

# **Poster Presentations**

## **Kyoto University International Symposium 2023 on Education and Research in Global Environmental Studies in Asia**

**Rural Culture and Conservation – Implications for Global  
Environmental Studies in the Anthropocene**

**Graduate School of Global Environment Studies  
Kyoto University**

**2023**

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Global Ecology (GE) · · · · · pp.7-26

\*GE 06, 15 and 19 are not published.

Environmental Technology (ET) · · · · · pp.27-63

\*ET 04, 06, 13, 15, 19, 20 and 21 are not published.

Natural Recourse (NR) · · · · · pp.64-100

\*NR 04, 06, 14, 20, 21 and 23 are not published.

# KYOTO UNIVERSITY INTERNATIONAL SYMPOSIUM 2023

## on Education and Research in Global Environmental Studies in Asia

### Rural Culture and Conservation - Implications for Global Environmental Studies in the Anthropocene

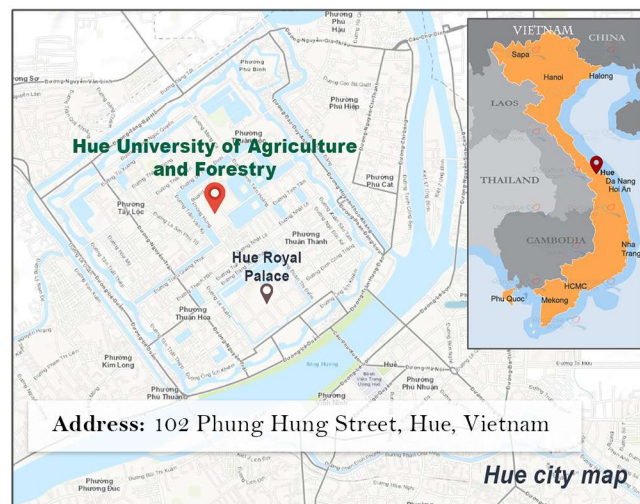
**December 11, 2023**

(UTC + 7:00 time zone)

- 09:00 - 09:20 **Opening and Welcome Address**  
(Moderators: Atsushi Takai, Vu Tuan Minh)  
Nagahiro Minato President, Kyoto University  
Le Anh Phuong President, Hue University  
Takeshi Katsumi Dean of GSGES, Kyoto University  
Tran Thanh Duc Rector, Hue University of Agriculture and Forestry
- 09:20 - 09:30 **Group Photo**
- 09:30 - 10:15 **Keynote Speech**  
Le Van An Former Rector, Hue University of Agriculture and Forestry
- 10:15 - 11:00 **Ceremony: The Title of Honorary Professor**  
Shigeo Fujii, Professor Emeritus, Kyoto University
- 11:00 - 12:00 -- Lunch break --
- 12:00 - 13:15 **Poster presentations**
- 13:30 - 15:00 **Oral presentations**  
Sub-session 1 : **Global Ecology**  
Sub-session 2 : **Environmental Technology**  
Sub-session 3 : **Natural Resources**  
-- Tea break --
- 15:00 - 15:15 **Award Ceremony for Best Posters**
- 15:15 - 15:20 **Group photo**
- 15:20 - 15:30 **Closing Remarks**  
(Moderators: Shinya Echigo, Tran Thi Quynh Tien)  
Makoto Usami, Vice-Dean of GSGES, Kyoto University

Participation fee  
**FREE of charge**

Online +  
**Hue University of Agriculture  
and Forestry**



### How to access Zoom?

URL: <https://www2.eip.ges.kyoto-u.ac.jp/symposium2023/zoom>

Please check the website for the  
Zoom link and other connection  
details >>



#### Organized by:

Graduate School of Global Environmental Studies (GSGES), Kyoto University | Hue University of Agriculture and Forestry

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京都大学  
KYOTO UNIVERSITY

**GSGES**  
Kyoto University  
Graduate School of Global Environmental Studies



# KYOTO UNIVERSITY INTERNATIONAL SYMPOSIUM 2023

## on Education and Research in Global Environmental Studies in Asia

### Rural Culture and Conservation - Implications for Global Environmental Studies in the Anthropocene

#### DIGNITARIES



#### Keynote Speech

#### Le Van An

Former Rector, Hue University of Agriculture and Forestry

'Participatory Approach in Cultural Conservation: A Story in Construction, Maintenance and Renovation of the Ethnic Minority Community House in Hong Ha commune'



#### Award Commemorative Speech

#### Shigeo Fujii

Professor Emeritus, Kyoto University

'Memories of GSGES's education and research activities in Hue'

This speech will highlight his contributions to Hue University and present ideas on establishing inter-university collaborations.

### POSTER PRESENTATIONS - Parallel sessions

1. Each presenter will be given 2 minutes to explain the poster. Q&A sessions will be conducted together for multiple presentations.
2. Best poster presentations (only for presenters under 40 years of age) will be judged by the selection committee, and awarded before the Closing session.

1

#### Global Ecology

23 posters

Co-chairs: **Ryo Nukina**  
GSGES, Kyoto University

**Tran Thanh Duc**  
Hue University of Agriculture and Forestry

#### Introduction of co-chairs and session (12:00 - 12:05)

|  |                             |  |
|--|-----------------------------|--|
| GE01   | <b>Daehan An</b>            | A study on the sustainable water-energy-food nexus in South Korea: A simultaneous equations approach   |
| GE02   | <b>Ryan Hidayat</b>         | Development of Sustainable Tourism in Cultural Heritage Areas in Kebumen Geopark   |
| GE03   | <b>Izazaya Binta</b>        | Conserving Living Heritage in Green Concept Approach: A Case of Singkawang City, Indonesia   |
| GE04   | <b>Le Thi Thu Ha</b>        | Factors Affecting the Development of Household-Scale Acacia Plantations for Large-sized Timber in Central Vietnam  |
| GE05   | <b>Shiori Sano</b>          | Process of Policy Learning by Local Governments: The Case of SDGs Platforms in Japan   |
| GE06   | <b>Nguyen Duy Ngoc Tan</b>  | Studying on effects of branch cutting position and Indole-3-Acetic Acid (IAA) to growth of Jasminum subtriplenerve blume in Central Vietnam  |
| GE07   | <b>Shoaib Salman</b>        | Sustainable drinking water production from Seawater  |
| <b>Discussion of Posters from GE01 to GE07 (12:19 - 12:27)</b> |                             |  |
| GE08   | <b>Yuqi Zhang</b>           | The livability in shrinking cities: A case study from Fuxin City, China  |
| GE09   | <b>Girbani Pokhrel</b>      | Transformative Shifts in Livelihood in Trans-Himalayan Zone: Manang, Nepal   |
| GE10   | <b>Yatong YANG</b>          | Beyond National Sovereignty: Applying the Subsidiarity Principle to Climate Change Displacement  |
| GE11   | <b>Sailu Zhang</b>          | The effects of emission trading scheme and government pressure on corporate climate change disclosure in China   |
| GE12   | <b>Rika Fajrini</b>         | Judge in White Coat : How Courts Assess the Environmental Impact Assessment (EIA) Case Study of Indonesia Environmental Administrative Litigation  |
| GE13   | <b>Yumi Anggraini</b>       | Residential Energy Behaviour in Japan: From the Gender Perspective   |
| GE14   | <b>Phan Thi Thao Linha</b>  | Studying the acute toxicity of iron and arsenic in the cladoceran Moina macrocopa  |
| GE15   | <b>Nahoko Tanemoto</b>      | Meat consumption and gender norms: The case of Japanese youth  |
| <b>Discussion of Posters from GE08 to GE15 (12:43 - 12:51)</b> |                             |  |
| GE16   | <b>Sahar Hassani</b>        | Environmental Crisis, Human Rights Violations, and Governments' Responsibilities: A Case Study of Dryness of Urmia Lake in Iran  |
| GE17   | <b>Fathan Aldi Rivai</b>    | Detection of Land Use and Land Cover Change in Sukajaya District use Machine Learning on Google Earth Engine   |
| GE18   | <b>Phuoc Cuong</b>          | Development of a dataset on soil and groundwater environmental health quality using a combination of physicochemical method and machine learning models in Vietnam Central: case study in Da Nang city |
| GE19   | <b>Xie Yusong</b>           | Urban Roadway Networks and Their Multifaceted Effects on LULC, Environment, and Economy: Taking the major metropolitan in Japan as example   |
| GE20   | <b>Mariam Kvaratskhelia</b> | Actual and Perceptual Barriers to Commuting Cycling in Georgia   |
| GE21   | <b>Roma Kandpal</b>         | Electric mobility transition in India: Mapping out policies at the sub-national level.   |
| GE22   | <b>Atie Ernawati</b>        | Architectural Fusion and Cultural Harmony: Exploring the Influence of Cultural Diversity on Kampung Baru Historic Mosque Jakarta   |
| GE23   | <b>Tomohiro Kondo</b>       | Adaptability to environmental stresses of local crops used to be cultivated in slash-and-burn fields in the Kyushu Mountains, Japan  |
| <b>Discussion of Posters from GE16 to GE23 (13:07 - 13:15)</b> |                             |  |

2

#### Environmental Technology I

23 posters

#### Pollution control and environmental management

Co-chairs: **Youhei Nomura**  
GSGES, Kyoto University

**Huynh Trung Hai**  
Hanoi University of Science and Technology

#### Introduction of co-chairs and session (12:00 - 12:05)

|  |                                |   |
|--|--------------------------------|---|
| ET01   | <b>Mai-Huong Cao</b>           | A comparison study of PM <sub>2.5</sub> concentrations in Hanoi and Ho Chi Minh city  |
| ET02   | <b>Dinh Quoc Huy</b>           | A study on the investigation of the dominant type of motorcycles in Hanoi, Vietnam  |
| ET03   | <b>Nguyen Phuoc Quy An</b>     | Studying on dust pollution from traffic activities in Ton Duc Thang - Nguyen Luong Bang Street, Da Nang                             |
| ET04   | <b>Yin Nyein Myat</b>          | Assessment of Airborne Microplastics Concentrations in Thung Thalad Dumpsite  |
| ET05   | <b>Chu Thi Thuc Trinh</b>      | Determining real-world driving characteristics of motorcycles in Hanoi, Vietnam   |
| ET06   | <b>Oluwatoyin Hannah O.</b>    | Exposure to Subway Particles' Components Induced Endothelial Dysfunction  |
| ET07   | <b>Le Hoang Son</b>            | Health risk assessment of street food customers: A comparative study in Danang, Vietnam   |
| ET08   | <b>Kanitthika Santhaweesuk</b> | Evaluation of Hexabromocyclododecane and Tetrabromobisphenol - A Levels in Indoor Total Dust in Bangkok Metropolitan Area, Thailand |
| <b>Discussion of Posters from ET01 to ET08 (12:21 - 12:29)</b> |                                |   |
| ET09   | <b>Tran Vu Chi Mai</b>         | Analysis of plastic waste generation and discard habits in Danang City, Vietnam   |
| ET10   | <b>Nguyen Hoang Trung H.</b>   | Biosynthesis of silver nanoparticles from Glinus Oppositifolius extract   |
| ET11   | <b>Vu Thi Mai Hoa</b>          | Composition of biosolids from high organic content wastewater treatment by activated sludge process                                 |
| ET12   | <b>Song Toan Pham Phu</b>      | Developing A Thermal-Composting System for Recycling Bio-solid Waste  |
| ET13   | <b>Kawinthip Wichatham</b>     | Discovering Bacteria with the Capability to Degrade Polypropylene Plastic in Soils  |

