



International Research Center for River Basin Environment  
University of Yamanashi

# IICRE

# Summary Report

## Global COE Program

Evolution of Research and Education on Integrated  
River Basin Management in Asian Region

Global COE Program



Interdisciplinary Graduate School of  
Medicine and Engineering

**UNIVERSITY OF YAMANASHI**

# CONTENTS

1	<b>Outline of Global COE Activities</b>
3	<b>Global COE Educational Structure</b>
5	<b>Global COE Special Course Lectures</b>
13	<b>Global COE Members</b>
19	<b>Publication List</b>
35	<b>Global COE Event Record</b>
	<b>Global COE Activity Report</b>
41	UY-GCOE Kick-off Symposium “Advanced Technology and Human Resources Leading the Future of Water Environment in Asia”
43	Symposium on Science and Practice of Basin-Scale Water Policy for Population Up Surging Area
45	The 6 <sup>th</sup> International Symposium on Southeast Asian Water Environment
47	Virtual Academy 2008
49	Symposium on Industry Academia Government Collaboration “Consideration of Energy and Environment by Industry, Academia and Government”
51	International Symposium “Contributing to the Solution of Water Issues in Asia through Human Resources Development”
55	International Symposium “Environment, Energy and Water in Nepal: Recent Researches and Direction for Future”
57	Report on a Field Survey in Kathmandu, Nepal
59	Field Survey on Channel and Ecosystem of the Mekong River Basin
61	Investigation of City Planning at Ho Chi Minh City, Vietnam
63	Field Survey in the Phytoremediation Site at Pakchong in Thailand for Analysis of Dynamics in Microbial Community in the Phytoremediation Field
65	Installation of Bank Erosion Monitoring Systems in the Mekong River
67	International Symposium “Preservation and Development of Great Mekong Sub-region and International”
69	The 1 <sup>st</sup> and 2 <sup>nd</sup> UY-GCOE Meeting 2009
71	International Conference on Water and Green
73	Virtual Academy 2009
79	The Seventh International Symposium on Southeast Asian Water Environment
81	National Symposium “Challenges and Opportunities for Sustainable Management of Groundwater Resources of Kathmandu Valley, Nepal”
83	Activity Report on 2009 of X-band Dual –Polarimetric Doppler Radar of University of Yamanashi

# OUTLINE OF GLOBAL COE ACTIVITIES

## :: ABOUT THE PROGRAM-----

### ● Introduction

Climatic changes are showing effects in various issues concerning water, these include extreme climatic phenomena that are becoming more routine, sea level rising, flooding caused by washouts from glacial lakes, drying up of glacial resources, changes in the geographical mapping of cultivation, and health issues related to drinking water. Due to the various natural and social factors in Asia, these problems are now rapidly increasing in concentration particularly in the region. In order to train people who can take on these problems, the MEXT has set up the Global COE (Evolution of Research and Education on Integrated River Basin Management in Asian Region) at the University of Yamanashi in 2008.

### ● Objectives

The aim of the Global COE is to conduct research and education on applying the cutting edge scientific technologies concerning water and water quality to suit the river basin environments in the Asian region; it also aims to train human resources that can take on the task of solving all various disasters and health problems caused by water issues occurring in Asia. With the results already achieved by 21st Century COE, further research education is being steadily conducted to encompass a wider scope. And in addition to existing courses, such as the “International Special Doctoral Program for Integrated River Basin Management” that has welcomed over 30 national and international students up to now and the “Virtual Academy” that saw 150 students, new courses have also been launched to include “Implementation of Interdisciplinary Education of Medicine and Engineering,” a pioneering new field, as well as core programs like “Hydro-Intelligence Unit” and “Overseas Cooperation Centers.”

## :: RESEARCH PROGRAM-----

### ● Consistent education for master’s and doctoral courses

Newly established master’s course, Special Master Course Program on International River Basin Environmental Science links with existing doctoral course, Special Course on Integrated International River Basin Water Management.

### ● Enrichment of Virtual Academy

Making packages of the latest technologies such as hydrologic models available online, and supervise front-line specialists while monitoring their level of achievement in aspects such as the acquisition of related knowledge and data management.

### ● Propelling interdisciplinary research work in medical and engineering fields

Train human resources who can reveal the overall relationship between environmental factors and the health of residents around Asia’s river basins through medical and engineering viewpoints, and can provide policies on water management and public health with scientific support.

### ● Information and Analysis Unit for IRBM

Access of data between researchers through specifying valid data, collecting onsite test data, and using data archives; combine data from and knowledge on all fields related to river basins.

- Overseas Cooperation Centers
  - Local organization and operation of tasks and events such as special lectures
  - Local supervision of Virtual Academy
  - Field research support for doctoral students
  - PR, support for people wishing to apply for entrance in our postgraduate programs
  - Support for foreign student recruitment
  - Support for lifelong education research activities
  - Maintenance of international social capitals

## ● : EDUCATION PROGRAM-----

- International Special Doctoral Course for Integrated River Basin Management  
 This special course is within the Social Development Engineering Program for the Doctor of Engineering Degree. The qualification for application is to hold the Master Degree or an equivalent experience in practice.  
 Now we have 16 students in this course from 8 countries (China, Nepal, Vietnam, Indonesia, Uabekistan, Thailand, Cambodia and Japan) as of April 2010.
- Special Master Course Program on International River Basin Environmental Science  
 In addition to the existing Ph.D. Course, "International Special Doctoral Course for Integrated River Basin Management", a new Course, "Special Master Course Program on International River Basin Environmental Science" has been established in 2009. The main objective of this program is to nurture talented people with broad knowledge of river basin environment.  
 Currently, we have 20 students in this master course.
- Virtual Academy on Integrated River Basin Management  
 The Global COE provides the internet-based courses as Virtual Academy. The academy is open to anyone who has interest in using the technologies put on the web and wishes to consult with the members of this Global COE. The technologies include the basin scale hydrological simulation model "YHyM/BTOPMC".

### Application for Enrollment

Application form for entrance to the Academy is available at the Academy website.  
<http://www.gcoe.yamanashi.ac.jp/>

### Certificate

The certificate was awarded for successful participants.



# **GLOBAL COE EDUCATIONAL STRUCTURE**

## **-SPECIAL GRADUATE COURSE AND VIRTUAL ACADEMY-**

The object of this Global COE program is, through research and education, to make the top sciences in hydrology and water quality management applicable to practice in the real basins in Asian region. It provides an opportunity to share regional experiences on water problems and management efforts and to develop solution techniques suited to the unique natural and social conditions of the region. Especially it aims to put high technologies available in the frontier sciences to practical use in the site-specific local conditions of Asian region. Education will be through (1) the International Special Doctoral Course for Integrated River Basin Management, (2) the Special Master Course Program on International River Basin Environmental Science and (3) the internet-based Virtual Academy open to all engineers and manager of basins in their home countries. Please refer to the section regarding the activity report for Virtual Academy 2009. Admission Guidance for reference is also available in this research report.

### 1. SPECIAL DOCTORAL COURSE

#### 1.1 Outline

The goals of the University of Yamanashi Global COE Program (UY-GCOE) and International Center for River basin Environment (ICRE) include the formation of an international human resources network for cooperative work by experts on water problems in Asia. The reason is that Asia's water problems include those which cannot be resolved by a single country. So in order to develop superior human resources to form this network, the Ph.D. course, "International Special Doctoral Course for Integrated River Basin Management" has been established.

This special course is established for specialists in the Natural, Biotic and Social Environment Engineering of the graduate school of the University of Yamanashi. Specialization in Natural, Biotic and Social Environment Engineering is a Ph.D course limited in principle to three years of study. It is a short enrolment period course for superior students.

The degree of Doctor (Doctor (Engineering)) is awarded to people who enroll for at least 3 years, obtain 14 or more credits for the class subjects in Curriculum, and after receiving required research guidance, pass a screening of their Ph.D thesis and a final exam. But persons who complete superior research only have to spend 1 year in this course. Research guidance to help with the preparation of the Ph.D thesis is provided by a group of at least three academic advisors including each candidate's principal advisor.

#### 1.2 Special Course Lectures

The mandatory lectures and supervisors in charge of this course are as follows. Lectures are given on these subjects primarily in English.

Special course offers lectures about the following subjects;

- Integrated River Basin Management (SUNADA Kengo, KITAMURA Shinichi and OYAMA Isao)
- Advanced Water Resources Systems (SUNADA Kengo and OISHI Satoru)
- Advanced Environmental Sanitary Engineering (HIRAYAMA Kimiaki and KANEKO Hidehiro)
- Advanced Water Quality Assessment (SAKAMOTO Yasushi, KAZAMA Futaba and NISHIDA Kei)
- Advanced Environmental Biotechnology (KOHNO Tetsuro and MORI Kazuhiro)
- River Basin Hydrological Simulation (ICHIKAWA Yutaka and ISHIDAIRA Hiroshi)
- Advanced Molecular Genetics and Epidemiology (YAMAGATA Zentaro) etc.

### 2. SPECIAL MASTER COURSE PROGRAM

#### 2.1 Outline

In order to deal with various water problems, it is essential that instead of considering them in terms of individual technologies, we view them from the perspectives of entire river basins and the globe.

The proposed Master Course program will offer education to train specialized technologists and researchers who, from a river basin management perspective which transcends the frameworks of the

national or regional government bodies, can consider measures to resolve water problems inside and outside of Japan by combining a local point of view with a global point of view. Specifically, personnel who 1) possess advanced specialized knowledge and technical skills concerning water resources, disaster prevention, and environmental management, and 2) who have problem resolution capabilities based on social harmony, and are capable of applying these to the management of river basins.

## 2.2 Special Course Lectures

### 1) Course Contents:

- a. River Basin Hydrology: global scale water cycle (including meteorology), impacts of warming and development, water resource conservation
- b. Environmental Dynamics: river environmental change and its impacts, harmful substances accompanying water cycles, movement of pathogens
- c. Environmental Management: appropriate management of river basin environments (control of waste and the water cycle)
- d. Regional Planning: river basin urban planning and disaster prevention
- e. Health Risk: river basin epidemiology, genetic engineering environmental sensors

### 2) Contents of class subjects unique to this program

#### a. Integrated Medicine and River Basin Engineering

With the cooperation of the teachers of the Faculty of Medicine, different teachers give lectures concerning introductory environmental medicine, biological environment sensors, environmental toxicants, and analysis of pathogenic microorganisms in the environment: subjects which form the foundation of river basin epidemiology.

#### b. River Basin Research Training

Students participate in national conferences of academic associations, conferences of research groups, etc., approved by their specialty course, and take part in short term exchange training (AIT, BNU), joint research and cooperative work with outside organizations, etc. This corresponds to field research in a Ph.D course. While an "internship" provides work experience in a public bureau or in a corporation, this includes a wider range of activities than "vocational experience".

#### c. Special Lecture on River Basin Environment I, II (Omnibus format)

These lectures teach the following topics related to the state of advanced research on river basin environmental science. 1) is a course combined with medical engineering (river basin sciences), is taught by teachers in the Faculty of Medicine. Others are taught by researchers (including assistant professors, and those with a record of successful subsidized research) from inside and outside the university (assistant professors are presumably members of the labs run by the professors in charge (professors and associate professors)).

## 3. VIRTUAL ACADEMY (VA)

### 3.1 Purpose

The purpose of the Virtual Academy of the University of Yamanashi Global Center of Excellence for Evolution of Research and Education on Integrated River Basin Management in Asian Region is to encourage international collaboration in research and the exchange of information and expertise in relation to river basin management. Registration in the Virtual Academy will give participants access to advanced technology (e.g. hydrological models), and the theoretical and practical expertise necessary to properly use them for their own local applications, through a structured curriculum offered through the internet.

### 3.2 Benefits

Participants will be able to consult with experts from the Global COE, regarding the technology being offered, and the underlying theory. Successful completion of the Virtual Academy curriculum will be recognized by a certificate awarded by the University of Yamanashi.

### 3.3 Target Audience of the Virtual Academy

The Virtual Academy is intended for use by engineers and researchers interested in developing expertise in the application of advanced technology. It is intended for use by personnel who are affiliated with an academic or government institution, consultancy, or company.

# GLOBAL COE SPECIAL COURSE LECTURES

## SPECIAL DOCTORAL COURSE

Course Name	<b>Integrated River Basin Management</b>
Professor	SUNADA Kengo, KITAMURA Shinichi and OYAMA Isao
Semester	2nd Semester
Contents	The purpose of this lecture is to identify basic concepts of "River Basin Management and Planning" and to introduce the methodological approaches for analyzing and evaluating its natural, biological and socio-environmental impact. At first, a conceptual framework for River Basin Management and Planning is discussed. Then, effective methodological approaches for evaluation of a river basin are introduced. Finally, some typical examples of the basin management such as flood and sediment control, city and community planning and natural environment in the Fuji River basin are presented.

Course Name	<b>Advanced Water Resources Systems</b>
Professor	SUNADA Kengo and OISHI Satoru
Semester	2nd Semester
Contents	Variation of environment in the global and basin wide scale depends on many well known and unknown factors. Almost all of the activity over the world is affected by the variation. Water is one of the most important material and media that causes and transports the variation of environment. Understanding of hydrological cycle that is defined as water circulation requires deep consideration of energy circulation, energy balance, temporal and spatial scale. Moreover, improvement of understanding of hydrological cycle is owed by advanced measurement that uses high-tech electronics. At first, phenomena and physics of the hydrological process from global scale to basin scale are explained in the lecture. In the next, the lecture gives the explanation of measurement for hydrological system. At last, the lecture touches various conditions of water resources in real world.

Course Name	<b>Advanced Environmental Sanitary Engineering</b>
Professor	HIRAYAMA Kimiaki and KANEKO Hidehiro
Semester	1st Semester
Contents	This lecture consists of two parts. One is about river water quality. Seasonal variations, historical trends, effects of sewer system construction and others are discussed with practical data analysis. Various statistical methods are introduced and applied in order to organize observed data. Trend and the background are examined. The other is about waste management. Using some references, basic matters for waste management are explained. And present topics concerning recycling, hazardous waste management, waste treatment facilities and communication with neighbors are also discussed.

Course Name	<b>Advanced Water Quality Assessment</b>
Professor	SAKAMOTO Yasushi, KAZAMA Futaba and NISHIDA Kei
Semester	2nd Semester
Contents	This lecture gives the introduction about problems and research methodology for water environment on land surface (ground water, river and lake). The fundamental lab-experiments of water quality measurement and water treatment will also be provided for students who do not have any experiences on water quality studies but need to have basic knowledge of these studies in the future, if necessary.

Course Name	<b>Advanced Environmental Biotechnology</b>
Professor	KOHNO Tetsuro and MORI Kazuhiro
Semester	1st Semester
Contents	Understanding of biology and its application are necessary in the environmental cleaning and conservation. This lecture consists of two topics of “environmental microbial engineering” and “environmental and ecological engineering”. In the former topic, classification and phylogenetic analysis of prokaryote based on 16s rRNA gene sequences and its application in this field are mainly studied. In the latter topic, natural cleaning mechanism of the ecosystem and its engineering control are studied.

Course Name	<b>River Basin Hydrological Simulation</b>
Professor	ISHIDAIRA Hiroshi and ICHIKAWA Yutaka
Semester	2nd Semester
Contents	<p>[Meso-scale meteorological model]</p> <p>In order to consider the global hydrological circulation, the process of transportation of mass and energy of atmosphere and process of precipitation are lectured. Moreover, the way of using meso-scale meteorological model and its application is lectured. At first the basic atmospheric phenomena such as momentum equation, continuity equation and thermodynamic equation are lectured. Then microphysical process that describe the generation, development and dissipation of precipitation. Finally, how to use the meso scale meteorological model and its application, how to use the result of regional scale model and its application is studied.</p> <p>[Basin scale Hydrological modeling]</p> <p>The objectives of "hydrological modeling part" are:</p> <ul style="list-style-type: none"> <li>- To understand the basic theory of water/energy flux between land surface and atmosphere</li> <li>- To develop the computational skills of distributed hydrological model</li> <li>- To expand the handling and analysis skills of RS/GIS data for hydrological modeling.</li> </ul>

Course Name	<b>Advanced Molecular Genetics and Epidemiology</b>
Professor	YAMAGATA Zentaro
Semester	1st Semester
Contents	With a genome / genetic information provided by human genome project, the theory and practice of the epidemiology techniques are explained in this lecture to clarify disease caused by the genetic factors mainly on the lifestyle-related disease and interaction with the environmental factors. The ethical, legal and social issues (ELSI) on adaptation of the theory will also be lectured.

Course Name	<b>Neuroendocrinology (Lecture)</b>
Professor	ARITA Jun
Semester	1st Semester
Contents	Lectures are given explaining the broad actions of female hormones, estrogen in particular, and their action mechanisms. It consists of lectures which explain molecular mechanisms related to genomic and non-genomic action, action unrelated to reproduction (anti-atherogenic action, osteogenic effect), cell-growth promotion action, and at the same time, details of the dynamism between female hormones and the central nervous system.

Course Name	<b>Signal Transduction</b>
Professor	NAKAO Atsuhito
Semester	1st Semester
Contents	This course provides molecular biological explanations of cytokine signaling which contributes to maintaining homeostasis of normal multicellular organisms including humans and disease states of allergic immunity disorders.

Course Name	<b>Genetic Engineering Technology</b>
Professor	KITAMURA Masanori
Semester	1st Semester
Contents	The development of genetic engineering technologies has supported high speed progress in the life sciences during the past quarter century. This course, which provides methodological interpretations of genetic manipulation technologies of germlines—technologies to introduce genes to cultured cells, methods of introducing genes to living organisms/internal organs, and transgenic mice or knock-out mice creation—and at the same time, considers what kinds of impacts such genetic engineering methods have on basic research and on clinical medicine, promises to expand the potential of these technologies.

## SPECIAL MASTER COURSE PROGRAM

Course Name	<b>Environmental Planning Advanced</b>
Professor	OYAMA Isao
Semester	1st Semester
Contents	<p>It has been widely recognized that Government-Public-Academia Cooperation is important for Environmental Planning. To ensure environmental sustainability dealing with Global environment issues, we should have 3 essentials, “Environment”, “Economy” and “Participation (Government-Public-Academia Cooperation)”.</p> <p>This lecture especially focuses on the importance of “Participation (Government-Public-Academia Cooperation)” and explains the way of “civic collaborative regional planning”.</p>

Course Name	<b>Advanced Sanitary Engineering</b>
Professor	KANEKO Hidehiro
Semester	1st Semester
Contents	<p>Main targets of sanitary engineering are water supply and sewerage systems and wastes. Each of them is a foundation for a healthy and comfortable society and also is needed the appropriate management. This lecture gives the knowledge about wastes and the way of thinking about the appropriate waste management.</p>

Course Name	<b>Advanced Water Quality Management Engineering</b>
Professor	HIRAYAMA Kimiaki
Semester	1st Semester
Contents	<p>In fluid like water, material transport is caused by many factors and it also causes a concentration change. For instance, while a pollution flowing into a river from its tributaries spreads across the river, it is purified and its concentration changes.</p> <p>To learn the theory of transfer phenomenon helps us to understand this kind of phenomenon.</p> <p>This lecture explains the theory of transfer phenomenon and how we should apply it to the issues on water quality.</p>

Course Name	<b>Urban Policy</b>
Professor	KITAMURA Shinichi
Semester	1st Semester
Contents	<p>Currently, cities have different problems. In urban spaces, it is needed to manage and practice the objectives of urban policy, such as to make an environmentally-friendly and nature conservation urban, to develop an economic society for citizen’s affluence, to build a functional urban infrastructure.</p> <p>This lecture picks up a point from literature of urban problems and has a discussion about it and how urban policy should function.</p>

Course Name	<b>Advanced Water Treatment Engineering</b>
Professor	MORI Kazuhiro
Semester	2nd Semester
Contents	This lecture explains treatment methods utilizing various biofunctions for sanitization of waste water and polluted environment. Besides, this lecture aims to deepen the participants' understanding of water treatment by PC exercises.

Course Name	<b>Principles of Ecosystem Biogeochemical Cycles</b>
Professor	IWATA Tomoya
Semester	2nd Semester
Contents	This is a lecture on ecosystem ecology and biogeochemistry. The aim of this lecture is to deepen participants' understanding of biogeochemical cycles of chemical elements that move through land, river, lake and ocean ecosystems.

Course Name	<b>Advanced River Basin Management</b>
Professor	SUNADA Kengo and ICHIKAWA Yutaka
Semester	2nd Semester
Contents	<p>This lecture gives an explanation of a basic and quantitative method for evaluation of river channel management and river basin management. At first, regarding river channel management, participants study how to understand a phenomenon and basic principles for design considering external forcing in order to construct a hydraulic engineering system for river flow, sediment transport, and river environment management. Production and propagation of floods along a river channel, sediment transport and river bed variation will be discussed. In addition, practical problems about river management and recent studies on these issues will also be lectured.</p> <p>For river basin management, a framework for constructing hydraulic systems as a foundation of safe and comfortable life will be discussed. The following topics are included: basic ideas and current status of river basin management, methodology for flood disaster risk assessment, relation between water disasters and land use, and economical evaluation of cost-benefit of river basin management strategy.</p>

Course Name	<b>Advanced Water Resources Engineering</b>
Professor	ICHIKAWA Yutaka
Semester	1st Semester
Contents	This lecture explains a method for evaluation of water resources system in different scales such as local, regional, and global. Firstly, from local point of view, participants study the basic equations of fluid dynamics and methods for evaluation of stream regime using the equations. Secondly, participants study modeling methodology of regional hydrological phenomenon and methods for evaluation of water resources system. At last, from global point of view, participants study the mechanism of global water cycle and its modeling and application to world water assessment. Each of these is important to use water resources sustainably under uncertain factors such as human society, economic development, and climate change.

Course Name	<b>Advanced Water Environment Assessment</b>
Professor	SAKAMOTO Yasushi, KAZAMA Futaba and NISHIDA Kei
Semester	1st Semester
Contents	In order to understand water environment (groundwater, river, lake), this lecture explains methods used frequently in hydrology, biogeochemical science, and analytical chemistry and shows how to apply such methods practically.

Course Name	<b>Advanced Applied Meteorology</b>
Professor	SUETSUGI Tadashi
Semester	1st Semester
Contents	This is an advanced lecture of the lectures of Hydraulics, applied hydrodynamics, hydrology and Environmental meteorology which studied in undergraduate course. The aim of this lecture is to understand the theory and to get the practical skill of Advanced Applied Meteorology. The theory is a basic theory of turbulence and a mathematical expression of 3D behavior of the atmosphere. And the practical skill is to understand the real climatic phenomenon in Japan using the data. Also, this lecture explains a structure of cumulonimbus cloud which is one of the components of heavy rainfall, a developing process of the cloud, and distinguished phenomena (e.g. blast) according to the cloud.

Course Name	<b>Advanced Remote Sensing and GIS</b>
Professor	ISHIDAIRA Hiroshi, KOBAYASHI Hiroshi and SHIMOKAWA Toshio
Semester	2nd Semester
Contents	Acquisition and analysis of various information in different temporal/spatial scale is necessary to understand river basin environment and to estimate the change of it. This lecture explains basic theory and technology for dealing with different environmental information. Especially, methods for collecting and analyzing of environmental information using remote sensing, GIS, Statistics Analysis are explained in detail.

Course Name	<b>Advanced Water Environment Analysis</b>
Professor	KAZAMA Futaba, NISHIDA Kei, IWATA Tomoya and HARAMOTO Eiji
Semester	2nd Semester
Contents	Participants learn a measurement method, an analysis method, a data analysis method used for environment research. The aim of this lecture is to learn what method we should choose depending on the objectives.



Course Name	<b>Medicine and Engineering: Interdisciplinary Research Techniques for River Basin Management</b>
Professor	ARITA Jun, YAMAGATA Zentaro, KITAMURA Masanori, NAKAO Atsuhito, KONDO Naoki and NISHIDA Kei
Semester	Intensive course
Contents	The people living around river basins in developing countries are vulnerable to water environment effects. This course covers the basic approaches from various disciplines aiming to evaluate health risks and the environmental improvement for better health. The lectures include epidemiological techniques for evaluating health risks of a population, the introduction of the leading molecular approaches to explore the mechanism explaining how each hazard in the environment affects health. Also, challenges in applying the research results to real society are reviewed.

Course Name	<b>River Basin Research Training</b>
Professor	GCOE professors
Semester	Intensive course
Contents	For research in master course, it is necessary to study various different things not only in laboratory but also in experimental field, other organizations, and conferences. It also needs to have experiences outside and obtain broader insight. In this training, participants join a national/research group meeting of academic society selected by the supervisor, a short term student exchange program with related institution inside and outside Japan (e.g. Nepal, Thailand, China), a cooperative research and work with external institution.

