**12/22**	**12/23**	**12/24**	**12/25**	**12/26**	**12/27**
1st period 9:00-10:30		P(01)-14 Quiz(2) — Dr. Ushiyama (ICHARM)		Thesis Work	Thesis Work		
2nd period 10:45-12:15		P(01)-15 Hydrologic Application Exercise (2) — Asso.Prof. Sayama (ICHARM)		Thesis Work	Thesis Work	(6)-9 Mechanics of debris flow (1) — Prof. Egashira (ICHARM)	
3rd period 13:15-14:45		(1) Lecture — Prof. Takeuchi		Thesis Work	Thesis Work	Self Study	
4th period 15:00-16:30		Self Study		Thesis Work	Thesis Work	Self Study	
	1/4	**1/5**	**1/6**	**1/7**	**1/8**	**1/9**	**1/10**
1st period 9:00-10:30		Thesis Work	Project Cycle Management	Project Cycle Management	Project Cycle Management	Self Study	
2nd period 10:45-12:15		Thesis Work				Self Study	
3rd period 13:15-14:45		Thesis Work				(1)' ** Examination ** — Prof. Takeuchi	
4th period 15:00-16:30		(3)' ** Examination ** — Prof. Koike (ICHARM)					

		1/11	1/12	1/13	1/14	1/15	1/16	1/17
January	1st period 9:00-10:30			(5)-2 ● Flood control planning Prof. Tanaka	Self Study	(6)-11 Mechanics of debris flow (2) Prof. Egashira (ICHARM)	(7)-2 ● Sediment yield, transport and deposition in a river basin Prof. Sasahara	
	2nd period 10:45-12:15			(5)-10 ● Flood frequency analysis(3) Prof. Tanaka	(6)-10 Bed forms and flow resistance (2) Prof. Egashira (ICHARM)	(6)-12 Bed forms and flow resistance (1) Prof. Egashira (ICHARM)	(7)-3 ● Sabo planning and control of sediment transport Prof. Sasahara	
	3rd period 13:15-14:45			Self Study	(2)-15 ● ** Examination ** 14:00-16:00 Prof. Fukuoka	Self Study	(7)-4 ● Planning and design of Sabo facilities Prof. Sasahara	
	4th period 15:00-16:30			Self Study	(2)-15 ● ** Examination ** 14:00-16:00 Prof. Fukuoka	Self Study	Self Study	
		1/18	1/19	1/20	1/21	1/22	1/23	1/24
	1st period 9:00-10:30		(5)-1 ● Laws for flood risk management in Japan Prof. Tanaka	Self Study	Self Study	(6)-15 Method to predict sediment transport process in drainage basins Prof. Egashira (ICHARM)	P(04)-3 National Research Institute ofr Earth Science and Disaster Prevention (NIED) Site Visit	
	2nd period 10:45-12:15		(5)-8 ● Flood frequency analysis(1) Prof. Tanaka	(7)-5 Restoration of vegetation on wasteland and its effects Dr. Osanai	(6)-13 Prediction of channel changes (1) Prof. Egashira (ICHARM)	P(03)-1 ArcGIS Data management Dr. Kwak (ICHARM)	Self Study	
	3rd period 13:15-14:45		(5)-9 ● Flood frequency analysis(2) Prof. Tanaka	(7)-6 Countermeasures for earthquake-induced natural Dams Dr. Osanai	(6)-14 Prediction of channel changes (2) Prof. Egashira (ICHARM)	P(03)-2 ArcGIS Data management Dr. Kwak (ICHARM)	1st Interim Presentation	
	4th period 15:00-16:30		Self Study	Self Study	Self Study	Thesis Work		
		1/25	1/26	1/27	1/28	1/29	1/30	1/31
	1st period 9:00-10:30		(9)-1 Disaster Mitigation - Recovery Policy	(9)-5 Disaster Mitigation - Recovery Policy	(9)-9 Disaster Mitigation - Recovery Policy	(9)-12 Disaster Mitigation - Recovery Policy	(9)-14 Disaster Mitigation - Recovery Policy	
	2nd period 10:40-12:10		(9)-2 Disaster Mitigation - Recovery Policy	(9)-6 Disaster Mitigation - Recovery Policy	(9)-10 Disaster Mitigation - Recovery Policy	(9)-13 Disaster Mitigation - Recovery Policy	(9)-15 Disaster Mitigation - Recovery Policy	
	3rd period 13:20-14:50		(9)-3 Disaster Mitigation - Recovery Policy	(9)-7 Disaster Mitigation - Recovery Policy	(9)-11 Disaster Mitigation - Recovery Policy			
	4th period 15:00-16:30		(9)-4 Disaster Mitigation - Recovery Policy	(9)-8 Disaster Mitigation - Recovery Policy				
uary		2/1	2/2	2/3	2/4	2/5	2/6	2/7
	1st period 9:00-10:30		(10)-1 Disaster Risk Management	(10)-5 Disaster Risk Management	(10)-9 Disaster Risk Management	(10)-12 Disaster Risk Management	(10)-14 Disaster Risk Management	
	2nd period 10:40-12:10		(10)-2 Disaster Risk Management	(10)-6 Disaster Risk Management	(10)-10 Disaster Risk Management	(10)-13 Disaster Risk Management	(10)-15 Disaster Risk Management	
	3rd period 13:20-14:50		(10)-3 Disaster Risk Management	(10)-7 Disaster Risk Management	(10)-11 Disaster Risk Management			
	4th period 15:00-16:30		(10)-4 Disaster Risk Management	(10)-8 Disaster Risk Management				
		2/8	2/9	2/10	2/11	2/12	2/13	2/14
	1st period 9:00-10:30		Thesis Work	Self Study		P(03)-3 ArcGIS Data management Dr. Kwak (ICHARM)	(7)-11 ● Hazard mapping for sediment-related disasters Dr. Takanashi	
	2nd period 10:45-12:15		Thesis Work	(7)-7 ● Introduction of landslides Dr. Tsunaki		P(03)-4 ArcGIS Data management Dr. Kwak (ICHARM)	(7)-12 ● Training of hazard mapping for sediment-related disasters (1) Dr. Takanashi	
	3rd period 13:15-14:45		Thesis Work	(7)-8 ● Survey and emergency response for landslides Dr. Tsunaki		(7)-10 ● Warning and evacuation system for sediment-related disasters Dr. Hara	(7)-13 ● Training of hazard mapping for sediment-related disasters (2) Dr. Takanashi	
	4th period 15:00-16:30		Thesis Work	●Special Lecture by the Chief Exective		Self Study		

