



International Hydrological Programme

Forest Hydrology–Conservation of Forest, Soil, and Water Resource

The Twenty-fourth IHP Training Course

24 November - 7 December, 2014

Nagoya, Japan

Hydrospheric Atmospheric Research Center, Nagoya University

Supported by

Water Resources Research Center, Disaster Prevention Research Institute,
Kyoto University



Outline

A short training course “Forest Hydrology–Conservation of Forest, Soil, and Water Resource” will be programmed for participants from Asia-Pacific regions as a part of Japanese contribution to the International Hydrological Program (IHP). The course is composed of a series of lectures and practice sessions.

Objectives

Incident rainwater is firstly intercepted by foliage and branches and evaporates from their surface to the atmosphere. From the surface full of rainwater, the rainwater conducts to soils along the plant body, and also, some of incident rainwater directly reaches the soils without touching foliage and branches. These rainwaters coming to the soils infiltrate into the soils with being influenced by the soil pore structure, and reaching to groundwater table. During the slow soil water movement, some of the soil water is absorbed by plant roots. It conducts through stem conduits, reaches leaves, and evaporates to the atmosphere through stomata. The ground water flows to a river. This is an outline of water cycling in the forest ecosystems, and science on this water cycling is “Forest Hydrology”.

As one can see above, Forest Hydrology has two major scientific aspects, i.e., discharge from forested watershed and water use by trees (evaporation from the forest canopy). Soils in the forested watershed have a high hydraulic conductivity at the ground surface, which prevents from soil erosion, and functions to make soil water flow slow, resulting in a behavior like a dam. Rainfall subtracted by the forest water use denotes the upper limit of available water for the ecosystem including human use. These mean that forest management such as thinning and forest conversions can be expected to alter and enhance the forest’s abilities to prevent from disasters and preserve water resources, Forest Hydrology’s main practical applications.

In this training course, the basics of forest hydrology and its application for conservation of forest, soil and water resource will be introduced. Its global scale implications will also be included. Practices are for understanding hydrological meaning of forest and learning skills to manage forests so that the forests can demonstrate enough their hydrological functions.

Conveners

Convener : Assoc. Prof. KUMAGAI, Tomo’omi

Chief Assistant : Prof. HIYAMA, Tetsuya

Assist. Prof. FUJINAMI, Hatsuki

Assistant : Dr. TOMITA, Hiroyuki

Secretary : Ms. HAGA, Saori

Hydrospheric Atmospheric Research Center, Nagoya University

Lecturers

KUMAGAI, Tomo'omi

HIYAMA, Tetsuya

FUJINAMI, Hatsuki

KANAMORI, Hironari

Hydrospheric Atmospheric Research Center, Nagoya University

SATO, Hisashi

Japan Agency for Marine-Earth Science and Technology

GOMI, Takashi

Tokyo University of Agriculture and Technology

TANI, Makoto

KOSUGI, Ken'ichiro

KOSUGI, Yoshiko

KOMATSU, Hikaru

Kyoto University

HAGA, Hirokazu

Tottori University

INOUE, Akio

Prefectural University of Kumamoto

Lectures' contents at Nagoya University

L1: Basics of forest hydrology

T. Kumagai

L2: Discharge from forested watershed (1)

M. Tani

L3: Discharge from forested watershed (2)

K. Kosugi

L4: Effect of vegetation cover on sediment transportation and erosion

T. Gomi

L5: Materials transportation from forested watershed

H. Haga

L6: Evapotranspiration from forest

Y. Kosugi

L7: Water resources in forested watershed

H. Komatsu

L8: Basics of forest dynamics

H. Sato

L9: Basics of forest management

A. Inoue

L10: Global/local hydrometeorology and forest (1)

T. Hiyama

L11: Global/local hydrometeorology and forest (2)

H. Fujinami

Exercise

E1: Exercise on forest dynamics modelling

H. Sato

E2: Exercise on forest structure measurement

A. Inoue

E3: Exercises on global/local hydrometeorology map

H. Fujinami, H. Kanamori

Excursion

Kiryu Experimental Watershed (Kyoto University) in Shiga Prefecture

Schedule (24 November to 7 December, 2014)