Course Name	<b>Special Lecture on River Basin Environment I</b>
Professor	NIHEI Yasuo and USHIYAMA Motoyuki
Semester	Intensive course
Contents	<p>A researcher inside or outside university gives a special lecture about the latest research on River Basin Environment. Especially from the perspectives of hydrology and disaster prevention, highly knowledge and advanced technology for river basin management are lectured. The specific topics are about methods for water environment improvement and conservation utilizing applied hydrology and field observations of river, lake and river basin, about currently status and challenges on heavy rain disasters, on disaster information, on disaster education, and about currently research trend related hydrology in real river basins.</p> <p>Bachelor students also can participate in this lecture since this lecture is regarded as not only a linkage between undergraduate education and graduate education but also an introductory and career formation lecture for a student who aims to be a researcher or technologist.</p>

Course Name	<b>Special Lecture on River Basin Environment II</b>
Professor	SUMINO Tatsuo and Sangam SHRESTHA
Semester	Intensive course
Contents	<p>A researcher inside or outside university gives a special lecture about the latest research on River Basin Environment. Especially from the perspective of water environment, highly knowledge and advanced technology for river basin management are lectured. The specific topics are about water quality and quantity management in the Asian region, about the latest water treatment technology, and about currently research trend related water quality in real river basins.</p> <p>Bachelor students also can participate in this lecture since this lecture is regarded as not only a linkage between undergraduate education and graduate education but also an introductory and career formation lecture for a student who aims to be a researcher or technologist.</p>

Course Name	<b>Internship</b>
Professor	GCOE professors
Semester	Intensive course
Contents	<p>The aim of this internship is to improve participants' understanding of knowledge which they acquired in master course by being instructed specialized technology from government office, public corporation, private company. There are 2 types of the internship, one is the supervisor introduces where the student will be instructed (ordinary type), and another is the student decides where to be instructed by him/herself selecting the challenge offered by the organization (new type).</p>

# GLOBAL COE MEMBERS

## FACULTY STAFF

Name	Group	Degree	Field of research
Kengo Sunada	River Basin Hydrology	Dr. Eng.	River Environment, Hydrology
Yasushi Sakamoto	Environmental Dynamics	Dr. Eng.	Water Quality, Hydrology
Futaba Kazama	Environmental Dynamics	Dr. Eng.	Water pollution control, Limnology
Hidehiro Kaneko	Environmental Management	Dr. Eng.	Ecotoxicology of Solid Waste, Composting
Tadashi Suetsugi	River Basin Hydrology	Dr. Eng.	Hydraulics, Disaster Mitigation Engineering
Kei Nishida	Environmental Dynamics	Dr. Eng.	Water Chemistry and Microbiology
Kazuhiro Mori	Environmental Management	Dr. Eng.	Biological Water and Soil Pollution Control
Satoru Oishi	River Basin Hydrology	Dr. Eng.	Hydrometeorology, Risk communication (-2009/Sep.)
Hiroshi Ishidaira	River Basin Hydrology	Dr. Eng.	Hydrology, Water Resources
Yutaka Ichikawa	River Basin Hydrology	Dr. Eng.	Hydrology and Water Resources Engineering
Naoki Kondo	Health Risk	M.D.	Social Epidemiology, Public Health
Shinichi Kitamura	Regional Planning	Dr. Eng.	City and Regional Planning, Environmental Design
Kimiaki Hirayama	Environmental Management	Dr. Eng.	Sanitary Engineering, River Water Quality
Isao Ooyama	Regional Planning	Dr. Eng.	Landscape Design, Urban and Rural Planning
Tomoya Iwata	Environmental Dynamics	Dr. Sci.	Community Ecology, Food Web Dynamics in Aquatic Ecosystems
Toshio Shimokawa	Regional Planning	Dr. Eng.	Statistical Visualization and Machine Learning
Keiko Katayama-Hirayama	Environmental Management	Dr. Eng.	Water and Waste Water Treatment
Naoki Miyazawa	River Basin Hydrology	M.E.	River Engineering
Yasuhiro Tanaka	Environmental Management	Ph. D.	Bioremediation, Environmental Microbiology, Microbial Ecology
Hiroshi Kobayashi	Environmental Dynamics	Dr. Eng.	Ocean Color Remote Sensing
Yukiko Hirabayashi	River Basin Hydrology	Dr. Eng.	Hydrology, Water Resources (-2009/Nov.)
Jun Magome	River Basin Hydrology	Dr. Eng.	Hydrology, Water Resources
Tetsuya Sano	River Basin Hydrology	Dr. Sci	Meso-scale Meteorology, Radar Meteorology
Eiji Haramoto	Environmental Dynamics	Dr. Eng.	Health-Related Water Microbiology
Takashi Nakamura	Environmental Dynamics	Dr. Eng.	Groundwater system analysis by stable isotopic analysis
Jun Arita	Health Risk	M.D.	Environ. Physiology
Zentaro Yamagata	Health Risk	M.D.	Epidemiology, Public Health
Masanori Kitamura	Health Risk	M.D.	Molecular Cellular Biology, Genetic Engineering
Atsuhito Nakao	Health Risk	M.D.	Immunology

## COLLABORATIVE RESEARCHERS (TENURE TRACK PROGRAM)

Name	Group	Degree	Field of research
Tadashi Toyama	Environmental Management	Ph. D.	Environmental biotechnology, Bioremediation, Phytoremediation
Kazuhiro Souma	River Basin Hydrology	Dr. Eng.	Hydrometeorology, Climatology

## RESEARCHERS

Name	Group	Degree	Field of research
Silva Galbokke Hewage Amila Chinthaka	River Basin Hydrology	Ph. D.	Hydrology and Water Resources Engineering
Takashi Nakamura	Environmental Dynamics	Dr. Eng.	Groundwater system analysis by stable isotopic analysis (2008/Oct. -2010/Mar.)
Ken'ichi Osaka	Environmental Dynamics	Dr. Agri.	Nutrient dynamics in catchment
Saroj Kumar Chapagain	Environmental Dynamics	Dr. Eng.	Groundwater quality in Kathmandu, Nepal (2009/Oct.-2010/Mar.)
Ao Jing	Environmental Dynamics	Dr. Eng.	Research on the sediment impact on the pathogenic microbe in river basin (2009/Apr.-2010/Jan.)
Luo Zhaofui	Environmental Management	Dr. Eng.	Photodegradation of Organic pollutants (2009/Apr.-2010/Mar.)
Kabirul Ahsan Mollah	Environmental Dynamics	Dr. Eng.	Study on Environmental Health and Social Epidemiology (2009/Oct.-2010/Mar.)
Ichiko Inagaki	River Basin Hydrology	Dr. Eng.	Disaster prevention education

## DOCTORAL COURSE STUDENTS

Name	Entrance Year/Month	Nationality	Research Theme
Takashi Nakamura	2005/Apr. -2008/Sep.	Japan	Groundwater system analysis by stable isotopic analysis
Ao Jing	2005/Oct. -2009/Mar.	China	Research on the sediment impact on the pathogenic microbe in river basin
Luo Zhaofui	2005/Oct. -2009/Mar.	China	Photodegradation of Organic pollutants
Ichiko Inagaki	2006/Apr. -2010/Mar.	Japan	Disaster prevention education
Koji Tsuji	2006/Apr. -2009/Mar.	Japan	Investigation of the unstable factors of biological nitrogen and phosphate removal
Saroj Kumar Chapagain	2006/Oct. -2009/Sep.	Nepal	Groundwater quality in Kathmandu, Nepal
Rabin Malla	2006/Oct. -2010/Mar.	Nepal	Phytoremediation and environmental model
Kabirul Ahsan Mollah	2006/Oct. -2009/Sep.	Bangladesh	Study on Environmental Health and Social Epidemiology

Sri Wahyuni	2006/Oct. -2009/Sep.	Indonesia	Groundwater modeling in Arid Area (Uzbekistan)
Vishnu Prasad Pandey	2007/Oct.	Nepal	Development of Methodology to Evaluate Long-term Adaptation Strategies in Sustainable Groundwater Management
Li Qiaoling	2007/Oct.	China	Development and assessment of a biosphere hydrological model considering vegetation dynamics under climate change at basin scale
Sun Wenchao	2007/Oct.	China	Estimating River Discharge by Integrating Satellite Remotely Sensed Information with a Hydrological Model in Ungauged Basins
Wilawan Khanitchaidecha	2007/Oct.	Thailand	Ammonium treatment in undeveloped countries
Kazuhiro Kakizawa	2008/Apr.	Japan	Estimating sediment transport in Mekong river basin
Satoru Ochiai	2008/Apr.	Japan	Evaluation of the effectiveness of seeding based on the observation of profiles of microbial community in composting reaction
Seng Bunrith	2008/Oct.	Cambodia	Organic waste treatment, Composting simulation
Ratih Indri Hapsari	2008/Oct.	Indonesia	Disaster prevention system by using multiparameter Doppler radar
Tran Van Ty	2008/Oct.	Vietnam	Multi-scale Assessment of Water Resources
Sushu Wu	2008/Oct.	China	Potential Impact of the Human Activity on Tonle Sap Lake
Yang Kun	2008/Oct.	China	Psychological and Physiological Evaluation of Infrastructure Design
Risky Ayu Kristanti	2009/Oct.	Indonesia	Construction of New Technique for Bioaugmentation of Aromatic Compounds in Water Pyhtoremediation System
Temur Mukhiddinovich Khujanazarov	2009/Oct.	Uzbekistan	Developing platform for structuring hydrological data and its geospatial visualization
Sujata Manandhar	2009/Oct.	Nepal	Climate change impacts on water resources availability, demand and its management in Kaligandaki River Basin, Nepal
Do Thu Nga	2009/Oct.	Vietnam	Integration of material flow analysis and process-based modeling
Sujan Shrestha	2009/Oct.	Nepal	Impact assessment of rainwater in the Shallow groundwater quality of Kathmandu Valley, Nepal

## MASTER COURSE STUDENTS

Name	Entrance Year/Month	Nationality	Research Theme
Takehiro Asada	2009/Apr.	Japan	River Basin Hydrology
Taku Arimasa	2009/Apr.	Japan	River Basin Hydrology
Shuntaro Ishimaru	2009/Apr.	Japan	Environmental Dynamics
Akiyasu Kotani	2009/Apr.	Japan	River Basin Hydrology
Ryoichi Kobayashi	2009/Apr.	Japan	Environmental Dynamics
Ai Sugiyama	2009/Apr.	Japan	Environmental Dynamics

Yuichi Nakano	2009/Apr.	Japan	Environmental Dynamics
Mikinobu Naruse	2009/Apr.	Japan	River Basin Hydrology
Kazuhide Noda	2009/Apr.	Japan	Environmental Dynamics
Masakazu Hashimoto	2009/Apr.	Japan	River Basin Hydrology
Akiko Sakamoto	2009/Oct.	Japan	Environmental Dynamics
Yuta Ami	2010/Apr.	Japan	Environmental Dynamics
Suguru Ishikura	2010/Apr.	Japan	Environmental Dynamics
Yuta Imai	2010/Apr.	Japan	Environmental Dynamics
Yuta Okuno	2010/Apr.	Japan	River Basin Hydrology
Mikie Otagiri	2010/Apr.	Japan	Environmental Dynamics
Yoshifumi Kinoshita	2010/Apr.	Japan	Environmental Dynamics
Shusuke Suzuki	2010/Apr.	Japan	River Basin Hydrology
Tomoaki Suzuki	2010/Apr.	Japan	River Basin Hydrology
Kenta Hasegawa	2010/Apr.	Japan	River Basin Hydrology

## VIRTUAL ACADEMY STUDENTS

Name	Affiliation	Course
Maheswor Shrestha	Department of Electricity Development (DOED)	VA2008
Dhiraj Pradhananga	Tri-chandra Campus, Tribhuvan University	VA2008
Tirtha Adhikari	Central Department of Hydrology & Meteorology, Tribhuvan University	VA2008
Nitesh Shrestha	Central Department of Hydrology & Meteorology, Tribhuvan University	VA2008
Raju Dhar Pradhananga	Central Department of Hydrology & Meteorology, Tribhuvan University	VA2008
Fanendra Raj Joshi	Nepal Electricity Authority (NEA)	VA2008
Ananda Dhungel	Nepal Electricity Authority (NEA)	VA2008
Pujan Piya	Nepal Electricity Authority (NEA)	VA2008
Maneesha Shakya	Center of Research for Environment, Energy and Water (CREEW)	VA2008
Sumnima Shrestha	Central Department of Environmental Science, Tribhuvan University	VA2008
Nirmal Mani Dahal	School of Environmental Management & Sustainable Development (SchEMS)	VA2008
Madhav Prasad Thakur	School of Environmental Management & Sustainable Development (SchEMS)	VA2008
Sangeeta Pandey	Center of Research for Environment, Energy and Water (CREEW)	VA2008
Suchita Shrestha	Central Department of Environmental Science, Tribhuvan University	VA2008
Ujjwal Chapagain	Development Center, Nepal	VA2008
Balakarzai Adbul Tawab	Asian Institute of Technology	VA2009 Main Course
Khattak Muhammad Shahzad Khan	Asian Institute of Technology	VA2009 Main Course
Nguyen Dinh Giang Nam	Cantho University	VA2009 Main Course
Le Ngoc Kieu	Cantho University	VA2009 Main Course

Tran Van Hung	Cantho University	VA2009 Main Course
Lam Van Thinh	Cantho University	VA2009 Main Course
Huynh Vuong Thu Minh	Cantho University	VA2009 Main Course
Abeer Mazhar	Global Change Impact Studies Centre	VA2009 Main Course
Waheeha Shafique	Global Change Impact Studies Centre	VA2009 Main Course
Qurat ul Ain Ahmad	Global Change Impact Studies Centre	VA2009 Main Course
Hasson Shabeh Ul	Global Change Impact Studies Centre	VA2009 Main Course
Amjad Masood	Global Change Impact Studies Centre	VA2009 Main Course
Bijaya Rana Magar	Kantipur Engineering College	VA2009 Main Course
Narayanage Dinusha Prabhath Ransara	Mahaweli Authority of Sri Lanka	VA2009 Main Course
Wendalyne I. Bonita	National Irrigation Administration	VA2009 Main Course
Glenn Anthony San Mateo	National Irrigation Administration	VA2009 Main Course
Marinel Tobias	National Irrigation Administration	VA2009 Main Course
Lontok, Marilou Asis	National Irrigation Administration	VA2009 Main Course
Badilla Roy Amadore	Philippine Atmospheric, Geophysical and Astronomical Services Administration	VA2009 Main Course
Mujjalinvimuti Anusak	Royal Irrigation Department	VA2009 Main Course
Nilobol Aranyabhaga	Royal Irrigation Department	VA2009 Main Course
Yao Xiliang	South China University of Technology	VA2009 Main Course
Medvedeva Alexandra Dmitrievna	State Hydrological Institute	VA2009 Main Course
Zhuravyov Sergey Alexandrovich	State Hydrological Institute	VA2009 Main Course
Baniya Resham	Tribhuvan University	VA2009 Main Course
Kan Guangyuan	Hohai University	VA2009 Main Course
Wu Yong Tue	Hohai University	VA2009 Main Course
Yao Yumei	Hohai University	VA2009 Main Course
Weerakoon, Gamlath Muhandiramalage, Prabha Ranjanie	University of Peradeniya	VA2009 Main Course
Dhanapala Sachindra Arachchige	University of Peradeniya	VA2009 Main Course
Dimapilis, Jeramee Villadiego	University of Perpetual Help System – Laguna	VA2009 Main Course
Wickramaarachchi Thushara Navodani	University of Ruhuna	VA2009 Main Course
Yam Prassad Dhital	Kathmandu University	VA2009 Intensive Program
Niraj Shankar Pradhananga	Department of Hydrology and Meteorology, Nepal	VA2009 Intensive Program
Jeeban Panthi	Tribhuvan University	VA2009 Intensive Program
Tripti Kharel	CREW	VA2009 Intensive Program
Sudha Shrestha	Kathmandu University	VA2009 Intensive Program
Netra Jit Khadka	Tribhuvan University	VA2009 Intensive Program

# PUBLICATION LIST

## (2008.4– 2009.3)

### AWARD

- (1) 大石哲を含む GPS 気象学研究プロジェクト：第 8 回日本測地学会坪井賞 2008 年度団体賞, 2008. 5.
- (2) 山縣然太朗：厚生労働大臣表彰 2008. 11.
- (3) 田川泰寛：日本学生支援機構平成 20 年度優秀学生顕彰「学術」の部「大賞」
- (4) 平松伸彦：山梨大学戦略的プロジェクト経費若手表彰（若手研究者の部）
- (5) 島田剛：山梨大学戦略的プロジェクト経費若手表彰（修士課程の部）
- (6) 河西あゆみ：山梨大学戦略的プロジェクト経費若手表彰（博士課程の部）
- (7) 澤田智史：山梨大学戦略的プロジェクト経費若手表彰（博士課程の部）
- (8) 辻幸志：環境システム計測制御学会奨励論文賞, 2008. 10.
- (9) 辻幸志：水環境学会博士研究奨励賞, 2008. 9.
- (10) Wilawan Khanitchaidecha：Best Poster Award, The 6<sup>th</sup> International Symposium on Southeast Asian Water Environment, 2008. 10
- (11) Li Qiaoling：Best Poster Award, 4th Conference of the Asia Pacific Association of Hydrology and Water Resources (APHW), 2008. 11

### BOOK

- (1) 風間ふたば：第 12 章 水環境健全性指標の活用, (社)日本水環境学会編集, 改訂版日本の水環境, ぎょうせい, pp.234-237, 2009. 3.
- (2) 岩田智也：陸域と水域の生態系をつなぐ, 大串隆之ほか (編)「シリーズ群集生態学 4：生態系と群集をむすぶ」, 京都大学学術出版会, pp.91-114, 2008. 10.
- (3) 森一博, 浅田素之：植物を用いたホウ素汚染土壌の浄化(第 3 章 10 項), メタルバイオテクノロジーによる環境保全と資源回収—新元素戦略の新しいキーテクノロジー— (シーエムシー出版), pp.70-75, 2009.
- (4) 山縣然太朗：健康増進対策他, 図説 国民衛生の動向 2008, 財団法人 厚生統計協会, pp.53-59, 2008. 10.
- (5) 山縣然太朗：母子保健、先天異常モニタリング, 標準公衆衛生・社会医学, 医学書院, pp.215-222, 2009. 3.
- (6) 姚建, 北村正敬：Gap Junction を介した細胞間情報伝達：メサンギウム細胞の動態制御に於ける役割, Annual Review 腎臓 2009, pp.14-19, 2009. 2.
- (7) 北村正敬：腎における小胞体ストレス (ER stress) の意義, Annual Review 腎臓 2008, pp.22-30, 2008. 2.

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- (1) Sokhem Pech, Kengo Sunada, Satoru Oishi, Naoki Miyazawa and Daisuke Tanaka: Trends of fish resources in the Tonle sap basin-their correlation with the hydrological conditions of the Mekong river, Intl. Journal of River Basin Management, Vol.6, No.3, pp.277-282, 2008.4.
- (2) Sokhem Pech and Kengo Sunada: Population Growth and Natural-Resources Pressures in the Mekong River Basin, AMBIO: A Journal of the Human Environment, Vol.37, Issue 3, pp.219-224, 2008. 5.
- (3) 中北英一・山口弘誠・隅田康彦・竹畑栄伸・鈴木賢士・中川勝広・大石哲・出世ゆかり・坪木和久・大東忠保：偏波レーダーとビデオゾンデの同期観測および降水粒子タイプ判別, 土木学会水工学論文集, 第 53 巻, pp.361-366, 2009. 2.
- (4) 甲山治・大石哲・砂田憲吾・馬籠純：長期水文・気象データおよび衛星データを用いたアラル海流域における水循環の解析, 土木学会水工学論文集, 第 53 巻, pp.31-36, 2009. 2.
- (5) S.Wahyuni, S.Oishi, K.Sunada, K.N.Toderich and N.E.Gorelkin: Analysis of Water-Level Fluctuations in Aydarkul-Arnasay-Tuzkan Lkae System and Impacts on the Surrounding Groundwater Level, Annual Journal of Hydraulic Engineering, JSCE, Vol.53, pp.37-42, 2009. 2.



- (6) H.Nakagawa, Y.Satofuka, S.Oishi, Y.Muto, T.Sayama, K.Takara and R.H.Sharma: Observations and Modeling of Rainfall and Sediment Runoff in the Lesti River Basin, Tributary of the Brantas River, Indonesia, Proceedings of International Conference on Hydro-Science and Engineering, CDROM, 2008. 9.
- (7) Hapuarachchi P.H., Takeuchi K., Zhou M.C., Kiem A.S., Georgievski M., Magome J. and Ishidaira H.: Investigation of the Mekong River basin hydrology for 1980-2000 using the YHyM Hydrological Processes Vol. 22, pp.1246-1256, 2008. 4.
- (8) Zhou M. C., Ishidaira H., Takeuchi K.: Comparative study of potential evapotranspiration and interception evaporation by land cover over Mekong basin, Hydrological Processes Vol. 22, pp.1290-1309, 2008. 4.
- (9) Kiem A. S., Ishidaira H., Hapuarachchi P.H., Zhou M. C., Hirabayashi Y. and Takeuchi K. : Future hydroclimatology of the Mekong River basin simulated using the high-resolution Japan Meteorological Agency (JMA) AGCM, Hydrological Processes Vol. 22, pp.1382-1394, 2008. 4.
- (10) Ishidaira H., Ishikawa Y., Funada S. and Takeuchi K. : Estimating the evolution of vegetation cover and its hydrological impact in the Mekong River basin in the 21st century, Hydrological Processes Vol. 22, pp.1395-1405, 2008. 4.
- (11) Bastola, S., Ishidaira, H., Takeuchi, K.: Regionalisation of hydrological model parameters under parameter uncertainty: a case study involving TOPMODEL and basins across the globe, Journal of Hydrology, doi: 10.1016/j.jhydrol.2008.05.007, 2008. 5.
- (12) Li, Q., Ishidaira, H., Bastola, S. and Magome, J.: Intercomparison of hydrological modeling performance with multi-objective optimization algorithm in different climates, Annual Journal of Hydraulic Engineering, JSCE, Vol.53, pp.19-24, 2009. 2.
- (13) Sun, W., Ishidaira, H. and Bastola, S.: Estimating discharge by calibrating hydrological model against water surface width measured from satellites in large ungauged basins, Annual Journal of Hydraulic Engineering, JSCE, Vol.53, pp.49-54, 2009. 2.
- (14) Hyunuk AN, Yutaka ICHIKAWA, Yasuto TACHIKAWA and Michiharu SHIIBA, Developing a three-dimensional coupled model of pipe-matrix subsurface flow, Hydrological Research Letters, 2, pp.52-55, 2008. 12.
- (15) 立川康人・須藤純一・市川温・椎葉充晴：中小河川を対象とする河川水位予測手法の構成法について，河川技術論文集，14，pp.35-40，2008. 6.
- (16) 加藤真也・椎葉充晴・市川温・立川康人：水文モデリングシステム OHyMoS の構造定義ファイル作成環境の開発，水工学論文集，第53巻，pp.451-456，2009. 2.
- (17) 立川康人・滝野晶平・市川温・椎葉充晴：地球温暖化が最上川・吉野川流域の河川流況に及ぼす影響について，水工学論文集，第53巻，pp.475-480，2009. 2.
- (18) Hunukumbura P.B., Yasuto Tachikawa, Yutaka Ichikawa and Michiharu Shiiba: Extending a storage-discharge relationship for subsurface flow modeling in dry mild-slope basins, 水工学論文集，第53巻，pp.25-30，2009. 2.
- (19) Yukiko Hirabayashi, Shinjiro Kanae, Kooichi Masuda, Ken Motoya and Petra Döll: A 59-year (1948-2006) global near-surface meteorological data set for land surface models. Part I: Development of daily forcing and assessment of precipitation intensity. Hydrological Research Letters, 2, pp.36-40, 2008. 12.
- (20) Yukiko Hirabayashi, Shinjiro Kanae, Seita Emori, Taikan Oki, Masahide Kimoto: Global projections of changing risks of floods and droughts in a changing climate, Hydrological Sciences Journal, 53, pp.754-772, 2008. 8.
- (21) Nobuyuki Utsumi, Shinjiro Kanae, Hyungjun Kim, Shinta Seto, Taikan Oki, Tomoko Nitta and Yukiko Hirabayashi: Importance of wind-induced undercatch adjustment in a gauge-based analysis of daily precipitation over Japan, Hydrological Research Letters, 2, pp.47-51, 2008. 12.
- (22) Yukiko Hirabayashi, Shinjiro Kanae, Kooichi Masuda, Ken Motoya and Petra Döll: A 59-year (1948-2008) global near-surface meteorological data set for land surface models. Part II: Global snowfall estimation. Hydrological Research Letters, 2, pp.65-69, 2008. 12.
- (23) Yukiko Hirabayashi and Shinjiro Kanae: First estimate of the future global population at risk of flooding, Hydrological Research Letters, 3, pp.6-9, 2009. 1.