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|  |                              |  |
|--|------------------------------|--|
| ET14   | <b>Diep Ngoc Khoi Vo</b>     | Evaluation of the stabilization effectiveness of dewatered sludge by aerobic incubation experiments combined with a bulking agent  |
| ET15   | <b>Nattharika Phongmanee</b> | Occurrence and fate of Super-hydrophilic organic matter in natural waters in Japan and related Haloacetic acid formation potential   |
| ET16   | <b>Jayson Arizapa</b>        | Assessment of Different Spectral Indices for Surface Water Extraction  |
| <b>Discussion of Posters from ET09 to ET16 (12:45 - 12:53)</b> |                              |  |
| ET17   | <b>Aprillia Findayani</b>    | The Effectiveness of the APO (Sea Water Breaker) as Natural Based Solution on Mangrove Restoration in the North Coast of Central Java: a Comparative Study   |
| ET18   | <b>Ho Hong Quyen</b>         | Development of chitosan-based adsorbent for boron removal from aqueous solution  |
| ET19   | <b>Duy Nam Dao</b>           | Enhancing the efficiency of methylene blue degradation using TiO <sub>2</sub> quantum dot photocatalyst  |
| ET20   | <b>Nguyen Thi Thuy Hang</b>  | Evaluation of seaweed utilization potential to reduce pollution of waste waters sourced from tropical intensive shrimp farms   |
| ET21   | <b>Tran Thi Kim Nhi</b>      | Effects of Sodium Nitroprusside (SNP) treatment combined and Calcium Chloride (CaCl <sub>2</sub> ) on slowing ripening process and shelf life extension of Booth7 Avocado (Persea americana Mill.) after harvest |
| ET22   | <b>Hoang Thi Hong Van</b>    | Can bio-drying be the solution for DSW-based RDF?  |
| ET23   | <b>Pham Nguyet Anh</b>       | Area source emission inventory for air quality management: a case study of Vinh Phuc province, Vietnam   |
| <b>Discussion of Posters from ET17 to ET23 (13:07 - 13:15)</b> |                              |  |

3

#### Environmental Technology II

24 posters

#### Architecture, regional design, and disaster prevention

Co-chairs: **Yuto Tada**  
GSGES, Kyoto University

**Tran Ha Quan**  
Danang University of Science and Technology

#### Introduction of co-chairs and session (12:00 - 12:05)

|  |                                   |   |
|--|-----------------------------------|---|
| ET24   | <b>Keika Sato</b>                 | A Study of the Local Stone Industry and its Use in the Community -A Study of the Kitahira District  |
| ET25   | <b>Chawin Chantharasuphit</b>     | Architectural and Space Design in Temporary Refugee Camps   |
| ET26   | <b>Shuwei Yang</b>                | Preserve or Abandon: A Study on Hearth Transformations of the Wa Ethnic Group in Southwest China under Post-Resettlement Context                    |
| ET27   | <b>Jakkai Srivanichsakulchai</b>  | Renovation buildings with carbon reduction principles   |
| ET28   | <b>Asaka Jobe</b>                 | Survey on piloti architecture in flood-prone areas -A case study from Hitoyoshi City, Kumamoto Prefecture   |
| ET29   | <b>Yehong Lai</b>                 | The transformation of Hakka vernacular architecture - Hakka Weilong House   |
| ET30   | <b>Jakkrit</b>                    | The use of rubber wood in the development of architectural structures   |
| <b>Discussion of Posters from ET24 to ET30 (12:19 - 12:26)</b> |                                   |   |
| ET31   | <b>Augusto Cesar Oyama</b>        | A foretold human-made disaster: impacts of mega events on housing rights and marginalized groups in Rio de Janeiro, Brazil                          |
| ET32   | <b>Jayne Tereza Brito S.</b>      | Temporary Emergency Shelter: A case study in Maranhão-Brazil  |
| ET33   | <b>Maria Perez Rodriguez</b>      | Post-Disaster Housing Reconstruction in Mexico after the Earthquakes of September 2017  |
| ET34   | <b>Ngo Thi Ngoc Huyen</b>         | Study on Housing Model to Cope with Flood and Typhoon for Low-income Households in Quang Vinh Commune, Quang Dien District, Thua Thien Hue Province |
| ET35   | <b>Amanda Devina Sihombing</b>    | Disaster Preparedness and Local Wisdom for the Community Conservation in a Rural Area of Indonesia  |
| ET36   | <b>Celine Jamin</b>               | Human Capital Transferring Thatching Technology- The case study of the Miyama Kayabuki Thatching Company  |
| ET37   | <b>Awliya Rahmat Erviyus</b>      | Informal Architectural Development Prototype of Informal Urban Village House  |
| ET38   | <b>Yogi Bachtiar</b>              | Myth and philosophy: Exploring Architectural and Conservation of historic Mosques in Lombok   |
| ET39   | <b>Xiaolan Yao</b>                | Research on the Transformation of Building Space by Changing Society in Changqi Village of South Guangdong, China                                   |
| <b>Discussion of Posters from ET31 to ET39 (12:44 - 12:51)</b> |                                   |   |
| ET40   | <b>Medria Shekar Rani</b>         | Land Cover Change Analysis of Kampung Batu Lonceng, Indonesia   |
| ET41   | <b>Naelis Sazqia Kamalin</b>      | Spatial Distribution and Driving Factors of Land Use Change in Lebak Regency, Indonesia   |
| ET42   | <b>Passawut Vacharasinthu</b>     | Study Method of Vernacular Architecture : Case Study of Buffalo Fighting Stadium in Koh Samui, Suratthani   |
| ET43   | <b>Qinglong An</b>                | Suitability assessment of industrial heritage tourism of the towns along Chinese Eastern Railway in Heilongjiang Province                           |
| ET44   | <b>Patricia Pahlevi Noviandri</b> | The Sound of Ramadhan: Perceive Affective Assessment of Kampung Kauman, Yogyakarta  |
| ET45   | <b>Eggi Septianto</b>             | Exploring the Immaterial Qualities of Bandung's Historic Area: Towards a Multi-Sensory-Based Study in Architecture                                  |
| ET46   | <b>Mizue Hayashi</b>              | Fundamental Studies of Regional Redevelopment Towards Sustainable Well-being Vitalizing Local Community   |
| ET47   | <b>Imelda Irmawati Damanik</b>    | Upgrading Informal Settlement Concept with Community Based Design (Case Study: Ledok Timoho Settlement)   |
| <b>Discussion of Posters from ET40 to ET47 (13:07 - 13:15)</b> |                                   |   |

4

#### Natural Resources I

21 posters

#### Regional resources management

Co-chairs: **Akiko Higashiguchi**  
GSGES, Kyoto University

**Andrea Emma Pravitarsari**  
IPB University

#### Introduction of co-chairs and session (12:00 - 12:05)

|  |                                 |  |
|--|---------------------------------|--|
| NR01   | <b>Cathleen Simatupang</b>      | Assessment of PM <sub>2.5</sub> morphology and source identification near an industrial area in Thailand using Field Emission Scanning Electron Microscope |
| NR02   | <b>Bon Haley R. Gumabay</b>     | Assessing Spatial Changes and Predicting Land Cover Dynamics in La Mesa Watershed  |
| NR03   | <b>Kheam Soklin</b>             | Changes in Soil Fertility: A Case Study From Agricultural Land in Aoral District Kampong Speu Province, Cambodia   |
| NR04   | <b>Ayu Savitri</b>              | Dynamics of Land Cover Change, Regional Development, and Its Local Dependence Driving Factors in Bojonegoro Regency  |
| NR05   | <b>A P Wardana</b>              | Dynamics of Land Cover, Development Level, and Regional Typology of Central Java Province Based on Sustainable Development Index                           |
| NR06   | <b>Rufaidah Qonita Muslim</b>   | Effect of land-use change on chemical properties of volcanic soil  |
| NR07   | <b>Thanakon Sukuman</b>         | Spatio-Temporal Dynamics and Prediction of Land Use/Cover Changes in a Depopulating Region: Case of Saijo City, Ehime Prefecture                           |
| NR08   | <b>Novella Giovanni</b>         | Land use changes by informal economic activities in SijunjungRegency, West Sumatra, Indonesia  |
| <b>Discussion of Posters from NR01 to NR08 (12:21 - 12:31)</b> |                                 |  |
| NR09   | <b>Wen Wang</b>                 | Land Use Transition in Satoyama and Satoumi in Minamisanriku Town, Miyagi Prefecture   |
| NR10   | <b>Sylvia Zahara</b>            | Settlement Development based on Land Capability in Disaster-Prone Area (Case Study: Banda Aceh, Indonesia)   |
| NR11   | <b>Marie Jessica C. Gabriel</b> | Temporal analysis of NDVI in a highly disturbed area in Albay, Philippines   |
| NR12   | <b>F. Asri</b>                  | Surface Soil Moisture on Landslides Prone Area: How's the distribution?  |
| NR13   | <b>Pitchaya Piyaviriyakul</b>   | Unraveling the Presence and Impact of PFAS in Water from Industrial and AFFF Sources   |
| NR14   | <b>Warid Zul Ilmi</b>           | Identification of Inclusive and Sustainable Water Provision in Coastal Slums towards Realizing a Healthy City in Bandar Lampung                            |
| NR15   | <b>Kanika Bimrah</b>            | Reviving Traditional Water Management Systems in Semi-Arid Regions of India: A Case Study of Jaipur, Rajasthan   |
| <b>Discussion of Posters from NR09 to NR15 (12:45 - 12:54)</b> |                                 |  |
| NR16   | <b>Chhe Sokhieng</b>            | Study on Urban Green Development in Siem Reap Town, Siem Reap Province, Case Study on Public Space   |
| NR17   | <b>Umaira AHMED</b>             | Historical and Current Use and Management of Mangrove Resources in the Maldives: Case Study of 3 Islands in NoonuAtoll                                     |