24 (Monday)	Arrival at Central Japan International Airport and movement to Nagoya University		
25 (Tuesday)	09 : 30-09 : 40	Registration & Guidance	
	09 : 40-12 : 10	Lecture 1	T. Kumagai
	14 : 00-16 : 00	Lecture 2	M. Tani
	17 : 00-19 : 00	Welcome party	
26 (Wednesday)	09 : 30-12 : 00	Lecture 3	K. Kosugi
	14 : 00-16 : 30	Lecture 4	T. Gomi
27 (Thursday)	09 : 30-12 : 00	Lecture 8	H. Sato
	14 : 00-16 : 30	Exercise 1	H. Sato
28 (Friday)	09 : 30-12 : 00	Lecture 5	H. Haga
	14 : 00-16 : 30	Lecture 6	Y. Kosugi
29 (Saturday)	Free time		
30 (Sunday)	Tour for Japanese culture (Move to Kyoto & Tour & Return to Nagoya)		
1 (Monday)	09 : 30-12 : 00	Lecture 7	H. Komatsu
	14 : 00-16 : 30	Lecture 10	T. Hiyama
2 (Tuesday)	09 : 30-12 : 00	Lecture 9	A. Inoue
	14 : 00-16 : 30	Exercise 2	A. Inoue
3 (Wednesday)	09 : 30-12 : 00	Lecture 11	H. Fujinami
	14 : 00-16 : 30	Exercise 3	H. Fujinami, H. Kanamori
4 (Thursday)	Excursion to Kiryu Experimental Watershed		
5 (Friday)	09 : 30-12 : 00	Making reports and discussions	T. Kumagai
	14 : 00-16 : 30	Making reports and discussions	T. Kumagai
6 (Saturday)	09 : 30-11 : 30	Report presentations and discussions	
	11 : 30-12 : 00	Completion ceremony of this course	
	13 : 30-15 : 30	Farewell party	
7 (Sunday)	Departure from Central Japan International Airport		

Downloading the Textbook for Participants from the Net

The textbook of “the 24th IHP Training Course”, which is converted in PDF style, will be prepared and will be put on the IHP Nagoya forum website of “www.ihpnagoyaforum.org”. The participants are requested to download such a PDF file from the website in advance as a preparation to the several lectures of the training course. The textbook should be constituted of contents (referred sentence bodies, figures, tables, pictures, equations and observed/calculated results) with authorized copyrights.

Web broadcasting the Lectures

The lectures except field trips will be webcasted to some universities in Asia via the UNESCO Office Jakarta and with other technology facilities. The slide materials will be distributed to the participants from the Net in advance. The materials are requested to be filtered out whenever copyrights apply in case of web broadcasting; part or its whole slides will be masked out with digital treatments such as overlaying mosaic images or with black-out screening during web broadcasting.



International Hydrological Programme

Ecohydrology for River Basin Management under Climate Change

The Twenty-third IHP Training Course

2 - 13 December, 2013

Kyoto, Japan

Water Resources Research Center, Disaster Prevention Research Institute, Kyoto
University

Hydrospheric Atmospheric Research Center, Nagoya University

Supported by

Disaster Prevention Research Institute, Kyoto University

Global Center for Education and Research on Sustainability Science for Resilient
Society Adaptable to Extreme Weather Conditions, Kyoto University



Outline

A short training course on ecohydrology under climate change is programmed for participants from Asian-Pacific regions as a part of Japanese contribution to the International Hydrological Program (IHP). The course composed of a series of lectures, practice sessions, and field surveys along the Kizu River will be held mainly at Disaster Prevention Research Institute (DPRI), Kyoto University during the two weeks from 2 to 13 December 2013.

Objectives

Water is our most valuable natural resource. The availability and quality of fresh water not only impact human health and wellbeing, but also the functioning of essential ecosystems, including rivers, wetlands, lakes and coastal ecosystems. Without sound water resources management, human activities can upset the delicate balance between water resources and environmental sustainability.

Ecohydrology is an integrative science studying the relationships between hydrological and ecological processes in soils, rivers and lakes at the catchment scale. It deals with hydrological factors which determine the dynamics of natural and human-driven ecosystems, together with ecological factors which influence water dynamics and water quality. It proposes a “dual regulation” of a system by simultaneously studying ecological and hydrological processes to enhance the overall integrity of aquatic ecosystems in the face of human-driven alterations and Global Change. River basins have a hierarchical structure and natural boundaries, and can be considered as inherent integrators of the effects of many climatic and non-climatic factors. That is why river basins represent a suitable scale for integrated ecohydrological studies and modelling.