- (24) Nick Rutter, Richard Essery, John Pomeroy, Nuria Altimir, Kostas Andreadis, Ian Baker, Alan Barr, Paul Bartlett, Aaron Boone, Huiping Deng, Herve Douville, Emanuel Dutra, Kelly Elder, Chad Ellis, Xia Feng, Alexander Gelfan, Angus Goodbody, Yeugeniy Gusev, David Gustafsson, Rob Hellstöm, Ykiko Hirabayashi, Tomoyoshi Hirota, Tobias Jonas, Victor Koren, Anna Kuragina, Dennis Lettenmaier, LeWei-Ping Li, Charlie Luce, Eric Martin, Olga Nasonova, Jukka Pumpanen, R. David Pyles, Patric Samuelsson, Melody Sandells, Gerd Schädler, Andrey Shmakin, Tatiana G. Smirnova, Manfred Stähli, Reto Stöckli, Ulrich Strasser, Hua Su, Kazuyoshi Suzuki, Kumiko Takata, Kenji Tanaka, Erin Thompson, Timo Vesala, Pedro Viterbo, Andrew Wiltshire, Kun Xia, Yongkang Xue, Takeshi Yamazaki: Evaluation of forest snow processes models (SnowMIP2), *Journal of Geophysical Research*, 114, D06111, doi:10.1029/2008JD011063, 2009. 3.
- (25) 坂本康・西田継・風間ふたば・今泉勇太・平賀由紀・中村高志・Saroj Kumar CHAPAGAIN : カトマーズ盆地の井戸水の大腸菌汚染の解析, *水工学論文集*第 53 卷, pp.535-540, 2009. 2.
- (26) C. Pokasowan, W. Khanitchaidecha, K.C Krishna., A.P. Annachatre: Investigation on laboratory and pilot-scale airlift sulfide oxidation reactor under varying sulfide loading rate., *J. Environ. Sci. Health Part A*, 44, pp.87-98, 2009.
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- (28) G. Du Laing, S.K. Chapagain, M. Dewispelaere, E. Meers, F. Kazama, F.M.G. Tack, J. Rinklebe, and M.G. Verloo: Presence and mobility of arsenic in estuarine wetland soils of the Scheldt estuary (Belgium). , *Journal of Environmental Monitoring*. DOI: 10.1039/b815875d, 2009.
- (29) S.K. Chapagain, S. Shrestha, T. Nakamura. and F. Kazama: Chemical characteristics of groundwater quality of Kathmandu Valley, Nepal ., *Southeast Asian Water Environment*, 3, IWA publisher (in press)
- (30) S.K. Chapagain, S. Shrestha, T. Nakamura, V.P. Pandey, and F. Kazama: Arsenic occurrence in groundwater of Kathmandu Valley, Nepal, *Proceedings of The 1st IWA Asia Pacific Young Water Professionals Conference*, Korea, Gwangju, pp.8-10, 2008. 12.
- (31) V. P. Pandey, M. S.Babel, and F. Kazama: Analysis of a Nepalese water resources system: Stress, adaptive capacity and vulnerability., *Proceedings of The 1st IWA Asia Pacific Young Water Professionals Conference*, Korea, Gwangju, pp.8-10, 2008. 12.
- (32) K. Hirabayashi, K. Yoshizawa, K. Oga, N. Toshida, K. Ariizumi and F. Kazama: Change of Chironomid fauna(Diptera:Chironomidae) in Eutrophic Lake Kawaguchi, Japan, *Bol. Mun.Funchal*, No.13, pp.109-117, 2008. 9.
- (33) Jing AO, Kei NISHIDA and Yasushi SAKAMOTO: Modelling Sediment-associated *Escherichia coli* in a Natural River: Comparison of the Reversible and Irreversible Adsorption, *Annual Journal of Hydraulic Engineering*, Vol.53, pp.187-192, 2009. 2.
- (34) Kabirul Ahsan Mollah and Toshiya Aramaki: Contribution to Environmental Burdens from Sanitation Systems in Abatement of Health Impacts-case study in low-income community of Dhaka, Bangladesh, *Southeast Asian Water Environment* 3, IWA publishing (accepted)
- (35) 芳賀弘和, 西田継, 坂本康 : 斜面での雨水流出経路が源流域河川の溶存有機炭素濃度－流量関係に与える影響, *土木学会論文集 G*, Vol.65, No.1, pp.37-43, 2009. 3.
- (36) Junko Nishikawa, Ayato Kohzu, Narin Boontanon, Tomoya Iwata, Takuya Tanaka, Nanako O. Ogawa, Reiichiro Ishii & Eitaro Wada: Isotopic composition of nitrogenous compounds with emphasis on anthropogenic loading in river ecosystems, *Isotopes in Environmental and Health Studies* 45, pp.27-40, 2009.
- (37) Gaku Takimoto, Tomoya Iwata & Masashi Murkami: Timescale hierarchy determines the indirect effects of fluctuating subsidy inputs on in situ resources, *The American Naturalist* 173, pp.200-211, 2009. 3.
- (38) Hisaya Kojima, Tomoya Iwata & Manabu Fukui: DNA-based analysis of planktonic methanotrophs in a stratified lake, *Freshwater Biology* 54, DOI: 10.1111/j.1365-2427.2009.02199, 2009. 2.
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- (40) Eiji Haramoto, Hiroyuki Katayama, Etsuko Utagawa, and Shinichiro Ohgaki: Development of sample storage methods for detecting enteric viruses in environmental water, *Journal of Virological Methods*, Vol.151, No.1, pp.1-6, 2008 6.
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- (42) 原本英司, 與那城雄司, 秋葉道宏, 橋本温, 森田重光, 浅見真理, 国包章一: 利根川流域の小河川におけるクリプトスポリジウムおよびジアルジアの汚染実態の解明, *環境工学研究論文集*, Vol.45, pp.371-377, 2008.11.
- (43) Eiji Haramoto, Hiroyuki Katayama, and Shinichiro Ohgaki: Quantification and genotyping of torque teno virus at a wastewater treatment plant in Japan, *Applied and Environmental Microbiology*, Vol.74, No.23, pp.7434-7436, 2008. 12.
- (44) Eiji Haramoto, Masaaki Kitajima, Hiroyuki Katayama, Takafumi Ito, Shinichiro Ohgaki: Development of virus concentration methods for detection of koi herpesvirus in water, *Journal of Fish Diseases*, Vol.32, No.3, pp.297-300, 2009. 3.
- (45) 原本英司, 與那城雄司, 西澤博, 浅見真理, 秋葉道宏, 国包章一: 利根川流域における原虫の検出と遺伝子型の同定及び指標菌との相関, *水道協会雑誌*, Vol.78, No.3, pp.2-11, 2009. 3.
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## **OTHER**

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# COE EVENT RECORD

<chronological order>

Date	Event
2008/06/27	<b>3rd ICRE Committee Meeting</b>
2008/06/18	<b>1st Preparatory Meeting for GCOE</b>
2008/06/25	<b>2nd Preparatory Meeting for GCOE</b>
2008/06/27	<b>GCOE briefing session to doctoral course students</b>
2008/06/30	<b>3rd Preparatory Meeting for GCOE</b>
2008/07/08	<b>Special Lecture</b> Time: 14:45-16:15 Presenter: Kristina Toderich (ICBA-CAC(International Center for Biosaline Agriculture in Central Asia and Caucasus)) Title: Biosaline Agriculture approach: from problem to opportunity (case study ICBA-CAC 2004-2008) Presenter: Naoko Matsuo (Forest Planning for the Environment, Mie University) Title: Water use and salt tolerance of desert plants in Central Asia
2008/07/09	<b>4th Preparatory Meeting for GCOE</b>
2008/07/16	<b>5th Preparatory Meeting for GCOE</b>
2008/07/22	<b>Presentation on doctoral dissertation of COE special course</b> Place: B-3 203 *Takashi Nakamura: 15:00-16:10
2008/07/24	<b>6th Preparatory Meeting for GCOE</b>
2008/07/29	<b>7th Preparatory Meeting for GCOE</b>
2008/07/30	<b>Japan Society on Water Environment(JSCE) Doctoral Research Award</b> Koji Tsuji (Special Doctoral Course student)
2008/08/05	<b>University of Yamanashi Global COE Program Kick-off Symposium</b> “Advanced Technology and Human Resources Leading the Future of Water Environment in Asia” Time: 15:00-18:10 Place: A2-21 University of Yamanashi
2008/08/06	<b>Intermediate Scrutiny</b> Place: B-3 203 *Koji Tsuji: 9:00-9:30
2008/08/12	<b>GCOE Leader and Assistant Leaders’ 1st Meeting</b>
2008/08/25	<b>GCOE Leader and Assistant Leaders’ 2nd Meeting</b>
2008/08/27	<b>Prof. Sunada became the President of Japan Society of Hydrology and Water Resources</b>
2008/08/27	<b>Poster Prize, Japan Society of Hydrology and Water Resources</b> Susumu Funada
2008/09/17	<b>JSCE Doctoral Research Award Ceremony</b> Koji Tsuji (Special Doctoral Course student)
2008/09/19	<b>GCOE Leader and Assistant Leaders’ 3rd Meeting</b>
2008/09/22	<b>Special Lecture</b> Time: 15:00-16:30 Presenter: Pech Sokhem (Senior International Environmental Governance Specialist, Hatfield Consultants Partnership, Canada) Title: Integrated Water Resources Management and Major Institutional and Technical Challenges in the Mekong Region.



2008/09/25 -26	<b>Symposium on Science and Practice of Basin-scale Water Policy for Population Upsurging Asia</b> Venue: Miraikan National Museum of Emerging Science and Innovation *Water Management Issues under Changing Climate in Monsoon Asia by Prof. Katsumi MUSIAKE *Support to Capacity Development in River Basin Management in Asia by Mr. Yuji OKAZAKI
2008/09/30	<b>GCOE Commencement Ceremony</b> Time: 15:00- Place: T1-804
2008/10/07	<b>Welcome Ceremony</b> Time: 10:30- Place: T1-804
2008/10/09	<b>GCOE Leader and Assistant Leaders' 4th Meeting</b>
2008/10/16	<b>GCOE Leader and Assistant Leaders' 5th Meeting</b>
2008/10/23	<b>GCOE Leader and Assistant Leaders' 6th Meeting</b>
2008/10/29 -31	<b>The 6th International Symposium on Southeast Asian Water Environment</b> Place: The Jayakarta Bundung Suite Hotel & Spa, Indonesia
2008/11/07 -09	<b>International Symposium of IAHS-PUB-CHINA 2008</b>
2008/11/13	<b>GCOE Leader and Assistant Leaders' 7th Meeting</b>
2008/11/28	<b>GCOE Leader and Assistant Leaders' 8th Meeting</b>
2008/12/11	<b>GCOE Leader and Assistant Leaders' 9th Meeting</b>
2008/12/13	<b>8th Lecture series for Community</b> "Problems in Asian River Basin" Kengo SUNADA
2008/12/25	<b>GCOE Leader and Assistant Leaders' 10th Meeting</b>
2008/12/26 -2009/01/18	<b>Virtual Academy 2008</b> Venue: School of Environmental Management and Sustainable Development (SchEMS), New Baneshwor, Kathmandu
2009/01/08	<b>GCOE Leader and Assistant Leaders' 11th Meeting</b>
2009/01/05	<b>Admission exam of special doctoral course for 2009 (Hotel Kido, Kathmandu, Nepal)</b>
2009/01/12	<b>Admission exam of special doctoral course for 2009 (Ho Chi Minh City University of Technology)</b>
2009/01/14	<b>Admission exam of special doctoral course for 2009 (Brawijaya University)</b>
2009/01/21	<b>Admission exam of special doctoral course for 2009 (Beijing Normal University)</b>
2009/01/23	<b>Admission exam of special doctoral course for 2009 (Asian Institute of Technology)</b>
2009/01/27	<b>Symposium on Industry-Academia-Government Collaboration</b> "Consideration of energy and environment by Industry, Academia and Government" Date: January 27th, 2009, 13:00-20:00 Place: The Bellclassic Kofu Program: Session 1 Special Lecture *Keynote Lecture: Prof. Masahiko Hayashi (National Astronomical Observatory of Japan, Observing station in Hawaii) *Special Lecture: Mr. Tadahito Yamamoto (president of Fuji Xerox Co. Ltd.) Session 2 Forum "Water Environment, Hazard & Health Issues" *Keynote Lecture "Objectives and framework of UY-GCOE" by Kengo Sunada *Panel Discussion "Hope of UY-GCOE program"

2009/01/28 -29	<p><b>International Symposium</b></p> <p>“Contributing to the Solution of Water Issues in Asia through Human Resources Development”</p> <p>Place: University of Yamanashi, Faculty of Engineering, Integrated Information Process Center, 5F Media Hall</p> <p>Program:</p> <p>January 28th (Wed) 9:00-17:30</p> <p>*Introduction of UY-GCOE Program</p> <p>*Technical Session 1 Water Hazard</p> <p>*Technical Session 2 Hydrology &amp; Water Resources</p> <p>*Technical Session 3 River Basin Environment · Public Health</p> <p>January 29th (Thu) 9:00-17:30</p> <p>*Technical Session 4 Water Environment in Asia</p> <p>*Technical Session 5 Special Session for Young Researchers</p> <p>*Integrated Discussion</p>
2009/02/02	<p><b>Presentation on doctoral dissertations of COE special course</b></p> <p>Place: 203 Meeting Room, B3 Building</p> <p>*Luo Zhaohui: 13:00-14:00, *Koji Tsuji: 14:45-15:45, *Ao Jing: 16:30-17:30</p>
2009/02/06	<p><b>Symposium “Management of Nigori river -the past, present, and future-”</b></p>
2009/02/09 -10	<p><b>Intermediate Scrutiny</b></p> <p>9 February 2009, B3-203</p> <p>*Saroj Kumar Chapagain: 13:30-14:00, *Rabin Malla: 14:30-15:00, *Kabirul Ahsan Mollah: 15:30-16:00</p> <p>10 February 2009, B1-336</p> <p>*Sri Wahyuni: 9:30-10:00, *Ichiko Inagaki: 10:30-11:00</p>
2009/02/10 -11	<p><b>February Meeting in Katsunuma</b></p> <p>Field Trip: 10 February 2009, 12:30-16:30</p> <p>Presentation: 11 February 2009, 9:30-12:40 (Katsunuma Budo no Oka)</p>
2009/02/13	<p><b>GCOE Leader and Assistant Leaders’ 12th Meeting</b></p>
2009/02/23	<p><b>GCOE Special Seminar</b></p> <p>Dr. Kenji Tanaka (assistant professor of Kumamoto University)</p> <p>Time: 16:00-, Place: B1-244</p>
2009/02/23	<p><b>GCOE Leader and Assistant Leaders’ 13th Meeting</b></p>
2009/03/13	<p><b>GCOE Leader and Assistant Leaders’ 14th Meeting</b></p>
2009/03/19	<p><b>GCOE Commencement Ceremony</b></p> <p>Time: 15:20-15:50, Place: T1-804</p>
2009/03/24	<p><b>GCOE Leader and Assistant Leaders’ 15th Meeting</b></p>
2009/03/19	<p><b>MOU between ICRE and ICHARM</b></p> <p>Memorandum of Understanding on “Research cooperation for integrated water-related disaster management at river basins in developing countries”</p> <p>Time:15:00-, Place: T1-801</p>
2009/03/31 -04/01	<p><b>International Symposium</b></p> <p>“Environment, Energy and Water in Nepal: Recent Researches and Direction for Future”</p> <p>Place: Kathmandu, Nepal</p>
2009/04/01	<p><b>Open a new course for master students</b></p> <p>“Special Master Course Program on International River Basin Environmental Science”</p>
2009/04/08	<p><b>GCOE Leader and Assistant Leaders’ 16th Meeting</b></p>
2009/04/09	<p><b>International Symposium on Preservation and Development of Great Mekong Sub-region and International Support</b></p> <p>Place: JSCE Headquarters</p>

2009/04/22	<b>1st UY-GCOE Steering Committee Meeting 2009</b>
2009/04/28	<b>GCOE Leader and Assistant Leaders' 17th Meeting</b>
2009/05/19	<b>GCOE Leader and Assistant Leaders' 18th Meeting</b>
2009/05/22	<b>Special Lecture on Activity in 2-year Stay in Germany</b> Lecturer: Assistant Professor Yukiko Hirabayashi Title: My 24 months in Frankfurt, Germany
2009/06/12	<b>GCOE Leader and Assistant Leaders' 19th Meeting</b>
2009/06/18	<b>GCOE Special Lecture</b> Place: T1-meeting room on 8th floor of T1 building Program: 10:00 Opening Remarks and brief explanation of GCOE by Prof. Sunada 10:15 Lecture from Prof. Kurumatov including discussion 11:15 Presentation from Ms. Sri Wahyuni on Uzbekistan Grandwater 11:35 Presentation from Mr. Saroj Kumar Chapagain on Water Quality issue
2009/06/25	<b>GIS database of GCOE Yokohama National University</b> Place: B1-217 GCOE Researcher (Yokohama National University) Yuichi Sato
2009/06/29	<b>GCOE Leader and Assistant Leaders' 20th Meeting</b>
2009/07/01	<b>Virtual Academy 2009 open</b>
2009/07/07	<b>Equipments for GCOE and ICRE Information Session</b> 16:30-17:00 Explanation about X-band Dual-Polarimetric Radar for Meteorology, Stable Isotope analysis system, Microbial experiment 17:00-17:50 1) Stable Isotope analysis system 2) Microbial experiment 3) X-band Dual-Polarimetric Radar for Meteorology
2009/07/14	<b>1st GCOE videoconference between Kofu campus and Tamaho campus</b>
2009/07/17	<b>GCOE Leader and Assistant Leaders' 21st Meeting</b>
2009/07/20 -10/18	<b>Virtual Academy 2009 Main Session</b>
2009/07/29	<b>GCOE Leader and Assistant Leaders' 22nd Meeting</b>
2009/07/30	<b>Special program research presentations</b> Place: B1-336
2009/08/03	<b>Presentation on doctoral dissertation of COE special course</b> Place: 203 meeting room, B3 building *Saroj Kumar Chapagain: 10:30-11:40, *Kabirul Ahsan Mollah: 15:30-16:30
2009/08/04 -06	<b>Special Lecture on River Basin Environment II</b> Place: B1-218 Lecturer: Mr. Sumino Tatsuo (Hitachi Plant Engineering & Construction Co., Ltd.) Title: Nitrogen Removal from Waste Water by Microorganisms Lecturer: Dr. Sangam Shrestha (IGES) Title: "Groundwater issues in Asian Country" "Climate change and its impact on groundwater resource"
2009/08/03	<b>Presentation on doctoral dissertation of COE special course</b> Place: B1-336 *Sri Wahyuni: 10:00-11:00
2009/08/07	<b>GCOE Leader and Assistant Leaders' 23rd Meeting</b>

2009/08/24	<b>The 1st GCOE Meeting 2009</b> Place: Integrated Information Process Center, 5F Media Hall
2009/08/26	<b>GCOE Leader and Assistant Leaders' 24th Meeting</b>
2009/09/08	<b>GCOE Leader and Assistant Leaders' 25th Meeting</b>
2009/09/08 -11	<b>Special Lecture on River Basin Environment I</b> Place: B1-336 Lecturer: Dr. Yasuo Nihei (Tokyo University of Science Title: Current Status and Challenges of Monitoring, Modeling Technology for River Basin Environment Lecturer: Dr. Motoyuki Ushiyama (Center for Integrated Research and Education of Natural hazards, Shizuoka University) Title: Discussion on Disaster-prevention Information
2009/09/12	<b>The International Conference on Water &amp; Green</b> Place: Yamanashi Prefectural University
2009/09/25	<b>1st Collaborative Meeting of GCOE programs on Mechanics, Civil Engineering and Architectonics</b>
2009/09/29	<b>GCOE Commencement Ceremony</b> Place: 203 meeting room, B3 building
2009/09/30	<b>GCOE Leader and Assistant Leaders' 26th Meeting</b>
2009/10/13	<b>GCOE Leader and Assistant Leaders' 27th Meeting</b>
2009/10/13	<b>Welcome Ceremony</b> Place: 203 meeting room, B3 building
2009/10/23	<b>Open Lab. for High School Students</b>
2009/10/28 -30	<b>The 7th International Symposium on Southeast Asian Water Environment</b> Place: Asian Institute of Technology Conference Center Thailand
2009/11/09	<b>GCOE Leader and Assistant Leaders' 28th Meeting</b>
2009/11/11	<b>2nd UY-GCOE Steering Committee Meeting 2009</b>
2009/11/16	<b>GCOE Leader and Assistant Leaders' 29th Meeting</b>
2009/11/17	<b>2nd GCOE videoconference between Kofu campus and Tamaho campus</b>
2009/11/30	<b>5th ICRE Committee Meeting</b>
2009/12/02	<b>GCOE Leader and Assistant Leaders' 30th Meeting</b>
2009/12/03	<b>Statement regarding the screening process issued from all G-COE Programs at press interview</b>
2009/12/08	<b>1st lecture for UY Faculty of Engineering Career House 2009 "Understanding of Issues on International Water Environment"</b>
2009/12/18	<b>GCOE Leader and Assistant Leaders' 31st Meeting</b>
2009/12/25	<b>GCOE Leader and Assistant Leaders' 32nd Meeting</b>
2009/12/27	<b>Admission exam of special doctoral course for 2010 (Hotel Kido, Kathmandu, Nepal)</b>
2009/12/28	<b>National Symposium on Challenges and Opportunities for Sustainable Management of Groundwater Resources of the Kathmandu Valley, Nepal</b> Place: DECC, United World Trade Center, Kathmandu
2010/01/09	<b>Admission exam of special doctoral course for 2010 (Beijing Normal University)</b>
2010/01/10	<b>Admission exam of special doctoral course for 2010 (Asian Institute of Technology)</b>
2010/01/14	<b>GCOE Leader and Assistant Leaders' 32nd Meeting</b>
2010/01/21	<b>GCOE Leader and Assistant Leaders' 33rd Meeting</b>
2010/01/22	<b>Admission exam of special doctoral course for 2010 (University of Yamanashi)</b>
2010/01/26 -27	<b>Admission exam of special doctoral course for 2009 (Brawijaya University)</b>

2010/01/29	<b>The 2nd GCOE Meeting 2009</b> Place: Integrated Information Process Center, 5F Media Hall
2010/02/02	<b>Presentation on doctoral dissertations of COE special course</b> Place: B1-336 *Malla Rabin: 8:45-9:45, *Ichiko Inagaki: 10:30-11:30
2010/02/03 -04	<b>Intermediate Scrutiny</b> Place: B3-203 3 February 2010: *Pandey Prasad Vishnu: 13:00-14:00, *Khanitchaidecha Wilawan: 14:00-15:00 4 February 2010: *Qiaoling Li: 9:30-10:30, *Wenchao Sun: 10:45-11:45
2010/02/04 -05	<b>Presentation (Special doctoral course)</b> Place: B1-336 4 February 2010: *Sujan Shrestha: 16:00-16:20, *Sujata Manandhar: 16:20-16:40, *Temur Mukhiddinovich Khujanazarov: 16:40-17:00, *Ratih Indri Hapsari: 17:00-17:20, *Tran Van Ty: 17:20-17:40, *Kazuhiro Kakizawa: 17:40-18:00 5 February 2010: *Do Thu Nga: 9:30-9:50, *Risky Ayu Kristanti: 9:50-10:10, *Wu Sushu: 10:10-10:30, *Seng Bunrith: 10:30-10:50, *Satoru Ochiai: 10:50-11:10, *Yang Kun: 11:10-11:30
2010/02/08	<b>GCOE Special Lecture</b> Place: B1-336 Lecturer: Dr. Taro Shinoda (Assistant Professor of Hydrospheric Atmospheric Research Center(HyARC), Nagoya University) Title: Current Status, Preliminary Results, and Future Plans of the HyARC Polarimetric Doppler Radars
2010/02/10	<b>GCOE Leader and Assistant Leaders' 35th Meeting</b>
2010/02/17	<b>Seminar on Ion Chromatography</b>
2010/02/17	<b>Seminar on Fluorescence Microscope</b>
2010/02/23	<b>GCOE Leader and Assistant Leaders' 36th Meeting</b>
2010/02/24	<b>Special program research presentations</b> Place: B1-336
2010/02/24	<b>Special Lecture</b> Place: B1-336 11:00-11:30, Dr. Kazuyoshi Souma, "Development of an advanced climate model including local human activities" 11:30-12:00, Dr. Tadashi Toyama "Rhizoremediation: A novel strategy using aquatic plant for the removal of pollutants from aquatic environments"
2010/03/01	<b>Meeting on Collaboration with Nepal and Thailand</b>
2010/03/11 -20	<b>Virtual Academy 2009 Intensive Program</b> Katmandu, Nepal
2010/03/12	<b>GCOE Leader and Assistant Leaders' 37th Meeting</b>
2010/03/19	<b>GCOE Commencement Ceremony</b> Place: T1-804
2010/03/24	<b>3rd UY-GCOE Steering Committee Meeting 2009</b>
2010/03/25	<b>Special Lecture</b> Place: T1-meeting room on 8th floor of T1 building Lecturer: Dr. Nguyen Thi Van Ha (Lecturer in HCM City University of Technology, Faculty of Environment) Title: Relative Contributions of Climate Variability and Human Activities to Surface Water Quality of the Saigon River in Ho Chi Minh City, Vietnam (and focus on two examples such as Mn and Fe leaching in the Saigon River Basin and the salinity intrusion simulation by using ANN)

# UY-GCOE KICK-OFF SYMPOSIUM “ADVANCED TECHNOLOGY AND HUMAN RESOURCES LEADING THE FUTURE OF WATER ENVIRONMENT IN ASIA”

August 5, 2008 at University of Yamanashi

Reported by Hiroshi ISHIDAIRA

UY-GCOE Kick-off symposium “Advanced Technology and Human Resources Leading the Future of Water Environment in Asia” was held at Kofu campus, University of Yamanashi on 5 August 2008. In this symposium, implementation plan of UY-GCOE was presented, especially about new “core activities” of this program: 1) Interdisciplinary Research and Education of Medicine and Engineering, 2) Hydro-Intelligence Unit and 3) Overseas support center. After the introduction, general discussion was held to discuss about “expected outcomes” and “detailed implementation plan” for the development of UY-GCOE program. Around 50 participants (both from UY and outside of University) attended to this symposium, and the suggestions and recommended actions were also summed up for further research and education of Integrated River Basin Management.

