

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING  
No. 223 (71-1)

---

Contents

Research Papers

Analyzing the Evaluation Structure of Irrigation Channel Landscapes Using Conjoint Analysis	KOBAYASHI H., TSUTSUI Y., KOJIMA Y. and SENGAI Y. ... 1
Uplift Resistance of Anchor in Two-layered Sand Masses	SAKAI T., CHIKUMA T. and OSHIRO Y. ... 11
Experimental Reflections Influence of Percolation Pattern on the Removal of Soluble Elements in Stratified Paddy Field with Rice and Alluvial Soil	SASAKI C. ... 19
A Comparison of the Methane Emission of the Watering Irrigation plot with that of the Conventional plot in the Rice Paddy Fields	KAMIO A. and KAINO D. ... 29
Measurement of Unsaturated Hydraulic Conductivity of Unfrozen and Frozen Soils by Centrifuging Method	LIU Xia, AMAYA T., AKAE T. and NISHIMURA N. ... 39
Analysis of Flow through Dense Vegetations Bent by Flow	AZECHI I. and KINOSE K. ... 47
Comparative Study on the Pozzolanic Activity of Fly Ash and Cinder Ash as Mineral Substitutes in Massive Concrete	HASSAN Khaled, HATTORI K., OGATA H. and SATO S. ... 57
Capillary Diameter Effects on the Viscosity of Coagulated Montmorillonite Suspension	MIYAHARA K., OOI S., NAKAISHI K. and ADACHI Y. ... 63
Herbicide Loadings from Paddy Fields and Purification Effect in Lagoon —Experiments in Ekainuma lagoon basin—	SUDO M., OKUBO T. and KUNIMA T. ... 71
Numerical Investigations of Flow in Vertical Single- and Double-slot Fishways	FUJIHARA M., FUKUSHIMA T. and TACHIBANA K. ... 79
Physical, Chemical and Mineralogical Influences on the Settling Patterns of Thoroughly Disturbed Soft Marine Clay	KONDO F. and J. Kenneth TORRANCE ... 89

Rainfall Evaluation for the Paddy Cropping Schedule in Lower Myanmar

.....Maung Maung Naing, SATOH M. and FUJIKI T. ... 99

Horizontal Two Dimensional Turbulence Analysis Model for Open Channel Flows over Submerged Vegetation

.....NAKAYA T. and KINOSE K. ...107

**Technical Reports**

The Assessment of Water Depth on Perception of Beauty for Channel Landscape

.....KOBAYASHI H., TSUTSUI Y. and SENGA Y. ...117

Irrigation Efficiency in a Rotation Block of Sprinkler Irrigation Systems .....ANYOL H. ...127

The Effect of Soil Desalinization in the Hetao Irrigation District, Inner Mongolia, China

.....KUME T., AMAYA T. and MITSUNO T. ...133

**Notice about photocopying**

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

**Except in the USA**

Japan Academic Association for Copyright Clearance (JAACC)

41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan

TEL : 81-3-3475-5618 FAX : 81-3-3475-5619 E-mail : kammori @ msh.biglobe.ne.jp

**In the USA**

Copyright Clearance Center, Inc. (CCC)

222 Rosewood Drive, Danvers, MA 01923 USA

Phone : (978)750-8400 FAX : (978)750-4744 [www.copyright.com](http://www.copyright.com)

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING  
No. 224 (71-2)