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## on Education and Research in Global Environmental Studies in Asia

### Rural Culture and Conservation - Implications for Global Environmental Studies in the Anthropocene

|  |                                |   |
|--|--------------------------------|---|
| NR18   | <b>Neysa Yumna Callista</b>    | Effects of Vinasse Waste Application for Plant Growth, Soil Physical Properties, Soil Chemical Properties, and Soil Quality                         |
| NR19   | <b>Komaki Haruna</b>           | The relation of horse-use and the change of natural-resource use and lifestyle -a case of Yamamuro-   |
| NR20   | <b>Adeline Davila Irazabal</b> | The Role of Shrines in Local Revitalization   |
| NR21   | <b>Nguyen Ngoc Tung</b>        | Strengthening climate resilience of urban regions in Central Vietnam through nature-based solutions for heat adaptation and air quality improvement |
| <i>Discussion of Posters from NR16 to NR21 (13:06 - 13:15)</i> |                                |   |

5

#### Natural Resources II

23 posters

#### Natural environment and livelihood

Co-chairs: **Makoto Shibata**  
GSGES, Kyoto University

**Pok Sophak**  
Royal University of Agriculture

#### Introduction of co-chairs and session (12:00 - 12:05)

|  |                               |  |
|--|-------------------------------|--|
| NR22   | <b>Adisak Taiyawong</b>       | Duo-Environments: The Cropping System for Year-Round Morkhor 60 Soybean Variety Production in Northeast Thailand                                   |
| NR23   | <b>Abil Dermail</b>           | Strategies to conserve temperate maize in tropical savanna of Thailand   |
| NR24   | <b>Millenia Dzikra</b>        | Food Estate Development and Institutionalization of Integrated Pest Management in Sungai Mandau District, Siak Regency, Riau, Indonesia            |
| NR25   | <b>Ngoc Tan Bui</b>           | Impact of Methane Fermentation Waste Fluid Application Rates on Maize Growth and Nitrogen Fate: A Soil Texture Perspective                         |
| NR26   | <b>Jabulani Nyengere</b>      | Influence of Spatial Soil Heterogeneity on Crop Response to Urine Fertilizer Application   |
| NR27   | <b>Thanarote Sricha</b>       | Niaw Dam Chaw Mai Pai 49: The genetic resource to new ideotype of rice breeding  |
| NR28   | <b>Amisa Hasanah</b>          | Rice foodshed of Indonesia's new capital and its rice self-sufficiency towards regional sustainable food system                                    |
| NR29   | <b>Thanaphon Putjaiko</b>     | Stigma exertion creates weedy rice developing phenotypically mimicry to cultivated rice  |
| NR30   | <b>Teppratan Rakvong</b>      | Winged bean: a genetic diversity to duo-purpose utilization  |
| <i>Discussion of Posters from NR22 to NR30 (12:23 - 12:31)</i> |                               |  |
| NR31   | <b>Dyna Chin</b>              | Agricultural and Livelihood Trajectories of Upland farmers In Northwestern, Cambodia   |
| NR32   | <b>Peiting Hao</b>            | Assessing the Situation of Impoverished Farming Households' Livelihood Capital in Vulnerable Eco-regions - A Case of Ulanqab City, China           |
| NR33   | <b>Tran Thi Quynh Tien</b>    | Situation and solutions to develop community based tourism in Thua Thien Hue   |
| NR34   | <b>Trang LE</b>               | Climate vulnerability of coastal communities in Da Nang City, Vietnam  |
| NR35   | <b>Sosuke Yamasaki</b>        | Evaluation of regional resources by rural communities for promoting tourism - A case of Hong Ha commune, Vietnam                                   |
| NR36   | <b>Adzani Ardhanawari A.</b>  | Exploring The Role of Women Self-help Group in Building Rural Community Capacity   |
| NR37   | <b>Nur Hidayah Djaimin</b>    | Social Network Analysis Approach to Improve Regional Islands Connectivity: A Case Study in Maluku Archipelago Area, Indonesia                      |
| <i>Discussion of Posters from NR31 to NR37 (12:45 - 12:53)</i> |                               |  |
| NR38   | <b>Mutiara Dewi</b>           | Assessment of Ecosystem Services at Kyoto University   |
| NR39   | <b>Dinh Dien</b>              | Diversity of the Annonaceae in Phong Dien Nature Reserve, Thua Thien Hue Province  |
| NR40   | <b>Kanon Tanaka</b>           | Have publicity and educational activities on Japanese giant salamander conservation in Kyoto raised public awareness of biodiversity conservation? |
| NR41   | <b>Mol Pengkheang</b>         | Estimating Leaf Area Index of Cassava Plantation using Aerial Imagery  |
| NR42   | <b>Muhammad Ghozaly Salim</b> | Genetic Identification and Population Structure of Houndshark (Hoshi-zame) in The Sea of Japan   |
| NR43   | <b>Van Thi Yen</b>            | Morphological characteristics and distribution status of Aquilaria banaensae Phamh. in Hue Saola Nature Reserve                                    |
| NR 44  | <b>Bounthavy V.</b>           | Growth, Yield Components, and Nutritional Value of Tropical Grass and Leucaena Grown for use as Roughage in Goat Fattening                         |
| <i>Discussion of Posters from NR38 to NR44 (13:07 - 13:15)</i> |                               |  |

## ORAL PRESENTATIONS - Parallel sessions

| Global Ecology  | Environmental Technology  | Natural Resources  |
|---|---|--|
| <p><b>Efforts towards decarbonisation in Asia</b></p> <p>Coordinator: <b>Gregory Patrick Trencher</b><br/>GSGES, Kyoto University</p>   | <p><b>Current status of water environment in Asia and countermeasure technologies</b></p> <p>Coordinators: <b>Taku Fujiwara</b><br/>GSGES, Kyoto University<br/><b>Suwanna Kitpati Boontanon</b><br/>Mahidol University</p>   | <p><b>Landscape with traditional livelihood in south-eastern Asia</b></p> <p>Coordinator: <b>Shozo Shibata</b><br/>GSGES, Kyoto University</p>   |
| <p>(13:30 - 13:45) <b>Rizaldi Boer:</b><br/>"Decarbonizing the Agriculture, Forest, and Land Use (AFOLU) sector in Indonesia Toward Net Zero Emission"</p> <p>(13:45 - 14:00) <b>Hoang Cong Tin:</b><br/>"Carbon storage capacity of seagrasses at Lang Co Lagoon, Thua Thien Hue province"</p> <p>(14:00 - 14:15) <b>Manuela Gertrud Hartwig:</b><br/>"Energy (In)Justices and Challenges to Japan's Decarbonization"</p> <p>(14:15 - 14:30) <b>Diomedes Racelis:</b><br/>"GHG Emission of the UPLB College of Forestry during the Pandemic"</p> | <p>(13:30 - 13:45) <b>Nguyen Thi Thu Huong:</b><br/>"Application of surface-modified nanofiltration membrane for enhanced heavy metals removal from groundwater"</p> <p>(13:45 - 14:00) <b>Le Cong Tuan:</b> "Applying indigenous bacterial strains to improve the efficiency of biofloc shrimp farming in Thua Thien Hue province"</p> <p>(14:00 - 14:15) <b>Kaung Htet Swan:</b> "Solution for urban wastewater management in developing countries: A case study of the decentralized system in Yangon"</p> <p>(14:15 - 14:30) <b>Wang Wen-Long:</b><br/>"Chemical oxidations for the removal of recalcitrant trace contaminants in reclaimed water"</p> <p>(14:30 - 14:45) <b>Tran Ha Quan:</b> "The ability of reusing municipal treated water for irrigation the landscaping in Vietnam. The research in constructed wetland in municipal wastewater treatment plant, Danang city"</p> | <p>Introduction to session (13:30 - 13:35)</p> <p>(13:35 - 13:50) <b>Mohammad Zaini Dahlan:</b><br/>"Locality in designing Sundanese Landscape: Study of Disaster, Ecology, and Society"</p> <p>(13:50 - 14:05) <b>Jan Joseph Dida:</b><br/>"Assessing Landscape and Ecosystem Services Dynamics in Cagayan de Oro River Basin"</p> <p>(14:05 - 14:20) <b>Tran Phuong Nhi:</b><br/>"Community-based tourism potential at Ru Cha mangrove ecological forest in Huong Phong commune, Thua Thien Hue province, Vietnam"</p> <p>(14:20 - 14:35) <b>Chin Dyna:</b><br/>"Agricultural and Livelihood Trajectories of Upland Farmers in Northwestern, Cambodia"</p> |
| <b>Q&amp;A, Panel Discussion (14:30 - 15:00)</b>  | <b>Q&amp;A, Panel Discussion (14:45 - 15:00)</b>  | <b>Q&amp;A, Panel Discussion (14:35 - 15:00)</b>   |

# A study on the sustainable water–energy–food nexus in South Korea : A simultaneous equations approach

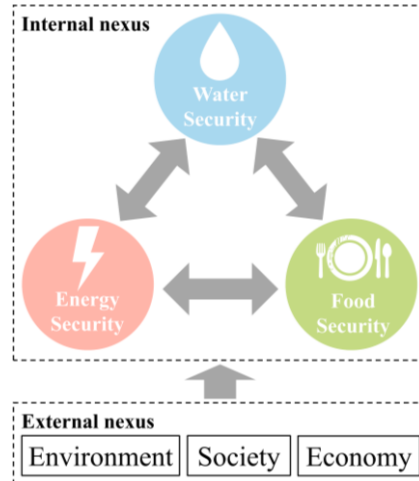
Authors: Daehan An\*

\* Global Environmental Policy Laboratory, Graduate School of Global Environmental Studies, Kyoto University

## I. Introduction

### 1. Background

- Water, Energy and Food (WEF) security is **under threat** due to population growth, climate change, COVID-19, and geopolitical instabilities
- WEF security are **highly interrelated** and should be considered together
- WEF nexus analyze the identification of **interactions** across **sectors**



[Fig. 1] Sustainable WEF nexus framework

### 2. Problems and gaps

- South Korea is one of the **largest importers** of WEF resources
- Considering **external drivers** and **sustainability** is **lacking** in **nexus** field