## Agenda

### 1. Opening address & greetings

- Hideaki Nukui (University President)
- Yasuhiko Nakagawa  
(Dean of Engineering School)
- Shuichiro Maeda (Dean of Medical School)
- Kengo Sunada (Program leader, UY-GCOE)

### 2. Introduction of UY-GCOE program

- 1) **Interdisciplinary Research and Education of Medicine and Engineering:** Propulsion of Interdisciplinary Research and Education for community health care.
- 2) **Hydro-Intelligence Unit:** Integration of river basin information, expected research outcomes of advanced radar observation in UY-GCOE
- 3) **Overseas Support Center:** Development of human resources network in Asian region.
- 4) **Education in International Special Ph.D course for Integrated River Basin Management**

### 3. General Discussion



Figure 1. Session for Introduction of UY-GCOE program



Figure 2. Introduction of UY-GCOE from program leader



Figure 3. General discussion

# SYMPOSIUM ON SCIENCE AND PRACTICE OF BASIN-SCALE WATER POLICY FOR POPULATION UP SURGING AREA

25-26 September, 2008 TOKYO, JAPAN

Reported by Satoru OISHI and Kengo SUNADA

The symposium for the research project entitled Sustainable Water Policy Scenarios for River Basins with Rapidly Increasing Population - Countermeasure strategy to global hydrological variation in monsoon Asia (known as SUNADA CREST) which is one of a research domain "Hydrological Modeling and Water Resources System" of Core Research for Evolutional Science and Technology (CREST) supported by Japan Science and Technology Agency (JST) was held from 25th to 26th September 2008 at the National Museum of Emerging Science and Innovation (MIRAikan). More than 120 of participants attended including 38% of foreign participants.

The list of foreign participants, their institution, their title and their title of presentation was listed as follows;

- i) Prof. Yicheng Wang, Head, China Institute of Water Resources and Hydropower Research, China's New Flood Management Policy Resulting from the 1998 Chanjiang River Great Flood;
- ii) Mr. Pech Sokhem, Manager and Senior International Environmental Governance Specialist, Hatfield Consultants Partnership, Canada, Ensuring Scientifically Informed Water Policy in the Mekong Region;
- iii) Prof. Ksemsan Suwarnarat, President, Environmental Engineering Association of Thailand, Flood Control Coupled with Urban Planning by Bangkok Metropolitan Administration;
- iv) Dr. Suwit Thanopanuwat, Professional Engineer for Planning, Royal Irrigation Department, Flood Control Policy Issue of the Chao Phraya River Basin;
- v) Dr. Aniek Masrevaniah, Lecturer, University of Brawijaya, Indonesia, Water Quality Degradation caused by Agriculture Land Management Pattern at Selorejo Reservoir Catchments Area, Indonesia;
- vi) Dr. Al-Lami Ali, Chief Researcher, National Coordinator of Iraqi Marshland Project, Ministry of Environment, Iraq, Water Resources in Iraq and Marshland Restoration
- vii) Dr. Brijesh Sikka, Director, National River Conservation Directorate, Ministry of Environment & Forests, India, Gang Action Plan and Municipal Sewerage in India.

## September 25<sup>th</sup>

At the beginning of the symposium, the purpose of this symposium was shown based on the aim of the research theme, the study system, past results of research by Professor Sunada, principal investigator. He also required the participation to significant discussion.

At first a keynote lecture about the problem of the water management in Asia was made by Professor Musiake, head of the CREST water cycle study domain. He gave a lecture of 20 minutes then the discussion time was open for 10 minutes for results of research of Sunada CREST successively.

From Dr. Kito, there was the presentation of influence on river flow quantity findings in the future of transversely climate change about nine object basins and argued in what the influence of human activities should have reflected by the estimate of the monthly division flow quantity. From Professor Wang, progress was explained about the recovery of the retarding pond function of the Dongting Lake in China, and arguments such as the utilization of the weather information in the future were done. Mr. Yoshitani showed a preliminary proposal about a transfer to the foreign country of



Fig 1 Keynote lecture from Professor Musiake





**Fig 2** Exciting presentation from Professor Kitamura

Chinese water management technology and the methodology, then a technical commonality and the individual nature were discussed. By Mr. Miyazawa, it was argued about the monitoring method of the river channel of the Mekong River head section application possibility of the Japanese tradition technology. Mr. Sokhem showed necessity of the introduction of the scientific knowledge to the international river management policy, and it was argued ideal methods of the cooperation of riparian countries. Dr. Miyamoto showed results of research about necessity of legal regulation explained by comparison between Chao Phraya river and Japanese rivers. Professor Ksemsan showed the progress of the flood countermeasure that it combined city planning in Bangkok. Dr. Suwit pointed out the problems of the flood defense of the Chao Phraya river, and it was argued method others of the combination of hardware measures and software measures and the enforcement. Mr. Shimizu showed results of research about the change of the social condition in the Indonesian Brantas river basin area and the change of the river channel, then it was argued the change of the river channel the origin of the dam sedimentation.

### September 26<sup>th</sup>

At first a keynote lecture was given about the capacity development support in the Asian region by Mr. Okazaki, senior administrative of JICA.

From Dr. Aniek, there was an introduction about the issue of degradation of water quality and the improvement of the Selorejo dam basin in Indonesia and argued about farmland management form / a water purification method. Professor Kitamura suggested the present conditions and the improvement scenario about water and farm management in the Aral Sea, and discussion about a farming form and the placement of the associated

irrigation institution and the international cooperation was done. From Professor Nakayama, the example about the water demand estimate in the Euphrates Iraq territory basin was introduced, and it was argued importance of the water maintenance, the effectiveness of the discussion of international by second truck conducted by the scientist. Dr. Al-Lami showed the present conditions and a problem about Iraqi aquatic resources and the reconstruction of the wetland, and it was argued about the environmental maintenance of the wetland. From Professor Murakami, the seawater introduction design from Red Sea to Dead Sea was shown, and it was discussed the technical effectiveness of the salt water to fresh water conversion. A field work for water pollution preventive measures and an analysis result were shown from Dr. Fujiki, then they argued by the interpretation of the water change along the drainage. Dr. Sikka presented Ganges improvement action plan and the sewer, and discussion was performed about the ways of thinking of the business expense. The problem of the water management of Ho Chi Minh City was shown from Professor Takizawa, and it was argued methodology of switch and the water improvement of the agriculture water. Development status of Knowledge Mining System(KMS) was explained by Mr. Kishida.

Finally general discussion about a total problem for two days was argued, and the things that were necessary for publication of the activeness of results of research, the grasp of the request of the society, enough understanding of the problem and the construction of rich communication between the people concerned were concluded.

Finally, all of the researchers thank international collaboration mechanism (JICA) and the person concerned of the Yamanashi University Global COE program for holding of the symposium support it in form.



**Fig 3** Final Discussion with four researchers



# THE 6<sup>th</sup> INTERNATIONAL SYMPOSIUM ON SOUTHEAST ASIAN WATER ENVIRONMENT

29-31 October, 2008 Bandung, Indonesia

Reported by Vishnu P. PANDEY, Wilawan Khanitchaidecha and Satoru OISHI

The sixth International Symposium on Southeast Asian Water Environment, organized jointly by Faculty of Industrial Technology and Center for Environmental Studies - Institute of Technology Bandung (ITB), Research center for Water Environment Technology - The University of Tokyo, and Southeast Asian Center for Water Environment Technology (SACWET) - Asian Institute of Technology (AIT) and the University of Tokyo; was held on 29-31 October, 2008 in Jayakarta Hotel, Bandung, Indonesia. The Global COE Program “Evolution of Research and Education on Integrated River Basin Management in Asian Region” of University of Yamanashi (UY-GCOE) was one of the co-organizers of the symposium along with Integrated Research System for Sustainability Science (IR3S), Asian Network for Incubation of Environmental Leaders (ANIEL)-University of Tokyo, “Wisdom of Water” (Suntory), Corporate Sponsored Research Program-University of Tokyo, and West Java Environmental Protection Agency.

The purpose of the symposium was to provide a forum for discussion and exchange among researchers/practitioners in Environment Technology and Management and related areas from the Asian Region and to promote interaction among researchers from Asia-Pacific countries, Japan and other parts of the world.



Fig 1 Participants in the Excursion to Pindodeli

More than 150 participants joined the symposium (Fig 1). Eight participants under the leadership of Prof. Kengo Sunda represented UY-GCOE in the symposium (Fig 2).



Fig 2 The UY-GCOE team with other participants

On the first day (29<sup>th</sup> October), participants enjoyed the excursion to Jatiluhur Dam, PT. Pindodeli Pulp & Paper, and shopping.



Fig 3 Excursion on 29<sup>th</sup> October 2008

On the second day (30<sup>th</sup> October), the symposium was officially opened at around 0900 by Prof. Shinichiro Ohgaki, *Director, RECWET-UT and Co-Director, SACWET-AIT&UT*; followed by the opening address delivered by the Rector of Bandung Institute of Technology (BIT), and keynote speeches from Ir. Rahmat Witoelar, *Minister of Environment, Republic of Indonesia* and Prof. Wun Jern Ng, *Executive Director, Nanyang Environment & Water Research Institute, Nanyang Technological University, Singapore* (Fig 4).



Fig 4 Opening ceremony of the symposium



After the coffee break, three parallel oral presentation sessions were started in the morning and poster sessions after the lunch, and continued until the evening. The delicious reception dinner was served in the evening followed by cultural program including Angklung performance. Everybody was given an Angklung and was taught how to play together to produce the sound harmony (Fig 5). It was a great fun.



Fig 5 The participants enjoyed playing Angklung instrument

Including the sessions convened on the third day (31<sup>st</sup> October) morning, forty-eight presentations were made on oral sessions (two from UY-GCOE, Fig 6) and forty-seven on poster sessions (two from UY-GCOE). The oral presentations covered nine themes related to water environment (*theme/number of presentations*) – biological processes (9), drinking water (3), soil and sediment contamination (3), water and wastewater management (3), public health (3), urban environment management and monitoring (3), physicochemical process (6), solid waste management for water environment (3), and groundwater (3). Two special sessions - *dialogs on water technology with societies (6) and towards sustainability in water system (6)* - were also convened.

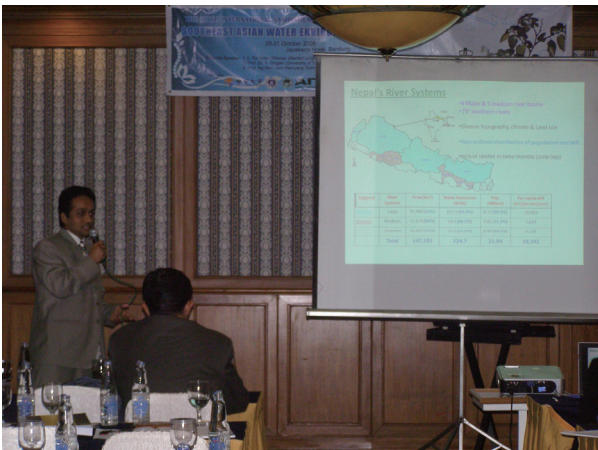


Fig 6 Presentation from UY-GCOE participant

The UY-GCOE team actively participated in most of the sessions. In Groundwater session, chaired by Prof. Yasushi Sakamoto, very interesting explanation about hydro-political situation of central Asia was delivered by Prof. Kengo SUNADA after the presentation related to Aral Sea Lake System by Ms. Sri Wahyuni. That explanation had ignited interesting discussion.

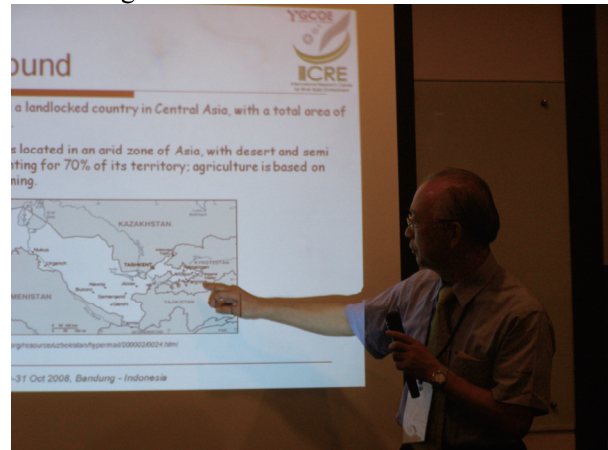


Fig 7 Prof. K. SUNADA explaining hydro-political situation upstream of Aral Sea Lake System in central Asia

After all the sessions were over on 31<sup>st</sup> October, farewell lunch was served, followed by announcement of the best poster award and host institute for the 7<sup>th</sup> Symposium to be held in 2009. Two posters including one from UY-GCOE, entitled “*Effect of Aeration and Non-Aeration Periods on Nitrogen Removal*” presented by Wilawan Khanitchaidecha, received the best poster award (Fig 8). After the award distribution, the symposium was officially closed by Prof. Tjandra Setiadi and Prof. Shinichiro Ohgaki, followed by announcement that the 7<sup>th</sup> *International Symposium on Southeast Asian Water Environment* would be held at Asian Institute of Technology (AIT) in Thailand in October 2009. Prof. C. Visvanthan, on behalf of the host institute for the 7<sup>th</sup> Symposium, welcomed/invited all the participants to join the 7<sup>th</sup> Symposium in AIT.



Fig 8 UY-GCOE participant receiving the best poster award

# ACTIVITY REPORT

## - Virtual Academy 2008 –

K.N. Dulal<sup>1,2</sup> and H. Ishidaira<sup>3</sup>

<sup>1</sup>Senior lecturer, Head of department (HOD) of the Civil Engineering program of the Kantipur engineering college

<sup>2</sup>Center of Research for Environment, Energy and Water  
(P.O. Box25563 Kathmandu)

<sup>3</sup> Associate Prof., Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi  
(4-3-11 Takeda, Kofu, Yamanashi 400-8511, Japan)

### 1. INTRODUCTION

Virtual Academy (VA) is one of the core educational activities of Global COE program “Evolution of Research and Education on Integrated River Basin Management in Asian Region” at the University of Yamanashi. The purpose of VA are :

- To provide theoretical knowledge on BTOPMC distributed hydrological model
- To understand various modules and the WinBTOPMC software
- To apply the model for local river basin
- To promote international collaboration of the Global COE program of the University of Yamanashi (UY-GCOE)
- To make the networking of UY-GCOE broader by means of Virtual Academy program

### 2. VIRTUAL ACADEMY COURSE FOR YEAR 2008 (VA2008)

#### (1) Schedule

VA 2008 was opened as a “intensive lecture” from Dec.26, 2008 to Jan. 19, 2009 in Nepal. The course syllabus of VA 2008 is as follows:

1. Introduction to Hydrological Modeling
2. Concepts of BTOPMC model
3. Introduction to Modules of BTOPMC
  - Topographic module
  - Precipitation module
  - Evapotranspiration module
  - Snow module
4. Demonstration of modules of BTOPMC
5. Introduction to data files and formats
6. Project work

- Data file preparation
- Runoff simulation
- Advanced analysis

Bagmati basin was selected as the target basin of VA 2008, and sample data for this basin were provided for participants.

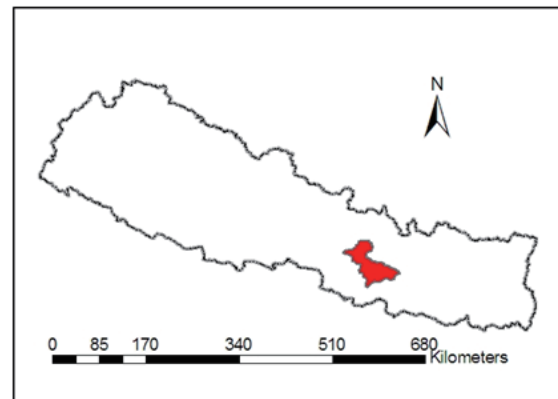


Fig. 1 Bagmati River basin in Nepal  
(Basin area: 2700 km<sup>2</sup>)

#### (2) Hydrological Model

The hydrological model used in the course is BTOPMC. BTOPMC refers to “Blockwise use of TOPMODEL with Muskingum-Cunge routing”. This model was developed at the University of Yamanashi, Japan. The model is a conceptual and distributed model. BTOPMC implements the concepts of TOPMODEL with Muskingum-Cunge method for flow routing. TOPMODEL is based on source area concept of hillslope hydrology, which has been applied to basins of few hundred km<sup>2</sup>. As the model considers catchment as an aggregate of heterogeneous land areas, it is practically impossible



to calibrate model parameters for large basins. Therefore, BTOPMC model has been developed in order to apply the concepts of TOPMODEL ranging from smaller to large basins.

### (3) Team members

Name	Responsibility
- Dr. Khada Nanda Dulal	Instructor/ Lesson Management
- Dr. Satoru Oishi	Advisor
- Dr. Hiroshi Ishidaira	Advisor
- Maki Ishihara	Administrative work
- Mariko Kato	Administrative work
*Dr. Jun Magome (ICHARM)	Advisor

### (4) Participants

Target audience of VA 2008 is hydrologists, technicians and engineers interested in water resources management and working in government sector, academic institutions, private company or consultancy. In total, 15 participants were joined to VA 2008.



Fig.2 Participants in Lecture room

Table 1 List of Participants

S.N.	Name	Affiliation
1	Maheswor Shrestha	Department of Electricity Development (DOED)
2	Dhiraj Pradhananga	Tri-chandra Campus, Tribhuvan University
3	Tirtha Adhikari	Central Department of Hydrology & Meteorology, Tribhuvan University
4	Nitesh Shrestha	Central Department of Hydrology & Meteorology, Tribhuvan University
5	Raju Dhar Pradhananga	Central Department of Hydrology & Meteorology, Tribhuvan University
6	Fanendra Raj Joshi	Nepal Electricity Authority (NEA)
7	Ananda Dhungel	Nepal Electricity Authority (NEA)
8	Pujan Piyta	Nepal Electricity Authority (NEA)
9	Maneesha Shakya	Center of Research for Environment, Energy and Water (CREEW)
10	Sumnima Shrestha	Central Department of Environmental Science, Tribhuvan University
11	Nirmal Mani Dahal	School of Environmental Management & Sustainable Development (SchEMS)
12	Madhav Prasad Thakur	School of Environmental Management & Sustainable Development (SchEMS)
13	Sangeeta Pandey	Center of Research for Environment, Energy and Water (CREEW)
14	Suchita Shrestha	Central Department of Environmental Science, Tribhuvan University
15	Ujjwal Chapagain	Development Center, Nepal



Fig.3 Group photo

### 3. RECOMMENDATIONS

- Support to the participants should be continued if they wish to apply the model for future research.
- UY-GCOE can support the overseas research center to establish computer lab for conducting training, workshop, seminar etc.
- The duration can be increased and other topics s, e.g. water quality model can be added.

# SYMPOSIUM ON INDUSTRY ACADEMIA GOVERNMENT COLLABORATION “CONSIDERATION OF ENERGY AND ENVIRONMENT BY INDUSTRY, ACADEMIA AND GOVERNMENT”

January 27, 2009 at Bell Classic Kofu, Japan

Reported by Hiroshi ISHIDAIRA

The Symposium on Industry Academia Government Collaboration “Consideration of energy and environment by Industry, Academia and Government” was held at Bell-Classic Kofu, January 27 2009. The aim of this symposium is to foster the new activities for application of “knowledge and technology” in university, and to develop new model for community activation. Over 500 people from industry, government and academia of outside/inside of Yamanashi Prefecture came to this symposium.

Following to the opening address by the prefectural governor Shomei Yokouchi, and the president of University of Yamanashi, Hideaki Nukui, two keynote lectures were given in the first session. Prof. Masahiko Hayashi (National Astronomical Observatory of Japan, Observing station in Hawaii) gave lecture about “Exploring the other Earth”, and Mr. Tadahito Yamamoto (president of Fuji Xerox Co. Ltd.) talked about “R & D for next generation in Fuji Xerox”.



Figure 1. Opening Ceremony

In the second session, three thematic forums were organized and one of the forums “Water Environment, Hazard & Health Issues” was hosted by University of Yamanashi Global COE program. In this forum, keynote speaker Prof. Sunada (leader of UY-GCOE program) introduced the objectives, framework and expected outcomes of UY-GCOE

program “Evolution of Research and Education on Integrated River Basin Management in Asian Region”, and explained about some core activities “Hydro-Intelligence Unit” and “Overseas Support Center”.



Figure 2. Keynote Lecture (1): Prof. Masahiko HAYASHI



Figure 3. Keynote Lecture (2): Mr. Tadahito YAMAMOTO

After this introduction, panel discussion was conducted to exchange the ideas between researchers, government officers and local residents for the better implementation of Integrated River Basin Management (IRBM). Prof. Sakamoto (sub-leader of UY-GCOE) took the chair, and following



panelists and commentator were invited to the panel discussion.

**Panelists:**

- 1) Xiaotao CHENG (Professor, Institute of Water Resources and Hydropower Research, China)
- 2) Mukand Singh BABEL (Associate Professor, Asian Institute of Technology, Thailand)
- 3) Masakazu FUJIKANE (Director of Kofu River/National Highway Office, Kanto Regional Development Bureau, MLIT)
- 4) Mitsuharu HAGIHARA (Chief editorialist, Yamanashi Nichinichi Shinbun)
- 5) Zentaro YAMAGATA (Professor, University of Yamanashi)

**Commentator:**

Kuniyoshi TAKEUCHI (Director, International Center for Water Hazard and Risk Management)

Prof. Cheng and Mr. Fujikane introduced the flood mitigation strategies in China and Japan (Fuji river basin), respectively. Dr. Babel shows some case studies for IRBM in the Asian countries. Prof. Yamagata mentioned the importance and necessity of human resources development of “bridging experts” between water management and epidemiology for the reduction of water related diseases. Mr. Hagihara pointed out the role of mass media for information sharing and distribution between government and local people. Finally, Prof. Takeuchi summarized the discussion, and suggested to think about 1) sharing the knowledge and wisdom of water management among Asian countries, and 2) development of human resources network through UY-GCOE activities.



**Figure 4.** Keynote Lecture by Prof. Kengo Sunada, Leader of Global COE program at Univ. of Yamanashi



**Figure 5.** Panel Discussion



**Figure 6.** General discussion.

# INTERNATIONAL SYMPOSIUM “CONTRIBUTING TO THE SOLUTION OF WATER ISSUES IN ASIA THROUGH HUMAN RESOURCES DEVELOPMENT”

January 28-29, 2009 at University of Yamanashi

Reported by Hiroshi ISHIDAIRA and Sangam Shrestha

On the 28th and 29th of January 2009, an international symposium was held at the Kofu Campus to exchange the ideas of research and education for Integrated River Basin Management in Asian region, and discuss about expected outcomes and detailed implementation plan for the development of Global COE program at University of Yamanashi “Evolution of Research and Education on Integrated River Basin Management in Asian Region”. This symposium was entitled “Contributing to the Solution of Water Issues in Asia through Human Resources Development”

After greetings from University President Hideaki Nukui, and Prof. Kengo Sunada, leader of Global COE Program, gave some explanations regarding the symposium and outlines of the program. Continuing on, implementation plan of core programs (1) Hydro-Intelligence Unit, (2) Overseas Support Centers and (3) Interdisciplinary Research and Education of Medicine and Engineering were introduced.

