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## PREFACE

Our home “The Earth” which is the most beautiful plant 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 key 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.

## WHAT IS ASGM?

### PART 1

Artisanal and small-scale gold mining known as ASGM becomes popular due to the global demand and continuously increasing gold price in recent decades. An estimated 10-15 million miners, including 4-5 million women and children involved in ASGM sector where another 100 million people to be reliant upon the sector for their livelihoods in more than 70 countries around the world and it became a complex global development issue.

ASGM use mercury for amalgamation as the traditional method to extract gold from the ore rock. On the other hand, it is also the largest global demand for mercury and releases the estimated amount of 1400 tons of mercury annually. The consequence of mercury intoxication happened due to the excessive amount of using mercury and releasing it during the amalgamation process.

Miners have suffered from varieties of health issues and diseases such as respiratory distress and lung disease from toxic inhalation, and vomiting, headache, fever, chills, abdominal pains, and diarrhea from absorption of elemental mercury.

Miners and their communities can be protected from the harmful effects of mercury by practicing simple and practical ways. It is necessary to include sustainable development efforts widely which will decrease or stop the applying of mercury in ASGM.

Until present, a great number of people in developing countries have to work in ASGM to meet their living needs. But this causes the downside of the whole community. Practicing of ASGM with improper technique has caused the environmental and occupational health problems which affect the health and well-being of minors, their family members and also nearby communities. The Minamata Convention on Mercury, adopted in October 2013, has encouraged the movement globally, regionally and nationally for the promotion and protection of health and well-being of populations that depend on ASGM. Hence the usage of mercury in ASGM has been identified as a threat to the health and environmental wellbeing, the Convention necessitates the members to establish the public health strategies aimed for the reduction of mercury exposure in ASGM miners and their communities.

to be continued in Part 2

***Artisanal and small-scale gold mining known as ASGM is the largest global demand for mercury and release the estimated amount of 1400 tonne of mercury annually.***



***Miners suffered varieties of health issues and diseases such as respiratory distress and lung disease from toxic inhalation, and vomiting, headache, fever, chills, abdominal pains, and diarrhea from absorption of elemental mercury.***

## TREPSEA 2018

### The 3rd international conference of the Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA2018) at Gorontalo, Sulawesi, Indonesia.

The 3rd international conference of the Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA 2018) was held on August 11 – 12, 2018 at TC Damhil UNG, State University of Gorontalo, Gorontalo City, Sulawesi, Indonesia.



This International conference of the Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA) aims to conduct integrative research of interactions between the natural environment and human-social systems in Southeast Asia to solve the environmental problems in Southeast Asia.

Its scope thus includes topics of geoscience, environmental science, engineering, medicine, economy, culture, education, and administration.

The TREPSEA conferences featured oral and poster presentations and workshop, and participants presented, shared and discussed their experience on the following topics: 1) Disaster Mitigation, 2) Sustainable Development and Environmental Preservation, 3) Measure and Improvement to Urban Environmental Problem, and 4) Food and Human Security.

There were more than 200 attendees: scientists, researchers, stakeholders, and funders from Indonesia, Japan, South Africa, Myanmar, and Vietnam attended at TREPSEA2018.



## TRPNEP 2018

### The 1<sup>st</sup> ASEAN-Japan Meeting Point of Collaboration by Stakeholders and Researchers for Reducing Environmental Problems in ASEAN Countries, Bandung, Indonesia.

The 1<sup>st</sup> ASEAN - Japan Meeting Point of Collaboration by Stakeholders and Researchers for Reducing Environmental Problems in ASEAN Countries which aims to create cooperation between stakeholders and researchers of Japan and ASEAN countries to make the better outcomes for our societies, and the reduction of environmental problems. The seminar was held at Bandung Institute of Technology (ITB), Bandung, Indonesia on December 8 ~ 9, 2018.

More than 120 participants from ASEAN and Japan shared, discussed, exhibited and exchanged their experience and expertise, innovation and outcomes of transdisciplinary research and practice



The seminar featured displays of innovations, presentations, and workshops.



More than 120 participants from ASEAN and Japan shared, discussed, exhibited and exchanged their experience and expertise, innovation and outcomes of transdisciplinary research and practice on the following topics: 1) Prevention and Reduction of Natural Disasters, 2) Improvement on Urban Environmental Problems, 3) Environmental Preservation and Sustainable Development and 4) National Security for Food and Health.

## THE 1ST JAPAN - ASEAN MEDICAL SEMINAR ON HUMAN HEALTH IMPACT OF HEAVY METALS, MAKASSAR, INDONESIA.

The 1st Japan - ASEAN medical seminar on the human health impact of heavy metals was held on May 3rd, 2019 at Prof. Amiruddin Auditorium, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia.

The purposes of the seminar are to share the information of Minamata disease and current challenges, and to discuss the diseases related to the consequence of heavy metals intoxication.



*Attendees from Makassar University, Kumamoto Gakuen University, Ehime University and Research Institute for Humanity and Nature*

More than eighty attendees including health care professionals, scientists and researchers with a range of medical experiences from Japan and Indonesia participated and shared their experience and concerns related to heavy metals intoxication in this seminar.



