



P4



Highlight

STUDY ON RAPID LAKE-SHRINKAGE

Mechanism of the Rapid
Shrinkage of **Limboto Lake** in
Gorontalo, Indonesia

PREFACE

Our home “The Earth” which is the most beautiful planet in our solar system and known for the only place of living organisms according to our acquired knowledge from the science.

Although, humankind especially our ancestors might have experience of the varieties of natural disasters and phenomenon in the past, the acceleration of exploiting natural resources due to industrialization and technology revolution made various environmental impacts at our present moment. Some of them are visible through our eyes. The crystal-clear river water that our ancestors used in the past for their daily basic turned unclean and intoxicated with heavy metals from industrial waste water during our generation.

Humankinds and surrounding ecosystems have been suffering from natural disasters: ozone layer depletion, global warming, sea level rising, as well as man-made environmental problems: air pollution, water pollution, industrial waste water contamination, etc. which may further lead to the excessive amount of chemicals in our food changes. These problems further lead to the health and social problems. Developed countries have been facing those environmental problems whilst developing countries have much higher impacts due to the issues of poverty as the underlying background.

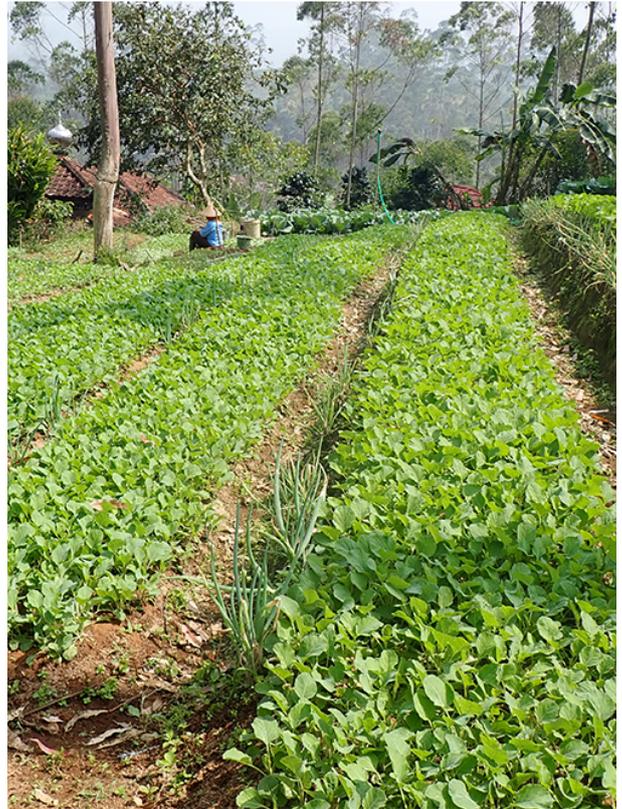
Poverty remains one of the greatest challenges in developing and underdeveloped countries where many are still struggling for the most basic human needs such as food, clean water, sanitation, education and work.

Due to the global demand and continuously increasing of gold price in recent decades, artisanal and small-scale gold mining known as ASGM became the survival for the living of the people living in poverty. An estimated 10-15 million miners, including 4-5 million women and children may directly involve in ASGM sector, another 100 million people to be reliant upon the sector for their livelihoods, where there are varieties of social conflicts and economic issues. Along with those conflicts and issues, it is also the largest global demand for mercury and release the estimated amount of 1400 tons of mercury annually.

The environmental pollution related to ASGM activities have health impacts as miners and people living surrounding areas have suffered from varieties of health issues such as respiratory distress and lung disease from toxic inhalation, and vomiting, headache, fever, chills, abdominal pains and diarrhea from absorption of elemental mercury.

In order to make solutions for those environmental and social problems, we need transdisciplinary approach of research and practice in collaboration and cooperation between scientists and key stakeholders including various societal partners such as governments, companies, and citizen groups, and then we will clarify the solution to solve the problems as well as the sustainable development for the future generations to become well-beings and live in this beautiful world because this is the only known planet where human beings can survive.