---

Contents

**Research Papers**

Analysis of Usage of Paddy Field under the Policy of Production Adjustment of Rice, by Indicator of the Basic Condition of Farming Area .....	TAKEYAMA E., TAKAHASHI T. and KUKI Y. ....	1
Effect of Water Quality on Hydraulic Properties of the Niigata Smectitic and Tottori Kaolinitic Soils .....	ARAI M., KEREN Rami, YAMAMOTO T. and INOUE M. ...	11
Influence of Direct Seeding Culture in a Well-drained and Non-tilled Paddy Field on Water Requirement — Case study on water requirement of Sunami district, Gifu Prefecture — .....Sangbong LEE, SENGE M., ITO K. and HAYASHI H. ...	19	
Changes in Soil and Eutrophic Component Losses due to Deforestation in Sloping Area .....	MIHARA M., Yan CHEN and KOMAMURA M. ...	27
A Paddy Runoff Model in Hilly Rural Areas for Evaluating Runoff Change due to Abandoned Rice Cultivation .....	MASUMOTO T., NOZOE M., YOSHIMURA A. and MATSUDA S. ...	35
Changes in Lot Scale Water Use and Management by Adopting Direct Seeding Culture in a Well-drained and Non-tilled Paddy Field .....	Sangbong LEE ,SENGE M., ITO K. and HAYASHI H. ...	45
Growth Environment of Sloped Millet Field in the Southwestern Niger and Effects of Introducing Contour Ridges .....	NAGANO T., HORINO H., MITSUNO T. and KIMURA M. ...	53
Aggregate Stability Evaluation of Sodic Soils Using Ethanol-Water Mixtures .....	ARAI M., KEREN Rami, YAMAMOTO T. and INOUE M. ...	65
Possibility of Nitrogen Removal from Animal Wastewater by a Bioelectrochemical Process .....	TANAKA T., OZAKI M., HIRANO N. and KURODA M. ...	73
Seawater Intrusion Analysis by Sharp Interface Approach with Groundwater Recharge — Study on conservation and development of groundwater resources in island — .....MOMII K., SHOJI J., NAKAGAWA K. and JINNO K. ...	81	
Estimation of Unfrozen Water Content by Time Domain Reflectometry Measurements in Frozen Soils .....	Wang Liping and AKAЕ T. ...	89
Application of Water Quality Tank Model Classified by Land Use to Nitrogen Load Reduction Plans .....	KATO T., KURODA H. and NAKASONE H. ...	97
Mechanical Properties of Soils Mixed with Crushed Expanded Plastic Wastes — Triaxial compression properties of saturated specimens — .....KIMATA T., KUWABARA T., KUDO Y. and FUJISHIGE M. ...	105	

## Technical Reports

On the Sediment Environment in Lake Koyama in Summer from the Viewpoint of Concentrations of Heavy Metals and Sulfide in Mud .....	HARADA M. and YOSHIDA I. ....111
20th Century Hydrological Research in the Field of Irrigation, Drainage and Reclamation Engineering .....	MARUYAMA T. ....121
A Study on Relation between Performance and Shapes of Labyrinth Weirs with Sharp Crests .....	TSUNESUMI N. ....135
An Examination on Approach to Regional Material Transportation Analysis in Rural Area by Waterfowl as Inferred from $\delta^{15}\text{N}$ .....	KOBAYASHI H., SAGOU R., KURECHI M. and IWABUCHI N. ....145

### Notice about photocopying

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

#### Except in the USA

Japan Academic Association for Copyright Clearance (JAACC)  
41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan  
TEL : 81-3-3475-5618    FAX : 81-3-3475-5619    E-mail : kammori @ msh.biglobe.ne.jp

#### In the USA

Copyright Clearance Center, Inc. (CCC)  
222 Rosewood Drive, Danvers, MA 01923 USA  
Phone : (978)750-8400    FAX : (978)750-4744    [www.copyright.com](http://www.copyright.com)

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING  
No. 225 (71-3)