Febr		**2/15**	**2/16**	**2/17**	**2/18**	**2/19**	**2/20**	**2/21**
	1st period 9:00-10:30		Self Study	P(03)-5 **Satellite image preparation** Dr. Kwak (ICHARM)	P(03)-11 **BTOP** Dr. GUSYEV (ICHARM)	P(03)-12 **BTOP** Dr. Gusyev (ICHARM)	(6)' **Mechanics of Sediment Transportation and River Changes** Prof. Egashira (ICHARM)	
	2nd period 10:45-12:15		Self Study	P(03)-6 **Image analysis with tutorial data with ArcGIS** Dr. Kwak (ICHARM)	Self Study	P(03)-13 **BTOP** Dr. Gusyev (ICHARM)	Self Study	
	3rd period 13:15-14:45		(7)-9 ● **Permanent measures for landslide damage reduction** Dr. Tsunaki	Self Study	Self Study	Self Study	Self Study	
	4th period 15:00-16:30		Thesis Work	●Special Lecture by the Chief Exective	Self Study	Self Study	Self Study	
		2/22	**2/23**	**2/24**	**2/25**	**2/26**	**2/27**	**2/28**
	1st period 9:00-10:30		Self Study	P(03)-7 **Application of image analysis with ArcGIS** Dr. Kwak (ICHARM)	Thesis Work	Thesis Work	(5)-3 ● **Local disaster management plan** Prof. Tanaka	
	2nd period 10:45-12:15		(5)-12 ● **Geomorphology around rivers and alluvial plain (1)** Prof. Sugai	Self Study	Thesis Work	Thesis Work	(5)-6 ● **Flood hazard map** Prof. Tanaka	
	3rd period 13:15-14:45		(5)-13 ● **Geomorphology around rivers and alluvial plain (2)** Prof. Sugai	Self Study	Thesis Work	Thesis Work	(5)-7 ● **Evacuation Plan with Flood Forecast** Prof. Tanaka	
	4th period 15:00-16:30		(5)-14 ● **Developments in social sciences on people's reactions and responses to disasters** Prof. Hayashi	Self Study	Thesis Work	Thesis Work	Self Study	
March		**3/1**	**3/2**	**3/3**	**3/4**	**3/5**	**3/6**	**3/7**
	1st period 9:00-10:30		P(03)-8 **IFAS** Dr. Shrestha (ICAHRM)	P(03)-9 **IFAS** Dr. Shrestha (ICHARM)	Thesis Work	Thesis Work	Thesis Work	
	2nd period 10:45-12:15		Thesis Work	P(03)-10 **IFAS** Dr. Shrestha (ICHARM)	Thesis Work	Thesis Work	Thesis Work	
	3rd period 13:15-14:45		Thesis Work	Self Study	Thesis Work	Thesis Work	Thesis Work	
	4th period 15:00-16:30		Thesis Work	Self Study	Thesis Work	Thesis Work	Thesis Work	
		3/8	**3/9**	**3/10**	**3/11**	**3/12**	**3/13**	**3/14**
	1st period 9:00-10:30		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	SENDAI COMMITTEE FOR THE UN WORLD CONFERENCE ON DISASTER RISK REDUCTION
	2nd period 10:45-12:15		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	3rd period 13:15-14:45		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	4th period 15:00-16:30		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
		3/15	**3/16**	**3/17**	**3/18**	**3/19**	**3/20**	**3/21**
	1st period 9:00-10:30	SITE VISIT IN ISHINOMAKI		Self Study	Thesis Work	Thesis Work	Thesis Work	
	2nd period 10:45-12:15			Self Study	Thesis Work	Thesis Work	Thesis Work	
	3rd period 13:15-14:45			P(03)-14 **RRI** Asso. Prof. Sayama (ICHARM)	Thesis Work	Thesis Work	Thesis Work	
	4th period 15:00-16:30			P(03)-15 **RRI** Asso.Prof. Sayama (ICHARM)	Thesis Work	Thesis Work	Thesis Work	
		3/22	**3/23**	**3/24**	**3/25**	**3/26**	**3/27**	**3/28**
	1st period 9:00-10:30		Thesis Work	Self Study	Thesis Work	Thesis Work	Self Study	
	2nd period 10:45-12:15		Thesis Work	Self Study	Thesis Work	Thesis Work	Self Study	
	3rd period 13:15-14:45		Thesis Work	(7)-14 ● **Application of Sabo/landslide projects to other countries (1)** Prof. Kondo & Dr. Osanai	Thesis Work	Thesis Work	2nd Interim Presentation	
	4th period 15:00-16:30		Thesis Work	(7)-15 ● **Application of Sabo/landslide projects to other countries (2)** Prof. Kondo & Dr. Osanai	Thesis Work	Thesis Work		