Following to the introduction of Global COE program at University of Yamanashi, five technical sessions were organized to exchange the knowledge and experiences about Integrated River Basin Management in Asian region.

## **Session 1: Water Hazard**

- Integrated Flood Analysis System (Prof. Kuniyoshi TAKEUCHI)
- Progress of Future Flood Foresight Study in the Taihu Basin (Prof. Xiaotao CHENG)
- Cost-Benefit Analysis of River Basin Management Based on Flood Risk Assessment: Towards Scientific Policy Making (Prof. Yutaka ICHIKAWA)
- Some Fundamental Aspects on the Modeling of Flood Inundation in Highly-Urbanized Area: Lessons Learnt from a Case Study in Kofu, Japan (Dr. Dian SISINGGIH)



Fig. 1 Opening address



Fig. 2 Introduction of Global COE program



Fig. 3 Session 1: Water Hazard (Prof. Takeuchi)



## **Session 2: Hydrology & Water Resources**

- Flood Drainage Improvement in the Surrounding Area of Suvarnabhumi Airport, Thailand and Assessment on Its Social and Environmental Impacts (Prof. Tingsanchali TAWATCHAI)
- Simulation of Monthly Streamflow by Using VIC-3L Model in the Headwater Catchment of the Tarim River Basin (Prof. Zongxue XU)
- Hydrological Cycle in Chinese Monsoon Area under Changing Environment (Prof. Liliang REN)
- Application of Dynamic Programming in the Optimization of Irrigation Scheduling using a Mathematical Production Function (Dr. Widandi SOETOPO)



**Fig. 4** Session 2: Hydrology & Water Resources (Prof. Xu)

## **Session 3: River Basin Environment, Public Health**

- Integrating River Basin Management Research and Capacity Building (Prof. Tetsuya KUSUDA)
- How Does Epidemiology Contribute to the Solution of Water Issues in Asia (Prof. Zentaro YAMAGATA)
- Water Pollution by Dioxins and other AhR Agonists - Approaches using Mammalian Biosensors - (Prof. Masanori KITAMURA)
- Cigarette Smoke Extract Induces TSLP Expression, Leading to Th2-type Immune Responses and Airway Inflammation (Prof. Atsuhito NAKAO)



**Fig. 5** Session 3: River Basin Environment, Public Health (Prof. Kusuda)

## **Session 4: Water Environment in Asia**

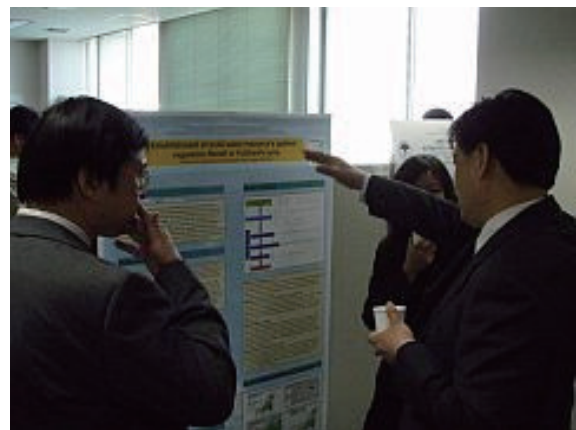
- Environmental Flow Incorporation in the Operation of Hydropower Reservoir: a Case Study in La Nga river Basin, Vietnam (Prof. Mukand Singh BABEL)
- Assessment and Monitoring of Water Quality Control of Zarafshan River and its Tributaries (Prof. Kristina TODERICH)
- Manganese and Iron Pathways in Sai Gon River, Viet Nam (Thi Van Ha NGUYEN)
- Engineering Approaches to Controlling the Phytoremediation System (Prof. Kazuhiro MORI)
- The effects of Perinatal Exposure to Dioxin on the Neural Function of the Hippocampus of Rats (Prof. Jun ARITA)



**Fig. 6** Session 4: Water Environment in Asia (Prof. Toderich)

## **Session 5: Special Session for Young Researchers** (Poster session)

The special session was organized for presenting the research activities of young researchers. In total, 25 researchers and Ph.D candidates were invited from International Special Doctoral Course for Integrated River Basin Management, International Research Center for River Basin Environment (ICRE) and other research institutes.



**Fig. 7** Poster Session



## **Integrated Discussion**

After the technical session, an integrated discussion was held on the following implementation plans as proposed by the GCOE-UY members:

1. Hydro-intelligence Unit
2. Overseas Support Center and
3. Interdisciplinary Research and Education of Medicine and Engineering

### **1. Hydro-intelligence Unit**

- Concept and definition of hydro-intelligence unit should be clearer. As many participants pointed out that this implementation plan is similar to other implementation plans (2 &3).
- Policy on data collection and data sharing should be prepared in advance to avoid conflict at later stages.
- Scaling up or down-scaling the databases by developing some models could be one more objectives of this hydro-intelligence unit.

### **2. Overseas Support Center**

- Overseas Support Center can be renamed as Overseas Partners (as an example).
- Additional activities such as organizing joint symposium and conferences, student and faculty exchange programs, joint researches between GCOE-UY and overseas support centers. Overseas support center can also provide trainings (such as on-site VA courses and GIS courses) with a funding support from GCOE-UY and logistic from overseas support center.
- Establishment of Overseas Support Center in developed nations such as Australia was suggested so that knowledge and experience on water resources management can be shared between developed and developing nations.
- Sustainability of overseas support center is a crucial issue and it can be maintained by seeking mutual interest and mutual benefit between GCOE-UY and overseas support center. Student and faculty exchange, dual degree courses will open the avenues for future activities.
- Overseas support center activities should be carried out by thinking the mission of GCOE-UY itself.
- Roles and responsibility (MoU) between GCOE-UY and overseas support center should be prepared in advance with a commitment for its

implementation. Developing short-term courses modules and joint publication could be other activities.

- GCOE-UY members can be dispatched to other countries for sharing and disseminating knowledge at a wider scale. This activity can significantly reduce the unnecessary expenditure of time and resources.
- Developing a system like 'JSPS Ronpaku' could be beneficial for research institutes in developing nations.

### **3. Interdisciplinary Research and Education of Medicine and Engineering**

- Revision, modification and addition of courses (as proposed) are necessary to cover research and education of medicine and engineering.
- Concentrating in specific research areas of IRBM will be rational thinking about the duration, funding and human resources inside GCOE-UY. Specific researches could be only in water-related issues.
- Developing double degree course was suggested to produce human resources who will have knowledge on interdisciplinary subjects.
- Consulting COE alumni, current students and future students was suggested to develop courses and for selection of research topics.
- Research and education should particularly consider the topics like lack of access to safe drinking water and sanitation in developing countries.
- Outreaching activities by GCOE-UY was suggested to cover the wide areas.

Around 100 participants, both Japanese and international, attended over both days of the symposium, and all the attendances were eagerly attentive.



**Fig. 8** Integrated discussion

# INTERNATIONAL SYMPOSIUM ON ENVIRONMENT, ENERGY AND WATER IN NEPAL: RECENT RESEARCHES AND DIRECTION FOR FUTURE, AND FIELD SURVEY (KATHMANDU, NEPAL)

## Participants

Kengo Sunada, Yasushi Sakamoto, Futaba Kazama, Kei Nishida, Kazuhiro Mori, G.H.A.C. Silva, Takashi Nakamura, Rabin Malla, Saroj K. Chapagain, Sri Wahyuni, Kazuhiro Kakizawa, Vishnu P. Pandey, Wilawan Khanitchaidecha

## Date

27 March-04 April 2009

## Schedule

### March

27 • Transfer from Narita Tokyo to Hong Kong (Transit) (Kazama, Nishida, Nakamura, Malla, Chapagain, Pandey)

- Transfer from Hong Kong to Kathmandu Nepal

28 • Preliminary preparation of the symposium by UY-GCOE members

- Meeting with the Nepal based organizers and co-organizers of the symposium

29 • Field visit and water sampling from the community owned spring water collection and distribution centre at Tau Daha, Chovar (south of Kathmandu)

- Meeting with the Nepal based organizers and co-organizers of the symposium

- Field visit and water sampling from shallow tube well at Sankhu (north-east of Kathmandu)

- Transfer from Narita Tokyo to Hong Kong (Transit) (Sunada, Sakamoto, Mori, Silva, Wahyuni, Kakizawa, Khanitchaidecha)

- Transfer from Hong Kong to Kathmandu Nepal

30 • Final preparation of the symposium by UY-GCOE members

- Meeting with CREEW and UY-GCOE

31 • Symposium

### April

01 • Symposium

02 • Field visit and ground water sampling from the groundwater plant of Blue Bird Departmental Store, Tripureshwor, Kathmandu (central part of Kathmandu)

- Field visit and groundwater sampling of the community based water treatment and distribution plant at Kawalachhi, Patan (Lalitpur)

03 • Transfer from Kathmandu to Hong Kong (Transit)

04 • Transfer from Hong Kong to Narita Tokyo

## Outcome report

Nepal locates on the south of the Himalaya Mountains and its national population is 27 million. The key industry is agriculture and almost the all electric power is supplied by hydroelectric power generation. They have high population growth rate of 2% and gravitation of population towards city area in these days. This time, International Symposium on Environmental, Energy, and Water in Nepal: Recent Researches and Direction for Future organized by Global COE Program & International Research Center for River Basin Environment, University of Yamanashi, (UY-GCOE & ICRE, Japan), Center of Research for Environment Energy and Water (CREEW, Nepal), Kurita Water and Environment Foundation (KWEF, Japan), Institute for Global Environment Strategies (IGES, Japan) were held at Kathmandu the capital in Nepal in Association with Environment and Public Health Organization (ENPHO, Nepal), Japan International Cooperation Agency (JICA), UNHABITAT-Nepal, Society of Public Health Engineers (SOPHEN) with 100 participators. From UY-GCOE, 3 professors, 2 associate professors, 2



Souvenir picture with participants of the international symposium

researchers, 6 doctor course students attended this symposium.

We left Kofu in the morning of 27<sup>th</sup> or 29<sup>th</sup> March and arrived at Kathmandu after 16 hours.

After preparation by executive committee including UY-GCOE, the international symposium was open at Hotel Himalaya, Kathmandu with the opening address by Mr. Bishnu Prasad Poudel (Honorable Minister, Ministry of Water Resources, Nepal), Mr. Tatsuo Mizuno (The Ambassador Extraordinary and Plenipotentiary of Japan), Mr. Noriaki Niwa (Chief Representative, Japan International Cooperation Agency), Prof. Kengo Sunada (University of Yamanashi, Japan) making all participants own present environmental situation and necessity of research as a approach to the solution. In this symposium, we welcomed 4 keynote speakers, Prof. Motoyuki Suzuki (The Open University of Japan), Dr. Dwarika Nath Dhungel (Institute for Integrated Development Studies, Nepal, Dr. Ramesh Ananda Vaidya (Senior Visiting Scientist, ICIMOD, Nepal), Dr. Roshan Raj Shrestha (Chief Technical Advisor, UNHABITAT, Nepal) presenting us essences and cases of global and regional environmental problems, applicability of various environmental technologies to Nepal with due regard to the regional features and the latest scientific approaches to the Nepal environmental conservation. In the oral presentation sessions, 44 speakers introduced recent research results on groundwater management, environment management-general contributions, energy diversification and energy use efficiencies, climate change & water induced disaster, water quality & public health, land use management following lively and impressive discussions with participants. The serious environmental situation, future direction of environmental research in Nepal and necessities of internal and international cooperating structure were discussed in the final panel discussion. Through this international symposium, all participants including many specialists from administration, industry and academia could have a common understanding on the environmental problem and high potential for the solution in Nepal.

Our UY-GCOE members performed field researches on environmental water in Kathmandu valley for dynamic analysis of contaminants through the river basin of this area, before and after symposium. We visited the community owned spring water collection and distribution centre at Tau Daha, Chovar (south of Kathmandu), shallow tube well at Sankhu (north-east of Kathmandu), the groundwater plant of Blue Bird Departmental Store, Tripureshwor, Kathmandu (central part of

Kathmandu), the community based water treatment and distribution plant at Kawalachhi, Patan (Lalitpur) and carried out water sampling and analysis.

We left Kathmandu in the night and arrived at Kofu in the afternoon of the 4<sup>th</sup> April.

During this trip to Nepal, because of increasing population and acute urbanization, we could understand that countermeasures to the increasing demand of water and the aggravation of environmental condition in Nepal are the urgent matters. In the other hand, urban planning considering the environmental conservation has been paid attention. We have been studied on the basin management in the Asian Monsoon region and accumulated information and experience. Collaboration with the several organizations in Nepal will contribute to such serious situations and create the common achievements in the future. Fortunately, we could construct partnerships with related organization in this trip.



Oral presentation in the symposium



Panel discussion in the symposium



Water sampling at Kathmandu valley



# REPORT ON A FIELD SURVEY IN KATHMANDU, NEPAL

Nishida, Kei

## 1. OBJECTIVES

Following the continuous surveys in Kathmandu valley, Nepal during the 21st century COE program, we visited the valley again to develop groundwater researches supported by the UY-GCOE program. The first purpose of the trip was to collect groundwater samples to analyse chemical contamination with Arsenic from natural sources and microbial contamination from faecal or other unknown pollution sources. The second purpose was to collect groundwater, geological, water supply and other relevant data from the government, institutes, NGOs and companies, thereby establishing a model for managing groundwater resources in the valley. The leading PhD students were S. K. Chapagain and V. P. Pandey in international special doctoral course for integrated river basin management, other members were Prof. Kazama, Dr. Nishida, Yamada (M1), Sakamoto (B4) and Raju as a local assistant & driver.

## 2. OUTLINE

The schedule of field sampling was as follows.

- 29 August (Fri):** Departure from Japan
- 30 August (Sat):** Arrival to Nepal and basic preparation for the sampling: National weekly holiday
- 31 August (Sun):** Groundwater Sampling at 4 deep wells
- 01 September (Mon):** Groundwater Sampling at 4 deep wells
- 02 September (Tue):** Groundwater Sampling at 4 deep wells
- 03 September (Wed):** Groundwater sampling at new locations in northern part (Varying with the altitude)
- 04 September (Thu):** Visit bore drill companies to collect sediments samples, visit local areas having the possibility to collect geological samples from low depth layers or exposed bedrock locations
- 05 September (Fri):** Groundwater Sampling at 5 shallow wells
- 06 September (Sat):** National weekly holiday: Re-analysing microbial samples
- 07 September (Sun):** Re-analysing microbial

samples

**08 September (Mon):** Visit collaborative local offices (ENPHO, CREEW, DC-Nepal, MARDO) to exchange and share the knowledge and information

**09 September (Tue):** Departure from Nepal

**10 September (Wed):** Arrival to Japan

We planned to use the ENPHO laboratory for pre-treatment of samples as in the previous surveys, however, due to unexpected long-time load shedding (electricity cut) and need to minimise time for transportation accordingly, conducted filtration, separation and microbial test in the hotel room on every day of sampling. All chemical and *E. coli* analyses have been finished and some of samples are undergoing molecular biological analyses.



At a deep well in a farmyard.



At a deep well in a city area.

The schedule of data collection was as follows.

- 20 August (Wed):** Departure from Japan
- 21 August (Thu):** Arrival to Nepal
- 22 August (Fri):** CEMAT Library: 1)
- 23 August (Sat):** Holiday
- 24-25 August (Sun-Mon):** GWRDP, Babarmahal: 2)
- 26-27 August (Tue-Wed):** Melamchi Water Supply Development Board: 3)
- 27-28 August (Thu-Fri):** Nepal Water Supply Corporation (NWSC), Tripureswor: 4)
- 30 August (Sat):** Holiday: meet with the sampling team
- 31 August-01 September (Sun-Mon):** Department of Mines and Geology (DMG) & Department of Survey: 5)
- 02 September (Tue):** Geology Journals (Dr. Taranadhi Bhattarai) & others: 6)
- 03-04 September (Wed-Thu):** NEDCO and NISSAKU: 7)
- 05 September (Fri):** Follow the groundwater-sampling team: 8)
- 06 September (Sat):** Holiday
- 07-08 September (Sun-Mon):** Survey of Hotels/PTBE/DWC/Gov/Embassy wells: 9)
- 09 September (Tue):** Departure from Nepal
- 10 September (Wed):** Arrival to Japan

- 1) M&E and CEMAT (1999, 2000, 2001) which deals more detail about GW in Ktm Valley.
- 2) Groundwater monitoring data of nearly 50 wells since 1999; some lithologs of Kathmandu geology
- 3) Their library has many references related to Water supply in Kathmandu valley (including GW). Visit their library and search for available documents related to water supply of Kathmandu valley; Acres International et al (2002), etc.
- 4) Updated data on groundwater abstraction from 7 NWSC well fields (quantity), their location, discharge from each wells, areal extent of well fields, JICA (1990) Report from NWSC library, etc.
- 5) At DMG, meet with Pujan Piya and B.D. Kharel who have worked a lot on geology of Kathmandu valley, collection of lithologs, Environment Geology Map of Kathmandu valley (GIS map is possible)
- 6) Special issue of Geological society of Nepal Journal (2001,2002) which have more details of geology of Ktm, Gautam R. and Rao G.K. (1991). Groundwater resources evaluation of Kathmandu valley. Journal of Nepal Geological Society 7:39-48.
- 7) These two are the main companies involved in

drilling most of the wells in the Kathmandu valley so collect number of wells drilled, their lithologs, hydrogeological parameters etc.

- 8) Work together with the sampling team to learn groundwater sampling technique, landscape and locations, etc.
- 9) Nearly 240 wells in the Kathmandu valley with discharge data (Qpump) (1998 data) and nearly 70 wells without those data which are needed in groundwater modelling thus, through a survey, find the quantity of water extracted from well, number of hours of extraction in dry and wet season.

We achieved almost all data collection and are integrating the results into a groundwater modelling.

We also had an important opportunity to discuss with CREEW that would be an 'Overseas Collaboration Centre' in Nepal, then invited a researcher of them to UY for on-site training of microbiology enabling stand-alone survey of shallow groundwater in Kathmandu in the end of 2008.



A quickly arranged laboratory in a hotel room.



Meeting with a local NGO



# FIELD SURVEY ON CHANNEL AND ECOSYSTEM OF THE MEKONG RIVER BASIN

October 28-November 7, 2008, at the Mekong River and the Tonle Sap Lake,  
Cambodia and Lao PDR

Reported by Naoki MIYAZAWA

We visited the Mekong River and the Tonle Sap Lake, Cambodia, and Lao PDR for a field survey of the channel and ecosystem in the Mekong River Basin, with financial support of the Global Centers of Excellence (COE) Program, University of Yamanashi (Evolution of Research and Education on Integrated River Basin Management in the Asian Region). This field survey was performed to study the following.

- (1) Prediction of integrated sediment transport in the Mekong River Basin for sediment management.
- (2) Extraction of hydrological and ecological environmental factors and their application in the Tonle Sap Great Lake.
- (3) Methodology for channel change assessment in the Mekong River for channel management.

## Activities

We visited the Department of Hydrology and River Works (DHRW), Ministry of Water Resources and Meteorology (MWRM) in Phnom Penh, Cambodia, and explained the 21<sup>st</sup> century COE program, the CREST Water Policy Scenarios research project, and the Global COE program of the University of Yamanashi.

We investigated severe bank erosion spots in the Mekong River near Compong Cham, Cambodia, as specified by geomorphological monitoring using satellite images (ASTER, TERRA).

We investigated the flow, bank damage, and bank protection works at the confluence of the Mekong, Tonle Sap, and Bassac Rivers in Phnom Penh. We also investigated middle-scale fishery activities in the Tonle Sap River.

We visited the Inland Fisheries Research and Development Institute (IFReDI) of Fisheries Administration (FIA) in Phnom Penh, Cambodia, and introduced previous and present education programs and research projects by the University of Yamanashi. We presented study results on the fish species habitat and ecosystem of the Tonle Sap Lake regarding topic (2) and discussed this topic. We obtained documents and information on Cambodia's inland fisheries (e.g., fish diversity and catch at the Tone Sap dai fishery). The Deputy Director of this institute agreed that the ecosystem of the Tonle Sap

Lake was an important concern, and welcomed our contribution to the study of the Tonle Sap.

We investigated land use of the eastern floodplain of the Tonle Sap Lake, the vegetation distribution of the western floodplain, and the fishery activities in the lake.



Figure 1 Prek Toal bird sanctuary, Tonle Sap

We investigated bank erosion and bank protection works in the Mekong River around the Vientiane capital, Lao PDR.

We visited the Mekong River Commission (MRC) and introduced previous and present education programs and research projects by the University of Yamanashi. We presented the study results on the fish habitat and ecosystem in the Tonle Sap Lake, channel changes of the Mekong River, and sediment management of the Mekong River Basin regarding topics (1), (2), and (3) and discussed these topics with the senior hydrologist and GIS specialist of the Technical Support Division (TSD). The Discharge and Sediment Monitoring Project is now under formulation and aims to improve our understanding of the sediment balance and sediment transport processes in the mainstream and tributaries of the Mekong River Basin. This project is implemented under Component 2 of the Information and Knowledge Management Program (IKMP) by the TSD.

We visited the National Geographic Department; the Prime Minister's Office, and the

National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR, and collected the map of 2000 land use in Laos and the plan map of 2020 land use.



**Figure 2** Presentation & discussion at MRC

We visited the office of Nam Ngum Dam and obtained from the deputy manager outlines of the dam, data on monthly inflow to the reservoir, and the future plan of water power generation in Laos.

We investigated the present land use in the Vientiane Plain.

We visited the Laos office of the Japan International Cooperation Agency (JICA) and explained the Global COE program of the University of Yamanashi. Where we obtained information about the bank protection works research project conducted by JICA and the ongoing projects in Laos (e.g., Disastrous Weather Monitoring System and some educational projects).



**Figure 3** Meeting at the Laos office of JICA

We investigated the tributaries of the Ou, Soung, and Kean River, upstream of Luang Prabang, and the people's dependence on the tributary basins for their livelihood.

### **MRC Discharge and Sediment Monitoring Project**

The Discharge and Sediment Monitoring Project is now under formulation and aims to improve our understanding of the sediment balance and sediment transport processes in the mainstream and tributaries of the Mekong River Basin. Component 2 of the IKMP, under the TSD, will implement the project. The objectives of this project correspond with those of our studies, especially topic (1). Sediment monitoring will be integrated into an MRC-integrated monitoring system for river discharge, sediment, water quality, and biological monitoring. The acquired information and knowledge will be useful for studies of river morphology and bank protection, sediment transport and nutrient loads, water quality and environment, raw water supply and intake, hydropower and water resource development, navigation, agricultural and fishery productivity, and coastal sedimentation processes.

Sediment data in the Lower Mekong Basin (LMB) has some spatial and temporal gaps. The tributaries of the LMB have a diluting effect on the sediment concentration of the mainstream. This fact, together with the lack of a distinctive downstream increase in sediment load, suggests that the sediment load contribution from the LMB tributaries may be more limited than the contribution from the Lancang River and that most sediment in the LMB is derived from China. However, the lack of data on the large left bank tributaries in Laos and Cambodia impedes confirmation of that conclusion.

### **Hydropower Development**

A sediment budget for the Mekong River Basin is important for assessing the impact of dams on sediment loads downstream. Potential future issues include reduced sediment loads due to dams, increased sediment loads due to land-use change, and river morphology changes. Eleven hydropower dams on the Mekong River mainstream are under consideration. We recognize the consequences of hydropower development on sediments loads and river morphology, and how dams can be best designed to prevent and mitigate negative effects.

### **Geomorphological Tools (Modeling)**

We need tools that can be used to predict the consequences of land-use change, water resources development, and climate change on sediment loads in rivers and river morphology. Our laboratory is currently developing a simulation model that can estimate sediment transport in the entire Mekong River Basin.



# INVESTIGATION OF CITY PLANNING AT HO CHI MINH CITY, VIETNAM

December 23-30, 2008

Reported by Shinichi KITAMURA, Isao OYAMA,  
Nguyen Hong Phuong, Phung My Hanh and Masamichi SUZUKI

The purpose of the investigation of Vietnamese Hochiminh City and environs is the grasp of the environment at metropolitan, farm village and traditional waterside, and information gatherings of city planning. We think that we want to investigate urban development in this region in the future. Therefore, requesting the cooperation of the investigation from the university in local, and searching for the possibility of the investigation execution was especially important purposes.