Prof. Masayuki Sakakibara
Project Leader
SRIREP Project, RIHN



Discussing with stakeholders

ABOUT SRIREP PROJECT

Among the environmental pollution problems, the mercury (Hg) pollution problem is one of the most serious problems impacting on the ecosystem and human health. Especially, "Minamata disease" that occurred in Kumamoto and Niigata prefectures in the 1950s and 1960s shocked the world. Despite these, Hg has been used in the industry until now for its unique usefulness, and Hg has been released into the atmosphere. To tackle this issue, the United Nation Environment Program (UNEP) concluded a global treaty, "Minamata Convention on Hg (10 October 2013)", which works for the reduction of anthropogenic release of Hg and prevention of Hg pollution on global scale. Recent investigations by UNEP have highlighted the continuing significance of Hg pollution in developing countries and its harmful effects on human health and ecosystems.

One of the main causes of Hg pollution is artisanal and small-scale gold mining (ASGM), where Hg is used in the traditional method of amalgamation to extract gold from the ore rock. Although many countries have ratified the Minamata Convention, mercury emissions are increasing rather than decreasing. This indicates that in practical, this poverty-based global environmental problem cannot be solved with ratification of international treaties and NGO activities alone.



Meeting with miners

OUR PURPOSE

The purpose of our FR is to understand the link between poverty reduction and environmental management and to establish a process for constructing sustainable societies through regional innovations in collaboration with stakeholders in ASGM areas and to strengthen related environmental governance in developing countries. In our FS, we will conduct the following three levels of research based on a transdisciplinary approach, within the scope of Association of Southeast Asian Nations (ASEAN) countries: a) case studies of reductions in Hg pollution using a future scenario in ASGM areas of Indonesia and Myanmar; b) study of regional networks that aim to generate Hg-free societies communities in Indonesia and Myanmar; and c) study of improvements in environmental governance in ASEAN countries.



Creating agriculture plot

Through these studies, we will achieve the regional innovation in collaboration with the stakeholders, and we will clarify the solution to solve the global mercury pollution of global environmental problem. In addition, we will also examine the design, practical use, and evaluation method of the transdisciplinary community of practice (TDCOP), a tool in problem-solving of regional communities, by applying the transformative boundary objects (TBOs) in interaction with stakeholders.

STUDY ON RAPID LAKE-SHRINKAGE

Mechanism of the Rapid Shrinkage of Limboto Lake in Gorontalo, Indonesia

Abstract: This study explores the mechanisms behind the rapid shrinkage of Limboto Lake, Gorontalo, Indonesia, using remotely sensed imagery and river outcrop investigation data. The results show that more than 70% of the sedimentation resulting in shrinkage is contributed by riverbank erosion causing rivers to drain into the lake during the period 2003–2017. From geological investigation, it is found that the lowland area to the west of Limboto Lake comprises 1 m of flood sediments, followed by at least 5 m of fine-grained inner bay sediments. Severe riverbank erosion is also observed at many points. Hence, it is concluded that the shrinkage of Limboto Lake resulted from rapid-induced rapid erosion of inner bay sediments formed during plate collision which readily flowed into and were deposited in Limboto Lake; this created a delta, especially on the west side of the lake. Accelerated sedimentation caused by river erosion has led to rapid lake shrinkage. This phenomenon could be typical of the transformation of enclosed seas into lakes by the rapid uplifting movement of land in collision zones.