### 3. Research aims (Left: main, Right: specific)

- To **assess the interactions on the sustainable WEF nexus in Korea via systematic estimation**
  - To develop the framework → Fig. 1\*
  - To estimate the interactions between WEF security & sustainability → Fig. 2
  - To explore sustainability by applying EKC\*\* hypothesis → Fig. 2

## II. Methods and Data

### 1. Simultaneous equations model (SEM)

- Estimate an analysis of interactions (elasticities) for a set of linear equations

### 2. EKC hypothesis

- Evaluate sustainability via relationship between income and pollution

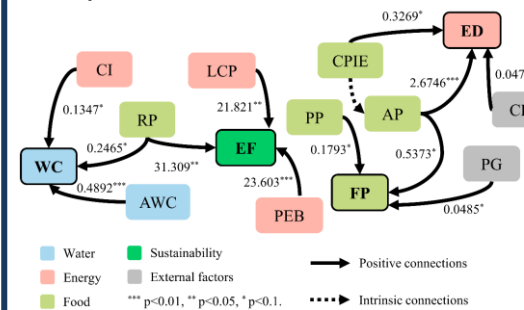
### 3. Materials

- Four equations consist of 26 indicators
  - Water consumption
  - Energy demand
  - Food production
  - Sustainability

## III. Results

### 1. Estimation on interactions via SEM

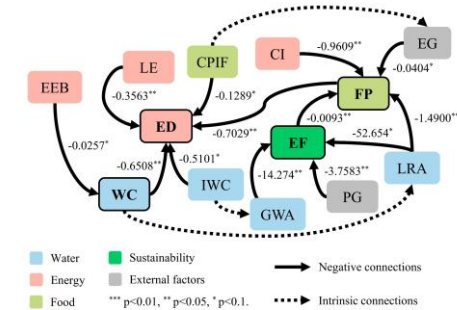
- Rice production is a **water & energy intensive industry** that **adversely affects**
- Increased Agri productivity (automation) can **improve food security**; it can also pose a **threat to energy security** by increasing electricity demand and energy import



|     |                                    |      |                                 |
|-----|------------------------------------|------|---------------------------------|
| WC  | Water consumption                  | LCP  | Low-carbon power                |
| ED  | Electricity demand                 | PP   | Producer protection             |
| FP  | Food production                    | CPIE | Consumer price index for energy |
| EF  | Ecological footprint               | PEB  | Public energy RD&D budget       |
| CI  | CO <sub>2</sub> intensity of power | AP   | Agricultural productivity       |
| AWC | Agricultural water consumption     | CD   | Climate disaster cost           |
| RP  | Rice production                    | PG   | Population growth               |

### 2. EKC hypothesis

- Rejected**, it means that the components of **WEF security impact environmental sustainability** rather than economic factor



|     |                               |      |                                       |
|-----|-------------------------------|------|---------------------------------------|
| WC  | Water consumption             | CPIF | Consumer price index for Food         |
| ED  | Electricity demand            | CI   | CO <sub>2</sub> intensity of power    |
| FP  | Food production               | LE   | Low-carbon energy tech                |
| EF  | Ecological footprint          | PG   | Population growth                     |
| EEB | Energy efficiency RD&D budget | EG   | Economic growth                       |
| IWC | Industrial water consumption  | LRA  | Lakes and rivers permanent water area |
| GWA | Ground water for agriculture  |      |                                       |

[Fig. 2] Positive (left) & negative (right) feedback loops

## IV. Conclusions

### 1. Main findings

- Through **SEM & EKC hypothesis**, this study determined that **optimizing the interactions** between the **sustainable WEF nexus**

- Maximizing synergies & minimizing trade-offs** in **WEF resources** could **improve WEF security & sustainability**

\* Adapted from Hoff (2011) & FAO (2014)

\*\* Environmental Kuznets Curve

# Development of Sustainable Tourism in Cultural Heritage Areas in Kebumen Geopark

Ryan Hidayat\*\*, Atie Ernawati\*\*, Marselly Dwiputri\*\* and Karya Widyawati\*\*

\*\* Architecture, Faculty of Engineering and Computer Science, Universitas Indraprasta PGRI

## BACKGROUND

Kebumen Geopark is a geosite area that has a wealth of geological, biological and cultural diversity. Kebumen Geopark which is known for its uplifted earth base became the forerunner of the island of Java. In order to become a UNESCO Global Geopark area, through the theme 'The Glowing Mother Earth of Java', the Kebumen Geopark which is currently a national geopark status, seeks geological significance, which has the potential to display unique landscapes, rock formations, or other geological phenomena. Geoparks often integrate conservation, education, and sustainable development. The existence of sites of important cultural value within the geopark includes historical buildings, archaeological sites, traditional communities, or other important cultural elements.



## METHODOLOGY

This research uses a multidisciplinary approach that pays attention to two main aspects, namely tourism aspects and cultural heritage aspects.



## RESULTS AND DISCUSSION

The results of this research are from field studies, surveys and FGDs. Efforts to empower tourism aspects in cultural heritage areas are still ongoing. The choice to develop various events and packaging cultural potential in a gradual manner and definitely shows its effect. The agenda is to continue to develop tourism in providing decent amenities facilities and in accordance with standards, while maintaining that all supporting attractions and main attractions to attract are maintained in quality and quantity. Therefore, to empower aspects of tourism through its potential in the context of cultural heritage will provide a form of knowledge, beliefs, understandings and customs or ethics that guide human behavior in life within the community. The air, land, and sea transport needed to support tourism can contribute to greenhouse gas emissions, contributing to global climate change. Sustainable tourism can provide economic benefits to local communities and support the preservation of cultural heritage. Good tourism management should include conservation practices to protect biodiversity and local ecosystems.



# Conserving Living Heritage in Green Concept Approach: A Case of Singkawang City, Indonesia

Authors: Izazaya Binta\*, Erika Yuni Astuti\*\*, Budi Faisal\*\*, Widjaja Martokusumo\*\*

\*Doctoral Student in Architecture, \*\*Architectural Design Research Group, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung

## Background

Conservation has evolved from material to value-based, developing living heritage, people-centered, and people-culture-nature approaches (Haselberger & Krist, 2022). Living heritage encompasses the continuity of traditions and cultures in communities, as noted by Wijesuriya (2015). Heritage conservation increasingly recognizes the importance of integrating 'green' initiatives. This study explores how Singkawang City's living heritage contributes to the green concept. Singkawang's rich cultural tapestry, influenced by Chinese, Malay, Dayak, Javanese, and Madurese, offers a historical context for the study of living heritage.

## Methodology

The research employs descriptive qualitative methodologies and conducts a case study in Singkawang City, West Kalimantan, Indonesia. Data collection is based on interviews with the local community. Based on the interview, three respondents highlighted how traditions and spiritual values influenced them to use natural resources wisely and live in harmony with their ecological surroundings.

## Case Study



Indonesia

Location : Singkawang  
Total Area : 504.0 km<sup>2</sup>  
Population : 241,467  
Density : 480/km<sup>2</sup>



Map of Singkawang



The City of Singkawang

## Discussion

In Singkawang City, this research delineates three principal dimensions: the environment, people, and process. The environmental dimension encapsulates the physical and natural settings that characterize the Singkawang landscape. The human dimension underscores the identities and roles of the inhabitants, reflecting their inheritance, traditions, and beliefs. The process dimension describes the dynamic interplay of change, conservation, and the functionality of cultural heritage. This research discusses the interwoven between heritage, environment, green concept, and the locals. Singkawang City shows that the traditions and beliefs in local communities, show the influence of their ecological consciousness attitude, leading to environmental protection, continuous change, and community connection. In this context, community connection is defined as the symbiotic relationship between the people of Singkawang and their environment. It is evident from the conclusions of interviews with respondents that the harmonious relationship between humans and the environment is a form of gratitude to the environment and respect for the gods and their ancestors.

## Conclusion

The initial stage of this research reveals that the concept of 'green' embedded within Singkawang's living heritage is deeply rooted in the community's longstanding traditions and beliefs. This emphasizes the role of living heritage as a driver for environmental stewardship and sustainability in heritage conservation.



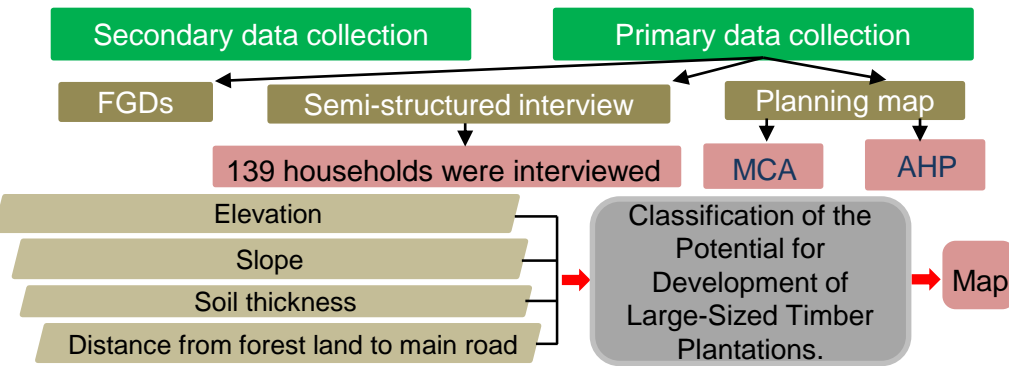
# Factors Affecting the Development of Household-Scale Acacia Plantations for Large-sized Timber in Central Vietnam

Authors: Le Thi Thu Ha<sup>\*\*\*</sup>, Vu Thi Thuy Trang<sup>\*\*</sup>, Nguyen Duy Phong<sup>\*\*</sup>, Hoang Phuoc Thoi<sup>\*\*</sup>, Le Thi Phuong Thao<sup>\*\*</sup>, Tran Nam Thang<sup>\*\*</sup>, Hitoshi Shinjo<sup>\*</sup>

<sup>\*</sup> Graduate School of Global Environmental Studies, Kyoto University; <sup>\*\*</sup> Faculty of Forestry, University of Agriculture and Forestry, Hue University

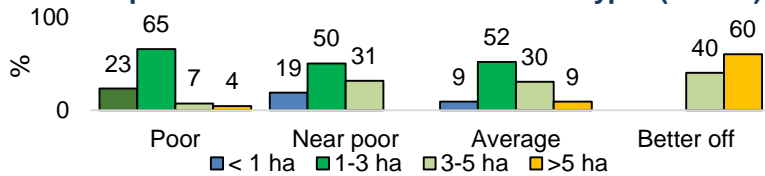
**BACKGROUND:** Vietnam's 2021–2030 forestry strategy focuses on large-sized timber plantations to align with sustainable development goals. High wood demand leads to imports, attributed to short acacia harvesting cycles. Transitioning to larger timber plantations is vital for optimal sawn timber size and bolstering the wood processing industry. This research assesses household-scale acacia plantings for large-sized timber potential, providing insights for policymakers to foster sustainable forestry development.