The 23rd IHP training course is focused on three major objectives: (1) to acquire the latest knowledge on hydrological and ecological assessment under climate changes at river basin scale, (2) to make practice for learning the methodologies for assessing the impact of climate change on hydrological and ecological processes, and (3) to discuss the possibility to include the hydrological and ecological responses to climate change into the water resources managements.

Course Contents

Convener: SUMI, Tetsuya (Disaster Prevention Research Institute, Kyoto University)

Chief assistant: TANAKA, Kenji (Disaster Prevention Research Institute, Kyoto University)

Lecturers

HAMAGUCHI, Toshio

Disaster Prevention Research Institute, Kyoto University

HORI, Tomoharu

Disaster Prevention Research Institute, Kyoto University

KAZAMA, So

Graduate School of Engineering, Tohoku University

KOBAYASHI, Sohei

Disaster Prevention Research Institute, Kyoto University

NAKAKITA, Eiichi

Disaster Prevention Research Institute, Kyoto University

NOHARA, Daisuke

Disaster Prevention Research Institute, Kyoto University

SAITO Osamu

United Nations University

SATO, Yoshinobu

Disaster Prevention Research Institute, Kyoto University

SUMI, Tetsuya

Disaster Prevention Research Institute, Kyoto University

SUTAPA, Ignasius D. A.

Asia Pacific Centre for Ecohydrology, UNESCO

SUZUKI, Yasushi

Japan Weather Association

TACHIKAWA, Yasuto

Graduate School of Engineering, Kyoto University

TAKEMON, Yasuhiro

Disaster Prevention Research Institute, Kyoto University

TANAKA, Kenji

Disaster Prevention Research Institute, Kyoto University

ZALEWSKI, Mariej

European Regional Centre for Ecohydrology, UNESCO

Lectures' contents at the Seminar Room (E517D) of DPRI, Kyoto University

- | | | |
|-----------|---|-----------------------|
| Keynote 1 | Ecohydrology: process oriented thinking towards sustainable enhancement, water resources, biodiversity, ecosystem services and resilience to climate change | M. Zalewski |
| Keynote 2 | Overall concepts of Ecohydrology | S. Kazama |
| Lecture 1 | Fundamentals of basin-scale hydrological processes | Y. Tachikawa |
| Lecture 2 | Projected future meteorological environment | E. Nakakita |
| Lecture 3 | Fundamentals of freshwater ecology | Y. Takemon |
| Lecture 4 | Sustainable management of water resources in marginal area:
Study case in Indonesia | Ignasius D. A. Sutapa |

Lecture 5	Ecosystem Services	O. Saito
Lecture 6	Integrated sediment management	T. Sumi
Lecture 7	Interaction between river and coastal ecosystem	Y. Suzuki
Lecture 8	Fundamentals in optimum operation of reservoir systems	T. Hori

Practices

Exercise 1	Basic course of data analysis	T. Hamaguchi
Exercise 2	Data analysis of GCM data, historical data	K. Tanaka
Exercise 3	River basin modelling	Y. Sato
Exercise 4	Impact assessment by hydrological model	Y. Sato
Exercise 5	Impact assessment by ecological model	S. Kobayashi
Exercise 6	Optimization of reservoir operation	D. Nohara
Field Survey	Ecological field survey at Kizu river	Y. Takemon

Technical visits

Lake Biwa, Katsura River, Yodo River

Schedule (2 to 13 December, 2013)

1 (Sunday)	Arrival at Kansai Airport and movement to Kyoto	
2 (Monday)	Registration & Guidance (morning)	
	Introduction of the activity of UNESCO (morning) Shahbaz Khan	
	Keynote Lecture 1 (afternoon)	M. Zalewski
	Keynote Lecture 2 (afternoon)	S. Kazama
	Welcome party (evening)	
3 (Tuesday)	Lecture 1 (morning)	Y. Tachikawa
	Lecture 2 (afternoon)	E. Nakakita
4 (Wednesday)	Lecture 3 (morning)	Y. Takemon
	Exercise 1 (afternoon)	T. Hamaguchi