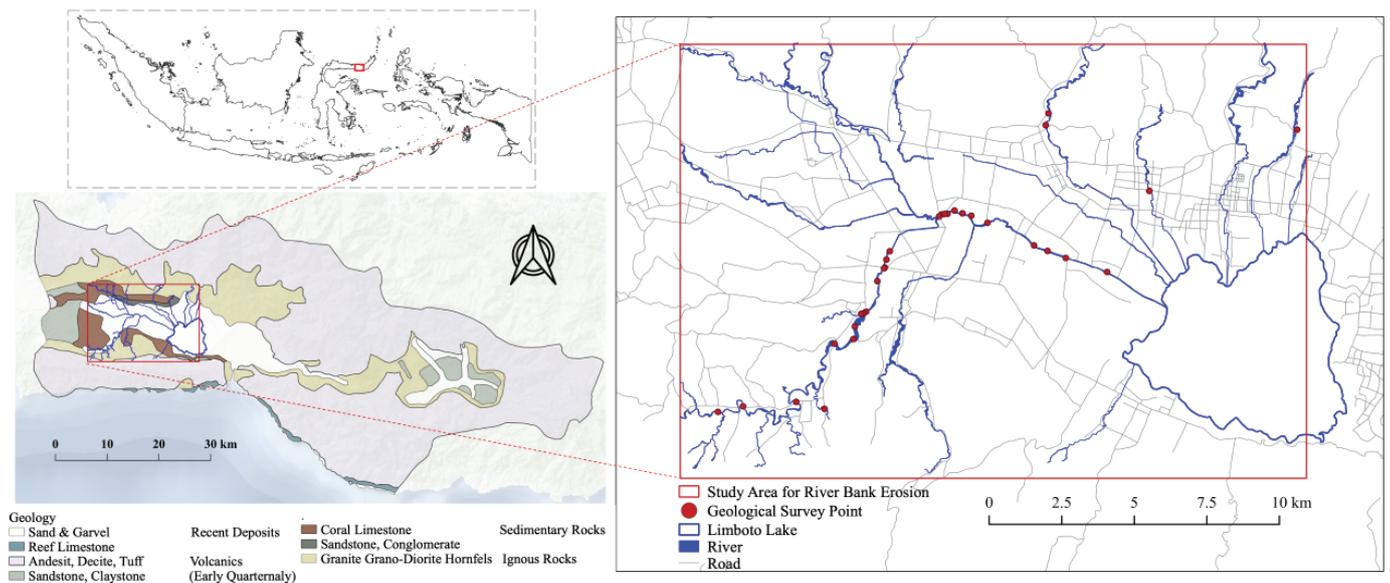


Figure 1. Study area.

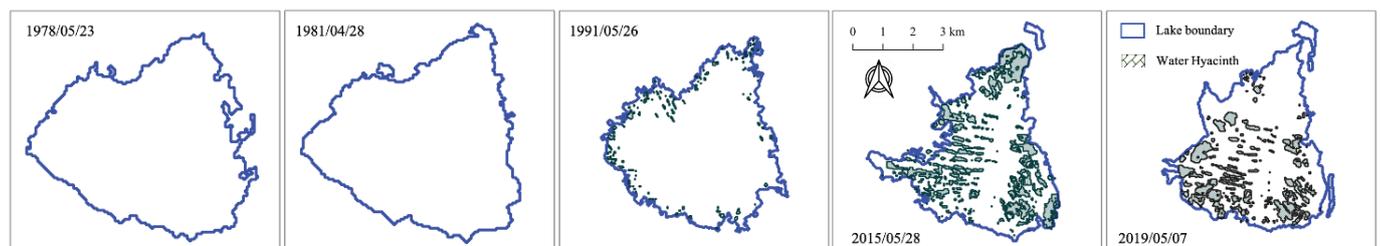


Figure 2. Time-series change in Limboto Lake extent and distribution of water hyacinth at the lake surface

