Chair

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	Nakatani, Kana, Dr. Agric. Sci.
	Assistant Professor	Fujimoto, Masamitsu, Dr. Agric. Sci.
	Doctor's program	4
	Master's Program	7
	Undergraduate	5
	Post-Doctoral fellow	2
	Researcher	1

A. Research Activities (2010.4-2011.3)

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. In 2010, we studied the effect of shutter sabo dam, which has the advantages of both closed type and open type sabo dams. We considered the effective operation method with numerical simulation. We also studied the impact of structures located in the alluvial fan. Using hydraulic model experiment and numerical simulations, we researched how the flow direction, flooding area and deposition process change by the presence or absence of structures.

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. The study sites are including Japan and also foreign countries: for example Jintsu River in Gifu Prefecture, Japan, and Mt.Merapi in Indonesia. In 2010, by considering a combination of bed load and suspended sediment observations obtained with the turbidimeter and hydrophones, we propose a method for estimating the sediment source in a mountainus river. This study was conducted in Ashiaraidani Basin.

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

We make an research and investigation on sediment disasters to get new information of the occurence and mechanism and provide as an effective tool for disaster prevention and mitigation. In 2010, we continued some field research on debris flow disasters occurred in Hofu City, Yamaguchi Prefecture in 2009.

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 and application of GUI equipped debris flow simulator

GUI equipped debirs flow simulator ‘Kanako’ is developed. It is applied to some real disasters and dangerous torrent in mountainous area. It is applied to evaluate and simulate several types of debris flow control structures.

A-2.Publications and presentations

a) Publications

Original Papers(including book-reviews)

- Hasegawa, Y., N. Sugiura, M. Shouzawa, T. Mizuyama: An investigation of measures against woody debris through hydraulic experiments, INTERPRAEVENT 2010, 135-143, 2010

- Horiuchi, S., J. Akanuma, K. Ogawa, S. Kuraoka, M. Sugiyama, T. Morita, T. Itoh, T. Mizuyama: Hydraulic model tests for debris flow due to break of a small natural landslide dam, INTERPRAEVENT 2010, 157-167, 2010

- Ishikawa, N., R. Inoue, M. Beppu, Y. Hasegawa T. Mizuyama: Dynamic load characteristics of debris flow model using different gravel size distribution: INTERPRAEVENT 2010, 207-216, 2010

- Mori, T., T. Sakaguchi, Y. Sawa, T. Mizuyama, Y. Satofuka, K. Ogawa, N. Usuki, K. Yoshino: Method of estimation for flood discharge caused by overflow erosion of landslide dams and its application in as a countermeasure, INTERPRAEVENT 2010, 293-302, 2010

- Nakatani, K., Y. Satofuka, T. Mizuyama: Development of user friendly debris flow simulation system equipped with semi-automatic sabo solution suggesting function, INTERPRAEVENT 2010, 840-849, 2010

- Mizuyama, Takahisa, Akira Oda, Jonathan B. Laronne, and Michinobu Nonaka, and Miwa Matsuoka,Laboratory tests of a Japanese Pipe Hydrophone for Continuous Acoustic Monitoring of Coarse Bedload, in, Gray, J.R., Laronne, J.B., and Marr, J.D.G, Bedload-surrogate monitoring technologies: U.S. Geological Survey Scientific Investigations Report 2010-5091, 296-318, 2010

- Mizuyama, Takahisa, Jonathan B. Laronne, Michinobu Nonaka, Toyoaki Sawada, Yoshifumi, Satofuka, Miwa Matsuoka, Shintaro Yamashita, Yoichi Sako, Shohei Tamaki, Masaaki Watari, Shinji Yamaguchi and Kenji Tsuruta, Calibration of a passive acoustic bedload monitoring system in Japanese mountain rivers, in, Gray, J.R., Laronne, J.B., and Marr, J.D.G, Bedload-surrogate monitoring technologies: U.S. Geological Survey Scientific Investigations Report 2010-5091, 319-335, 2010