5 (Thursday)	Lecture 4 (morning)	Ignasius D. A. Sutapa
	Exercise 2 (afternoon)	K. Tanaka
6 (Friday)	Exercise 3 (morning)	Y. Sato
	Exercise 4 (afternoon)	Y. Sato
7 (Saturday)	Technical visits to Lake Biwa and Yodo River	
8 (Sunday)	Technical visits and Cultural exchange with students at the Katsura river	
9 (Monday)	Lecture 5 (morning)	O. Saito
	Lecture 6 (afternoon)	T. Sumi
10 (Tuesday)	Lecture 7 (morning)	Y. Suzuki
	Exercise 5 (afternoon)	S. Kobayashi
11 (Wednesday)	Field Survey (morning & afternoon around the Kizu River)	Y. Takemon
12 (Thursday)	Lecture 8 (morning)	T. Hori
	Exercise 6 (afternoon)	D. Nohara
13 (Friday)	Report presentation by each participant (morning)	
	Completion ceremony of this course (morning)	
	Farewell party (afternoon)	
14 (Saturday)	Departure from Kansai Airport	

Downloading the Textbook for Participants from the Net

The textbook of “the 23rd IHP Training Course”, which is converted in PDF style, will be prepared and will be put on the IHP Nagoya forum website of “www.ihpnagoyaforum.org”. The participants are requested to download such a PDF file from the website in advance as a preparation to the several lectures of the training course. The textbook should be constituted of one page abstract and presentation material with authorized copyrights.

Web broadcasting the Lectures

The lectures except with the exception of field survey will be webcasted to some universities in Asia via the UNESCO Office Jakarta and with other technology through DPRI facilities. The slide materials will be distributed to the participants from the Net in advance. The materials are requested to be filtered out whenever copyrights apply in case of web broadcasting part or its whole slides will be masked out with digital treatments such as overlaying mosaic images or with black-out screening during web broadcasting.



第 23 回 UNESCO－IHP 研修コース 「気候変動下の河川流域管理のための生態水文学」を実施

京都大学防災研究所水資源環境研究センターでは、名古屋大学地球水循環研究センターと共同で、UNESCO国際水文学計画（IHP）短期研修事業（IHP研修コース）を実施しています。研修コースは両センターが隔年で担当し、今回は2013年12月2日から12月13日の2週間にわたり、第23回目の研修コースを防災研究所で実施しました。

今回は「Ecohydrology for River Basin Management under Climate Change（気候変動下の河川流域管理のための生態水文学）」をテーマとし、1）河川流域スケールでの気候変動の水文学的、生態学的影響評価に関する最新の知識を身に付けること、2）水文過程、生態過程の気候変動影響評価の具体的な手順を覚えること、ならびに3）気候変動に対する水文学的、生態学的応答を水資源管理に取り入れる可能性を議論することを目的としました。

内容は、11項目の講義、6項目の屋内演習、1日間の野外実習に加え、1日は琵琶湖から瀬田川を経て、天ヶ瀬ダム・宇治川の現地視察を実施しました。講義は、水文学、気象学、生態学、水資源管理、環境システム、総合土砂管理、貯水池操作など、生態水文学に関係する広範なテーマをカバーし、京都大学防災研究所、京都大学大学院工学研究科、日本気象協会、東北大学、国連大学の教員が担当するとともに、UNESCOのアジア・太平洋支部、アジア・太平洋生態水文学センター、欧州生態水文学センターから外国人講師を招聘し、充実した内容となりました。

演習や屋外実習を除く全講義については、慶応大学のSchool on Internet Asiaを通じて講義映像を海外に一斉配信し、インドネシアなどから多くのアクセスがありました。また、屋内演習では、ノートパソコンにフリーのFortranコンパイラーや可視化ソフトをインストールして、データ解析の基礎、気候モデルデータの解析、河川流域のモデル化、水文モデルや生態モデルによる気候変動影響評価、貯水池操作の最適化について、それぞれ実践的な演習を行うことができました。

今回の研修には、国外よりアジア諸国より来日したUNESCO派遣研修生5名、文科省UNESCO事業支援経費で招聘した研修生7名、JSPSメガデルタプロジェクトから2名が参加しました。また、本研修コースは、グローバルCOEプログラム「極端気象と適応社会の生存科学」のセミナー科目としても位置付けられ、現在京都大学に在籍している留学生や研究者ら10名を加えて、合計24名の参加となりました。

受講生にとって、研究の最前線に携わる現役研究者から直接指導を受けられただけでなく、普段接することの少ない他国の同分野の研究者と交流できる貴重な機会となりました。最終日には、受講者全員がプレゼンテーションを行い、トレーニングコースで得た知識や経験を各国における実務や研究に活かそうという決意が示されました。