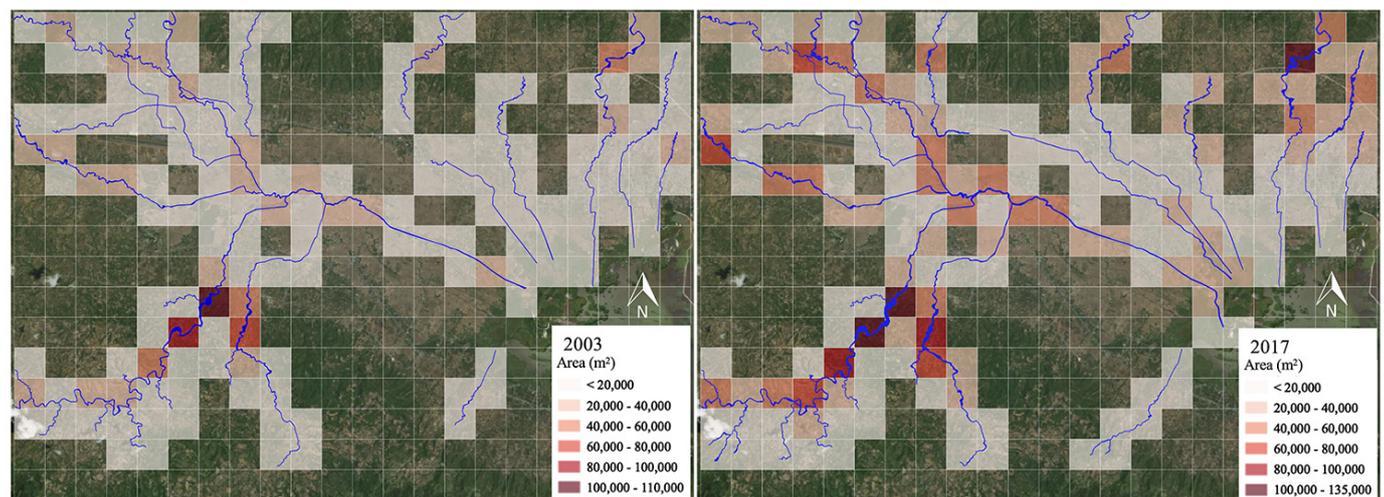


Figure 3. River in 2003 and 2017 by Mesh (1 km x 1km)

STUDY ON RAPID LAKE-SHRINKAGE

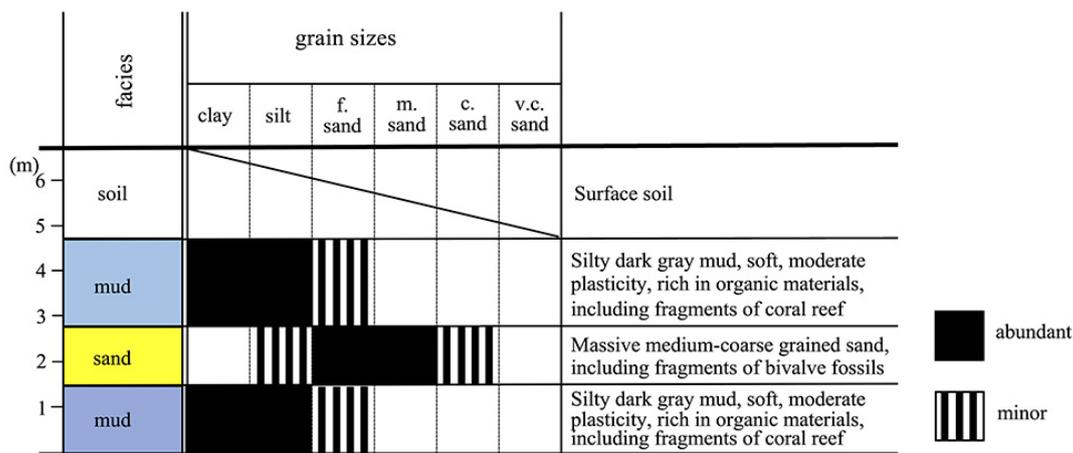


Figure 4. Representative geologic columnar section at an outcrop along the Alopohu river in the west area of Limboto Lake, Gorontalo Province.