- Wei-Li, Liang, K. Kosugi, T. Mizuyama: The effect of saturated zones induced by stemflow on slope stability, J. of ECE, 63-1, 22-30, 2010 (in Japanese)

- Mizuyama, T., S. Egashira: Sediment induced disasters in the world and 1999-debris flow disasters in Venezuela, Jour. of Disaster Research 5-3, p.229-235, 2010

- Inoue, K., T. Mizuyama, Y. Sakatani: The catastrophic Tombi landslide and accompanying landslide dams induced by the 1858 Hietsu earthquake, Jour. of Disaster Research 5-3, p.245-256, 2010

- Satofuka, Y., T. Mori, T. Mizuyama, K. Ogawa, K. Yoshino: Prediction of floods caused by landslide dam collapse, Jour. of Disaster Research 5-3, p.288-295, 2010

- Osanai, N., H. Mizuno, T. Mizuyama: Design standard of control structures against debris flow in Japan, Jour. of Disaster Research 5-3, p.307-314, 2010

- Miyata, S., K. Kosugi, Y. Nishi, T. Gomi, R. Sidle, T. Mizuyama: Spatial pattern of infiltration rate and its effect on hydrological processes in a small headwater catchment, Hydrological Processes 24, 535-549, 2010

- Yamakawa, Y., K. Kosugi, N.Masaoka, Y. Tada, T. Mizuyama: Combination use of combined penetrometer-moisture probe with geophysical method for surveying hydrological properties of a hillslope, Proceedings of soil moisture workshop 2010, p.13-17, 2010 (in Japanese)

- KOSUGE, Y., M. SHOZAWA, Y. HASEGAWA, Y. SATOFUKA and T. MIZUYAMA: Crush and abrasion test of cobbles and gravels, J-JSECE, 63-2,3-11,2010 (in Japanese)

- Nakatani, K., D. Maeda, Y. Satofuka, T. Mizuyama: Study on preventing debris flow disaster occurred on September 6, 2005 in Miyajima, Hiroshima Prefecture applying numerical simulation; Disaster Mitigation of Cultural Heritage and Historic Cities Vol.4, p.107-114, 2010 (in Japanese)

- Nakatani, K., D. Maeda, Y. Satofuka, T. Mizuyama: Study on debris flow occurred in Ishihara and Hachimandani, Hofu City, Yamaguchi Prefecture in July 2009; Proceedings of the 5th Symposium on Sediment Related Disasters, p.81-86, 2010 (in Japanese)

- Mizuyama, T.: Recent developments in sabo technology in Japan, IJ of ECE, 3-1, 2010, p.1-3

- Yamakawa, Y., K. Kosugi, N. Masaoka, J. Su,ida, M.Tani, T. Mizuyama: Estimation of soil thickness distribution on a granitic hillslope using electric resistivity method, IJ of ECE, 3-1, 2010 p.20-26

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- Mori, T., M. Chiba, T. Mizuyama, Y. Satofuka: Estimation of flood discharge caused by landslide dam overflow erosion and application of countermeasures, IJ of ECE, 3-1, 2010, p.69-74

- Yamakawa, Y., K. Kosugi, N. Masaoka, Y. Tada, T. Mizuyama: Use of a Combined Penetrometer-Moisture Probe Together with Geophysical Methods to Survey Hydrological Properties of a Natural Slope, Vadose Zone Journal 2010-9, p.768-779

- Oda, A., T. Mizuyama, K. Miyamoto: Experimental study of the shape of small landslidedams and the hydrograph during the outburst of small landslide dams, J-JSECE 63-3, p.3-10, 2010 (in Japanese)

- Shibuya, H., H. Osumi, N. Ishikawa, T. Mizuyama: Experimental study on woody debris trap performance of drift wood capturing structure, J-JSECE 63-3, p.34-41, 2010 (in Japanese)

- Nakatani, K., Y. Satofuka, T. Mizuyama: Planning effective sabo dams with user friendly debris flow simulator KANAKO, J-JSECE 63-3, p.42-49, 2010 (in Japanese)