Annex II

April		3/29	3/30	3/31	4/1	4/2	4/3	4/4
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		4/5	4/6	4/7	4/8	4/9	4/10	4/11
	AM		12:00-13:00 Cherry bloosom viewing	Thesis Work	Thesis Work	Thesis Work	P(05)-7 Site Visit (tentative) Fukuoka weir	
	PM							
		4/12	4/13	4/14	4/15	4/16	4/17	4/18
	AM		13:15-14:45 (5)-15 **Examination** Prof. Tanaka	Thesis Work	Self study	Thesis Work	Openday	
	PM				**Lecture for an Exercise in Nigata Site Visit**			
		4/19	4/20	4/21	4/22	4/23	4/24	4/25
	AM		Thesis Work	Thesis Work	Thesis Work	P(04)-8 **Site Visit** Nigata	P(04)-8 **Site Visit** Nigata	P(04) Site Visit
	PM					P(04)-8 **Site Visit** Nigata	P(04)-8 **Exercise of observation** Nigata	
		4/26	4/27	4/28	4/29	4/30	5/1	5/2
	AM		Thesis Work	Thesis Work		Thesis Work	Thesis Work	
	PM							
May		5/3	5/4	5/5	5/6	5/7	5/8	5/9
	AM					Thesis Work	Thesis Work	
	PM							
		5/10	5/11	5/12	5/13	5/14	5/15	5/16
	AM		Thesis Work	Thesis Work	Self Study	Thesis Work	Thesis Work	
	PM				3rd Interim Presentation (Tentative)			
		5/17	5/18	5/19	5/20	5/21	5/22	5/23
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		5/24	5/25	5/26	5/27	5/28	5/29	5/30
	AM		Thesis Work	Thesis Work	P(04)-8 **Site Visit** Kinki	P(04)-8 **Site Visit** Kinki	P(04)-8 **Site Visit** Kinki	P(04) Site Visit
	PM				P(04)-8 **Site Visit** Kinki	P(04)-8 **Site Visit** Kinki	P(04)-8 **Site Visit** Kinki	P(04) Site Visit
June		5/31	6/1	6/2	6/3	6/4	6/5	6/6
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		6/7	6/8	6/9	6/10	6/11	6/12	6/13
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	p(04) HAKOJIMA RETARDING BASIN	
	PM							
		6/14	6/15	6/16	6/17	6/18	6/19	6/20
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		6/21	6/22	6/23	6/24	6/25	6/26	6/27
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							

Annex II

Month								
July		6/28	6/29	6/30	7/1	7/2	7/3	7/4
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Deadline of submission of the 1st draft thesis	
	PM							
		7/5	7/6	7/7	7/8	7/9	7/10	7/11
	AM	Flood Fighting Drill in Tsukuba	Thesis Work	Thesis Work	4th Interim Presentation (Tentative)	Thesis Work	Thesis Work	
	PM	(5)-11 Emergency operation						
		7/12	7/13	7/14	7/15	7/16	7/17	7/18
	AM		P(02)-15 Remote Sensing for Inundation Mapping (RS) Asso.Prof. Yorozuya (ICHARM)	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM		(4)-14 Review of the exercise Asso. Prof. Yorozuya					
		7/19	7/20	7/21	7/22	7/23	7/24	7/25
	AM			Thesis Work	Thesis Work	Thesis Work	Deadline of submission of the 2nd draft thesis	
	PM							
		7/26	7/27	7/28	7/29	7/30	7/31	8/1
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
August		8/2	8/3	8/4	8/5	8/6	8/7	8/8
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Thesis Work	
	PM							
		8/9	8/10	8/11	8/12	8/13	8/14	8/15
	AM		Thesis Work	Thesis Work	Final Presentation (Tentative)	Thesis Work	Thesis Work	
	PM							
		8/16	8/17	8/18	8/19	8/20	8/21	8/22
	AM		Thesis Work	Thesis Work	Thesis Work	Thesis Work	Submission of Master Thesis to GRIPS	
	PM							
		8/23	8/24	8/25	8/26	8/27	8/28	8/29
	AM		Makig Action Plan	Makig Action Plan	Makig Action Plan	Makig Action Plan	Makig Action Plan	
	PM							
Sept.		8/30	8/31	9/1	9/2	9/3	9/4	9/5
	AM		Makig Action Plan	Makig Action Plan	Makig Action Plan	Makig Action Plan	Makig Action Plan	
	PM							
		9/6	9/7	9/8	9/9	9/10	9/11	9/12
	AM		Makig Action Plan	Makig Action Plan	Makig Action Plan	Makig Action Plan	Presentation on action plan	
	PM							
		9/13	9/14	9/15	9/16	9/17	9/18	9/19
	AM				Closing Celemony at JICA	Graduation Celemony at GRIPS	Return to home Country	
	PM							

Curriculum (Recommended course)