This report entitled

Mechanism of the Rapid Shrinkage of Limboto Lake in Gorontalo, Indonesia

has been published in **Sustainability**, Multidisciplinary Digital Publishing Institute (MDPI) and available to download at <https://www.mdpi.com/2071-1050/12/22/9598>

This research was led by Dr. Satomi Kimijima, a researcher and one of the leading members in SRIREP project at Research Institute for Humanity and Nature (RIHN). She studied Master's in Gender and Development Studies at Asian Institute of Technology (AIT), Thailand as well as at Ochanomizu University, Tokyo, Japan respectively, and then she obtained Ph.D. for the specialties of Remote Sensing and GIS from Asian Institute of Technology (AIT), Thailand. Her interest in rural development and passion for the integration of the engineering approach into social science produces the essential involvement in the objectives of SRIREP projects especially creating transdisciplinary boundary objects and transdisciplinary communities of practice in rural areas of Indonesia.



Fishery in Limboto Lake

HEALTH SEMINAR

3rd Japan - ASEAN Medical Seminar on Human Health Impact of Heavy Metals

SRIREP Project held a medical seminar as an online Zoom Webinar entitled "3rd Japan - ASEAN Medical Seminar on Human Health Impact of Heavy Metals" on 31st October 2020 Saturday at 10:30 - 11:50 (Myanmar Local Time). The emphasized and highlighted topic of the seminar is "General Information on Mercury and its Pollution".

The seminar was organized by Research Institute for Humanity and Nature (RIHN), Japan and SRIREP project and supported by Japan Society for the Promotion of Science (JSPS), Japan and Environmental Conservation Department (ECD) of Ministry of Natural Resources and Environmental Conservation (MONREC), Myanmar. 109 participants from various governmental departments such as Environmental Conservation Department (ECD), Food and Drug Administration (FDA), etc. and the representatives from local organizations such as Network Activities Group (NAG) and We Women Foundation Myanmar attended the seminar.

First and foremost, Deputy Director-General U Min Maw, Environmental Conservation Department (ECD) of Ministry of Natural Resources and Environmental Conservation (MONREC), Myanmar gave the opening speech to the audience regarding mercury intoxication and current issues, the roles of ECD for handling the use of mercury matters in Myanmar.

Professor Masayuki Sakakibara, Project Leader of SRIREP Project, Research Institute for Humanity and Nature (RIHN) presented "What is Mercury?" and Mr. Myo Han Htun, Research Associated of SRIREP Project presented "The Use of Mercury in Daily Life" respectively. Then, Dr. Win Thiri Kyaw explained about "Mercury Free Society Networks" and its visions, missions, and planning to the audiences. Participants actively questioned, answered, and discussed the current issues regarding mercury pollution and mercury pollution control, mercury-intoxication, mercury containing products with the panelists.

The seminar was conducted in bilingual: English and Myanmar languages due to the majority of audiences is from the general public.

3rd Japan-ASEAN Medical Seminar on Human Health Impact of Heavy Metals

Please Think! Health & Well-being of Future Generations

Seminar Title
General Information on Mercury and its Pollution

Date and Time:
31st October 2020 (SAT)
 10:30 - 11:50 (Myanmar Time)
 13:00 - 14:20 (Japan Time)

Moderator:
Myo Han Htun

Audience:
General Public of Myanmar

Language:
English

Method:
Zoom Video Webinar

Organized by
 Inter-University Research Institute Corporation
 National Institutes for the Humanities
Research Institute for Humanity and Nature

SRiREP
 regional innovation

Topics/ Speakers

Section 1: 13:00 - 13:10
Opening Speech by Invited Speaker
Deputy Director General U Min Maw,
 Environmental Conservation Department,
 Ministry of Natural Resources and Environmental Conservation

Section 2: 13:10 - 13:25
What is Mercury?
Professor Masayuki Sakakibara,
 SRIREP Project, Research Institute for Humanity and Nature,
 Kyoto, Japan

Section 3: 13:25 - 13:35
Use of Mercury in Daily Life
Myo Han Htun,
 SRIREP Project, Research Institute for Humanity and Nature,
 Kyoto, Japan

