2.2.6 Laboratory : Laboratory of Erosion Control

Member:	Professor	Mizuyama, Takahisa, Dr. Agric. Sci.
	Associate Professor	Kosugi, Ken'ichirou, Dr. Agric. Sci.
	Assistant Professor	Fujimoto, Masamitsu, Dr. Agric. Sci.
	Doctor's program	4
	Master's Program	7
	Undergraduate	4
	Post-Doctoral fellow	2
	Researcher	1

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

a) Mechanism of sediment movement

Basic research has been carried out on debris flow, flash flood, and shallow landslide. The relationship between shallow landslide and underground pipe flow and the flow in bedrock are studied particularly.

b) Countermeasures to prevent or reduce sediment disasters

Effective permeable dams are investigated in order to store the excessive sediment and, at the same time, not to damage the eco-system established in the streams. Barakawaeng landslide in Indonesia was studied in 2008.

c) Hydrologic cycle in forested slopes

Elements controlling hydrologic cycle in forest are studied. Effects of forest soil hydraulic properties on water discharge from forested watersheds are analyzed by laboratory experiments, field measurements, and numerical simulation methods. Seepage into bed rock and seepage along tree trunks and tree roots were observed. Simulation models to explain these phenomena were developed.

d) Sediment movement and integrated sediment management in river system

Sediment production process and sediment movement process in mountain region are investigated. A numerical model for calculating sediment routing is also developed. Using these results, the sediment management for mitigating sediment-related disaster and providing better natural environment from mountains to seashore is studied. Abrasion of stones was studied by experiments with rotating device and a flume.

e) Bedload measurement with hydrophone and pits

New bedload measurement methods; hydrophone and a pit bedload sampler were developed. They have been applied in the field. The data were collected and analyzed.

f) Survey and research on sediment disasters

Natural landslide dams formed by Iwate Miyagi Earthquake and Sichuan Earthquake were studied to predict flood discharge to evaluate countermeasures.

g) Buffer green belt against sediment hazards

The effects of trees against debris flow and landslide are studied to design buffer green belts. Infiltration and water storage characteristics are studied in different tree kinds.

h) Development a debris flow simulator equipped with GUI

A simulator 'Kanako' is developed, that evaluate several types of debris flow control structures.

A-2.Publications and presentations

a) Publications

Original Papers

- Mizuyama, T., H. Wada, K. Yoshida: Debris flow control structures installed in zero-order torrents- a debris flow fence-. J-JSECE62-1, 74-76, 2009

- Mizuyama, T., S. Kasai, H. Moriyama: Development of a survival room from sediment-related hazards. J-JSECE62-1, 77-79, 2009

 Miyata, S., K. Kosugi, T. Gomi, and T. Mizuyama: Effects of forest floor coverage on overland flow and soil erosion on hillslopes in Japanese cypress plantation forests.
Water Resour. Res., 45, W06402, 2009

- Horiuchi, S., J. Akanuma, K. Ogawa, S. Kuraoka, M. Sugiyama, T. Morita T. Itoh, T. Mizuyama(2009): Hydraulic model tests for evaluating sediment control function with a grid-type high dam in a straight flume, J-JSECE 62-2, 29-36, 2009

- Horiuchi, S., J. Akanuma, K. Ogawa, S. Kuraoka, M. Sugiyama, T. Morita T. Itoh, T. Mizuyama: Hydraulic model tests for evaluating sediment control function with a grid-type high dam, J-JSECE 62-2, 37-44, 2009

- Mieko Sonoda, Ken'ichirou Kosugi, T. Mizuyama: Numerical simulation of secondary discharge peak generation in a steep forested hillslope of weathered granite,

Transactions, Japan Geomorphological Union, 30-3, p.161-188, 2009

- Sumaryono, K. Nakatani, Y. Satofuka and T. Mizuyama: One-dimensional numerical simulation for sabo dam planning using Kanako (Ver. 1.40): A case study at Cipanas, Guntur Volcanoes, West Java, Indonesia, IJECE 2-1, 22-32, 2009

- Liang, W.-L., K. Kosugi and T. Mizuyama: Characteristics of stemflow or tall stewartia (Stewartia monadelpha) growing on a hillslope. Journal of Hydrology, 378(1-2): 168-178. (DOI information: 10.1016/j.jhydrol.2009.08.013),2009.