**METHODOLOGY:** Study site: A Luoi district, Thua Thien Hue province



## RESULTS & DISCUSSION

### Acacia plantation area of different household types (n = 139)

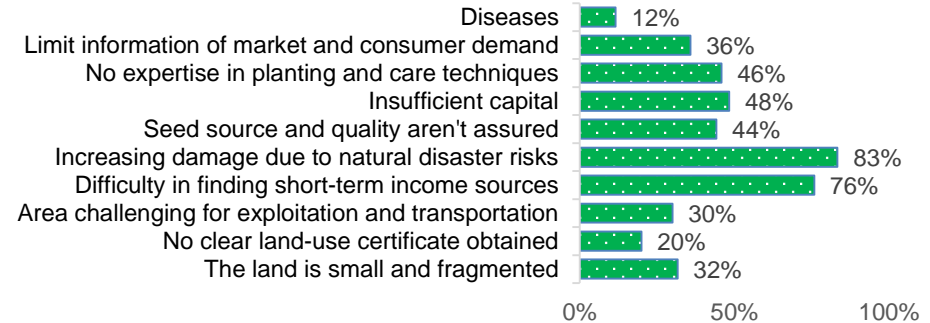


### Factors affect the demand for transitioning to large-sized timber in Acacia plantations

| n=139              | Education level | Household type | Forest area (ha) |
|--------------------|-----------------|----------------|------------------|
| Pearson Chi-Square | 4.348           | 8.363*         | 11.386*          |

The decision to cultivate large-sized timber Acacia forests is significantly influenced by household type and forest area ( $p < 0.05$ ). Wealthy households with ample land can convert to large-sized timber forests by maintaining short-term and long-term afforestation cycles to stabilize family income.

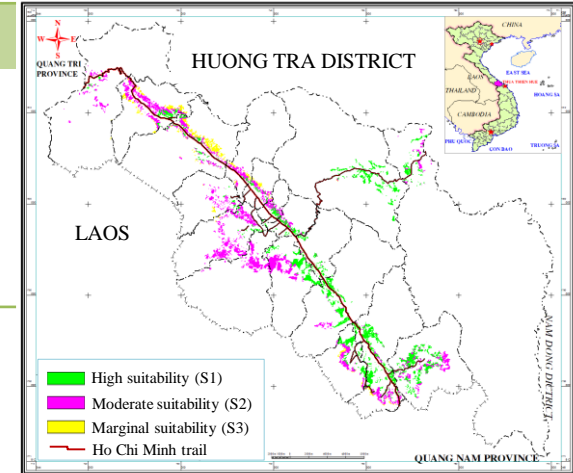
## Challenges in deciding to plant large-sized timber for Acacia plantations



## Classification factors for developing large-sized timber Acacia plantations

|                     | High suitability | Moderate suitability | Marginal suitability |
|---------------------|------------------|----------------------|----------------------|
| Soil thickness (cm) | >70              | 30-70                | <30                  |
| Elevation (m)       | <300             | 300-700              | >700                 |
| Slope (degree)      | <16              | 16-25                | >25                  |
| Distance (km)       | <1               | 1-2                  | >2                   |

| Suitability area | Area (ha) | (%) |
|------------------|-----------|-----|
| High (S1)        | 2666.70   | 43  |
| Moderate (S2)    | 3105.64   | 50  |
| Marginal (S3)    | 502.78    | 8   |
| Total            | 6275.12   | 100 |



Suitability map for cultivating large-sized timber Acacia plantations in A Luoi district, Thua Thien Hue province

**CONCLUSIONS:** Acacia growers struggle to shift to large-sized timber plantations due to many factors such as limited short-term income and fears of natural disasters. This forest conversion suits wealthier households with more land. It's crucial to assist poor households with alternative livelihoods such as animal husbandry and community tourism. Encouraging joint ventures between wood processing enterprises and households can alleviate capital burdens and ensure market price. Establishing groups of large-sized timber growers to share experiences is necessary.

The research was funded by the FT Viet project.

# Process of Policy Learning by Local Governments: The Case of SDGs Platforms in Japan

Author: Shiori Sano\*

\* Graduate School of Global Environmental Studies, Kyoto University

## 【Background】

- ◆ Importance of Multi-stakeholder platform (MSP)
  - **Collaborative governance** is effective for **solving complex and uncertain social issues** such as climate change, agriculture etc.
  - **MSP** is a form of collaborative governance, in which **stakeholders of different sectors** gather together, discuss and tackle the issues collectively under the shared target of MSP.
- ◆ Current trend on MSPs
  - IO (Momen 2020)
  - In Japan, local MSPs related to SDGs began to diffuse among local governments after 2018.

## ◆ Policy learning perspective

Policy learning theory focuses on policymakers' seeking information of

There is few researches on why and how governments decide to learn about and make MSPs.



Research question (1) What do local governments in Japan learn through making SDGs platform policy?

(2) What individual/organizational factors affect the process of learning SDGs platform policy, and at which stage?

## 【Methodology】

### ◆ Framework

The idea of policy learning and factors are based on the research of policy learning.

I distinguished between learning & realizing what is learned, with reference to literature of organizational studies (Zahra and George (2002)).

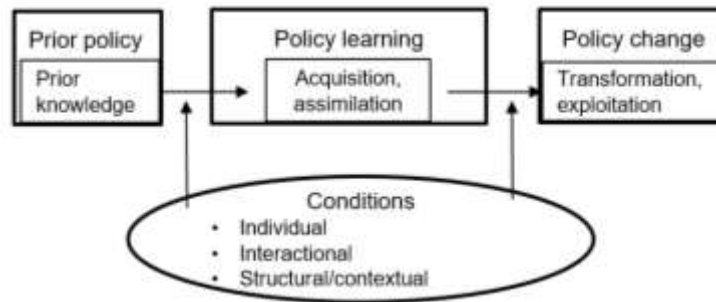


Figure 1: The process of policy learning and knowledge (Based on Riche et al. (2021); Zahra and George (2002))

### ◆ Data collection

Interview at a prefectural office

### ◆ Data analysis

Thematic coding

## 【Research sites】

### ◆ Japanese context: politics, governance and society

Growing interest in sustainability in society and governments.

In Japan, national government and often local governments have tradition of authoritative policy making process → The idea of horizontal “governance” is not seen everywhere.

However, along with bursting interest of society in sustainability, some governments are focusing on MSPs

|                | Total | Have MSP |
|----------------|-------|----------|
| Prefectures    | 47    | 9        |
| Municipalities | 1774  | 15       |

# Sustainable drinking water production from Seawater

Authors: Shoaib Salman

\* Graduate School of Environmental and Water Resource Engineering, Mahidol University \*\* Department of Engineering, Mahidol University.

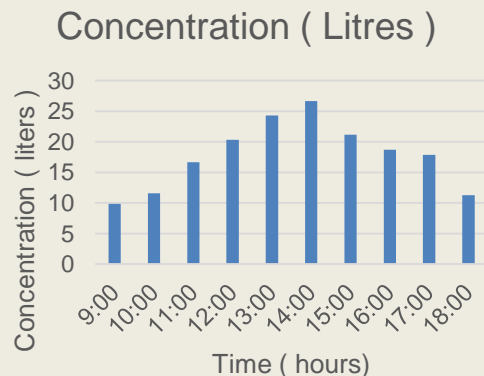
## BACKGROUND

This project is focused on producing fresh drinking water from saline or brackish water using only solar power with a one-time minimum installation cost and minimum to no maintenance cost.

In this model, we have optimized most of the factors that affect the evaporation rate in order to maximize the vapor yield.

## RESULT AND DISCUSSION

The production of fresh drinking water through this method is cheap alternative of Membrane desalination and Multi effect distillation. As we got **178.374 liters/10 hours Or, 17.837 liters/hour** By using 1000 liters of Seawater.



## METHODOLOGY

The purpose is to design a container that contains saline or brackish water and that allows external heat and radiation while maintaining that heat inside, reflectors are used to increase the temperature inside the container.

The basic concept of our model is that there will be two stages made of glass. In the first stage, steam will be produced by solar radiation this process is conducted with a vacuum (To lower the boiling point of water) and reflectors which will concentrate the sunlight on the container then steam generated from the process will be condensed into water. Then add minerals according to standards.



# The Livability in Shrinking Cities: A Case Study of Fuxin City, China

Authors: Yuqi ZHANG\*, Chiho OCHIAI\*

\* Graduate School of Global Environmental Studies, Kyoto University

## INTRODUCTION

### Background

- urban shrinkage has become a global phenomenon and has also emerged in China.
- Urban shrinkage poses various negative impacts on local communities.
- It is crucial for shrinking cities to enhance community livability and retain residents.
- However, most studies have focused on the macro level of regions and cities, overlooking community-level analyses.

### Research contents and methodology

- A total of 107 questionnaires were collected from two case communities in Fuxin City, accompanied by in-depth interviews.
- The survey included residents' socio-economic attributes, satisfaction with income, employment opportunities, community livability, renovation projects, perceptions of urban shrinkage, and their willingness to move or stay.

### Research objects

- Fuxin has faced population loss and economic decline due to depleted coal resources.
- The case communities, Wenxinyuan and Mijia, represent typical shantytown reconstruction areas.



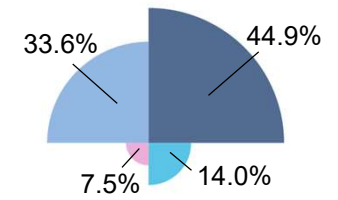
## RESULTS

### Evaluation of community livability

a) Wenxinyuan Community b) Mijia Community



### Perception of urban shrinkage



- Affordability
- Building quality
- Heating
- Sewerage
- Greening
- Sanitation
- Schools
- Elderly Care
- Entertainment
- Medical
- Transport
- Shopping
- Sports
- Relationships
- Participation
- Security
- Overall
- Renovation Projects

### Future intentions to move or stay



## DISCUSSION & CONCLUSION

- The livability in the Wenxinyuan community is significantly higher than that in the Mijia community, possibly due to the community's location.
- The majority of residents believe Fuxin City has experienced both demographic and economic shrinkage in the past five years.
- In Wenxinyuan, with improved livability, fewer residents are willing to relocate, highlighting the potential of enhanced neighborhood livability in attracting the population.