Section 4: 13:25 - 13:35
Mercury Free Society Network
Dr. Win Thiri Kyaw,
 SRIREP Project, Research Institute for Humanity and Nature,
 Kyoto, Japan

Section 5: 13:50 - 14:20
Discussion

SRIREP PROJECT MEMBERS

Sakakibara Masayuki

Project Leader of SRIREP project
RIHN/ Ehime University

MATSUDA, Hiroyuki

Professor, Yokohama National University,
Leader of Natural Science Group

SHIMAGAMI, Motoko

Associate Professor, Ehime University,
Sociology of Community in ASGM Area

MATSUMOTO, Yuichi

Professor, Kwansai Gakuin University,
Theoretical and Practical Studies on TDCOP

KASAMATSU, Hiroki

Senior Assistant Professor, Ehime University,
Sociology of the Local Community in ASGM
Area

KOMATSU, Satoru

Associate Professor, Nagasaki University,
Social-economic Evaluation in ASGM Area

YAMAMOTO, Yuki

Associate Professor, Nagasaki University,
Social-economic Evaluation in ASGM Area

NARABAYASHI, Kenji

Professor, Ehime University, Environmental
Law in Southeast Asian Countries

KITAMURA, Kenji

Assistant Professor, Kanazawa University,
Theoretical Study on TDCOP

ABE, Akira

Professor, Mie Prefectural College Of Nursing,
Theoretical Research on Poverty and
Environmental Ethics Problems

MIYAKITA, Takeshi

Professor, Kumamoto Gakuen University,
Research on a Reconstruction of Communi-
ty/Epidemiologic Survey on ASGM Areas

SAYANAGI, Nobuo

Associate Professor, Yamanashi Eiwa College,
Psychological Study on Poverty in ASEAN
Countries

YAMAGUCHI, Tsutomu

Chief of Nagoya Office, ESPEC MIC Corp.,
Technological Support for the Development
Plant Products

SUGAWARA, Hisanari

Curator, Gunma Museum of Natural History,
Study on Community Management of Global
Geopark

OKAMOTO, Ikuko

Professor, Toyo University, Study on
International Development

MIYASAKI, Hidetoshi

Visiting Researcher, National Museum of
Ethnology, Practical Research of Value-added
Composite Agriculture in a Non-polluted Area

ITO, Yutaka

Lecturer, Akita University, Social-economic
Evaluation in ASGM Area

WATANABE, Yasuko

CEO, Watanabe-tette, Design Development of
Traditional Hand-craft "Karawang" in Gorontalo
Province

KOIZUMI, Hatsu

Staff, Soshisha, the Minamata Disease Museum,
Sociology of community in ASGM Area

ABBAS, Habo Hasriwiani

Lecturer and Researcher, Universitas Islam
Indonesia, Medical Geology of Traditional
Smelters in Sulawesi

BASRI

Lecturer and Researcher, College of Health
Sciences Makassar, Environmental Science in
ASGM Area in Bombana Regency, Southeast
Sulawesi Province, Indonesia

PRASETIA, Hendra

Lecturer and Researcher, Development of
Bioindicator using Dendrochemistry, Lampung
University

GAFUR, Abdul Nurfitri

Expert of Researcher, BAPPEDA-LITBANG of Bone
Bolango Regency, Environmental Science in
ASGM Area in Bone Bolango Regency

PATEDA, Sri Manovita

Graduate student, Ehime University, Develop-
ment of Bioindicator on Mercury Exposure

BASIR

Graduate Student, Ehime University, Case study
in Bombana Regency, Southeast Sulawesi
Province, Indonesia

BADARU, Arifia Warapsari

Graduate Student, Ehime University, Survey of
Geosites in Gorontalo Geopark Concept

RACHAMAN, Agus Bahar

Graduate Student, Ehime University, Practical
Research of Value-added Composite Agriculture
in Non-polluted Area