First of all, we visited municipal officials, and inspected the schedule ground of urban development (Figure 1 and 7). The population of Hochiminh City is 8,000,000 (Inside in municipal district). The living population is 5,500,000, and the migrant worker is 2,500,000. A population increase in recent years is 200,000/year.

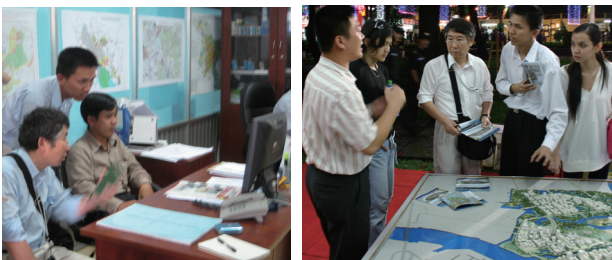


Figure 1. Hearing investigation in Planning Information Center of development of Urban Planning and Architecture, Hochiminh City. (Right side: in the place of opening to public of the city planning.)



Figure 2. State of residential housing area and road traffic

Therefore, the lack of a dwelling and a traffic infrastructure that catches a population increase is a problem (Figure 2). The government is suppressing the car possession by raising an acquisition tax rate of the car to 200%.

Municipal officials are planning the urban renewal to accept a population increase. The Saigon River opposite bank district in Figure 3-② is a top priority district. Redevelopment plans are other ③-⑤. However, the redevelopment far from the center of a city doesn't go well because the investor withdrew. Not a public tax but the private capital executes the redevelopment. The communal facilities maintenance such as roads also relies on private development not public works but almost. The administration (municipal officials and national administration) wants to win the understanding of the residents to the city master plan. The resident in the redevelopment district cannot live in the city after it redevelops it by the compensation that they obtain. The government official talked:

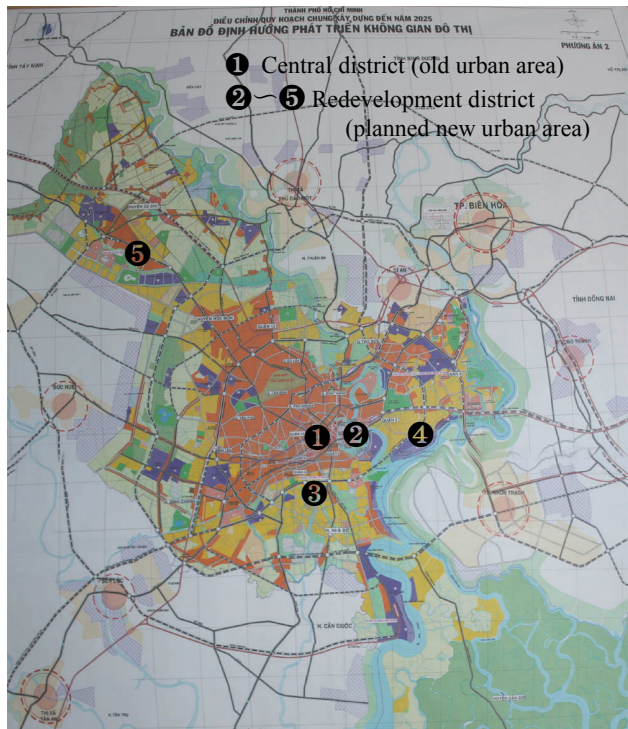


Figure 3. City planning master plan of Hochiminh City in which it aims at 2025 year



Therefore, the maximum problem of a present city planning is citizens' consensus buildings. The land ownership is in the country in Vietnam of the communist state. However, municipal officials want to be avoiding the means of a compulsory removal. This seems to originate in a historical cultural context of Vietnam. The reason for people is that is that a community that is smaller than the nation is valued. Municipal officials did competition concerning ②district, and opened the result to the citizens (Figure 4 and 5). The design is an imitation of modern Europe, and an exciting futuristic city. It considers neither current citizens life nor the climate in Vietnam. It lacks the aspect of a move and old urban update of the resident. Recently, the flood damage of the low ground farm village happens frequently because of urban development and global warming. The redevelopment district was planned to the swale, became a problem with new flood control measures, and began to be examined by the specialist from Germany. The speed of an urban population increase is fast, and urban development cannot correspond. The population of this redevelopment district is 300,000 people and has



Figure 4. Current state of redevelopment district in Saigon River opposite bank.



Figure 5. Redevelopment plan in Saigon River opposite bank

only 1 or 2 year for the increasing population.

We visited the Ham dean at the Vietnam National University and the Ha departmental dean at the University of Architecture of Hochiminh City (Figure 6). We obtained the answer of cooperating from both to the surveillance study. University of Architecture has the lecture of the citizenry participation. This program is executed in cooperation with the university in Germany. They said that there is a possibility of the exchange by the laboratory and the department.

Professor Ha described the problem of the city planning of Hochiminh as follows. I think that I should think about the city planning in consideration of a Vietnamese mind and a historical context. Do not copy the foreign country. Oneself should invent it. Especially, the technology of the advanced country might be not suitable for Vietnam. For instance, a Vietnamese custom is to buy fresh food every day. Therefore, the suburban shopping center failed. A peculiar feature to Vietnam is not to use the bus by the citizens either.

Vietnam's agriculture is still wholesome, and food circulates abundantly. The citizens are not economically affluent. However, a lot of people divide work, and it is possible to live even by a little income. They have a lot of free time. We felt the necessity for adjusting the life of such the citizens whom Japan had lost and the form of this city of future.

The government clearance is necessary to execute our social investigation. The difficulty exists. We want to work hard to the research.



Figure 6. At the Vietnam National University and the Ministry of Construction University of Architecture of Hochiminh City.



Figure 7. Hearing investigation in district where redevelopment is planned

# FIELD SURVEY IN THE PHYTOREMEDIATION SITE AT PAKCHONG IN THAILAND FOR ANALYSIS OF DYNAMICS IN MICROBIAL COMMUNITY IN THE PHYTOREMEDIATION FIELD

Reported by Kazuhiro MORI

## Field trip schedule

- January 19 Transfer from Narita Tokyo to Bangkok  
20 Field survey in the phytoremediation site at Pakchong  
Research discussion with cooperating researcher Dr. Nipa of Khon Kaen University at Asian Institute of Technology (AIT)  
21 Transfer from Bangkok to Narita Tokyo

## Outcome report

### 1. Background and Field survey

Phytoremediation is a plants-using environmental cleaning techniques applicable to organic and inorganic pollutants in the soil and water. The typical functions of the plants in the phytoremediation system are summarized to the absorption/adsorption and accumulation of inorganic matters. The one more important mechanism of phytoremediation could be the biodegradation or bioconversion of pollutants by rhizo-microorganisms. The applicability of phytoremediation techniques against not only heavy metals and nutrients but also organic pollutants including hydrocarbons of aromatics and aliphatic compounds in the petroleum or agricultural chemicals has been revealed. But the dynamic response of microbial community in the rhizosphere to the environmental control of phytoremediation system is not studied well. And the ecological responses of rhizo-bacterial communities against such chemical loading are also not clear. Such detailed information about the microorganisms in the plantation systems would be necessary to develop the cleaning performance of phytoremediation technique.

In this study we elucidated the dynamics of microbial community in the polluted soil of phytoremediation field. In this studying term, we analyzed the transition of microbial community in the target polluted site through phytoremediation treatment. Before detail analysis of microbial community of remediation site, a field survey of phytoremediation site in Pakchong, Thailand polluted by VOCs were performed from 19 to 20 2009. After analysis of the soils in the plant cultivation area, sampling of soil were carried out.



Sampling at phytoremediation field

### 2. Dynamics of microbial community through phytoremediation

The soil quality analysis data showed a successful performance of this phytoremediation treatment with effective removal of VOC contaminants and production of CO<sub>2</sub> metabolite. We analyzed the microbial communities in the soil sample of initial, 7 months treated and 12 months treated site (surveyed this time).

After optimizing the conditions of DNA extraction and PCR for microbial community analysis, we constructed the 16S rRNA gene DNA library of target field soil. The analysis of 16S rRNA gene sequences of the representative sample of each classified groups showed their phylogenetic affiliation data. The initial samples belonged to 10 phylum groups and 10 order groups. The 7 months treated samples belonged to 9-12 phylum groups and 13-16 order groups, and after one year, the samples belonged to 15-16 phylum groups and 19-21 order groups. The bio-diversity analysis using Shannon index indicated that the microbial diversity in the rhizosphere increased through the

phytoremediation. The higher bacterial numbers were also detected in the planted soil ( $10^{4-5}$  copies-*rpo B* /g-soil) rather than control site without plantation ( $10^{2-3}$  copies-*rpo B* /g-soil). The number of aromatic compounds degrading gene also analyzed. Degrading genes (protocatechuate 3,4 dioxygenase gene) of  $10^{4-5}$  copies/g-soil measured by our primer set were detected in the planted site in spite of detected number of  $10^{3-4}$  copies/g-soil in the control site.

As previously stated, the results indicate that plants stimulate the bio-activities in the rhizosphere and especially aromatic compound degrading activities. As a future research subject, the mechanisms of this acceleration of microbial activities by plantation and interaction between plants and microorganisms have to be elucidated to develop the cleaning potential of phytoremediation.



# INSTALLATION OF BANK EROSION MONITORING SYSTEMS IN THE MEKONG RIVER

February 24-March 6, 2009, at Vientiane, Lao PDR

Reported by Naoki MIYAZAWA

I visited Vientiane, Lao PDR, from February 24 to March 6, 2009, for installation of a bank erosion monitoring systems in the vegetated site of the Mekong River, with financial support from the Global Centers of Excellence (COE) Program of the University of Yamanashi (Evolution of Research and Education on Integrated River Basin Management in the Asian Region). Here, I introduce our activities on bank erosion problems in the Mekong River.

## Objectives

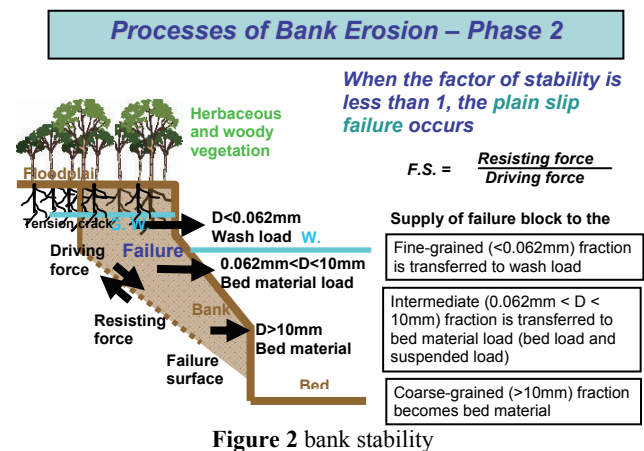
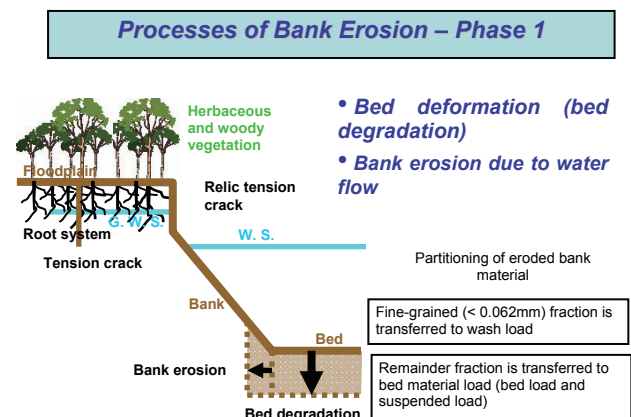
Bank erosion processes represent an important factor in driving planform change, meandering development, and channel width adjustments in alluvial rivers. Bank erosion is also a significant river management problem because it is responsible for land loss, damage to structures adjacent to the river channel, delivery of excessive volumes of sediment to downstream reaches, and alteration in the relationship between river stage and groundwater surface beneath the floodplain.

Bank retreat results from a complex combination of processes of fluvial erosion (Fig. 1) and mechanisms of mass failure (Fig. 2). Many aspects of bank erosion and instability are still not well understood because of difficulties associated with monitoring the parameters involved. This study aims to develop a bank erosion model for analysis of the processes of bank erosion and its cause.

## Bank Erosion Monitoring System

The objective of these activities is to understand the processes of bank erosion. First, I installed monitoring instruments at the vegetated site (Fig. 3). The monitoring site is located on the left bank of the Mekong River in the Vientiane Capital (Ban Nahai, Km1554), at the outer bank of a bend 5km upstream of the Nong Khai water level gauging station. I have already established a monitoring station (Fig. 4) at a bare site near the new monitoring site, with the financial support of the 21<sup>st</sup> Century COE Program of the University of Yamanashi (Research and Education on Integrated River Basin Management in the Asian Monsoon

Region). I have acquired hydrologic and morphological monitoring data since February 2008. Second, I set the benchmarks and measure their 3D positions using a StarFire GPS receiver (NAVCOM). I then surveyed the cross-profiling across the existing site and the new site by using a total station (Sokkia). This study is conducted in collaboration with the Department of Public Works on Waterway (DPW), Ministry of Public Works and Transport (MPWT), Lao PDR. This department is responsible for maintenance of monitoring stations, management of monitoring equipments, and collection of data.



The monitoring instruments are three pressure transducer tensiometers (UMS), one piezometer (Campbell Science), one soil moisture sensor

(Decagon Devices), one rain gauge (Campbell Science), a data logger (Campbell Science), a solar panel, and many erosion pins for measuring negative pore water pressure (water tension), soil temperature, groundwater elevation, soil moisture content, rainfall rate, and erosion depth.

Similar bank erosion monitoring stations have already been set up on the bank of the Sieve River, Tuscany, Italy, by the University of Florence and on the bank of Goodwin Creek, Mississippi, USA, by the United States Department of Agriculture-Agricultural Research Service (USDA-ARS) National Sedimentation Laboratory.

### Sketch of the monitored reach

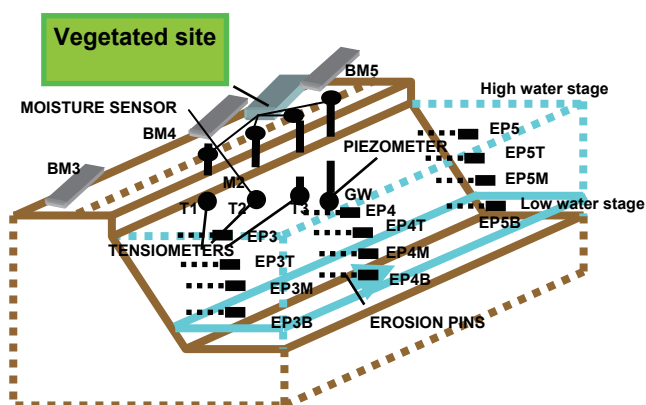


Figure 3 monitoring station (vegetated site)

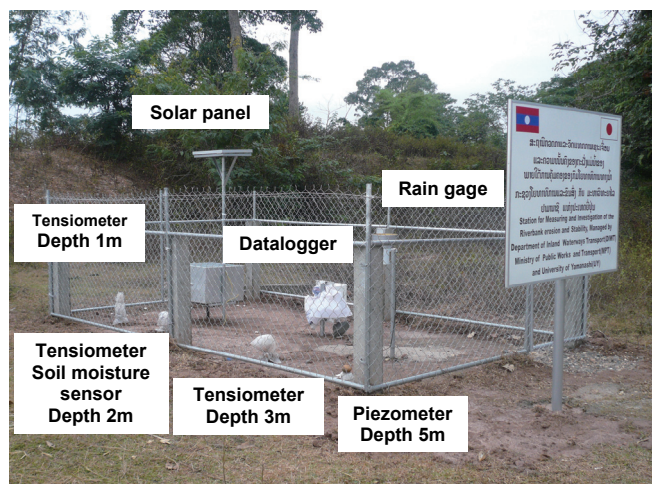


Figure 4 monitoring station (bare site)

### Significance of Riparian Vegetation

The impact of riparian vegetation on bank stability is divided into mechanical effects and hydrologic effects, with further subdivision into stabilizing and destabilizing effects. Riparian vegetation increases bank stability by both soil reinforcement due to root system (mechanical effect) and decreased soil moisture content due to canopy interception and evapotranspiration (hydrologic effect). However, vegetation decreases

bank stability by increased soil moisture content near the ground surface, due to increased soil infiltration capacity during and after rainfall events (hydrologic effect) and increased surcharge of trees (mechanical effect). Previous studies focused mainly on estimating the mechanical benefit of riparian vegetation. However, studies on quantifying the hydrological effect of riparian vegetation and on the balance between stabilizing and destabilizing effects under different scenarios are very few. Thus, it is important to quantify the hydrologic and mechanical effects of different vegetation species on bank stability and to clarify the role of vegetation in bank stability.

### Why the Mekong River?

Determining a sediment budget for the Mekong River Basin is important for assessing the impact of dams on sediment loads downstream. Existing sediment issues in the Lower Mekong Basin are bank erosion, shifting islands (loss of land, national territory), and aggradations in the shipping channels and Tonle Sap lake mouth. Potential future issues are reduced sediment loads due to dams, increased sediment loads due to land-use change, and river morphology changes. Eleven hydropower dams on the Mekong River mainstream are under consideration. Two dam cascades are planned for the bedrock control reaches, with alluvial reaches in between.

Dams, land-use change, and climate change will cause changes in discharge, sediment loads, and river morphology. To assess their impact, it is necessary to combine tools with different scales, scopes, and sciences; morphodynamic models (e.g., flow hydraulics model, sediment transport model, and bank erosion model), 1D modeling, then 2D or 3D modeling; scenario design; climate models linked to hydrological modeling; and catchment-scale sediment models.

### Following Studies

We will continue to develop bank erosion modeling based on field monitoring data. To do so, it is necessary to consider the following points.

- (1) Measuring the in situ shear strength of a bank by using the borehole shear test (BST).
- (2) Manufacturing a device for measuring the in situ tensile strength of roots
- (3) Measuring root diameter, direction, tensile strength, and density of each vegetation species.
- (4) Developing an equation for estimating soil strength increments due to the root system. Pollen has developed another root-reinforcement model considering both the pullout force and breaking force of roots [Pollen, N.: *Catena*, 69, 2007].

# THE INTERNATIONAL SYMPOSIUM ON PRESERVATION AND DEVELOPMENT OF GREAT MEKONG SUB-REGION AND INTERNATIONAL SUPPORT

April 9, 2009 at JSCE lecture hall

Reported by Hiroshi ISHIDAIRA

The International Symposium on Preservation and Development of Great Mekong Sub-region and International Support was held at Japan Society of Civil Engineers (JSCE) lecture hall on 9 April, 2009. The symposium was held by Asian Civil Engineering Coordinating Council (ACECC) committee of JSCE, hosted by JSCE and ACECC, co-hosted by International Centre for Water Hazard and Risk Management (ICHARM) and GCOE of University of Yamanashi "Evolution of Research and Education on Integrated River Basin Management in Asia Region".

The Mekong basin has world's foremost biological diversity and cultural heritage, whereas continuing the international support of social infrastructure, educational infrastructure maintenance, and the overseas investment foresaw economical growth, grope for viable development harmonized with international support / overseas investment. The symposium sponsored by JSCE and ACECC was aimed at deepening of understanding about the way of international cooperation on practical use / management of the river basin through lecture and discussion such as environment / culture maintenance, basin development, human resources development, the disaster prevention.

The symposium began by opening speech of JSCE president Hideo Kayahara (at the time of symposium) and chairperson of ACECC committee Kenichi Horikoshi. The former president of Hokkaido University (the former JSCE president) Norihito Tambo preached the uneven distribution of world water resources and current crisis situation, the necessity of the water use system controlled energy and resources consumption by the special lecture titled "World water resources". Subsequently, in three sessions titled "Capacity building and international support", "World cultural heritage maintenance and the international support of the basin", "Basin development, disaster prevention and international support," the lecture was performed by 5 people from the basin countries (Thailand, Laos,

Cambodia, Myanmar) and 5 people from Japan, the discussion was conducted.

In the session on "Capacity building and international support", associate professor Ishidaira on behalf of GCOE of University of Yamanashi introduced the distributed hydrological model for reproduction and prediction of Mekong river flow, the educational program "Virtual Academy" for local practitioner and researcher, the current status and issue of human resources development program for organization in basin countries.

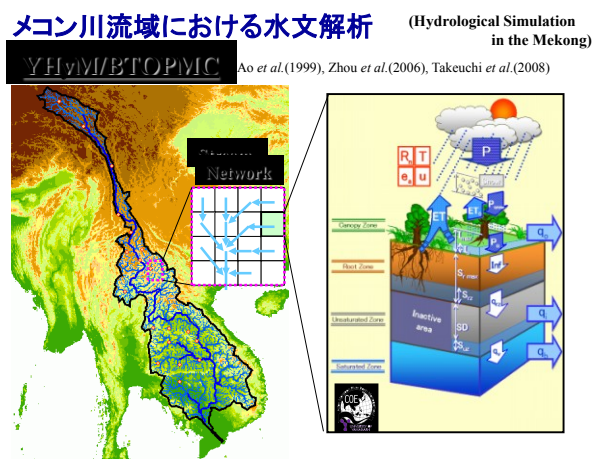


Fig.1 Distributed Hydrological Model for the Mekong

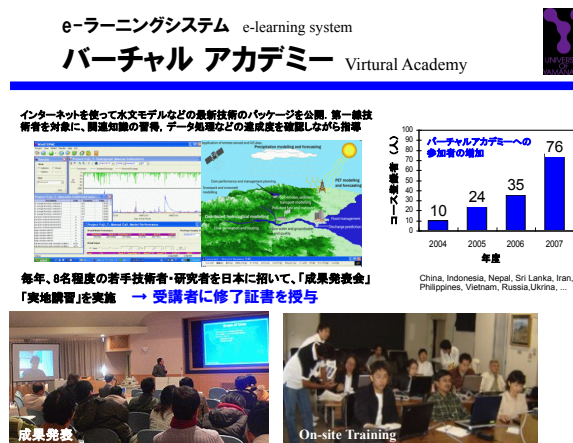


Fig.2 Introduction of Virtual Academy

The symposium attracted about 140 people. They conducted in vigorous discussion on the harmonization of basin development and maintenance, the basin development harmonized with culture and environment, the human resources development and international support for it.

## Agenda

### Morning session (9:00am - 12:05pm)

- Opening ceremony (9:00am - 9:30am)
- Special lecture (9:30am - 10:20am)  
「World water resources」 lecturer:  
Norihito Tambo (the former president of  
Hokkaido University)

### Session I:

*「Water resources of Mekong river basin, capacity building and international support」  
(10:20am - 12:05am)*

- Hiroshi Ishidaira (University of Yamanashi)  
「Water resources assessment of Mekong river basin using a distributed hydrological model」
- Chhouk Horng (Institute of Technology of Cambodia, Cambodia)  
「Water resources and international support」
- Sanda Thant (Mekong Institute, Thai)  
「Capacity building program and international support of Mekong river basin」

### Afternoon session (13:30pm - 17:50pm)

### Session II:

*「World cultural heritage maintenance and international support of Mekong river basin」  
(13:30pm - 14:40pm)*

- Ricardo Favis (UNESCO, Thai)  
「Local transfer of cultural heritage maintenance and management on Mekong river basin」
- Shinobu Yamaguchi  
(Tokyo Institute of Technology)  
「Application of IT for viable development and management of Laos Luang Prabang world heritage town」

【Break】 14:40pm - 14:50pm

### Session III:

*「River basin development, disaster prevention and international support of Mekong river basin」 (14:50pm - 17:20pm)*

- Tadashi Yamada (Chuo University )  
「Outline of Mekong river / Lancang river」
- Pornwilai Pumira (Mekong Institute, Thai)  
「(Title Undecided)」
- Phonpheth Mounnarath  
(National University of Laos, Laos)  
「Currently Status of new social capital infrastructure plan and specialist training of Laos」
- Katsuhito Miyake / Kazuhiko Fukami (ICHARM)  
「Approach of ICHARM to improvement of local disaster prevention on Mekong basin river」

*Summary of the symposium and report of technical committee on ACECC  
(17:20pm - 17:40pm)*

- Osamu Kusakabe  
(Tokyo Institute of Technology)

*Closing ceremony (17:40pm - 17:50pm)*



# The 1<sup>st</sup> and 2<sup>nd</sup> UY-GCOE Meeting 2009

Reported by Kazuhiro Mori

## OUTLINE

### The 1<sup>st</sup> UY-GCOE Meeting 2009

Date: August 24, 2009

Venue: at Media Hall of Media Center in UY  
Kofu Campus

Speakers: with 22 speakers

Participators: with 45 members of UY-GCOE



Fig.1 The 1<sup>st</sup> UY-GCOE Meeting 2009

### The 2<sup>nd</sup> UY-GCOE Meeting 2009

Date: January 29, 2010

Venue: at Media Hall of Media Center in UY  
Kofu Campus

Speakers: with 16 speakers

Participators: with 68 members of UY-GCOE



Fig.2 The 2<sup>nd</sup> UY-GCOE Meeting 2009

The 1st and 2nd UY-GCOE Meeting 2009 were held at Kofu Campus of University of Yamanashi with 50-70 members of UY-GCOE and students. At the 1<sup>st</sup> meeting, 22 members introduced their research achievements and next plans. This meeting was composed of wide and hot topics of hydrology, environmental meteorology, environmental chemistry, waste and wastewater treatment, social medical science. The 2<sup>nd</sup> meeting was also performed with 16 impressive presentation on hydrology, remote sensing, environmental ecology, waste and wastewater treatment, environmental medical science, urban planning. Research activities of interdisciplinary study on medicine and engineering could be shown and this field was one of important topics in the both meeting. Through these two meetings, all the members of UY-GCOE made their presentations and 50 or more parties including GCOE special doctor course students exchanged opinions. The UY-GCOE meetings proved very significant because we could hold the activities and aims of UY-GCOE in common. Future prospects were also discussed with the participants.