---

Contents

Research Papers

Nitrogen Outflow and its Variance After Rainfall Events From the Watershed with Pig Farms	SHIMURA M. and TABUCHI T. ... 1
A Study on the Assessment Procedure in Determining the Money Used for Settling Replotting Accounts	MORITA M., HIROTA J. and SATO Y. ... 9
Dynamic Behavior of Small Earth Dam with Central Core Stabilized by Lime —A case study of the small earth dam damaged during the Geijo Earthquake in 2001—	KOBAYASHI N., YOSHITAKE Y., KATSUYAMA K. and YOKOO K. ... 17
Rheological Aspect of the Collapse Settlement Property of the Loess	Guo Yuwen, NISHIMURA T., SUZUKI S. and KATO M. ... 25
Mass Transport Analysis with Nitrogen Species Transformation Model in Soil	INOUE K., KOBAYASHI A. and AOYAMA S. ... 33
Measurement of Nitrate Nitrogen Reduction Potential of Soil in Upland Field	YAMAOKA M., SHINOGI Y., Stephen ABENNEY-MICKSON and SAITO T. ... 43
Effects of Water Content and NaCl Concentration on Thermal Conductivity of Swelling and Nonswelling Clays	MOCHIZUKI H., MIZOGUCHI M. and MIYAZAKI T. ... 55
Hydrogeological Survey Using Geophysical Prospecting for Saline Groundwater in Phra Yuen area, Northeast Thailand	IMAIZUMI M., Somsak Sukchan, NAKAZATO H., OKUYAMA T., OHONISI R. and TAKEUCHI M. ... 63
Examination of Dispersion Coefficient in Two-Dimensional Saturated and Unsaturated Porous Media	INOUE K., KOBAYASHI A., INOUE K. and AOYAMA S. ... 75
A Study to Determine an Equation of Enveloping Curve for Regional Flood Peaks by Maximum Rainfall Data	OHNISHI R., KATO T., IMAIZUMI M. and TANJI H. ... 85
A Countermeasure for Agricultural Land Resource Maintenance from the View of Restoration Cost of Abandoned Paddy Fields —A case study in Ohshima Higashi-kubiki Niigata, JAPAN—	ARITA H., YAMAMOTO M., TOMOSYOU T. and OHKURO T. ... 95
Fundamental Studies on the Utilization of the Air-cooled Slag from Incineration Ash from Municipal Solid Waste as Coarse Aggregate for Concrete	KITATSUJI M. and TANAKA R. ... 103
Study on Behavior of CO <sub>2</sub> and O <sub>2</sub> Gas in Soil with a Hard Pan	FUJIKAWA T., MIYAZAKI T. and IMOTO H. ... 111

The Present Situation and Problems of the Establishment of Water Users' Organizations in the Chao Phraya Delta	ONIMARU T., SATOH M., KAWSARD Kanching and SHIODA K. ...119
Identification of Non-Point Groundwater Contamination Sources Using an Extended GA	ICHION E., HIRAMATSU K., KAWACHI T. and KITAMURA K. ...127
Study on Selection of Objective Functions for Calibration of Rainfall-Runoff Models	FUJIHARA Y., TANAKAMARU H., HATA T. and TADA A. ...137

### **Technical Reports**

Groundwater Concentrations of Nitrate Nitrogen in M city in the Miyakonojo Basin	TOYOMITSU Y., MUTO I., and SUGIMOTO Y. ...151
Land Use Induction in Surrounding Rural Area of Large-scale City Development in China —A case study of the wedge type green area plan in Shanghai Pudong New Area—	WANG Lei, TAKAHASHI T. and KUKI Y. ...157

### **Notes**

Utilization of Charcoal Chips for Sunshade	YAMAOKA K., SHINOGI Y. and SAITO T. ... 167
--------------------------------------------	---------------------------------------------

### **Notice about photocopying**

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

#### **Except in the USA**

Japan Academic Association for Copyright Clearance (JAACC)  
41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan  
TEL : 81-3-3475-5618 FAX : 81-3-3475-5619 E-mail : kammori @ msh.biglobe.ne.jp

#### **In the USA**

Copyright Clearance Center, Inc. (CCC)  
222 Rosewood Drive, Danvers, MA 01923 USA  
Phone : (978)750-8400 FAX : (978)750-4744 www.copyright.com