- Ishikawa, N., R. Inoue, M. Beppu, Y. Hasegawa, T. Mizuyama: Strain response test of steel and mortal specimens by debris flow model、10th Symposium on Impact , 2010(in Japanese)

- Beppu, M., R. Inoue, N. Ishikawa, Y. Hasegawa and T. Mizuyama: Numerical simulation of debris flow model using modified MPS method, 10th Symposium on Impact , 2010(in Japanese)

- Subehi, L., T. Fukushima, Y. Onda, S. Mizugaki, T. Gomi, K. Kosugi, S. Hiramatsu, H. Kitahara, K. Kuraji, and T. Terajima, Analysis of stream water temperature changes during rainfall events in forested watersheds, Limnology, 11, 115-124, DOI 10.1007/s10201-009-0296-2, 2010.

- Fukuyama, T., Y. Onda, T. Gomi, K. Yamamoto, N. Kondo, S. Miyata, K. Kosugi, S. Mizugaki, and N. Tsubonuma, Quantifying the impact of forest management practice on the runoff of the surface-derived suspended sediment using fallout radionuclides. Hydrol. Process., 24, 596-607, 2010.

- Gomi, T., Y. Asano, T. Uchida, Y. Onda, R. C. Sidle, S. Miyata, K. Kosugi, S. Mizugaki, T. Fukuyama, and T. Fukushima, Evaluation of storm runoff pathways in steep nested catchments draining a Japanese cypress forest in central Japan: a geochemical approach, Hydrol. Process., 24, 550-566, 2010.

- Suryatmojo, H., P.Nugroho, A.R.Hakim, F.Masamitsu, K.Kosugi, T.Mizuyama, Water balance status in a tropical Indonesia rainforest, International Conference on Sustainable Future for Human Security (SustaiN' 2010), 7p., 2010

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- Matsui, M., T. Mizuyama, N. Anyoji, J. Minagawa: Traveling distance of pyroclastic surge as shown on a volcano hazard map, J-JSECE, 63-5, p.33-35, 2011(in Japanese)

- Yoshida, K., M. Yamaguchi, T. Mizuyama: Field survey on capture of debris flow with steel open sabo dams, J-JSECE, 63-5, p.43-45, 2011(in Japanese)

- Liang, W.-L., K. Kosugi, and T. Mizuyama, Soil water dynamics around a tree on a hillslope with or without rainwater supplied by stemflow, Water Resour. Res., 47, W02541, doi:10.1029/2010WR009856., 2011

- Nakatani, K., LIU Jinfeng, Y. Satofuka,T. Mizuyama: EFFECT EVALUATION OF DEBRIS FLOW COUNTERMEASURES WITH KANAKO (CASE STUDY ON HONGQIAO GULLY, CHINA),Annual Jour. of Hydraulic Engineering, JSCE Vol.55, 701-714,2011(in Japanese)

- Abe.,T., Y. Satofuka, T.Mizuyama: Development of modified particle method for simulations of highly-concentrated granular flows considering inter-particle stress, J-JSECE 63-6, p.23-31, 2011(in Japanese)

- Beppu, M., R. Imoue, N. Ishikawa, Y. Hasegawa, T. Mizuyama: Numerical simulation of debris flow model by using modified MPS method with solid and liquid particles, J-JSECE 63-6, p.32-42, 2011(in Japanese)

- Nakatani, K., D. Imoto, Y. Satofuka, T. Mizuyama: Study on sediment control effect of shutter sabo dam applying numerical simulation, J-JSECE 63-6, p.43-51, 2011(in Japanese)

- Yoshino, K., J. Takahama, T. Mizuyama, T. Uchida, K. Ogawa: Numerical simulation of landslide dam overtopping erosion process considering side bank collapse, J-JSECE 63-6, p.52-58, 2011(in Japanese)