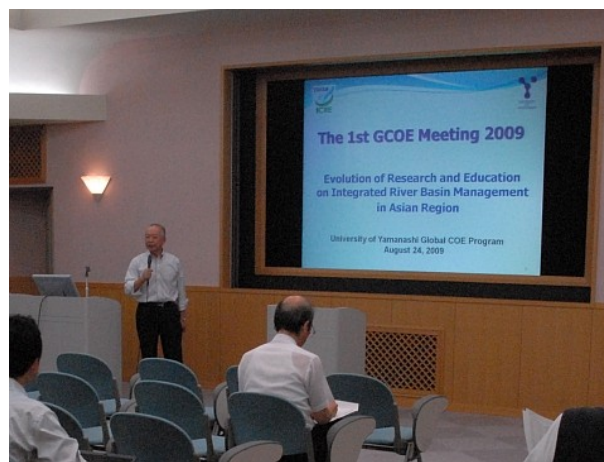


Fig.3 Opening address: Prof. Sunada





**Fig.4** Discussion



**Fig.5** Stand-up party

## **PROGRAM**

### The 1<sup>st</sup> UY-GCOE Meeting 2009

- Opening address: Prof. Kengo Sunada
- Dr. Satoru Oishi
- Dr. Hiroshi Ishidaira
- Dr. Yutaka Ichikawa
- Dr. Tetsuya Sano
- break
- Dr. Silva Galbokke Hewage Amila Chinthaka
- Prof. Futaba Kazama
- Dr. Kei Nishida
- Prof. Hidehiro Kaneko
- break
- Dr. Eiji Haramoto
- Dr. Ao Jing
- Prof. Kimiaki Hirayama
- Dr. Kazuhiro Mori
- Dr. Luo Zhaohui
- break
- Dr. Toshio Shimokawa
- Dr. Naoki Kondo
- Mr. Tran Van Ty
- Mr. Sun Wenchao
- Ms. Khanitchaidecha Wilawan
- break
- Mr. Rabin Malla
- Mr. Satoru Ochiai
- Closing address: Prof. Yasushi Sakamoto

### The 2<sup>nd</sup> UY-GCOE Meeting 2009

- Opening address: Prof. Kengo Sunada
- Prof. Yasushi Sakamoto
- Prof. Jun Arita
- break
- Prof. Atsuhito Nakao
- Dr. Naoki Miyazawa
- Dr. Hiroshi Kobayashi
- break
- Dr. Tomoya Iwata
- Dr. Keiko Hirayama
- Dr. Yasuhiro Tanaka
- Dr. Tadashi Toyama
- Prof. Shinichi Kitamura
- break
- Dr. Takashi Nakamura
- Dr. Kenichi Osaka
- Prof. Masanori Kitamura
- Dr. Chapagain Kumar Saroj
- Closing address: Prof. Hidehiro Kaneko

# REPORT OF INTERNATIONAL CONFERENCE ON WATER AND GREEN, 2ND COMMITTEE MEETING, WATER CYCLE AND LIVING

Futaba KAZAMA<sup>1</sup>, Kengo SUNADA<sup>2</sup> and Satoru OISHI<sup>3</sup>

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This committee Meeting is part of the Global Center Of Excellence Program at the University of Yamanashi called “Evolution of Research and Education on Integrated River Basin Management in the Asian Region”. In this program we, together with local students, are seeking ways to solve water problems in the Asian region through academic research which also serves to develop the practical problem-solving skills of these students.

## 1. INTRODUCTION

Citizens’ attitude surveys conducted in Yamanashi Prefecture and other sources show a high valuation of the region of Yamanashi Prefecture as an area of scenic beauty, or at least a strong desire to make it so. Through this symposium, we reaffirm and explore ways to sustain the abundant natural environment of our homeland as well as the wisdom of our ancestors gained through their close interactions with nature for the next generation. Although traditional knowledge regarding the natural environment is very important, if we reconsider “nature” in a somewhat rational way, we realize that it undergoes change. Society, too, changes with changes in lifestyle. Thus, in order to protect the environment of our homeland and to sustain it for the next generation, we first need to learn about the current state of water, vegetation, and even society. Furthermore, to enable us to safely coexist with nature, it is necessary to determine what types of changes should be monitored, and this knowledge can only be gained through academic research.

This committee Meeting is part of the Global Center Of Excellence Program at the University of Yamanashi called “Evolution of Research and Education on Integrated River Basin Management in the Asian Region”. In this program we, together with local students, are seeking ways to solve water problems in the Asian region through academic research which also serves to develop the practical problem-solving skills of these students. On this occasion, we organized two sessions focusing on the water cycle in which the management of river basins is considered. From the human perspective, the water cycle providing a sustainable source of water for use and in some cases, the cause of natural disasters, such as flooding. The goal of these sessions was to present the current state of academic research that can benefit the relationship between the water cycle and our lives to the citizens of the prefecture.



**Fig. 1** Opening address (Dr. Yo Ito, president of Yamanashi Prefectural University)



**Fig. 2** Keynote speech (Prof. Kengo Sunada)

## 2. SESSION

### (1) Session 1

Session 1, “New Developments in River Basin Disaster Prevention”, introduced research conducted with the goal of protecting people from flood disasters through the improved use of radar in flood forecasting and more precise methods of flood forecast simulation. The effectiveness of the X-band dual polarimetric radar installed at the University of Yamanashi was introduced. Using this latest equipment together with planned escape ways and coping methods for flood disasters should reduce damage significantly, even in cases of sudden flooding.

### (2) Session 2

In Session 2, “Contribution to the Water Environment of Asia”, attitude surveys of people living in river basins conducted to improve local participation in river environment, measurement of

stable isotopes ratio in groundwater to identify groundwater recharge sources, and other researches were presented. Groundwater problems of growing concern in Asian countries were presented, and the presenters stressed the importance of academic investigative research aimed at resolving groundwater-related issues.



**Fig. 3** Session 1

## 3. CONCLUSION

Since this committee meeting was undertaken in English and most of the participants were students and professors of the University of Yamanashi and the Yamanashi Prefectural University, we strongly felt the desire to share the results of our research with more people in the prefecture. However, it was obvious from the young students’ lively exchange of opinions that the research carried out in Yamanashi should also greatly benefit people in other Asian countries.

**ACKNOWLEDGMENT:** The G-COE group gives a deep thanks to the organizing committee of the international conference on water and green. Especially, we appreciated Dr. Yo Ito, president of Yamanashi Prefectural University, to give us an opportunity to held such an important meeting

# ACTIVITY REPORT

## - Virtual Academy 2009 –

### Main Program

G.H.A.C. Silva

International Research Center for River Basin Environment,  
Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi,  
4-3-11, Takeda, Kofu, Yamanashi 400-8511, Japan

The Virtual Academy (VA) of the University of Yamanashi, Center of Excellence was first established in year 2004. Over the years the VA has been a main project of COE program to promote collaboration in hydrological model development, application and assessment, and to encourage the international exchange of information and expertise with all the participants. The first five sessions of the VA were successfully completed with nearly 100 applicants from 11 countries participated in the on-line course. In this 6<sup>th</sup> session, The VA2009 course consists of seven main lessons and the participants were guided through internet in a well organized structured program. All the reports submitted by participants were evaluated by VA management team and feedback conveyed to the participants to further enhancement of their knowledge. Appropriate modifications for VA2010 program will be incorporated considering the comments and suggestions provided by participants of the VA2009.

**Key Words:** *E-learning, COE, BTOPMC, Virtual Academy, LMS*

## 1. OVERVIEW

The Virtual Academy (VA) by the University of Yamanashi Center of Excellence program (UY-COE) was established in year 2004, which is available at any time throughout the year by using E-learning technology. The sixth phase of VA and first under Global COE program was concluded in the fiscal year of 2009 with the main VA session of which was offered from the 1<sup>st</sup> July, 2009 till 18<sup>th</sup> October, 2009 and concluded on 31<sup>st</sup> January, 2010 with the follow up activities and offering the certificates for completed participants.

The course contents in VA2009 was hydrological modeling for water resources management, which is named as YHyM/BTOPMC 2009, and started with 33 applicants registered from 8 different countries (China, Nepal, Pakistan, Philippine, Russia, Sri Lanka, Thailand and Vietnam).

### 1.1 Objective of Virtual Academy

The objective of the VA is to encourage international collaboration in research and the exchange of information and expertise in relation to river basin management. Registration in the VA will give participants access to hydrological models, and the theoretical and practical expertise necessary to properly use them for their own local applications, through a structured curriculum offered via internet (**Fig.1**). Here, an advanced E-learning technology based on Learning Management System (LMS) has been used. All of lesson contents, scores, reports, Q&A and bulletin board are managed and displayed to participants and instructors through LMS.

VA Participants will be able to consult with experts from the COE, regarding the models and other technology being offered, and the underlying theory. Successful completion of the VA curriculum will be recognized by a certificate awarded by the University of Yamanashi.



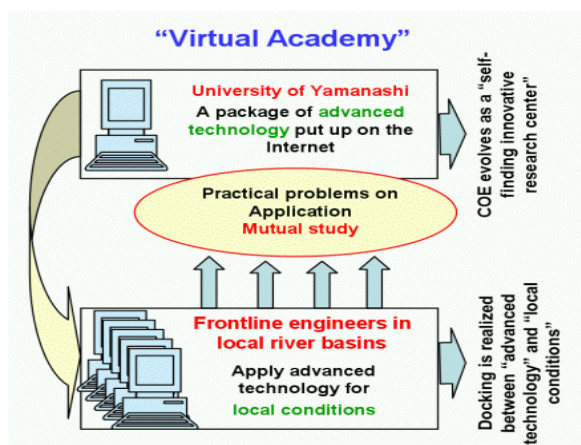


Fig. 1 Structure of Virtual Academy

## 1.2 Target Audience of the Virtual Academy

The Virtual Academy is intended for use by engineers and hydrologists interested in developing expertise in the application of hydrological modeling tools. It is intended for use by personnel who are affiliated with an academic or government institution, consultancy or company.

## 1.3 Management/Supporting Member of VA2009

Table 1 illustrates management staff of Virtual Academy 2009.

Table 1 VA2009 Staff (\*Supporting Staff)

Role	Member	Note
Advisors	Satoru OISHI Hiroshi ISHIDAIRA	
Content Managers	Amila SILVA *Khada Nanda DULAL	Dr. Dulal is attached to CREEW, Nepal.
Instructors	Amila SILVA *Khada Nanda DULAL	
Software Developers	Hiroshi ISHIDAIRA *Jun MAGOME	Dr. Magome is attached to ICHARM, Japan.
IT Managers	Satoru OISHI *Jun MAGOME	
Administrative and Technical assistants	Maki ISHIHARA Mariko KATOU	

## 2. CONTENTS MANAGEMENT 2009

The VA2009 basically focused on distributed hydrological modeling/ simulation and the catchment discharge prediction using the YHyM/BTOPMC. The course describes theory underlying BTOPMC model as well as all necessary

steps to apply the distributed hydrological model for participant's target river basin. The curriculum provides all the necessary expertise for setting up the YHyM/BTOPMC model, executing it, and interpreting the model output, using the Fujikawa basin as an example application. Table 2 illustrates the overall lesson contents in VA2009.

Table 2 List of Lessons in VA2009 (YHyM/BTOPMC 2009)

### Lesson Number and Title

Introduction Important Notice  
 Lesson 1. What's YHyM/BTOPMC?  
 Lesson 2. DEM processing  
 Lesson 3. Precipitation & Discharge data  
 Lesson 4. Potential Evapotranspiration  
 Lesson 5. Snow and Soil freezing  
 Lesson 6. Parameterization  
 Lesson 7. Running YHyM  
 Appendix

## 3. COURSE MANAGEMENT

The course consists of 7 major lessons and the participants were supposed to submit a report at the end of each lesson based on an assignment given by the VA staff. The reports and the used data are evaluated by the VA staff and the participants are allowed to proceed to the next lesson (or resubmit the report with corrections) based on their performances.

Fig.2 shows the lesson completion of the VA2009 participants at different stages. 26 participants proceeded to Lesson-1 from the total registered 33 participants. Finally, 15 participants (Fig.3) completed the Final-Lesson and fulfilled all the stipulated requirements and hence recognized by a participation certificate awarded by the University of Yamanashi GCOE (Global Center of Excellence) program. The initial drop out has been a concern and VA management had taken all possible measures to encourage participants to complete the program. In the later part of the program (after lesson 3) only two participants out of 17 could not complete the rest of the lessons. The VA management will take appropriate actions in future VA programs to further minimize drop out number.

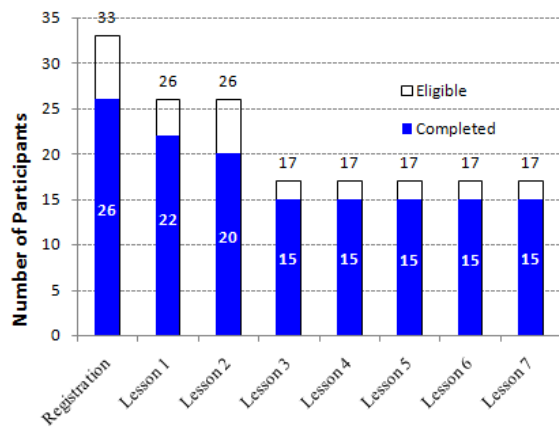


Fig.2 Lesson Completion of Participants



Fig.3 Participants completed VA2009 programme

#### 4. SUMMARY

The VA2009 was commenced with 33 participants from 8 countries. Fifteen (15) participants completed all the lesson requirements

and awarded the VA2009 certificate after successful completion of the program.

Following facts are highlighted as the most important suggestions that should be considered in future VA programs. These are based on feedbacks from VA participants and VA staffs.

- 1) Theoretical Content about the hydrological model should be improved in all lessons.
- 2) More improvement in software is needed as still there are some bugs that hinder the effectiveness of the program.
- 3) Prompt support/instruction is vital to convey the clarifications/answers to respective participants.

#### Appendix: Participants' Feedbacks

##### (1) E-learning Course Contents

1. The course content is clear, understandable and useful.
2. If lessons are open at once, it is more better for user
3. It is necessary to include the theory of the YHyM in the curriculum of the watershed modeling courses.

##### (2) Significant ideas through this course

1. Experience in running a hydrological model; the importance of setting correct parameter values to get better results.
2. Use of different parameters as spatial representation and using the values of each parameter to get actual output.
3. WinBTOPMC interface is user-friendly and easy to understand

##### (3) Strengths of VA program

1. The course is well structured and easy to understand.
2. Detailed principle and detailed operational manual are available.
3. Adequate time is given to participants to absorb and fully understand the lessons.

##### (4) Management/Instruction/Support

1. The communication between participant and the instructor (Q&A) is efficient and useful
2. The lesson reports were evaluated and comments were cited to enhance the understanding.
3. However, prompt responses are expected from BTOPMC development team for timely submission of the lesson reports.





# ACTIVITY REPORT

## - Virtual Academy 2009 –

### Intensive program

S. K. Chapagain<sup>1</sup> and G.H.A.C. Silva<sup>2</sup>

<sup>1</sup>Center of Research for Environment, Energy and Water  
P.O. Box 25563, Kathmandu, Nepal

<sup>2</sup>International Research Center for River Basin Environment,  
Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi,  
4-3-11, Takeda, Kofu, Yamanashi 400-8511, Japan

## 1. Introduction

VA2009 was opened as an “intensive lecture” from March 11, 2010 to March 20, 2010 in Kathmandu, Nepal. The course syllabus of VA2009 is as follows:

1. Introduction to Hydrological Modeling
2. Introduction of BTOPMC model
3. Introduction to Modules of BTOPMC
  - a. Topographic module
  - b. Precipitation module
  - c. Evapotranspiration module
  - d. Snow Accumulation and Snow melt module
4. Data formatting and preparation technique
5. Demonstration of preprocessing tools
6. Project work

## 2. Study area

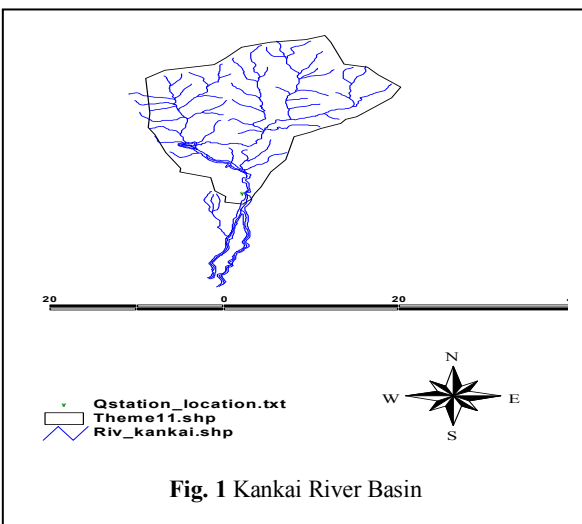


Fig. 1 Kankai River Basin

Kankai river basin situated in Mechi zone was selected as the target basin of VA2009, and sample data for this basin were provided for participants.

## 3. Methodology

After preparation of DEM data for YHyM/BTOPMC model, DEM pre-processing was performed for Kankai river basin. Pre-processor helps in identifying the largest basin as a delineated model basin, which can further be sub-divided to improve the predictive performance of the model. Rainfall, discharge and temperature data also acquired for the same basin. Soil and Land use data were obtained from global datasets from open source data bases. Evapotranspiration module was used for the computation of daily evaporation. Different file formats were utilized for the data preparation as given below; i) ESRI ASCII Raster-File format was used for DEM data and Land cover data and ii) YHyM/BTOPMC ASCII Volume- File Format was used for NDVI, mean daily temperature, diurnal temperature range, actual vapor pressure, wind speed and the calculated extraterrestrial radiation and daylight data. Climatic data were acquired from CRU dataset which is available as open source data base. Finally, parameterization was performed with manual calibration and validation process from which the river discharge outputs were compared with observations.

## 4. Management team

Table 1: Management Team

Role	Member
Content Manager	Bijay Pokharel
Instructor	Bijay Pokharel
Advisors	Satoru OISHI
	Hiroshi ISHIDAIRA
	Jun MAGOME
Administrative work	Maki ISHIHARA
	Mariko KATOU

## 5. Participants

Target audience of VA2009 comprises hydrologists, technicians and engineers interested in water resources management and working in government institutions, academic institutions, private company or consultancy. In total 06 participants completed VA2009 intensive program.

Table 2: List of Participants

Name	Affiliation
Yam Prasad Dhital	Kathmandu University
Niraj Shankar Pradhananga	Department of Hydrology and Meteorology, Nepal
Jeeban Panthi	Trbhuwan University
Tripti Kharel	CREEW
Sudha Shrestha	Kathmandu University
Netra Jit Khadka	Tribhuwan University



Fig. 2 Introductory session



Fig. 3 Section of participants

## 6. Conclusion

The Virtual Academy program focuses on discharge prediction of a basin using the YHyM/BTOPMC distributed hydrological model. The BTOPMC model is a valuable tool for river basin management and flood prediction applications. With this training, the participants were able to understand the concept of hydrological model very well .

# THE SEVENTH INTERNATIONAL SYMPOSIUM ON SOUTHEAST ASIAN WATER ENVIRONMENT

28-30 October, 2009 at AITCC, Bangkok, Thailand  
Reported by G.H.A.C. Silva

The seventh International Symposium on Southeast Asian Water Environment, organized jointly by Integrated Research System for Sustainability Science (IR3S), Department of Urban Engineering (DUE), Southeast Asian Center for Water Environment Technology (SACWET) of the University of Tokyo and Asian Institute of Technology (AIT); and it was held between 28-30 October, 2009 at Asian Institute of Technology Conference Center (AITCC), Bangkok, Thailand.

Global Center of Excellence Program & International Research Center for River Basin Environment, University of Yamanashi (UY-GCOE & ICRE) was one of the co-organizers of the symposium along with Research Center for Water Environment Technology (RECWET), United Nations University (UNU), Institution for Global Environmental Strategies (IGES), Environmental and Hazardous Waste Management-Chiang Mai University (EHWM-CMU) and the Alliance for Global Sustainability.

The purpose of the symposium was to provide a forum for discussion and exchange of ideas among researchers/practitioners in Environment Technology and Management and related areas particularly from Asia-Pacific countries, Japan and other parts of the globe. It is also expected that through the Symposium, a strong network and partnership with active local agents would be established, and researchers in Southeast Asia will be able to learn more from the experts of other countries to protect the environment of the region. This year, there were more than 200 participants attended the symposium. Eight participants under the leadership of Prof. Kengo Sunada represented UY-GCOE in the symposium.

On the first day (28<sup>th</sup> October), participants enjoyed the excursion to Ecological Sustainable Project along the canals; Agro Tourism at Don Modtanoi Village; Meklong Dam site and floating market shopping in Kanchanaburi Province.

On the second day (29<sup>th</sup> October), the symposium was officially commenced (**Fig. 1**)



**Fig. 1:** Inauguration session

with welcome speeches by Prof. Peter Haddawy from Asian Institute of Technology Thailand and Prof. Hioaki Furumai from the University of Tokyo, Japan. Then there were three keynote speeches. On the first keynote speaker was Prof. Takashi Asano who is an Emeritus Professor, Department of Civil and Environmental Engineering, University of California at Davis, USA and he has delivered an interesting presentation under the title of “To Drink or Not to Drink – A case of Potable Water Reuse”. The second keynote speaker was Prof. Chongrak Poprasert who is from Sirindhorn International Institute of Technology, Thammasat University, Thailand and he has delivered related to a local water-environment issue titled “Emerging Environmental Issues in Thailand with Emphasis on Hazardous Chemicals and Global Warming”. The third keynote speaker was Prof. Ohgaki Shinichiro who is the president of National Institute for Environmental Studies, Japan and he has presented under the title of “Vulnerability of Water Environment and Role of Scientific Monitoring”.

After the coffee break, three parallel special project sessions were conducted under following titles; 1. Emerging issues of water and sanitation in Southeast Asia and Workshop on “Compendium of environmental sanitation systems and technologies”, 2. Water reuse technology in



Fig. 2: Oral Presentation

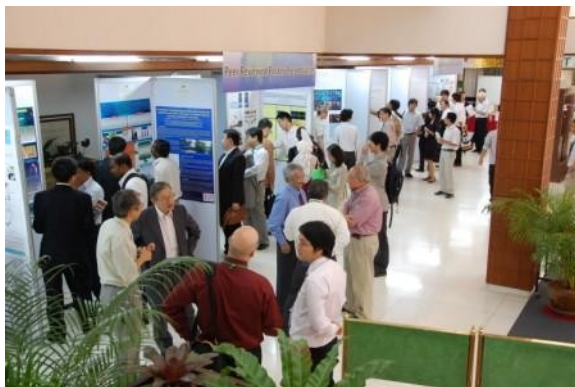


Fig. 3: Poster Presentation

tropical regions and 3. Education for Environmental Leadership Development at 7<sup>th</sup> International Symposium on Southeast Asian Water Environment;

After lunch break, two of four parallel oral presentation sessions converted in the afternoon of the first day of the symposium. The delicious reception dinner was served in the evening during which many senior professors addressed the reception gathering including UY-GCOE leader Prof. Sunada.