Lecture	Disaster Management Policies A: from Regional and Infrastructure Aspect		Disaster Management Policies B: from Urban and Building Aspect		Hydrology	
Number	DMP2000E		DMP2010E		DMP2800E	
Instructor	Prof. Hitoshi Ieda		Prof. Shoichi Ando		Prof. Toshio KOIKE	
Period	Winter		Winter		Fall through Winter	
	Lecture	Lecturer	Lecture	Lecturer	Lecture	Lecturer
1	Anti-Disaster Human Actions	Prof. IEDA	Recent large-scale disasters 2001 - 2010	Prof. Ando	Water properties and their roles in climate system	Prof. Koike, ICHARM/ Tokyu Univ.
2	Anti-Disaster Design Philosophies in Infrastructure Facilities	Prof. IEDA	Lessons from 1995 Kobe/2011 Tohoku	Prof. Ando	Characteristics of moist air and precipitation	Prof. Koike, ICHARM/ Tokyu Univ.
3	Anti-Disaster Planning Philosophies in Wide-Area Systems	Prof. IEDA	Basics of Disaster Risk Management	Prof. Ando	Global energy and water cycle	Prof. Koike, ICHARM/ Tokyu Univ.
4	Wind and Rain Disaster Management in Railway Operation	Prof. SHIMAMURA	Disaster Risk Management in Japan	Prof. Ando	River basin hydrological processes	Prof. Koike, ICHARM/ Tokyu Univ.
5	Heavy Rain, Snow and Other Disasters in Road Systems (Mr. Takaaki KUSAKABE)	Mr. KUSAKABE	Urban policy and disaster management	Prof. Ando	Atmosphere-land interaction	Prof. Koike, ICHARM/ Tokyu Univ.
6	Heavy Rain, Snow and Other Disasters in Road Systems (Mr. Takaaki KUSAKABE)	Mr. KUSAKABE	Building / housing policy and technology	Prof. Ando	Soil moisture and ground water	Prof. Koike, ICHARM/ Tokyu Univ.
7	Storm Surge, Tsunami and Other Disasters in Port, Coast and Airport	Mr. SUZUKI	Community based DM / risk communication	Prof. Ando	Runoff	Prof. Koike, ICHARM/ Tokyu Univ.
8	Storm Surge, Tsunami and Other Disasters in Port, Coast and Airport	Mr. SUZUKI	(presentation and discussion 1with A: Prof. Ieda)	Prof. Ando	River basin hydrological modelling	Prof. Koike, ICHARM/ Tokyu Univ.
9	Disasters and Restoration in Rural Area	Prof. SANO	(presentation and discussion 2 with A: Prof. Ieda)	Prof. Ando	Electromagnetic theory as a basis of remote sensing	Prof. Koike, ICHARM/ Tokyu Univ.
10	Site-Based Study in Tokyo Metropolitan District	Prof. IEDA	(presentation and discussion 3 with A: Prof. Ieda)	Prof. Ando	Ground-based remote sensing - radar	Prof. Koike, ICHARM/ Tokyu Univ.
11	Site-Based Study in Tokyo Metropolitan District	Prof. IEDA	Practice of Disaster Risk Management (field visit I)	Prof. Ando	Space-based remote sensing – satellite	Prof. Koike, ICHARM/ Tokyu Univ.
12	History of Water-Disasters and Flood Management in Japan	Prof. FUKUOKA	Practice of Disaster Risk Management (field visit II)	Prof. Ando	Frequency and time series analysis	Prof. Koike, ICHARM/ Tokyu Univ.
13	(2) Role of Science and Engineering for Disaster Management	Prof. HORI	Practical Technologies for Urban and Building Safety	Prof. Ando	Cost-benefit analysis and optimization	Prof. Koike, ICHARM/ Tokyu Univ.
14	Group Presentation and Discussion: Philosophies and Lessons from the Past	Prof. IEDA	Community Based Disaster Management (case studies)	Prof. Ando	Climate change impact assessment and adaptation	Prof. Koike, ICHARM/ Tokyu Univ.
15	Group Presentation and Discussion: Philosophies and Lessons from the Past	Prof. IEDA	Special lecture "Disaster Risk Management in Japan"	Prof. Ikeya	Examination	

Lecture	Hydraulics		Basic Concepts of Integrated Flood Risk management (IFRM)		Urban Flood Management and Flood Hazard Mapping	
Number	DMP2810E		DMP2820E		DMP2870E	
Instructor	Prof. Guangwei HUANG		Prof. Kuniyoshi TAKEUCHI		Prof. Shigenobu TANAKA	
Period	Fall through Winter		Fall through Winter		Fall through Spring	
	Lecture	Lecturer	Lecture	Lecturer	Lecture	Lecturer
1	Basic mathematics and fundamental equations in Hydraulics	Asso. Prof. Yorozuya ICHARM	Introduction: What is natural disaster? Risk, Hazard and Vulnerability	Prof. Takeuchi, ICHARM	Laws for flood risk management in Japan	Prof. Tanaka, Kyoto Univ
2	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	Flood control planning (1)	Prof. Tanaka, Kyoto Univ
3	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	Flood control planning(2)	Prof. Tanaka, Kyoto Univ
4	Experimental study of flow resistance and water surface profiles (1)	Asso. Prof. Yorozuya ICHARM	ACCESS Model	Prof. Takeuchi, ICHARM	Local disaster management plan	Mr. Kamoto, ICHARM
5	Experimental study of flow resistance and water surface profiles (2)	Asso. Prof. Yorozuya ICHARM	Disaster management cycle; Hyogo Framework for Action	Prof. Takeuchi, ICHARM	Case study of comprehensive flood control measures -Tsurumi river-	Mr. Imbe, ARSIT
6	Systematic classification of water surface profiles	Prof. Huang, Sophia Univ.	IFRM and traditional FRM; IFRM as part of IWRM	Prof. Takeuchi, ICHARM	Flood hazard map	Prof. Tanaka, Kyoto Univ
7	Hydraulic jump and its application	Prof. Huang, Sophia Univ.	Concept of IWRM (1): Agenda 21, Global Water Partnership	Prof. Takeuchi, ICHARM	Evacuation Plan with Flood Forecast	Prof. Tanaka, Kyoto Univ
8	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	Flood frequency analysis (1)	Prof. Tanaka, Kyoto Univ
9	Unsteady flow models	Prof. Huang, Sophia Univ.	Japanese experiences (1) Flood damages and flood control investment	Prof. Takeuchi, ICHARM	Flood frequency analysis (2)	Prof. Tanaka, Kyoto Univ
10	Numerical methods for unsteady flow simulation (1)	Prof. Huang, Sophia Univ.	Japanese experiences (2) Ground subsidence control	Prof. Takeuchi, ICHARM	Flood frequency analysis (3)	Prof. Tanaka, Kyoto Univ
11	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	Emergency operation	
12	Channel design	Prof. Huang, Sophia Univ.	Global trends (1) Impact of climatic change	Prof. Oki, Tokyo Univ.	Geomorphology around rivers and alluvial plain (1)	Prof. Sugai, Kyoto Univ
13	On site flow measurement (1)	Asso. Prof. Yorozuya ICHARM	Global trends (2) International actions	Prof. Oki, Tokyo Univ.	Geomorphology around rivers and alluvial plain (2)	Prof. Sugai, Kyoto Univ
14	On site flow measurement (2)	Asso. Prof. Yorozuya ICHARM	Application of Sabo Works and landslide countermeasures to overseas countries	Mr. Watanabe	Developments in social sciences on people ' s reactions and responses to disasters	Prof. Hayashi, Kyoto Univ.
15	Examination		Examination		Examination	

