



## International Hydrological Programme

### **Forest Hydrology –Conservation of Forest, Soil, and Water Resources**

The Twenty-fourth IHP Training Course

23 November - 7 December, 2014

Nagoya, Japan

Hydrospheric Atmospheric Research Center, Nagoya University

Supported by

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

Ecohydrology Research Institute, The University of Tokyo Forests  
Graduate School of Agricultural and Life Sciences, The University of Tokyo



## **Outline**

A short training course “Forest Hydrology –Conservation of Forest, Soil, and Water Resources” will be programmed for participants from Asia-Pacific regions as a part of the 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. Following interceptions by plant surfaces, the water is channeled along the plant body. Some of incident rainwater directly reaches the soils without touching foliage and branches. This rainwater infiltrates into the soils and is influenced by the soil pore structure, as it percolates to the groundwater table. Since soil water movement is slow, some of the soil water is absorbed by plant roots, where it is conducted through stem conduits, reaches leaves, and evaporates to the atmosphere through stomata. The groundwater 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: (1) discharge from forested watersheds; and (2) 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 soil erosion, and functions to make soil water flow slowly, 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. This means that forest management, such as thinning and conversion of forest, can be expected to alter and enhance the forest’s abilities to prevent disasters and preserve water resources. These are the main practical applications of Forest Hydrology.

In this training course, the basics of forest hydrology and its application for conservation of forests, soil and water resources will be introduced. Its global scale implications will also be included. Practices are for understanding hydrological significance of forests and learning skills to manage forests so that managers may optimize their hydrological functions. As an important aspect, this training course will deal with the specific hydrological issues of East Asian countries. For example, many of the forest water use theories assume larger evaporative demand than annual precipitation and an evenly distributed precipitation throughout the year or large precipitation in winter. Scientists from the US and UK devised these theories for application to their familiar hydrologic environment. As such, there is a need for more detailed information of forest water use when precipitation is larger than evaporative demand and when there is greater precipitation in summer conditions, as in most East Asian countries, which would advance knowledge of forest hydrology both locally and globally.

## **Conveners**

Convener : Assoc. Prof. KUMAGAI, Tomo'omi

Chief Assistant : Prof. HIYAMA, Tetsuya

Assist. Prof. FUJINAMI, Hatsuki

Assistant : Dr. TOMITA, Hiroyuki

Secretary : Ms. HAGA, Saori

Ms. TAKAHASHI, Kayoko

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

KURAJI, Koichiro

TANAKA, Nobuaki

The University of Tokyo

## **Keynoters**

CHAPPELL, Nick A.

Lancaster University

GIAMBELLUCA, Thomas W.

University of Hawai'i at Manoa

## **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 measurement	A. Inoue
L10: Global/local hydrometeorology and forest (1)	T. Hiyama
L11: Global/local hydrometeorology and forest (2)	H. Fujinami

## Exercise

E1: Forest dynamics modelling	H. Sato
E2: Global/local hydrometeorology map	H. Fujinami, H. Kanamori

## Field Workshop

W1: Hydrologic regime change accompanied by forest recovery	K. Kuraji, N. Tanaka
W2: Hydrologic observations at Kiryu Experimental Watershed (Kyoto University) in Shiga Prefecture	

## Schedule (23 November to 7 December, 2014)

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23 (Sunday)	Arrival at Central Japan International Airport and movement to Nagoya University		
24 (Monday)	09 : 30-09 : 40	Registration & Guidance	
	09 : 40-12 : 10	Lecture 1	T. Kumagai
	14 : 00-16 : 00	Keynote 1	T. W. Giambelluca
25 (Tuesday)	17 : 00-19 : 00	Welcome party	
	09 : 30-11 : 30	Keynote 2	N. A. Chappell
	14 : 00-16 : 30	Lecture 2	M. Tani
26 (Wednesday)	09 : 30-12 : 00	Lecture 8	H. Sato
	14 : 00-16 : 30	Exercise 1	H. Sato
27 (Thursday)	09 : 30-12 : 00	Lecture 3	K. Kosugi
	14 : 00-16 : 30	Lecture 4	T. Gomi
28 (Friday)	09 : 30-12 : 00	Lecture 5	H. Haga
	14 : 00-16 : 30	Lecture 6	Y. Kosugi
29 (Saturday)	09 : 30-12 : 00	Lecture 11	H. Fujinami
	14 : 00-16 : 30	Exercise 3	H. Fujinami, H. Kanamori
30 (Sunday)	Free time		
1 (Monday)	09 : 30-12 : 00	Lecture 7	H. Komatsu
	14 : 00-16 : 30	Lecture 10	T. Hiyama
2 (Tuesday)	09 : 30-11 : 30	Field Workshop 1	K. Kuraji, N. Tanaka
	13 : 30-16 : 30	Field Workshop 1	K. Kuraji, N. Tanaka
3 (Wednesday)	Briefing for Field Workshop 2 and Tour for Japanese culture (Move to Kyoto)		
4 (Thursday)	Field Workshop 2 at 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 Website**

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](http://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 website 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.