Reports,others

- Mizuyama, T.:Local Sabo Works and Universities, Japan Sabo association,Sabo to Chisui,Vol.43-1, 6-8, 2010(in Japanese)

- Mizuyama, T.: Sabo structures for the upstream of reservoirs, J-JSECE, 63-1、57-58, 2010(in Japanese)

- Mizuyama, T.: Sediment yield, International symposium on sediment disasters and river environment in mountainous area, Kyoto, 2010, p.1-5

- Tsutsumi, D., R. Hirasawa, T. Mizuyama, M. Shida, M. Fujita: Bed Load Observation in a Mountainous Watershed by Hydrophone Equipments, Annual of Disas. Prev. Res. Inst. Kyoto Univ. No. 53 B, p.537-543, 2010 (in Japanese)

- Kosugi, K., Mizuyama, T.:Detection of landslide vulnerable slopes by thermal remote sensing and geophysical methods, Proceedings of Report Meeting for Sabo Technical Research in 2009, p.75-92, 2010(in Japanese)

- Fujimoto M, Kosugi K, and Mizuyama T.：The accuracy of shallow landslide prediction using high-resolution digital elevation model data. Proceeding of International Symposium on a Robust and Resilient Society against Natural Hazards & Environmental Disasters and the third AUN/SEED-Net Regional Conference on Geo-Disaster Mitigation. 376-385, 2010

- Ohte N, Tokuchi N and Fujimoto M：A factor to control the seasonal variation of the NO3- outflow, Water Science,54, 1-16, 2010(in Japanese)

- Shibanmoto, H., Mizuyama, T.:Debris flow research trends, J-JSECE, 63-6、78, 2011(in Japanese)

b) Conference and seminar papers presented

- 2010 meeting of Japan Society of Erosion Control Engineering:30

- 121th meeting of the Japanese Forest Society: 2

- INTERPRAEVENT 2010 International Symposium in the Pacific Rim. In Taipei, Taiwan: 5

- Americal Geophysical Union Fall Meeting 2010: 2

A-3.Off-campus activities 1

Membership in academic societies

- Mizuyama, Takahisa : Japan Society of Erosion Control Engineering (President, Chairman of the International Journal editorial)

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

- Nakatani, Kana : Japan Society of Erosion Control Engineering (member), Japan Society of Civil Engineers(member)

Membership in Science Council of Japan, etc.

- Mizuyama, Takahisa : Liaison member

A-3.Off-campus activities 2

Research grants

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

- General scientific research (A) : Kosugi, Kenichirou : Prediction of debris flow occurrences induced by landslides under heavy rainfall condition

2.Other Research Grants

- The River Fund : Mizuyama, Takahisa : Sabo plan to control sediment and woody debris flowing into reservoirs

- SABO Technical Center Research Fund : Mizuyama, Takahisa : Development of a simulator on rainfall-runoff and sediment discharge in mountain watersheds

- Sumitomo Fund : Kosugi, Kenichirou : Study on watershed managements

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

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

- Lake-Biwa and Yodo River Water Quality Fund : Kosugi, Kenichirou : Prediction of nitrate discharge from forested watershed affected by global warming

- ISHIHARA Research Fellowship (Assosiation For Dissaster Prevention Research) : Fujimoto, Masamitsu : Sediment yeild process in a forested hillslope

A-4.International cooperation and overseas activities 1

Membership in academic societies

- Mizuyama, Takahisa: International Workshop on Debris Flow Hazard Mitigation (Member of the International Organizing Committee)

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

B.Educational Activities(2010.4-2011.3)

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 : Advanced experiment of Erosion Control (Mizuyama, Kosugi), Seminar of Erosion Contrl (Mizuyama, Kosugi)

B-3.Overseas teaching 1

International students

- International students : Undergraduate 1 (Indonesia) Doctral 1 (Indonesia) Research Students 1 (China)

C.Other Remarks

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

- Kosugi, Ken'ichirou : Council for "Investigation on evaluation method of water and soil conservation function of forest" by Forest Agency (member)