# Transformative Shifts in Livelihood in Trans-Himalayan Zone: Manang, Nepal

Girbani Pokhrel\* and Chandra P. Pokhrel\*\*

\* School of Arts, Department of Economics, Kathmandu University, Nepal \*\* Central Department of Botany, Tribhuvan University, Nepal

## BACKGROUND

Manang, trans-Himalayan zone, predominantly inhabited by the Tibetan and Gurung people (Gurung, 1976); historically thrived on livelihood centred on agriculture, livestock rearing and the trade of medicinal herbs. However, the inhabitants sustained their livelihood in rampant poverty, low land holdings, food insecurity, and the challenges of a harsh environment. These circumstances hindered effective agricultural production, continuing the cycle of struggle. The aim of this study is to identify transformative shifts in livelihood of residents of Manang.

## METHODOLOGY

The study was focused in Manang Valley, Neshyang Rural Municipality, 28° 20'02" N 84° 00' 50" E, at the altitude of 3800-4200 metres. The open and close types of questionnaires were designed to gain the insights on the various aspects of livelihoods and socio-economic conditions, applying stratified random sampling methods. To gather the comprehensive information, 32 households out of 593 households were surveyed (April and June 2023).

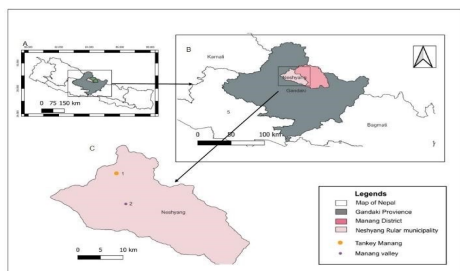


Fig: Map of the Study Area



Fig: Abandoned Land



Fig: Apple Farming

## RESULTS AND DISCUSSION

1. The average family size is 3.75 individuals with an average landholding size per household around  $0.39 \pm 0.27$  hectares. The major crops are wheat, barley, buckwheat and potato. For instance: Staple crops like wheat ( $1.56 \pm 0.33$  t/ha) yield relatively low productivity in comparison to the national average (2.99 t/ha) (GON, 2022).
2. The environmental limitations of the trans-Himalayan zone allows only one crop to harvest annually, livelihoods are constrained, leading some to out-migrate or turn to tourism for better economic opportunities.
3. The introduction of tourism, trade, and out-migration emerged as utmost shifts in livelihood strategies and reshaped the economic landscape, offering new avenues for sustenance.
4. Shifting livelihood caused about 75% of land to be abandoned. The remaining population practising agriculture focuses more on apple farming (cash crop).
5. In 2021, unusual heavy rainfall during the pre-monsoon season triggered a devastating disaster causing the loss of hundreds of households and substantial damage on economy. Moreover, changing climate caused the emergence of crop diseases alongside insect infestation exacerbating the challenges faced by the residents in the affected area.

## REFERENCES

- Gurung, N. J. 1976. An introduction to the socio-economic structure of Manang district. *Kailash: Journal of Himalayan Studies*, 4(3): 295-309.
- GON. 2022. Ministry of Agriculture and Livestock Development. *Statistical Information on Nepalese Agriculture*

# Beyond National Sovereignty: Applying the Subsidiarity Principle to Climate Change Displacement

Yatong YANG

Graduate School of Global Environmental Studies, Kyoto University

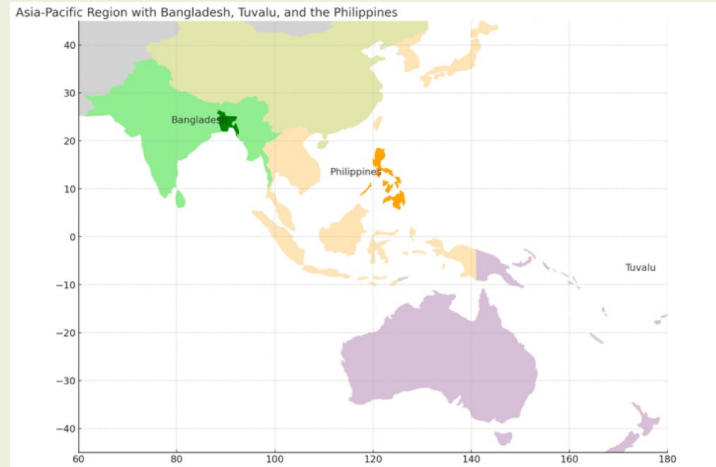
## INTRODUCTION

This study examines the **subsidiarity principle\*** in climate change governance, focusing on how national, regional, and global responses can collaboratively address climate-induced displacement. By analyzing cases from **Bangladesh, Tuvalu, and the Philippines**, it highlights effective strategies for nuanced, multi-level climate action.



\*: The principle of subsidiarity posits that decisions should be made at the most effective governance level, ensuring local actions are supported by higher authorities when necessary, particularly vital in complex issues like climate change.

## RESULTS



### Bangladesh:

- Enhanced local flood resilience strategies.
- Limited cooperative water management initiatives.
- Need for international technological and financial support.

### Tuvalu:

- Localized adaptations to rising sea levels.
- Inadequate Pacific regional support mechanisms.
- Urgent need for international legal and infrastructural aid.

### Philippines:

- Robust national disaster response policies.
- ASEAN disaster relief collaborations.
- Dependency on international recovery and resilience funding.

## DISCUSSIONS



**National Adaptations and Challenges:** Focus on localized strategies and internal policy strengths/weaknesses.



**Regional Cooperation and Limitations:** Examine the effectiveness of regional alliances and shared resource management.



**Global Support and Obligations:** Discuss global responsibilities, aid dynamics, and long-term sustainability goals.



**Balancing Local Autonomy with External Assistance:** Explore the equilibrium between local decision-making and the need for higher-level support.



**Future Directions and Policy Implications:** Identify potential policy developments and areas for future research.

## REFERENCE

Barnett, J., & Campbell, J. (2010). "Climate Change and Small Island States: Power, Knowledge, and the South Pacific." Earthscan.

# The effects of emission trading scheme and government pressure on corporate climate change disclosure in China

Sailu Zhang

Global Environmental Policy Laboratory, Graduate School of Global Environmental Studies, Kyoto University

## Introduction

### Background:

- In China, **climate change disclosure** holds significant relevance for businesses in presenting their sustainability efforts to their **stakeholders and society**.
- It is necessary to investigate **the key factors** propelling climate change disclosure.

### Research Gaps:

- Lack of empirical studies on the **correlation between emission trading schemes and disclosure**
- No empirical research considered **government pressure essential in promoting** climate change disclosure.

### Objectives:

- To examine whether the **emission trading scheme** can improve **corporate climate change disclosure** in China and to explore the **role of government pressure** in the process.

## Methodology

### Quantitative approach: Difference-in-Differences Model

- Target companies: Listed companies in heavily polluting industries from ETS pilot regions
- Panel data: **8 years**; ETS implementation year: **2013**
- Variables and measurements:
  - Disclosure performance(DP): manual scoring (1~16)
  - Locations: binary variable→1 and 0;
  - Government pressure: binary variable, measured by the attributes of the actual controller;
  - Control variables: corporate financial and governance performance.

## Results & Discussion

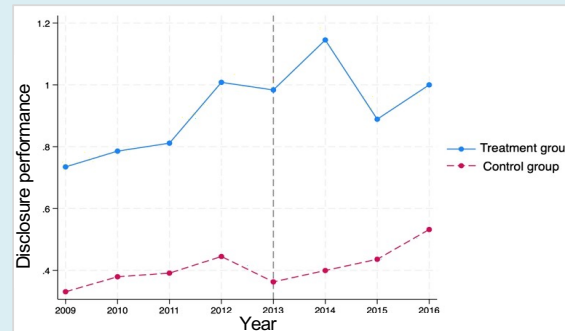


Fig. 1. Parallel trend test

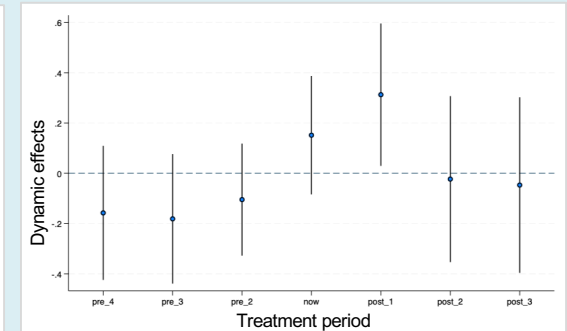


Fig. 2. Dynamic event study

Table 1. DID regression results.

| Variables          | Model 1   | Model 2   | Model 3    |
|--------------------|-----------|-----------|------------|
| DID                | 0.6343*** | 0.6297*** | 0.6603***  |
| Actual Controller  |           | 0.2570*** | 0.1353***  |
| Firmsize           |           |           | 0.1646***  |
| Profitability      |           |           | -0.0233    |
| Financial Risk     |           |           | -0.0014    |
| Board Size         |           |           | -0.0263**  |
| Board Independence |           |           | 0.0115***  |
| Year-fixed effect  | YES       | YES       | YES        |
| Constant           | 0.5010*** | 0.3779*** | -0.9307*** |
| Observations       | 2776      | 2776      | 2776       |

Note: standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2. Regression results of the dynamic event study.

| Variables    | Dynamic Effects |
|--------------|-----------------|
| pre_4        | -0.158          |
| pre_3        | -0.181          |
| pre_2        | -0.105          |
| Now (2013)   | 0.152           |
| post_1       | 0.313**         |
| post_2       | -0.023          |
| post_3       | -0.047          |
| Observations | 2,776           |

Note: standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

- The disclosure performance was **significantly affected by ETS**.
- The effect of ETS on disclosure performance **tends to be stronger when the companies face stronger government pressure**.
- A rebound appeared following the impact of the policy.

## Conclusions and Policy Implications

- The government should appropriately utilize **market mechanisms instead of implementing mandatory policies** directly targeting disclosure.
- Companies facing **higher government pressure** play a **leading role** in climate change disclosure within the industries.
- The government should ensure the **stability** of policy effects, and further regulate the behavior of localities and industries concerning disclosure by **providing explicit guidance**.