Including the sessions convened on the third day (30<sup>th</sup> October) morning, altogether there were eighty-four oral presentations (Fig. 2) and eighteen poster presentations (Fig. 3) that was conducted after lunch of the third day. The oral presentations covered sixteen themes (given below) related to water environment; (*theme/number of presentations*) – Groundwater treatment and remediation (4 including W. Khanitchaidecha from UY-GCOE), Water environment: Monitoring and characterization (4), Wastewater treatment: Membrane technology (4), Evaluation tools (4), Water management business (4), Water environment: Socio-economic aspects (4 including Tran Van Ty from UY-GCOE), Wastewater treatment: Biological aspects (4), Water resources (3 including Vishnu P. Pandey and Qiaoling Li

from UY-GCOE), Water treatment: Membrane technology (4), Water environment: Monitoring and modeling (4 including K. Kakizawa from UY-GCOE), Wastewater treatment: Industrial wastewaters (4), Water treatment: Physico-chemical processes (3), Risk analysis and management (3 including G.H.A.C. Silva from UY-GCOE) and Wastewater treatment: Process Evaluation (3) – The UY-GCOE team actively participated in most of the sessions (Table 1).

Following to all the oral and poster sessions, announcement of the joint three winners of “Award of Asian Young Professional on Water Research” and host institute for the 8<sup>th</sup> Symposium to be held in 2010 were made. One of the three awards received for the oral presentation entitled “DALYs Lost due to Diarrhoea: Household Level Drinking Water Treatment” presented by Ms. N.A. Mollah and this was co-authored by Dr. Kabirul Ahsan Mollah, one of the UY-GCOE team members. The symposium was officially concluded by Prof. C. Visvanthan, on behalf of the host institution for the 7<sup>th</sup> SAWE symposium, followed by announcement that the 8<sup>th</sup> International Symposium on Southeast Asian Water Environment would be held at Phuket Island, south of Thailand in October, 2010 and Prince of Songkla University would be the host institution.

Table 1: The titles of presentations from the group of UY-GCOE

Presenter	Presentation Title
K. Kakizawa	The Influence of Climate Change on the Sediment Transport in the Mekong River Basin.
Qiaoling Li	Variations in Asian-Pacific vegetation activity inferred from satellite data of vegetation index during 1982-2006
Wilawan Khanitchaidecha	Nitrogen removal efficiency on different reactor designs
Vishnu P. Pandey	Vulnerability of freshwater resources in large and medium Nepalese river basins to environmental change
Tran Van Ty	Evaluation of Local Water Situation Using Water Poverty Index: A case Study in the Lower Mekong Basin
G.H.A.C. Silva	Development of Flood Inundation Maps Using HEC Models – A Pilot Study at Upper Gin-River Basin, Sri Lanka –



# National Symposium on Challenges and Opportunities for Sustainable Management of Groundwater Resources of Kathmandu Valley, Nepal

Reported by Futaba KAZAMA

National Symposium on Challenges and Opportunities for Sustainable Management of Groundwater Resources of the Kathmandu Valley, Nepal was held in Kathmandu at the DECC, UWTC on 28 December 2009.

The idea of this National Symposium began with recognition of interests by the Center of Research for Environment Energy and Water (CREEW) and The Small Earth Nepal (SEN). The challenges and opportunities for sustainable management of ground water of the Kathmandu Valley in the coming decades are so huge that appropriate policies and measures require the cooperation of many disciplines.

The organizers, CREEW and SEN-Nepal hope that the symposium do contribute to the discussion on quantitative, qualitative and legislative issues regarding the groundwater of the Kathmandu Valley, and seek appropriate coping measures.

## Objectives:

- To identify quantitative, qualitative and legislative issues of groundwater use in Kathmandu Valley
- To identify remedial measures to improve quality of groundwater in Kathmandu Valley
- To identify groundwater recharge potential and prospects of artificial recharge in Kathmandu Valley

## Organized by:

The Center of Research for Environment Energy and Water (CREEW)  
The Small Earth Nepal (SEN)

## Supported by:

The Kurita Water and Environment Foundation (KWEF)  
ICRE, GCOE, University of Yamanashi





**Program schedule**  
**28th December 2009, Kathmandu, Nepal**

**Master of Ceremony: Ms. Kanchan Shrestha**

8:30	Arrival
8:30-9:00	Registration

**Opening Session**

9:00-9:10	Welcome speech (Mr. Sanjeev Kumar Dhungana, CREEW)	
9:10-9:20	Introduction of the symposium (Ms. Isha Manandhar, SEN)	
9:20-9:35	Prize distribution to the winners of the photography competition on <i>'Groundwater: today's matter, manage it sustainably for better future'</i>	
9:35-10:05	Keynote speeches	1. Dr. Roshan Raj Shrestha (Water for Asian Cities Programme, UN-HABITAT): Rainwater harvesting for groundwater recharge in Kathmandu Valley 2. Dr. Sangam Shrestha (Asian Institute of Technology (AIT), Thailand): Groundwater and climate change: No longer the hidden resource

**Coffee Break (10:05-10:20)**

**Session 1: Presentation (10:20-14:40)**

**Chairs: Dr. Khada Nanda Dulal and Mr. Jagadishwor Karmacharya**

10:20-10:40	Dr. Saroj K. Chapagain (University of Yamanashi, Japan): Application of stable isotopes (D and <sup>18</sup> O) to evaluate groundwater recharge characteristics of Kathmandu Valley	
10:40-11:00	Ms. Pramita Maharjan (Non Governmental Organization Forum, Nepal): Enumerator, mapping and water quality analysis of traditional stone spouts in Kathmandu Metropolitan Area	
11:00-11:20	M. Basanta Adhikari (Pro-Public, Nepal): Regulatory framework on groundwater extraction in Nepal	
11:20-11:40	Mr. Bhoj Raj Panta (Nepal Academy of Science and Technology, Nepal): Groundwater quality in the Kathmandu Valley	
11:40-12:00	Mr. Madhukar Upadhyana (Institute for Social and Environmental Transition): Groundwater sustainability and future food supply	

**Lunch Break (12:00-13:00)**

**Session 2: Presentation (13:00-14:40)**

**Chairs: Mr. Dhiraj Pradhananga and Mr. Sanjeev Kumar Dhungana**

13:00-13:20	Prof. Futaba Kazama (University of Yamanashi, Japan): Research works on groundwater in Kofu, Japan and Kathmandu, Nepal	
13:20-13:40	Dr. Suresh Das Shrestha (Central Department of Geology, TU): Potential for shallow groundwater recharge from rainwater in Kathmandu Valley under the perceived impacts of climate change	
13:40-14:00	Mr. Prakash Amatya (National Steering Committee on Rainwater Harvesting): Policy framework for rainwater harvesting in the urban Nepal	
14:00-14:20	Mr. Naba Raj Shrestha (Department of Irrigation, Nepal): Groundwater status in Kathmandu Valley	

**Coffee Break (14:20-14:50)**

**Panel Discussion on Challenges and Opportunities for the Sustainable Management of Groundwater Resources of Kathmandu Valley (14:50-16:25)**

**Moderator: Dr. Sangam Shrestha; Rapporteurs : Ms. Maneesha Shakya and Mr. Shakti P. C.**

**Panelists:**

Prof. Futaba Kazama, University of Yamanashi, Japan  
Mr. Basanta Adhikari, Pro-Public, Nepal  
Mr. Naba Raj Shrestha Department of Irrigation, Nepal  
Dr. Suresh Das Shrestha Central Department of Geology, TU, Nepal  
Dr. Narayan Upadhyaya, Environmental and Public Health Organization (ENPHO), Nepal  
Mr, Indra Kumar Maharjan, Kathmandu Upatyaka Khanepani Limited (KUKL), Nepal

16:25-16:40 Concluding Remarks: Mr. Dhiraj Pradhananga, SEN

16:40-17:00 Vote of Thanks: Ms. Kanchan Shrestha, SEN

**Closing (17:00)**

# Activity Report on 2009 of X-band Dual-Polarimetric Doppler Radar of University of Yamanashi

Reported by Tetsuya SANO and Satoru OISHI

To observe precipitating phenomena, an important content of water input to river basin, X-band Dual-Polarimetric Doppler Radar was installed in the Kofu Campus of University of Yamanashi (the UYradar) (Fig.1). The observation has been carried out since April, 2009 and the observative area is shown in Fig.2. This report introduces the outline and some studies of the UYradar.



Fig.1 Exterior of the UYradar

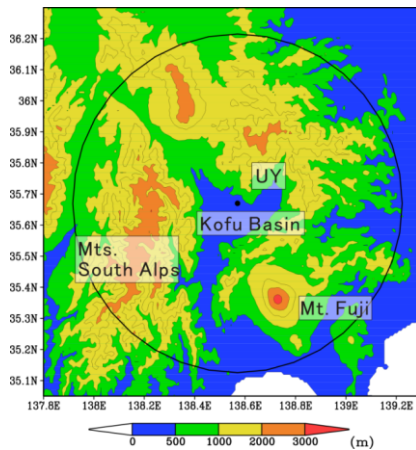


Fig.2 Observative range of the UYradar. Circle indicates the observative area.

Table 1 Main specifications of the UYradar

Transmitting frequency	9720 MHz (3cm wave length)
Type of antenna	Parabola with 2.13 m of a diameter
Antenna gain	42 dB
Transmitting power	200W (H,V)
Transmitting polarization	Horizontal and Vertical Polarizations
Transmitter	Solid state
Width of pulse	1 $\mu$ s(short wave) and 32 $\mu$ s(long wave)
Width of beam	1.2 $^{\circ}$
Pulse repetition frequency	1600 Hz, 2000 Hz (normal)
Maximum observational range	64 km
Resolution of distance	150 m
Observed raw data	Received power(H,V), Raw Doppler velocity, Width of Doppler velocity, Total differential phase and Correlation coefficient
Size of the container	2m $\times$ 2m $\times$ 2m

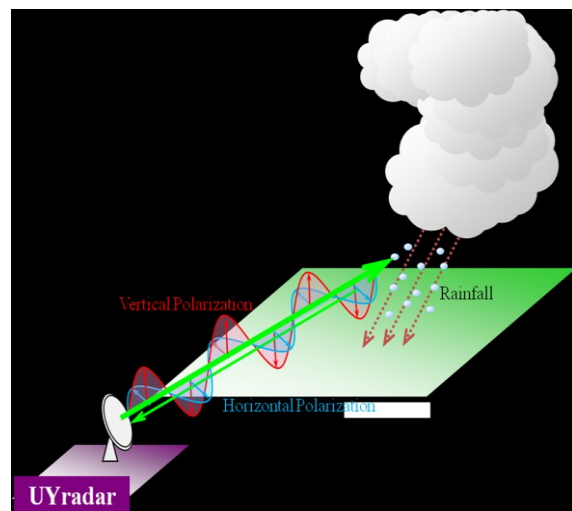


Fig.3 Conceptual image of the observation of the UYradar<sup>1)</sup>.

## 1. Outline of the UYradar

Table 1 shows the specifications of the UYradar. The UYradar is small and light. Furthermore, the operation with economy of electric power becomes possible using solid states for the transmitter.

The characteristic of the UYradar is the transmission and reception of horizontal and vertical

polarizations (Fig.3). The UYradar observes not only the position and intensity of rainfall but also the information associated with shapes of precipitating particles. Then, using the microwave with 3 cm wave length, the spatial resolution for the observation is high.

The UYradar obtains raw data shown in Table 1. The raw data are transformed to the polarimetric

parameters using the  $y\_read$  system. The  $y\_read$  system developed in ICRE is the software analyzing raw data obtained by the UYradar.

The transformations to polarimetric parameters in  $y\_read$  system were referred by Bringi and Chandrasekar<sup>2)</sup> and Doviak and Zrnic<sup>3)</sup>. Created polarimetric parameters are radar reflectivity factor in horizontal polarization ( $Z_H$ ), unfolded Doppler velocity ( $V$ ), width of Doppler velocity ( $W$ ), differential reflectivity ( $Z_{DR}$ ), correlation coefficient ( $\rho_{HV}$ ) and specific differential phase ( $K_{DP}$ ). Latter 3 parameters are obtained using dual polarizations.  $Z_{DR}$  and  $\rho_{HV}$  indicate the information associated with the shapes and irregularity of precipitating particles, respectively.  $K_{DP}$  also indicates the information associated with the shapes of precipitating particles. Because obtained by phase information observed by dual polarizations, it is relatively less affected by rainfall attenuation.  $K_{DP}$  is applied to the correction of rainfall attenuation for  $Z_H$  and  $Z_{DR}$  composed by rain drops<sup>4)5)</sup>.

## 2. Observation of the UYradar

The UYradar performs Plan Positional Indicator (PPI) volume scans with a time interval of 6 minutes. The PPI scans are stepped up from 0.5 to 44.8 degree. The UYradar observes the three-dimensional structure of a precipitating system. The observation started on April, 2009. Because of the continuous observation, the UYradar succeeded to observe many severe and remarkable cases of precipitating phenomena (Table 2).

**Table 2** Remarkable cases observed by UYradar

May 24, 2009	Convective precipitation with lightning
June 16, 2009	Stratiform precipitation with Baiu Front
July 24, 2009	Heavy rainfall at Nanbu
August 2, 2009	Convective precipitation without lightning
September 4, 2009	Convective precipitation with lightning
October 7 and 8, 2009	Heavy rainfall with Typhoon 0918
November 11, 2009	Precipitating system with synoptic low
February 1, 2010	Snowfall system
February 26, 2010	Precipitating system with synoptic low
May 9, 2010	Snowfall system

## 3. Highlights of studies using the UYradar

### (1) Quantitative valuation of rainfall intensity

One of the problems for the observation of meteorological radar is the accuracy of estimation of rainfall intensity and amount. Rainfall intensity ( $R$ ) is derived using the empirical equation suggested by Marshall et al.<sup>6)</sup> as follows,

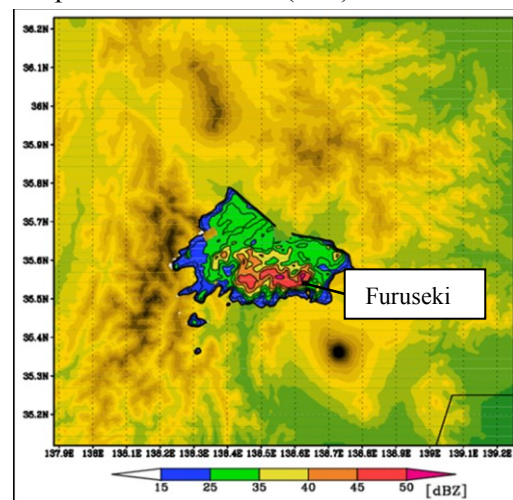
$$Z_H = 200R^{1.6}. \quad (1)$$

Here, the unit of  $Z_H$  is  $\text{mm}^6 \text{m}^{-3}$  and the unit of  $R$  is  $\text{mm h}^{-1}$ . Because  $Z_H$  is the equation with the diameter of a precipitating particle to the power of six and is affected by rainfall attenuation strongly in the observation, the accuracy of  $R$  derived using Eq. (1) is not good. On the other hand,  $K_{DP}$  is affected by rainfall attenuation.  $K_{DP}$  indicates the horizontal orientation of precipitating particles as the difference of phases between dual polarizations<sup>2)</sup>. Pruppacher and Pitter<sup>7)</sup> indicated that the larger a falling rain drop is, the flatter the shape is. Therefore, for rain drops, high  $K_{DP}$  means the occupation of the large size of rain drops. Maki et al.<sup>8)</sup> suggested the empirical equation using  $K_{DP}$  as follow,

$$R = 19.6K_{DP}^{0.825} \quad (2)$$

Here, the unit of  $K_{DP}$  is  $\text{degree km}^{-1}$ . Kato and Maki<sup>9)</sup> obtained the good estimation of rainfall intensity using Eq. (2) for X-band dual-polarimetric radar observation. For the estimation of rainfall intensity using the UY radar, the estimating Equations (1) and (2) improved by Maki and Park<sup>10)</sup>, considering temperature and elevation angles for constant numbers and exponents, are used.

On September 4, 2009, developed precipitating system was observed at about 20 km south from the UY radar (Fig.4). One developed precipitating cell in the precipitating system passed over Furuseki between 1830 Japan Standard Time (JST) and 1920 JST.

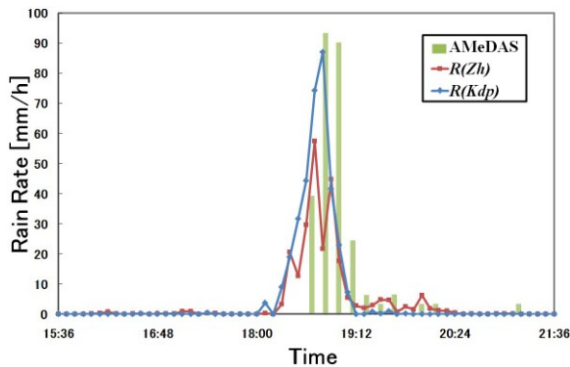


**Fig.4** Horizontal section of corrected  $Z_H$  at 2.25 km ASL on 1830 JST on September 4, 2009<sup>1)</sup>.

Figure 5 shows the time series variations of rainfall intensity at Furuseki derived by AMeDAS data (surface rainfall amount), corrected  $Z_H$  and  $K_{DP}$ . The height of  $R(Z_H)$  and  $R(K_{DP})$  was 1.77 km Above mean Sea Level (ASL). At Furuseki, rainfall intensity at surface between 1840 JST and 1900 JST reached  $90 \text{ mm h}^{-1}$ .  $R(Z_H)$  and  $R(K_{DP})$  increased leading the occurrence of heavy rainfall at surface.

$R(Z_H)$  was about  $60 \text{ mm h}^{-1}$  at 1836 JST and about  $20 \text{ mm h}^{-1}$  at 1842 JST. In comparison to AMeDAS,  $R(Z_H)$  was lower valuation than rainfall intensity derived by AMeDAS. Especially, low  $R(Z_H)$  at 1842 JST was caused by strong rainfall attenuation.

On the other hand,  $R(K_{DP})$  was about  $75 \text{ mm h}^{-1}$  at 1836 JST and about  $90 \text{ mm h}^{-1}$  at 1842 JST.  $R(K_{DP})$  was very close to rainfall intensity derived by AMeDAS.

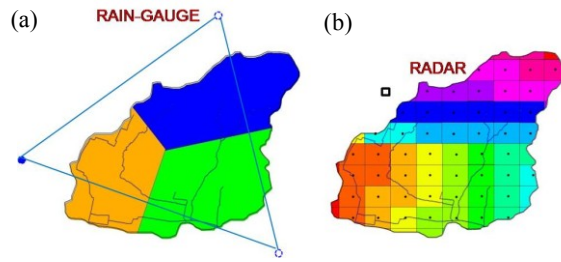


**Fig.5** Time series variations of rainfall intensity at Furuseki ( $35.53^\circ \text{ N}$ ,  $138.62^\circ \text{ E}$ ) on September 4, 2009<sup>1)</sup>. Time intervals are 10 minutes for AMeDAS and 6 minutes for  $R(Z_H)$  and  $R(K_{DP})$ .

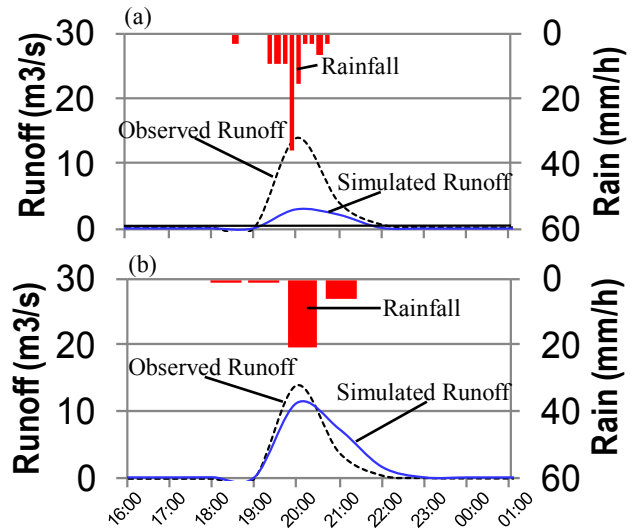
The normalized errors (NEs) between the rainfall intensity derived by AMeDAS,  $R(Z_H)$  and  $R(K_{DP})$  were calculated to estimate the errors between them, respectively<sup>8)</sup>. The NE between the rainfall intensity derived by AMeDAS and  $R(Z_H)$  was 46.2 %, which was almost similar to that between AMeDAS and the JMA radar data<sup>8)</sup>. On the other hand, the NE between the rainfall intensity derived by AMeDAS and  $R(K_{DP})$  was 23.9 %, which was better than those in the cases of  $R(Z_H)$  and the JMA radar. For the UYradar, the result indicates the possibility that the accuracy of estimation of rainfall intensity increases using  $K_{DP}$ .

## (2) Application to runoff model

Rainfall intensity derived by the UYradar data applied to the calculation of runoff using BTOPMC developed at University of Yamanashi<sup>11)</sup>. The calculation of runoff needs the spatial rainfall data. Until now, the spatial rainfall data is formed by surface rainfall amount at some gauges and Thiessen



**Fig.6** Conceptual figure of spatial rainfall data formed using (a) Thiessen method with surface rainfall amount and (b) the UYradar data<sup>12)</sup>.



**Fig.7** Areal rainfall, observed and simulated hydrograph of storm events of August 2, 2009 at Nigori outlet by using (a) surface rain-gauge and (b) X-band  $R(Z_H)R(K_{DP})$ <sup>12)</sup>.

method. On the other hand, the rainfall intensity derived the UYradar data is spatial grid data with high resolution. The rainfall intensity derived the UYradar provide the initial input rainfall data to the calculation of runoff using the BTOPMC.

On August 2, 2009, heavy rainfall occurred over the Kofu Basin between 1830 JST and 2030 JST. The heavy rainfall caused runoff at the Nigori river between 19 JST and 22 JST (Fig. 7). The maximum value of runoff was about  $14 \text{ m}^3 \text{ s}^{-1}$ .

Using the rainfall intensity derived by Thiessen method with surface rainfall amount and the UYradar data (not shown), runoff was simulated by the BTOPMC. Rainfall intensity derived by the UYradar data was the composition of  $R(Z_H)$  and  $R(K_{DP})$ . In the former case, the value of simulated runoff was lower than observed runoff (Fig. 7a). In the latter case, the value of simulated runoff was similar to observed runoff (Fig. 7b). Root Mean Square Errors (RMSEs) of the former and the latter cases were  $4.1 \text{ m}^3 \text{ s}^{-1}$  and  $1.1 \text{ m}^3 \text{ s}^{-1}$ , respectively. The error estimations using other methods (NSE and PRMSE) were almost same



to the results using RMSE. The rainfall intensity derived by the UYradar data obtained the detail input rainfall data to the calculation of runoff using the BTOPMC, which connects to the high accuracy of estimation of simulated runoff.

### (3) Experimentation of real time distribution of the Yardarm data

For prevention and reduction of water damage, rainfall information needs to distribute to people and society instantly. As experimentation of real time distribution of the Yardarm data, real time  $Z_H$  data is distributed on the web page of ICRE. The distributed  $Z_H$  uses figure image on the quick view of the UYradar system (Fig. 9).  $Z_H$  is the index of rainfall intensity not the value of it. Currently, the real time distribution system of the UYradar data calculated by  $y\_read$  system is being developed.

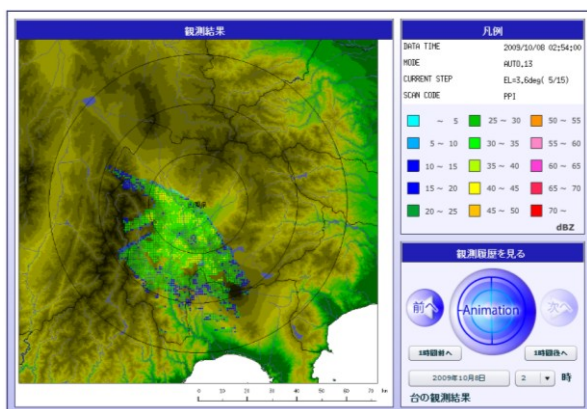


Fig.8 Realtime radar image on the web page<sup>13)</sup>.

## 4. Summary and future development

The UYradar has been operated smoothly since it was installed. Because of the smooth operation, many studies using data of the UYradar have been promoted. In addition to the introduce of studies, the UYradar data was used to the study on falling process of rain drops and the development of the alarm system to the occurrence of an avalanche.

As stated above, the usefulness of the UYradar to hydrology, water management and so on was confirmed. In the future, the development of the studies beyond the interdisciplinary fields associated with water using the UYradar is expected.

**ACKNOWLEDGMENT:** Section 3.1 was referred by the product of Mr. Shusuke Suzuki, and section 3.2 was referred by the product of Ms. Ratih Indri Hapsari. The authors express respect to them. In addition, we give thanks to Mr. Kenta Hasegawa and Mr. Yuuto Aoyagi for the utilization of the UYradar. The development of  $y\_read$  system was referred by the routine of radar analysis developed by Dr. Yasutaka Wakazuki of Japan Agency for Marine-Earth Science and Technology (JAMSTEC).

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