- Ikeda, A., T.Mizuyama, N. Sugiura, Y.Hasegawa: Study about deformation of stream bed deposit at initiation zone of debris flow, J-JSECE 62-4, 46-51, 2009

- Yamazaki, Y., Laurentia DHANIO, T. Mizuyama, Y. Satofuka: Evaluation of the effect on Bili-bili Dam in Indonesia as a sabo dam by numerical simulations, J-JSECE 62-4, 52-55, 2009

- Kosuge, Y., Y. Hasegawa, Y. Satofuka, T. Mizuyama: Experiments on crush and abrasion of cobble gravels during transport, J-JSECE 62-5,b3-11,2010

- Katsura, S., K. Kosugi, T. Mizutani, and T. Mizuyama, Hydraulic Properties of Variously Weathered Granitic Bedrock in Headwater Catchments, Vadose Zone J., 8. 557-573, doi:10.2136/vzj2008.0142, 2009.

- Subehi L., T. Fukushima, Y. Onda, S. Mizugaki, T. Gomi, T. Terajima, K. Kosugi, S. Hiramatsu, H. Kitahara, K. Kuraji, and N. Ozaki, Influences of forested watershed conditions on fluctuations in stream water temperature with special reference to watershed area and forest type, Limnology, 10, 33-45, DOI 10.1007/s10201-008-0258-0, 2009.

- Sharma, R.H., H. Konietzky, K. Kosugi, Numerical analysis of soil pipe effects on hillslope water dynamics, Acta Geotechnica, DOI 10.1007/s11440-009-0104-5, 2009.

Miyata, S., Y. Onda, T. Gomi, S. Mizugaki, H. Asai, T. Hirano, T. Fukuyama, K. Kosugi, R. C. Sidle, T. Terajima, S. Hiramatsu, Factors Affecting Generation of Hortonian Overland Flow in Forested Hillslopes: Analysis of Observation Results at Three Sites with Different Geology and Rainfall Characteristics, J. Jpn. For. Soc., 91, 398-407, 2009.

<u>Reviews</u>

- Mizuyama, T., Y. Satofuka: Operation of shutter sabo dams with monitoring flow and sediment discharge, Research Results by Sabo Technical Center 1-28, 2009(in Japanese)

Mizuyama, T.: Recent development in Sabo technology in Japan, Asia-Pacific
Symposium on New Technologies for Prediction and Mitigation of Sediment Disasters,
JSECE Publ. No. 55, 2-5, 2009

- Mizuyama, T.: Sediment monitoring with acoustic methods, Foundation of River & Wateshed Environment Management, 59-73, 2009

- Mizuyama, T.: Sabo, Hillside Works to Debris Flow Control and Crisis Management, Water Science, No.310(53-5),1-11, 2009 (in Japanese)

- Mizuyama, T.: Large-scale Sediment-related Hazards by Earthquakes, Journal of CivilEngineering 52-2, p.3, 2010 (in Japanese)

- Nakatani, K., T. Wada, Y. Satofuka, T. Mizuyama: Studies on development and application of general-purpose debris flow simulation system equipped with GUI, International Workshop on Multimodal Disasters Triggered by Heavy Rainfall and Earthquake and the countermeasures, p.197-206, 2010

 Miyata, S., K. Kosugi, T. Gomi, Roles of soil water repellency on hydrological processes in a small catchment covered by a Japanese cypress plantation, J. Jpn. Soc. Soil Phys., 111, 9-16, 2009.