Lecture	Flood Hydraulics and River Channel Design		Mechanics of Sediment Transportation and River Changes	
Number	DMP3810E		DMP3820E	
Instructor	Prof. Shoji FUKUOKA		Prof. Shinji EGASHIRA	
Period	Fall through Winter		Fall through Winter	
	Lecture	Lecturer	Lecture	Lecturer
1	Outlines of characteristics and management of Japanese rivers	Prof. Fukuoka, Chuo Univ	Introduction (1) - Characteristics of sediment	Prof. Egashira, ICHARM
2	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	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	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	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	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	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	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	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	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	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	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	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	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	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

Lecture	Control Measures for Landslide & Debris Flow		River Ecohydraulics	
Number	DMP3840E		DMP3870E	
Instructor	Prof. Koichi KONDO		Asso. Prof. Kelly Kibler	
Period	Fall through Winter		Winter through Spring	
	Lecture	Lecturer	Lecture	Lecturer
1	Outline of sediment-related disasters and Sabo projects	Prof. Kondo, SABO Technical Center	Dynamic equilibrium of rivers and effective discharges for geomorphic work	Asso. Prof. Kelly Kibler, ICHARM
2	Sediment yield, transport and deposition in a river basin	Prof. Sasahara, Kouchi Univ.	Physical aquatic habitat of lotic ecosystems	Asso. Prof. Kelly Kibler, ICHARM
3	Sabo planning and control of sediment transport	Prof. Sasahara, Kouchi Univ.	Specialized use of hydraulic habitats by aquatic organisms (I)	Asso. Prof. Kelly Kibler, ICHARM
4	Planning and design of Sabo facilities	Prof. Sasahara, Kouchi Univ.	Specialized use of hydraulic habitats by aquatic organisms (II)	Asso. Prof. Kelly Kibler, ICHARM
5	Restoration of vegetation on wasteland and its effects	Dr. Osanai, Group Leader, PWRI	Natural flow regimes and hydrologic alteration	Asso. Prof. Kelly Kibler, ICHARM
6	Countermeasures for earthquake-induced natural Dams	Dr. Osanai, Group Leader, PWRI	Flow restoration and environmental flows	Asso. Prof. Kelly Kibler, ICHARM
7	Introduction of landslides	Dr. Tsunaki, Division chief, SABO Technical Center	Aquatic-terrestrial ecosystem linkages	Asso. Prof. Kelly Kibler, ICHARM
8	Survey and emergency response for landslides	Dr. Tsunaki, Division chief, SABO Technical Center	Ecosystem disturbance	Asso. Prof. Kelly Kibler, ICHARM
9	Permanent measures for landslide damage reduction	Dr. Tsunaki, Division chief, SABO Technical Center	Hydrogeomorphic interaction: river response to flow and sediment alteration	Asso. Prof. Kelly Kibler, ICHARM
10	Warning and evacuation system for sediment-related disasters	Dr. Hara, Advisor, Sabo Technical Center	Environmental Impacts of Dams Guest Lecturer	Mr. Iwami, ICHARM
11	Hazard mapping for sediment-related disasters	Dr. Takanashi, Advisor, Asia Air Survey CO.,LTD	Ecosystem services and river restoration	Asso. Prof. Kelly Kibler, ICHARM
12	Training of hazard mapping for sediment-related disasters (1)	Dr. Takanashi, Advisor, Asia Air Survey CO.,LTD	Environmental Impacts of Dams	Prof. Sumi, Kyoto Univ
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	Application of Sabo/landslide projects to other countries (1)	Prof. Kondo, Dr. Osanai	Sediment Management in Reservoirs	Prof. Sumi, Kyoto Univ
15	Application of Sabo/landslide projects to other countries (2)	Prof. Kondo, Dr. Osanai	Exam	

Curriculum (Elective course)