# Judge in White Coat : How Courts Assess the Environmental Impact Assessment (EIA) Case Study of Indonesia Environmental Administrative Litigation

Rika Fajrini\*

\* Global Environmental Policy Laboratory, Graduate School of Global Environmental Studies, Kyoto University

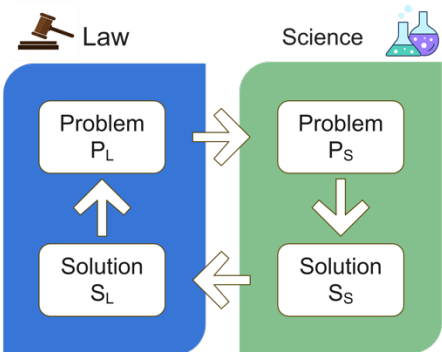
## I. Introduction

- The majority of research on EIA Litigation focuses on the public participation aspect. meanwhile, there is an increase in cases that challenge the scientific substance of EIA.
- Arguing on EIA scientific substance in the court raises the question of the judge's role to make value judgement instead of epistemological judgment

Research Objective:

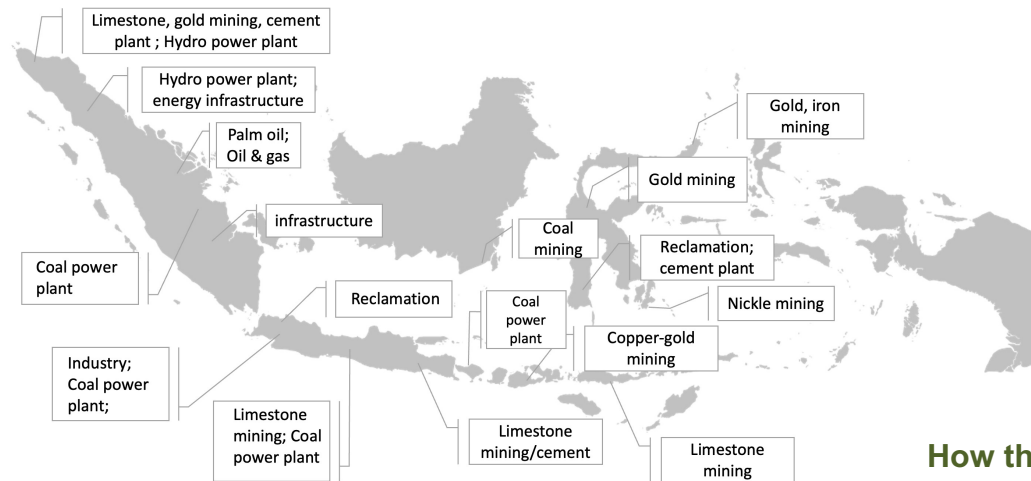
**How judges assess scientific debate related to EIA substance**

## II. Methodology

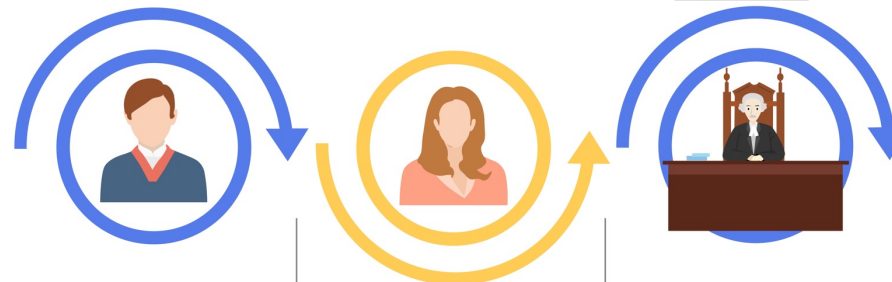


Case study of 72 EIA Litigation filed from 2010-2022 analyzed using **Problem-feeding model of interdisciplinarity** (Thoren et al, 2021, Thoren and Persson, 2013)

## III. Result and Discussion



32 Cases involving high-profile projects with significant environmental impact argued on the scientific substance of EIA in addition to the procedural aspect.



What plaintiff argue

- The impact that should have been studied is not included
- Invalid method and approach in the analysis
- Invalid data and assumption
- Invalid inference in deciding environmental feasibility

How defendant respond

- Emphasizing the competency of EIA Consultants and the Appraisal Team
- Explain the importance of the project for public and economic interest
- Actually giving a counter-argument to the plaintiff question on EIA substance
- Arguing the permit can be revoked if harm occurs

How judges decide

- Deciding the case by procedural issue
- Taking the easiest EIA substance problem to be assessed
- Making the decision on the main debate on EIA substance

### How the cases are decided?

- In many cases, the bilateral problem-feeding between law and science failed. There is a disconnection between the plaintiff's scientific argument and the Defendant's response.
- In cases where problem-feeding succeeds, Judges do not decide which science is correct but resort to legal principle and written law when deciding on the scientific answer given to the legal question being asked
- In general, The judge's deference attitude to the government agency's competence in science is still prevalent.

# Residential Energy Behaviour in Japan: From the Gender Perspective

Authors: Yumi Anggraini

\* Global Environmental Policy Laboratory, Graduate School of Global Environmental Studies, Kyoto

## Introduction

- ▶ Reducing energy consumption is crucial - researching how people use and perceive energy becomes a key aspect of sustainable transitions
- ▶ Mass media campaigns are cost-effective for reaching a wide audience, however, their effectiveness in inducing behaviour is inconsistent.

## Research Objectives

1. Examine the influence of gender on energy-saving behaviours and practices in Japanese households.
2. Assess the effectiveness of energy-saving campaigns that use gender role stereotypes in encouraging energy conservation.

### Challenges and Gaps

1. Despite the lack of behaviour change evident, information campaigns continue to be widely used for promoting residential energy conservation.
2. Few previous studies in Japan on the analysis of household energy behaviour from a gender perspective.

**Conclusion:** Acknowledging the embedded nature of gender in all home and technology relations can facilitate a more comprehensive and gender-balanced perspective in research.

## Context



- Household consumption, contributing to 15% of Japan's national energy consumption in 2021, plays a significant role in CO2 emissions.
- During the summer of 2023, households and businesses within the TEPCO service area were requested by METI to reduce energy consumption.
- Information campaign efforts were introduced to encourage people to use easy, free or low-cost means to improve energy efficiency.

## Gender and Energy

Women and men have different consumption patterns. Energy consumption patterns often differ between women and men due to various factors, including societal norms, gender roles, and responsibilities

## Theoretical Framework & Methodology

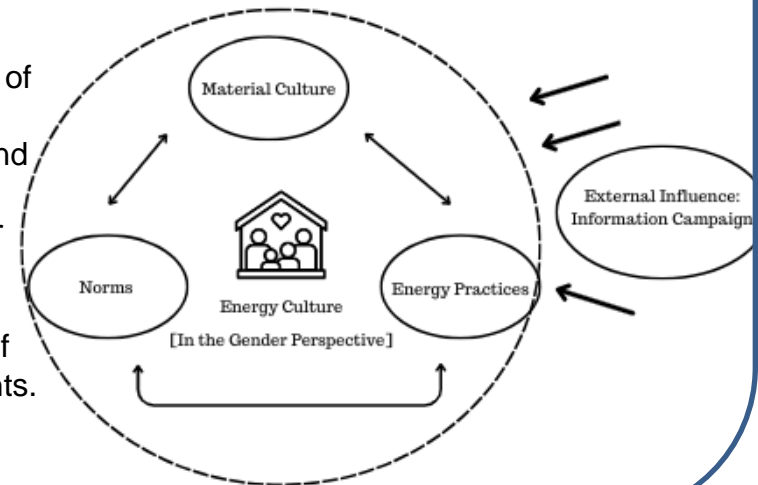
**Social Role Theory:** emphasises the impact of gender roles and stereotypes on behaviour

**Energy Cultures Framework (Stephenson et al., 2010):** designed to provide insights into the role of sociocultural factors in shaping energy consumption patterns and behaviour.

The **ECF** looks at three core aspects of material culture, cognitive norms, and energy practices through the gender lens in terms of energy use and saving behaviour of Kanto area residents.

**Data Collection:**

- Online Questionnaire Survey (multiple choice, Likert scale)
- Field focus group discussions

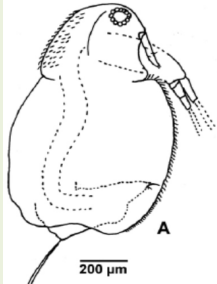


# STUDYING THE ACUTE TOXICITY OF IRON AND ARSENIC IN THE CLADOCERAN *MOINA MACROCOPA*

Phan Thi Thao Linh<sup>a,\*</sup>, Trinh-Dang Mau<sup>a</sup>, Tran-Nguyen Quynh Anh<sup>a</sup>

<sup>a</sup> The University of Da Nang, University of Science and Education, 459 Ton Duc Thang St., Danang 550000, Viet Nam

## 1. Background



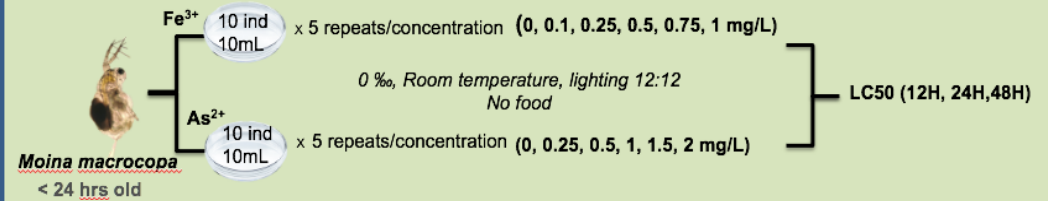
*Moina macrocopa*  
(Straus, 1820)

Biomonitoring, which involves the use of living organisms as biosensors of the physicochemical and biological properties of water, is the most suitable method for studying the environmental quality, specifically, controlling the water quality.

Cladocerans are among the oldest test organisms and have been used since the 1930's.