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING  
No. 226 (71-4)

---

Contents

**Research Papers**

Modeling Analysis of Nitrate Nitrogen Pollution Processes of Groundwater in Nasunogahara Basin	SOMURA H., GOTO A. and MIZUTANI M. ... 1
Drainage Property of the Perforated Clay Pipe	KUSAKA T., SUEMOTO W., NISIYAMA S. and FUKADA M. ... 11
Developing the Farmer's Compost Demand Forecasting Methods for Planning Compost Production Facilities —Based on Contingent Valuation Method —	AIZAKI H. ... 15
Effects of Flow Rates and Cooling Water Temperatures to Temperature Profiles around a Cooling Pipe and Their Analyses	ASANO I., KOHGO Y. and HAYASHIDA Y. ... 25
Economical Evaluation of the Irrigation Water's Multi-Functional Roles by CVM —A Contingent Valuation Study on Regional Water at Kanazawa City in Ishikawa Prefecture—	TAKIMOTO H., TANO N., MURASHIMA K., HASHIMOTO I., UEDA T., MINAMI Y., MARUYAMA T., NOGUCHI Y. and HORINO H. ... 35
Measurement and Estimation of Thermal Conductivity of Quartz-Containing Frozen and Unfrozen Soils	YAMAZAKI Y., TSUCHIYA F., and TSUJI O. ... 43
Quasi-three-dimensional Analysis model for Open Channel Flows near Submerged Vegetation Zone	KINOSE K., HARADA T. and FURUYA K. ... 53
Modeling of Runoff Processes for Various Land Uses in a Grid-based Distributed Hydrological Model —Improvements of Kinu-Kokai Model—	MATSUI H. ... 61

**Technical Reports**

Evaluation by Hedonic Pricing Method of the Effect of Farm Road Improvement Project on Improvement of Living Convenience —An Example of Wide-area Farm Road Bird Line—	ARARAGI Y. and TANJI H. ... 69
Experimental Study on Flow Characteristics of the Historical Irrigation Channel “Hanaguri-Ide”	TAKAKI K., KOBAYASHI H. and NAMIHARA A. ... 77
Applicability of a Sediment Yield Prediction Model on a Sloping Ridged Cropland with Long Furrows	NAKAO S., TAKAGI A. and MATSUDA S. ... 89
A Method for determining a Soil Erodibility Parameter of a Soil Erosion Model by Flow Tests	NAKAO S., TAKAGI A. and MATSUDA S. ... 97

## Notes

Deformation Properties of Sludge Cakes ..... NISHIMURA S., INOUE T., FUJII H. and WAKITANI Y. .... 105

### Notice about photocopying

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

#### Except in the USA

Japan Academic Association for Copyright Clearance (JAACC)

41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan

TEL : 81-3-3475-5618 FAX : 81-3-3475-5619 E-mail : kammori @ msh.biglobe.ne.jp

#### In the USA

Copyright Clearance Center, Inc. (CCC)

222 Rosewood Drive, Danvers, MA 01923 USA

Phone : (978)750-8400 FAX : (978)750-4744 [www.copyright.com](http://www.copyright.com)

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING  
No. 227 (71-5)