Lecture	Computer Programming		Basic Practice on Flood Forecasting & Inundation Analysis		Advanced Practice on Flood Forecasting & Inundation Analysis	
Number	DMP1800E		DMP2860E		DMP3802E	
Instructor	Asso. Prof. Takahiro SAYAMA		Asso. 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. Sayama, ICHARM	Geographic Information System (GIS) (1)	Dr. Kwak, Research Specialist, ICHARM	Advanced Geographic Information System (GIS) (1)	Dr. Kwak, Research Specialist, ICHARM
2	Variables	Asso. Prof. Sayama, ICHARM	Geographic Information System (GIS) (2)	Dr. Kwak, Research Specialist, ICHARM	Advanced Geographic Information System (GIS) (2)	Dr. Kwak, Research Specialist, ICHARM
3	Arithmetic Calculation	Asso. Prof. Sayama, ICHARM	Geographic Information System (GIS) (3)	Dr. Kwak, Research Specialist, ICHARM	Advanced Geographic Information System (GIS) (3)	Dr. Kwak, Research Specialist, ICHARM
4	Program Structure (if)	Dr. Hasegawa, ICHARM	Geographic Information System (GIS) (4)	Dr. Kwak, Research Specialist, ICHARM	Advanced Geographic Information System (GIS) (4)	Dr. Kwak, Research Specialist, ICHARM
5	Program Structure (if)	Dr. Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (1)	Asso. Prof. Sayama, ICHARM	Advanced Remote Sensing (1)	Asso. Prof. Yorozuya ICHARM
6	I/O Statement	Dr. Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (2)	Asso. Prof. Sayama, ICHARM	Advanced Remote Sensing (2)	Asso. Prof. Yorozuya ICHARM
7	Program Structure (do loop)	Dr. Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (3)	Asso. Prof. Sayama, ICHARM	Advanced Remote Sensing (3)	Asso. Prof. Yorozuya ICHARM
8	Program Structure (do loop)	Dr. Hasegawa, ICHARM	Rainfall-runoff-inundation modeling (4)	Asso. Prof. Sayama, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (1)	ICHARM researcher
9	Quiz(1)	Dr. Hasegawa, ICHARM	Runoff analysis with IFAS (1)	Dr. Shrestha, Researcher, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (2)	
10	Hydrologic Application Exercise (1)	Asso. Prof. Sayama, ICHARM	Runoff analysis with IFAS (2)	Dr. Shrestha, Researcher, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (3)	
11	Arrays	Dr. Ushiyama, ICHARM	Runoff analysis with IFAS (3)	Dr. Shrestha, Researcher, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (4)	
12	Arrays	Dr. Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (1)	Dr. Gusyev, Research Specialist, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (5)	
13	Procedures and Structured Programming (subroutine, function)	Dr. Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (2)	Dr. Gusyev, Research Specialist, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (6)	
14	Quiz(2)	Dr. Ushiyama, ICHARM	Large-scale Runoff analysis with BTOP (3)	Dr. Gusyev, Research Specialist, ICHARM	Advanced hydrological model (RRI/BTOP/IFAS) (7)	
15	Hydrologic Application Exercise (2)	Asso. Prof. Sayama, ICHARM	Remote Sensing for Inundation Mapping (RS)	ICHARM researcher	Advanced hydrological model (RRI/BTOP/IFAS) (8)	

Lecture	Site Visit of Water-related Disaster Management Practice in Japan	
Number	DMP3900E	
Instructor	Asso. Prof. Kelly Kibler	
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

Subject: Computer Programming

Course number：DMP1800E
Instructor：Assoc. Prof. Takahiro SAYAMA
Term / Time：Fall

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: 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

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

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. 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 ：Flood control planning	Prof. TANAKA
3 ：Local disaster management plan	Prof. TANAKA
4 ：Flood control structure	Mr. Kamoto
5 ：Case study of comprehensive flood control measures -Tsurumi river-	Mr. Imbe
6 ：Flood hazard map	Prof. TANAKA
7 ：Evacuation Plan with Flood Forecast	Prof. TANAKA
8 ：Flood frequency analysis(1)	Prof. TANAKA
9 ：Flood frequency analysis(2)	Prof. TANAKA
10 ：Flood frequency analysis(3)	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

Reports (40%), Final Exam (60%)

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

4 Textbooks

4-1 Required

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

4-2 Others

Subject: Basic Practice on Flood Forecasting & Inundation Analysis

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

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 five components: practice on the basic of Geographic Information System (GIS), introduction of Rainfall-Runoff-Inundation (RRI) modeling, practice on Integrated Flood Analysis System (IFAS) and Block-wise use of TOPMODEL (BTOP) for runoff analysis, followed by 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) Working with ArcGIS
3 ：Geographic Information System (GIS) (3) ArcGIS surface analysis
4 ：Geographic Information System (GIS) (4) ArcGIS hydrology analysis
5 ：Rainfall-runoff-inundation modeling (1) Basic Concept
6 ：Rainfall-runoff-inundation modeling (2) Model run with tutorial data
7 ：Rainfall-runoff-inundation modeling (3) Topographic data preparation
8 ：Rainfall-runoff-inundation modeling (4) Parameter setting
9 ：Runoff analysis with IFAS (1) Data import, Model building
10 ：Runoff analysis with IFAS (2) Parameter estimation
11 ：Runoff analysis with IFAS (3) Validation of calculated discharge
12 ：Large-scale Runoff analysis with BTOP (1) Basic concept
13 ：Large-scale Runoff analysis with BTOP (2) Data preparation
14 ：Large-scale Runoff analysis with BTOP (3) Running model
15 ：Remote Sensing for Inundation Mapping (RS) Basic concept & case study

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: Advanced Practice on Flood Forecasting & Inundation Analysis

Course number：DMP3802E
Instructor：Adjunct Prof. Atsuhiro YOROZUYA
Term / Time：Winter

1 Course Description

The objective of this course is to build deeper capacities for undertaking hydrological tools, which are expecting to be applied in the individual study. Students are expected to preliminarily take Basic Practice on Flood Forecasting & Inundation Analysis.

The course consists of three components; practice on the Advanced Geographic Information System (GIS), the Advanced Remote Sensing, and the Advanced hydrological models. The Advanced hydrological models are composed with three different topics, such as learning of Rainfall-Runoff-Inundation modeling (RRI), Block-wise use of TOPMODEL (BTOP), Integrated Flood Analysis System (IFAS). The Students need to select one topic depending on their individual study.

