2.5.9 Laboratory: Water Resources Engineering

Member:	Professor	Kawachi, Toshihiko, D. Agric. Sci.
	Associate Professor	Unami, Koichi, D. Agric. Sci.
	Senior Lecturer	Maeda, Shigeya, D. Agric. Sci.
	Assistant Professor	Takeuchi, Junichiro
	Doctor's program	6
	Master's Program	4
	Undergraduate	6

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

a) Hydraulic and environmental modeling

Analytical approaches to assessment and prediction of water environment interacting with human activities are explored standing on environmental hydraulics. Major research effort is devoted to mathematical modeling of flows, transport phenomena, and eclogy, in a wide variety of bodies of surface and subsurface water, with the ultimate aim of offering hydraulic and environmental engineers an integrated family of powerful tools that encompasses all possible water environmental problems encountered. Much attention is paid to development of robust, versatile and efficient computational methods.

b) Optimal management and control of water resources systems

Optimal strategies for management and control of water resources systems are fundamentally investigated to give better answers for tasks of water resources development, management and conservation. Both static and dynamic models are applied for supporting decision makers in agricultural water management, water quality control, and aquatic ecosystem restoration problems. Stochastic methods are applied for strategic management of floods, droughts, or aquatic ecosystems. Problems of optimal fertilizer application strategy in open fields using genetic algorithm, etc. are being tackled. Optimal allocation problems of allowable pollutant load are processed on GIS.

A-2.Publications and presentations

a) Publications

Original Papers

- Unami, K., T. Kawachi, G. Kranjac-Berisavljevic, F. K. Abagale, S. Maeda, J. Takeuchi:
Case study: Hydraulic modeling of runoff processes in Ghanaian inland valleys, Journal of Hydraulic Engineering
135(7); 539-553, 2009

- Maeda, S., T. Kawachi, K. Unami, J. Takeuchi, T. Izumi, S. Chono:
Fuzzy optimization model for integrated management of total nitrogen loads from distributed point and nonpoint sources in watershed, Paddy and Water Environment
7; 163-175, 2009

- Izumi, T., J. Takeuchi, T. Kawachi, M. Fujihara:
An inverse method to estimate unsaturated hydraulic conductivity in seepage flow in non-isothermal soil, Transactions of JSIDRE
264; 35-42, 2009

- Maeda, S., T. Kawachi, K. Unami, J. Takeuchi:
Optimal allocations of maximum allowable load among influent rivers: An application for strategic management of lake water quality, Transactions of JSIDRE
264; 1-7, 2009

- Unami, K., T. Izumi, C. Imagawa, T. Kawaci, S. Maeda, J. Takeuchi:
Infiltration process in rainfed rice field soil of Ghanaian inland valley, Journal of Rainwater Catchment Systems
15(2); 17-20, 2010

- Maeda, S., K. Yoshikawa, J. Takeuchi, T. Kawachi, S. Chono, K. Unami:
Optimal allocation of maximum allowable discharged total nitrogen load among field plots in agricultural watershed, Transactions of JSIDRE
265; 23-31, 2010

b) Conference and seminar papers presented

- 2009's Annual Conf. of Jap. Soci. Irri. Drain. Rural Eng.: 7 presentations
- 66th Kyoto-Branch Conf. of Irri. Drain. Rural Eng.: 9 presentations
- 17th Congress of Jap. Rain. Catch. Sys. Associ.: 9 presentations
- 2009 JSIDRE Workshop of Applied Hydraulics: 2 presentation
- International Symposium on Rural Planning 2010: 1 presentation

A-3.Off-campus activities

Membership in academic societies

- Kawachi, Toshihiko, D.Agric.Sci : Rainwater Catchment Systems Association (Executive), Japanese Society of Irrigation, Drainage and Rural Engineering (Executive, Journal editor in Chief)

- Unami, Koichi, D.Agric.Sci. : Rainwater Catchment Systems Association (Councilor)

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Scientific Research (A) : Unami, Koichi, D.Agric.Sci. : Development options for rural water in West African savannas

- Young Scientists (B) : Takeuchi, Juinchiro : Development of simulation optimization model for environmentally sound fertilizer application to upland crop field on sloping land

A-4.International cooperation and overseas activities

Membership in academic societies

- Kawachi, Toshihiko, D.Agric.Sci.: International Water Resources Association (Member of Peer-reviewers Committee)

International joint research, overseas research surveys

- Development options for rural water in West African savannas; Unami, Koichi, D.Agric.Sci. (Ghana)

B.Educational Activities(2009.4-2010.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level: Applied Mathematics (Maeda), Hydraulics (Unami), Water Resources Utilization (Kawachi), Water-Use Systems Engineering (Kawachi), Seminar in Computational Hydraulics (Kawachi, Unami, Maeda, Takeuchi), Laboratory Course in Hydraulics (Unami, Maeda, Takeuchi), Seminar in Agricultural and Environmental Engineering (Kawachi)
- Graduate level: Hydraulic and Environmental Modeling (Unami), Seminar-I in Water Resources Engineering (Maeda), Seminar-II in Water

Resources Engineering (Kawachi, Unami, Maeda), Laboratory Course in Water Resources Engineering (Kawachi, Unami, Maeda)

C.Other Remarks

- Kawachi, Toshihiko : Member of the Japan National Council on Food, Agriculture and Rural Policies, Chair of the Consultation Committee for Restoration of Irrigation Tanks in Shiga, Chair of the Council for Environmentally Sound Rural Developments in Fukui, Member of the Council for Local Community Use of Irrigation Water in Yasu River Area, Chair of the Council for Environmentally Sound Kuzuryu-Project Implementation, Member of the Council for Building Flood-Proof Towns in Southern Biwa-Lake Areas