*Traditional Song "Sulawesi Pa'rasanganta" was performed at the opening ceremony of the seminar*



*Prof. Masayuki Sakakibara from Ehime University & Research Institute for Humanity and Nature (RIHN) gave opening speech at the seminar*



*Prof. Akitomo Shimoji, Kumamoto Gakuen University gave his lecture on Minamata spectrum syndrome*



*Attendees from Makassar University, Kumamoto Gakuen University, Ehime University and Research Institute for Humanity and Nature*

## THE 2ND JAPAN - ASEAN MEDICAL SEMINAR ON HUMAN HEALTH IMPACT OF HEAVY METALS, GORONTALO, INDONESIA.

We also performed the 2nd Japan - ASEAN medical seminar on the human health impact of heavy metals on May 5th, 2019 at Damhil Hotel, Gorontalo University, Gorontalo, Indonesia.

In this seminar, we shared the information of Minamata disease and current challenges, and discussed on the diseases related to the consequence of heavy metals intoxication.



*Dr. dr. Muhammad Isman Jusuf gave appreciation of tokens to the invited speakers*

There were more than one hundred and thirty participants including health care professionals, scientists and researchers with a range of medical experience from Japan and Indonesia. They shared their experience and concerns related to heavy metals intoxication in this seminar.



*Performance dance named "Kreasi Saronde" at the opening ceremony of the seminar*



*Prof. Masayuki Sakakibara from Ehime University & Research Institute for Humanity and Nature (RIHN) gave opening speech at the seminar*



*Participants including health care professionals, scientists and researchers with a range of medical experience from Japan and Indonesia.*



*Activity from the 2nd Japan - ASEAN medical seminar on the human health impact of heavy metals*

## THE PROGRESS OF THE COLLABORATION FOR MYANMAR

Myanmar has been known as a resourceful country with rich natural resources and biodiversity, however the over reliance on available natural resources and intensive operating of natural resources sectors has led to fast environmental degradation and environmental pollution. Among the industries, mining has been practiced increasing to meet the country's needs of development and economic transformation while the effective environmental regulations of mining activity are under development. ASGM is also widely practiced across the country's mining area without proper assessment of ASGM induced mercury pollution. We have been starting dialogs with Ministry of Natural Resources and Environmental Conservation (MONERC), Environmental Conservation Department (ECD) for the collaboration and the reduction of environmental pollution problems especially mercury pollution in ASGM areas in Myanmar since last year.



*Director General Mr. Hla Maung Thein, Ministry of Natural Resources and Environmental Conservation (MONERC), Environmental Conservation Department (ECD) explained about the condition of environmental issues in Myanmar to Prof. Hein Mallee and Prof. Makoto Taniguchi and Deputy Director Generals of Research Institute for Humanity and Nature in February, 2019.*



*Prof. Masayuki Sakakibara discussed with Director General Mr. Hla Maung Thein at Ministry of Natural Resources and Environmental Conservation (MONERC), Environmental Conservation Department (ECD) during his visit in October, 2018.*



*Prof. Masayuki Sakakibara discussed with Director Dr. Tin Min Maung, Environmental Conservation Department (ECD) of Mandalay Region during his visit in October, 2018.*

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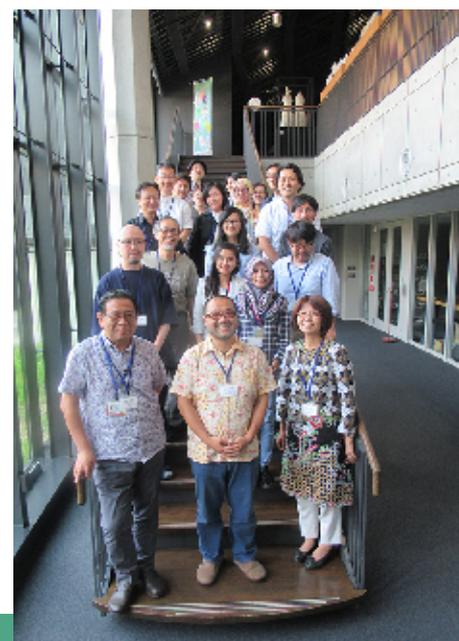
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**Masayuki SAKAKIBARA**  
Project Leader of SRIREP project, RIHN/ Ehime University

Professor Masayuki Sakakibara is an earth scientist with multidisciplinary backgrounds of Geology, Petrology, Astrobiology, Geochemistry, Medical Geology, Geoengineering, and Remediation Engineering etc., currently working at Faculty of Collaborative Regional Innovation and Graduate School of Science and Engineering, Ehime University in Ehime Prefecture.

His strong interest in environmental pollution led him to intensive fieldwork and activities to reduce mercury pollution and poverty problems in artisanal and small-scale gold mining (ASGM) areas in Indonesia for over eight years, work conducted with students, scientists, researchers, and various stakeholders from Indonesia, ASEAN countries, and Japan. Professor Sakakibara is also responsible for international conferences and seminars such as Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA) and Transdisciplinary Research and Practice for Reducing Environmental Problems (TRPNEP), which focus on transdisciplinary approaches to research and practice, as well as development of various regional innovations for the reduction of environmental pollutions in ASEAN countries.