2 Course Outline (Course Topics)

Week

1 ：Advanced Geographic Information System (GIS) (1) ArcGIS Data management
2 ：Advanced Geographic Information System (GIS) (2) ArcGIS Data processing
3 ：Advanced Geographic Information System (GIS) (3) ArcGIS Spatial analysis
4 :Advanced Geographic Information System (GIS) (4) Model-builder window in ArcGIS
5 ：Advanced Remote Sensing (1) Satellite image preparation
6 ：Advanced Remote Sensing (2) Image analysis with tutorial data with ArcGIS
7 ：Advanced Remote Sensing (3) Application of image analysis with ArcGIS
8 ：Advanced hydrological model (RRI/BTOP/IFAS) (1)
9 ：Advanced hydrological model (RRI/BTOP/IFAS) (2)
10 ：Advanced hydrological model (RRI/BTOP/IFAS) (3)
11 ：Advanced hydrological model (RRI/BTOP/IFAS) (4)
12 ：Advanced hydrological model (RRI/BTOP/IFAS) (5)
13 ：Advanced hydrological model (RRI/BTOP/IFAS) (6)
14 ：Advanced hydrological model (RRI/BTOP/IFAS) (7)
15 ：Advanced hydrological model (RRI/BTOP/IFAS) (8)

3 Grading

Participation (100%)

4 Textbooks

4-1 Required

4-2 Others

Material made by the instructors

Subject: Flood Hydraulics and River Channel Design

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

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. Outlines of characteristics and management of Japanese rivers.
2. Occurrence of flood flows.
3. Propagation of hydrographs 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 and application to river channel design.
6. Quasi-two dimensional analysis of flood flows in rivers with vegetations.
7. Effects of Channel Vegetations on Flood Propagation
8. Relationship between dimensionless width, depth and discharge in rivers - Learning from natural rivers
9. River cross-sections harmonizing the flood control and river environment
10. Flow in the dam reservoir during floods
11. Flood flow and Bed variations in the Ishikari River
12. Flow and Bed variations in the Hi-i river sections before and after the flow diversion
13. Effects of the Watarase retarding basin on flood control by in Tone river system
14. Design Method of No.2 Consolidation Work in the Shinano River
15. Summary of “Flood Hydraulics and River Channel Design ”

3 Grading

Reports (30%) Final examination (70%)

4 Textbooks

4-1 Required

4-2 Others

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	Dr.Osanai
6． Countermeasures for earthquake-induced natural Dams	Dr. 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. Takanasi
14． Application of Sabo/landslide projects to other countries (1)	Prof.Kondo Dr. Osanai
15． Application of Sabo/landslide projects to other countries (2)	Prof.Kondo Dr. Osanai

3 Grading

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

4 Textbooks

4-1Required

4-2 Others

Subject: River Ecohydraulics

Course number：DMP3870E
Instructor：Assoc. Prof. Kelly Kibler
Term / Time：Fall

1 Course Description

Modification of natural rivers is often necessary to protect against losses of human lives and property related to water and sediment-related hazards. However, without careful planning, river modification may lead to ecosystem degradation. To support sustainable and multi-objective management of rivers and aquatic resources, this course investigates fundamental linkages between physical processes, management actions, and ecological responses. Students will explore processes relevant to low- and high-gradient river systems, gaining knowledge at the intersection of fluvial geomorphology, river engineering, and stream ecology theory.

2 Course Outline (Course Topics)

Week

1：Dynamic equilibrium of rivers and effective discharges for geomorphic work
2：Physical aquatic habitat of lotic ecosystems
3：Specialized use of hydraulic habitats by aquatic organisms (I)
4：Specialized use of hydraulic habitats by aquatic organisms (II)
5：Natural flow regimes and hydrologic alteration
6：Flow restoration and environmental flows
7：Aquatic-terrestrial ecosystem linkages**
8：Ecosystem disturbance
9：Hydrogeomorphic interaction: river response to flow and sediment alteration
10：Environmental Impacts of Dams Guest Lecturer, Mr. Iwami, ICHARM
11：Ecosystem services and river restoration
12：Environmental Impacts of Dams, Professor Sumi, Kyoto University
13：Sediment management in reservoirs (I), Professor Sumi, Kyoto University
14：Sediment management in reservoirs (II), Professor Sumi, Kyoto University
15：Exam

** Supplement activity to Lecture 7: Extra credit viewing of film *Riverwebs*, outside of class time.

3 Grading

60% Assignments, readings, and participation
40% Exams and short quizzes

4 Textbooks

4-1 Other- Primary academic literature, provided by the instructor

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

Course number：DMP3900E
Instructor：Asso. Prof. Kelly Kibler
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 are introduced in other courses. The structures include river levees, flood retarding basins, dams, and sabo structures. After each study visit, students will be required 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
4-2 Others

Visit to Nikko(TONE RIVER BASIN)

Dam, Sabo

[29th October (Wed)]

10:00 Leave TBIC
↓
10:30 ICHARM
↓
(JICA bus)
↓
11:30-12:30 Lunch (at roadside restaurant "Michi-no-eki GOKA")（道の駅ごか）
↓
(JICA bus)
↓
14:00-16:00 Tone Canal Management and Construction Office of Japan Water Agency
利根導水総合事業所（埼玉県行田市） ↓
(JICA bus)
↓
17:30 Utsunomiya City (Chisan Hotel)

[30th October (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 in Utsunomiya City)
↓
(JICA bus)
↓
(JICA bus) Buy your lunch at a convenience store

(JICA bus) Lunch on the way
↓
(JICA bus)
↓
13:00-14:15 Site visit at Kawaji Dam
↓
(JICA bus)
↓
14:30-16:00 Site visit at Yunishigawa Dam
↓
(JICA bus)
↓
18:30 Utsunomiya City (Chisan Hotel)

[31st October (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
↓
(JICA bus) Lunch on the way
↓
13:30-15:30 Lecture of Ashio Sabo works
↓
(JICA bus) via ICHARM & Tsukuba sta.
↓
19:00 Arrival at TBIC

Site Visit

Urban River in Japan

[17th December (Wed)]

11:00 Leave from TBIC

Hitachino Ushiku Sta. 11:15 => 12:20 Ueno Sta. 12:30 => 12:52 Saitama Shintoshin Sta.

Lunch at Saitama Shintoshin Sta.