Reports

- Tani, M., Katsuyama, M., Kosugi, Y., Fujimoto, M., Kosugi, K., Kojima, N., Hododa, I: Prediction and Classification of hydrological characteristics on small mountainous catchment with soil disturbance Report of Forest and Lake Biwa Research Group, p39-74, 2010

b) Conference and seminar papers presented

- 120th meeting of the Japanese Forest Society: 6

- 2009 meeting of Japan Society of Erosion Control Engineering: 21
- Asia-Pacific Symposium on new technologies for prediction and mitigation of sediment disasters: 5
- Americal Geophysical Union Fall Meeting 2009: 3

A-3.Off-campus activities

Membership in academic societies

- Mizuyama, Takahisa, D. Agric. Sci. : Japan Society of Erosion Control Engineering (President)

- Kenichirou Kosugi : Japan Society of Erosion Control Engineering (Editor), Japanese Society of Soil Physics (Council member)

Membership in Science Council of Japan, etc.

- Mizuyama, Takahisa, D. Agric. Sci. : Liaison member

Research grants

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

- General scientific research (B) : Kenichirou Kosugi : Physical analyses on critical rainfall to trigger shallow landslides

2. Other Research Grants

- The River Fund: Mizuyama, Takahisa, D. Agric. Sci.: Abrasion of grabel in mountain streams

- Fund for Young Resercher (Japan Society of Erosion Control Engineering): Fujimoto, Masamitsu, Dr. Agric. Sci.: Accuracy of shallow landslide prediction using high-density digital elevation model data

- Fund for Young Resercher (Assosiation For Dissaster Prevention Research): Fujimoto, Masamitsu, Dr. Agric. Sci.: Dynamics of bedrock groundwater for evaluating the prediction of shallow-land slide

- The River Fund: Kenichirou Kosugi: Study on bedrock groundwater for landslide prediction

- Sumitomo Found: Kenichirou Kosugi: Study on watershed managements

- CREST: Yuichi Onda: Forest management technology for improving water resources

A-4.International cooperation and overseas activities

Membership in academic societies

- Mizuyama, Takahisa, D. Agric. Sci.: International Workshop on Debris Flow Hazard

Mitigation (Member of the International Organizing Committee)

- Kenichirou Kosugi: American Geophysical Union (member), American society of soil science (member)

International joint research, overseas research surveys

- Investigation on sediment dissaster by Typhoon Morakot, 2009 (Taiwan)

B.Educational Activities(2009.4-2010.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level :	Theory of Erosion Contrl 1,2 (Mizuyama), Practice in Erosion
	Control (Mizuyama, Kosugi), Planning of Erosion Control
	(mizuyama, Kosugi), reading of Foreign Literature 1 (Mizuyama),
	Special Seminar on Erosion Control 1,2 (Mizuyama, Kosugi), Basic
	Science for Forest and Biomaterials 3 (Mizuyama), Forest and
	Biomaterial Science 3 (Kosugi), Laboratory Cource in Forest and
	Biomaterials Science 3 (Mizuyama, Kosugi)
- Graduate level:	Theory of sediment induced disaster control (Kosugi), Advanced
	experiment of Erosion Control (Mizuyama, Kosugi), Seminar of
	Erosion Contrl (mizuyama, Kosugi)

B-2.Off-campus teaching etc.

Part-time lecturer

- Mizuyama, Takahisa, D. Agric. Sci.: Kyoto Prifecural University (Material and constructive methods), Tokyo University (Sabo works)

B-3.Overseas teaching

International students

- International students : Research Students 1 (Taiwan)

C.Other Remarks

- Mizuyama, Takahisa, D. Agric. Sci.: Council for the Ministry of Land, Infrastructure and Transport (member),, Forest Council of Kyoto Prefecture (member), Land Use Committee of Kyoto Prefecture (member)