ISA, Ishak

Professor, State University of Gorontalo, Study
on Bioethanol



SRIREP PROJECT MEMBERS

MOHAMAD, Jahja

Associate Professor, State University of Gorontalo, Physical Analytical Study on Natural Products

ARIFIN, Indriati Yayu

Lecturer and Researcher, State University of Gorontalo, Analysis of Total Mercury Concentration on Natural Samples, Study on Medical Geology

LAHINTA, Agus

Lecturer, State University of Gorontalo, Study on Karawo Management

OLILINGO, Fachruddin

Lecturer, State University of Gorontalo, Social-economical Evaluation on Transdisciplinary Practical Researches

PONGOLIU, D. Isyana Yayu

Lecturer, State University of Gorontalo, Social-economical Evaluation on Transdisciplinary Practical Researches

MANYOE, Noviantari Intan

Lecturer, State University of Gorontalo, Study on Geopark

ZAENAL, Abidin

Lecturer and Researcher, Bogor Agricultural University, Development of Environmental Remediation Materials

KARDENA, Edwan

Associate Professor, Bandung Institute of Technology, Study of Environmental Governance in Indonesia

ABDURRACHMAN, Mirzam

Lecturer, Bandung Institute of Technology, Basic Study of Geopark, Case Study of ASGM Site in Southern Bandung Area, Indonesia

KURNUAWAN, Andri Idham

Lecturer and Researcher, Bandung Institute of Technology, Basic Study of Geopark, Case Study of ASGM Site in Southern Bandung Area, Indonesia

ARIFIN, Bustanul

Professor, University of Lampung, Socioeconomic Evaluation of Agricultural Areas in Gorontalo Province

ISOMONO, Hanung

Lecturer, University of Lampung, Socioeconomic Evaluation of Agricultural Areas in Gorontalo Province

MUHAMMAD, Gobel

Graduate student, Local communicator Bogor Agricultural University

MOHAD, Lamanasa

Prefecture staff, Local communicator Bone Bolango Regency

BOBBY

Chief Executive Officer, Network Activities Groups, Practice of Action Program and its Management in Myanmar

KIMIJIMA, Satomi

Researcher, Research Institute for Humanity and Nature, Case studies of ASGM sites in Indonesia and Myanmar

KUANG, Xiaoxu

Researcher, Research Institute for Humanity and Nature, Chemical Analysis of Environmental Samples

WIN THIRI KYAW

Researcher, Research Institute for Humanity and Nature, Medical Study on Mercury Toxicity in Myanmar

JOMAE, Kyoko

Clerical Assistant, Project Management, Ehime University

TAKEHARA, Mari

Research Associate, Project Management, Research Institute for Humanity and Nature (RIHN)

MYO HAN HTUN

Research Associate, Management on Websites and Supporting FR Researchers, Research Institute for Humanity and Nature (RIHN)

SRIREP Project / Mercury Project

Please contact us via the following information regarding the project, research, and activities such as conference, seminar, workshop, collaboration, etc.

Address

Research Institute for Humanity and Nature (RIHN)
457-4 Kamigamo Motoyama, Kita-ku, Kyōto-shi, Kyōto-fu 603-8047

Telephone

Please call us during office hours (08:30 – 17:00)
except weekend and public holidays
075-707-2357 (Japanese Speaking)
075-707-2344 (English Speaking)

Email

room11@chikyu.ac.jp



Satoru KOMATSU

Associate Professor,
Graduate School for Global Humanities and Social Sciences, Nagasaki University

Satoru Komatsu is working as an Associate Professor at the Graduate School for Global Humanities and Social Sciences, Nagasaki University, Japan. His research interest includes the economic valuation of the environment and natural resources, evaluation of the rural electrification projects, water hauling, and development challenges mainly in Asia. He intends to evaluate the environmental and health consequences of engaging ASGM issues for rural villagers under SRIREP projects. He published academic articles in the field of environmental economics and energy economics such as Environment, Development and Sustainability, Energy, Energy for Sustainable Development, Ecological Economics, etc.