(On foot)

14:20 Saitama Shintoshin Second Common Building for Government Offices 2F

Reception

14:30-16:00 Lecture at Kanto Regional Bureau of MLIT

Flood forecasting and early warning system

(On foot)

Saitama Shintoshin Sta. 16:35 => 16:58 Ueno 17:05 => 17:54 Sakuragi-cho sta.

(On foot)

JICA Yokohama

[18th December (Thu)]

Buy your lunch at convenience store

8:30 JICA Yokohama

(On foot)

Sakuragi-cho Sta. 8:54 => 9:12 Kozukue Sta.

9:20 Tsurumi River Basin Information Center

9:30-10:30 Lecture on Integrated River Basin Management by Mr. Imbe

Urban Flood Management and Flood Hazard Mappig

10:30-11:30 Site visit at the Information Center

11:30-12:30 Lunch at the Information Center

Move by bus

13:00-14:00 Kawawa River Retarding Basin

(Under subway train depot, Yokohama-city)

Move by bus

14:20-14:30 Kirigaoka Regulating Pond

(Kirigaoka, Midori-ku, Kawasaki-city)

Move by bus

14:50-16:00 Onmawasi Park Underground Tunnel-type Reservoir

(Shimoasao, Asao-ku, Yokohama-city)

Move by bus

16:50-17:20 Rainwater storage and infiltration system in individual house

(Prof. Takahashi's house : Todoroki, Setagaya-ku, Tokyo)

Move by bus

18:00 JICA Tokyo

[19th December (Fri)]

9:30 JICA Tokyo

Move by bus

10:00-11:30 Lecture at JMA

Move by bus

13:30-15:00 Edo Tokyo museum (Entrance Fee ¥300*13)

(On foot)

Ryogoku Sta. 15:34 => 13:38 Akihabara Sta. 15:41 => 15:45 Ueno Sta.15:52 => 16:52 Hitachino-Ushiku Sta. 17:10=>17:25 TBIC

World Conference on Disaster Risk Reduction

March 14th

Meeting time : 7:45
TBIC 7:50 =>On Foot => Kohyadai,Rikagaku-kenkyusyo bus stop 8:11=>
(Tsuku-bus) =>8:35
Tsukuba center 8:47 => (TX) => 9:39 Akihabara sta. 9:55 => (JR) => 9:59 Ueno sta. 10:26 =>
(Shinkansen, Hayabusa13) => 11:52 Sendai sta. => (On Foot, 3miin.) => TKP Garden City Sendai
13:00-20:00 Conference
Sendai Sta. 21:15 => (Shinkansen, Hayabusa105) => 21:27 Furukawa sta. =>
(On Foot, 2min.) =>
Hotel Route Inn Furukawa sta.
Stay in Furukawa city

March 15th

Meeting time: 8:45
Hotel 9:00 => (Chartered Bus) => 10:20 Hiyori-yama park in Ishinomaki city
10:20-11:05 Hiyori-yama park
(Chartered Bus)
11:10-12:00 Observation of Ishinomaki city
(Chartered Bus, Lunch)
13:15-14:30 Matsushima park
(Chartered Bus)
Sendai sta.16:44 => (Shinkansen, Yamabiko150) => 18:42 Ueno sta. 19:08
=> (JR) 19:12 Akihabara sta. 19:30 => (TX) => 20:15 Tsukuba 20:25 =>
(Tsuku-bus) => 20:46 Kohyadai,Rikagaku-kenkyusyo
bus stop => TBIC

Niigata(Shinano River)　Schedule

【23rd April (Thu)】

Meeting time: 6:15

TBIC 6:20 -> (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") -> 10:32 Niigata Sta.

We are meeting the ICHARM Researchers at Niigata 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

【24th April (Fri)】

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　Ojiya-shi Shinanogawa River Park

14:00-19:00　**Exercise on River Discharge Measurement at Ojiya-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)

【25th April (Sat)】

8:30　Leave from hotel

Nagaoka Sta. 8:50 -> (Shinkansen "MAX Toki 310") ->10:26 Ueno Sta. 10:52 ->
(JR Joban Line) -> 11:45 Ushiku Sta. 12:05 -> (Kantetsu Bus) -> Bus stip -> (on foot) -> TBIC

Site Visit
Yodo River Basin

27th May (Wed)

8:10 TBIC 8:20 － (JICA Bus) → 8:35 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 left the belongings and have a lunch) → 14:45 Higashi-umeda Sta. → (Tanimachi line) → 14:49 → Temmanbashi 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		

28th May (Thu)

Leave at		
		JICA Bus (60 min.)
9:00-10:00	**Yodogawa museum** **（Yodogawa river office in MLIT）　60 min.** （Lecture 60 min.　: The out line 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》	
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 Kyoto		

29th May (Fri)

Leave at		
9:00-10:00	**Yodogawa Integrated Dam Control Office 60 min.** （Lecture : Dam Operation for Typhoon No.18 in 2013）	
		JICA Bus (50 min.)
11:00-12:00	**World Heritage Byoudoin**	Entrance fee @600(Outside) @300 (Inside) Parking fee
		JICA Bus (15 min.)
12:30	Lunch at Amagase Dam	
13:30-14:30	**Amagase Dam 60 min.** （Site Visit）	
		JICA Bus
Stay in Kyoto		

30th May (Sat)

Leave at		Leave luggage at Kyoto sta. or Hotel
		JICA BUS
09:00-10:30	Biwako Canal Memorial Hall	
		JICA BUS
11:00-12:00	**World Heritage Nijo Castle**	Entrance fee @600
		JICA BUS

Kyoto Sta. 14:45 → (Shinkansen Nozomi 370) → 17:03 Tokyo Sta. 17:25 →(JR)→ 18:26 Ushiku 18:35 → (Local bas) → 18:50 TBIC

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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