---

Contents

**Research Papers**

Application of an Automatic Control System with ORP to the Batch Activated Sludge Process —Studies on the Automatic control system for rural sewage treatment—	HOMMA S., HATA K. and YUYAMA Y. ... 1
Study on Characteristics of Organic ( BOD, COD ) Removal in Sedimentation Storage Tank of Rural Sewerage Facilities with Submerged Biological Filters	NAKANO T. ... 9
Effect of Pore Solutions on Liquid Limits of Swelling Clay Slurries	DOMEKI T., YAMAMOTO T., FUJII K. and FUJISAKI H. ... 17
Assessment of Settlement Conditions by the AHP Method in Hilly and Mountainous Villages in Korea	KIM Y. and TAKAHASHI T. ... 25
Characteristics of Stream Water Quality during Rainfall Runoff on an Upland Field Area of Eastern Hokkaido, Japan	OKAZAWA H., INOUE T., YAMAMOTO T., NAGASAWA T. and UNOKI K. ... 33
Effects of Length of Rim Grouting Works on Seepage Loss Reduction	KOBAYASHI N., TATEISHI T., YOSHITAKE Y. and IKEGASHIRA J. ... 41
Properties of Concrete Product Using Recycled Coarse Aggregate from Waste Flumes	HOSOKAWA Y. ... 49
NONDIMENSIONAL ANALYSIS OF TRANSIENT PHENOMENA TOWARD STEADY STATE IN SHORT CANAL	
	R. K. Peter and KUBO N. ... 57
NONDIMENSIONAL ANALYSIS OF TRANSIENT PHENOMENA TOWARD STEADY STATE IN LONGER CANAL	
	R. K. Peter and KUBO N. ... 65
Examination of Method of Crack Verification in Construction Stage of Reverse-T Retaining Wall Type Farm Pond	OGATA H., NONAKA T., ISHII M. and HATTORI K. ... 73
Regional Activation and Improvement of Settlement Conditions in Hilly and Mountainous Villages in Korea	KIM Y. and TAKAHASHI T. ... 83
A Study in a Application of Game Theory to Agricultural Water Use Conflicts	MOTOSUGI A. ... 91
Evaluation of Groundwater Properties in Terraced Paddy Fields Using Transient Unsaturated-Saturated Water Flow Analysis	ONISHI T., HORINO H., NAKAMURA K. and MITSHNO T. ... 97
Salinity Measurement of Homogeneous Soil Using Electromagnetic Induction Method	KUME T., NAGANO T., WATANABE T. and MITSUNO T. ... 105
The Shear Strength of Strongly Weathered and Fractured Mudstones for Slope Stability Analysis —Stability of slopes in the mudstone area of the Shimajiri-group, Okinawa—	GIBO S., NAKAMURA S., HIGA Y. and YOSHIZAWA M. ... 113
Calibration of Rainfall-Runoff Models Using the Evolution Strategy	FUJIHARA Y., TANAKAMARU H., HATA T. and TADA A. ... 119

---

Estimation of the Water Temperature at a Reservoir by the Multiple Rectangular Model

.....KURASHIMA E., KATO T., MIWA H. and MUKAIDA Y. ···131

**Technical Reports**

- Changes in Physical Properties of Clayey Soil in Soybean-Barley-Cabbage Sequences on Upland Fields Converted  
from Paddy .....ADACHI K., YOSHIDA S. and HOSOKAWA H. ···139
- Effects of Depth and Slope on Flow in Rice Paddy Subsurface Drainage Pipes  
.....KAJISA T., NARIOKA H., KIMOTO Y. and ARAGAKI M. ···149
- Analysis on Consciousness of Residents for Living Environment in Preservation Area of  
Historical Landscape .....FUJII Y. ···157

**Notice about photocopying**

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

**Except in the USA**

Japan Academic Association for Copyright Clearance (JAACC)  
41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan  
TEL : 81-3-3475-5618 FAX : 81-3-3475-5619 E-mail : kammori @ msh.biglobe.ne.jp

**In the USA**

Copyright Clearance Center, Inc. (CCC)  
222 Rosewood Drive, Danvers, MA 01923 USA  
Phone : (978)750-8400 FAX : (978)750-4744 www.copyright.com

TRANSACTIONS OF THE JAPANESE  
SOCIETY OF IRRIGATION, DRAINAGE  
AND RECLAMATION ENGINEERING

No.228

Contents

Research Papers

Effects of the Excrement and Urine of Domestic Animals Applied to a Grass Field on Groundwater Quality	OCHIAI H., and NOBORIO K. ... 1
River Water Quality and Hydrological Condition of Dairy Farming Watershed during Snowmelt and Ground Thawing Period	UNOKI K., YAMAMOTO T., INOUE T., NAGASAWA T. and OKAZAWA H. ... 9
Development of Operation Rule for Multipurpose Reservoirs to Secure Water Supply in the Mae Klong River Basin, Thailand	SATOH M., KAWABATA A., VUDHIVANICH Varawoot, KWANYUEN Bancha and CHERDCHANPIPAT Nimit ... 17
Prediction of Critical Slope Length for Incipient Rilling in a Field	TAKAGI A., MASUMOTO T. and TSUTSUMI S. ... 25
A Case Study for Comparison of Predicted and Measured Soil Loss in Mountain Watershed using RUSLE Model	UCHIDA K., NASIR Abdul and NAKAMURA M. ... 33
The Research on Characteristics of the Temperature Distribution of the Limestone Culture Soil —Control of the culture soil temperature by the subsurface dam water—	YOSHINAGA A. and SAKAI K. ... 41
Hydraulic Survey on Flow Characteristics in Vertical-Slot Type Fishway —Case study of Tayama Headworks on the Nakano River—	IZUMI M., SUGAWARA K., KUDO A. and AZUMA N. ... 49
Hydrological Characteristics during Cold Season in a Snowy Mountain Basin	SUGIYAMA H., WHITAKER C Andrew, YAWATA M. and HIROSE M. ... 57
Mathematical Modeling of Preference Intensity of Japanese Medaka for Instream Water Environment using Fuzzy Inference	HIRAMATSU K., FUKUDA S. and SHIKASHO S. ... 65
Quantitative Evaluation of Thickness and Cavity in Concrete Models by Impact Acoustic Method	GODA K., KOSUGI H., AOYAMA S. and KOBAYASHI A. ... 73
Settling and Dispersion-Flocculation Characteristics, and Zeta Potential of Chlorite	KONDO F., SAITO Y., KANAYAMA M. and NAKAZONO T. ... 83
Comparison between Vertical and Horizontal Coefficients of Consolidation of Remolded and Undisturbed Clays	NISHIMURA S., KITAGAWA Y., NISHIYAMA T., MURAKAMI A. and MURAYAMA Y. ... 91

XRF Observation of Cd Distribution in a Freezing Porous Powder

.....WATANABE K. and NAKANISHI K. ... 99

**Technical Reports**

Comparison of Resident's Consciousness on Multi-Functional Role of Irrigation Water at Urban and Rural Areas  
—Case study of the functions at Kanazawa City and the Shichika irrigation district—

...HASHIMOTO I., TANO N., MURASHIMA K., TAKIMOTO H., UEDA T., MINAMI Y. and MARUYAMA T. ...105  
Aeration Performance at Slopes with Embedded Stones

.....FUJIHARA M., FUKUSHIMA T. and OKAMOTO T. ...119  
Aeration Performance at Weirs with Slope

—Comparative study with aeration at free weir—

.....FUJIHARA M., FUKUSHIMA T., MATSUKI Y. and OKAMOTO T. ...127

**Critical Review**

Colloid-facilitated Transport in Soil-Water Systems

.....SUETSUGU A., SATO T., KANETA Y. and SATO A. ...135

**Notice about photocopying**

In order to photocopy any work from this publication, you or your organization must obtain permission from the following organization which has been delegated for copyright for clearance by the copyright owner of this publication.

**Except in the USA**

Japan Academic Association for Copyright Clearance (JAACC)  
41-6 Akasaka 9-chome, Minato-ku, Tokyo 107-0052, Japan  
Phone : 81-3-3475-5618    FAX : 81-3-3475-5619    E-mail : kammori@msh.biglobe.ne.jp

**In the USA**

Copyright Clearance Center, Inc.(CCC)  
222 Rosewood Drive, Danvers, MA 01923 USA  
Phone : (978)750-8400    FAX : (978)750-4744    www.copyright.com