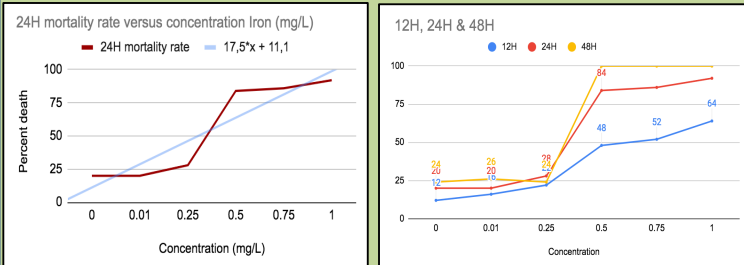
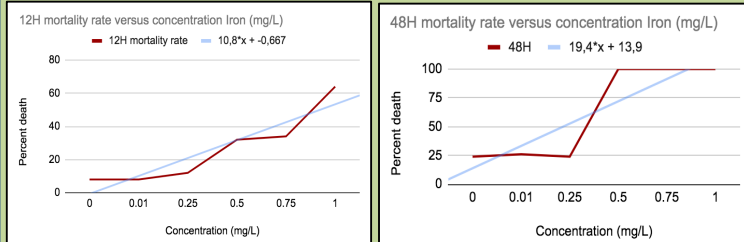
## 2. Objectives and Methodology

This study aims to evaluate the toxicity of Iron and Arsenic on the survival ability of *Moina macrocopa* within 12, 24, and 48 hours.



## 3. Results The acute toxicity of Iron

LC50(12H): 1.45 mg/L LC50(48H): 0.77 mg/L

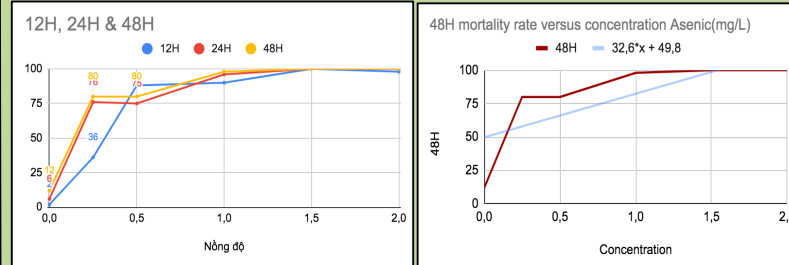
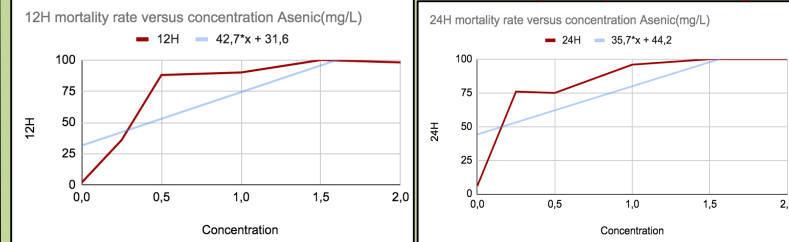


LC50(24H): 0.89 mg/L

Acute effects of Iron at different concentrations on *M. macrocopa* after 12-h, 24-h, and 48-h exposure

## The acute toxicity of Arsenic

LC50(12H): 0.43 mg/L LC50(24H): 0.16 mg/L



LC50(48H): 0.06 mg/L

Acute effects of Arsenic at different concentrations on *M. macrocopa* after 12-h, 24-h, and 48-h exposure

## 4. Discussion

In this study, the control sample up to 48H was still over 90%. The study also evaluated that the higher the concentration, the higher the death rate for two types of toxins: Arsenic and Iron. In the future, more diverse studies on toxicants are needed to build a database large enough for practical use or specifically in warning systems.

# (Environmental Crisis, Human Rights Violations, and Governments' Responsibilities: A Case Study of the Dryness of Urmia Lake in Iran)

Authors: Sahar Hassani\*

\* Graduate School of Global Environmental Studies, Kyoto University \*\* Department of Global Ecology

## Study Background

## Methodology

## Results

The prolonged desiccation of Lake Urmia since 1991 in Iran significantly impacts the local community's third-generation of human rights, notably the right to a healthy environment, and the right to health. The study examines if the Iranian government breached its obligations outlined in Article 12 of the International Covenant on Economic, Social, and Cultural Rights regarding this environmental crisis..

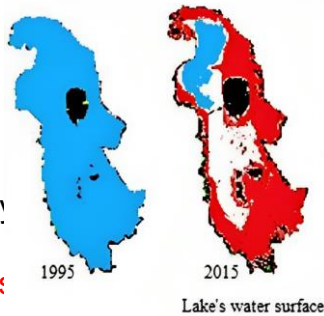


Figure.1: Water level surface of the lake up to 2015

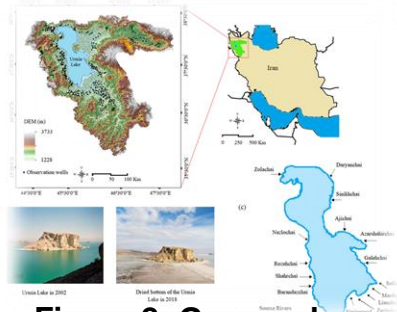
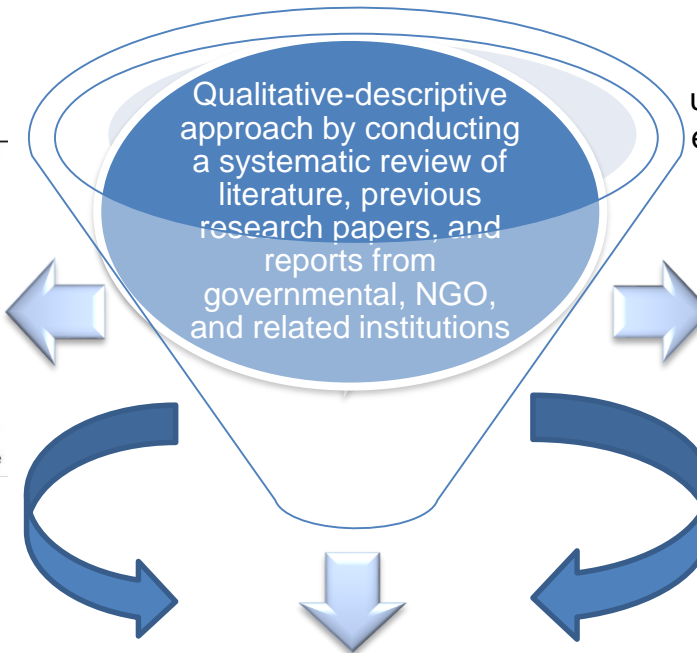


Figure.2: Geography situation of the lake



## Discussion and Conclusion

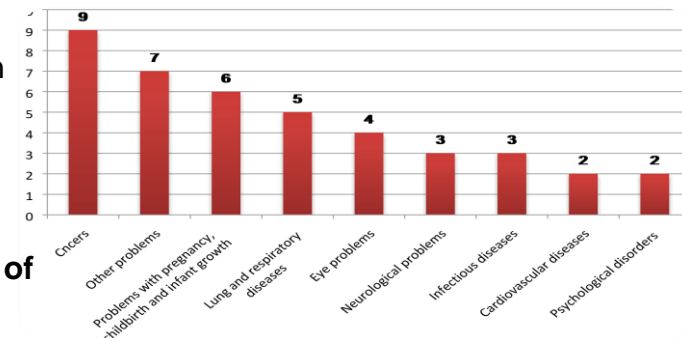
The drying of Lake Urmia, beyond an environmental problem, violates citizens' right to health, mandated by international law. The Iranian government's negligence in addressing this constitutes a severe violation of fundamental human rights.

Table 1 and 2: Contributing factors and the rate of diseases

Four main factors, including large dam projects, changes in agricultural patterns, unauthorized well digging, uncontrolled water extraction, contribute to 51.8% of the crisis in Lake Urmia

the expansion of the salt-dust scatters has impacted the residents' health, as confirmed by the increasing number of cancer, hypertensive, lung, and psychological patients.

| Criterion                              | Criterion Weight | Sub-Criterion Title                                    |
|--|------------------|--|
| Improper Management of Water Resources | 429.0            | Implementation of Large Dam Projects                   |
|  |                  | Unsanctioned Well Digging                              |
|  |                  | Unregulated Surface and Underground Water Extraction   |
|  |                  | Neglecting Prioritization in Water Resource Allocation |
| Climate Change                         | 064.0            | Disregard for Water's Economic Aspect                  |
|  |                  | Reduced Precipitation                                  |
|  |                  | Increased Water Evaporation due to Rising Temperatures |



# Detection of Land Use and Land Cover Change in Sukajaya District use Machine Learning on Google Earth Engine

Fathan Aldi Rivai 1\*, Boedi Tjahjono 2\*, Khursatul Munibah 3\*

\*Regional Planning Science Program Study, Department of Soil Science and Land Resource, IPB University

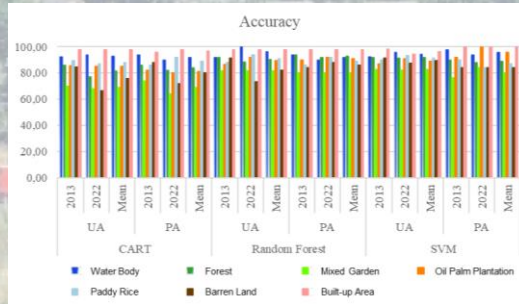
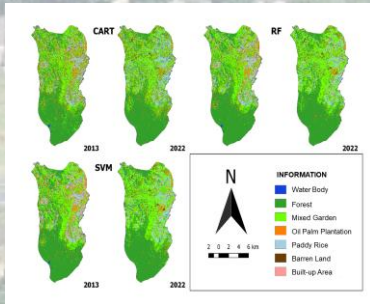
## Introduction

Sukajaya District in Bogor Regency exhibits varied and unregulated land use patterns due to the distribution of land to individuals, leading to uncontrolled alterations. These changes often overlook the land's capacity, compounded by a 14.25% population increase from 60.684 in 2013 to 69.329 individuals in 2022. Google Earth Engine (GEE), equipped with CART, RF, and SVM for the heterogeneous land use classification. The comparison of these techniques is crucial for knowing the land use changes in Sukajaya between 2013 and 2022.

## Methodology

- Research Tools : QGIS, GEE, Google Earth Pro, Avenza Map
- Materials : Land use data sample, 12 spectral indices from Landsat-8 for 2013 and 2022
- Location : Sukajaya District, Bogor Regency, West Java, Indonesia
- Method : CART, Random Forest and Support Vector Machine

## Result and Discussion



|                            | Water Body | Forest | Mixed Garden | Oil Palm Plantation | Paddy Rice | Barren Land | Built-up Area | Area in 2013 (ha) |
|----------------------------|------------|--------|--------------|---------------------|------------|-------------|---------------|-------------------|
| <b>Water Body</b>          | 63         | 22     | 15           | 0                   | 53         | 3           | 6             | 162               |
| <b>Forest</b>              | 53         | 6.246  | 1.061        | 283                 | 78         | 45          | 7             | 7.772             |
| <b>Mixed Garden</b>        | 11         | 727    | 3.020        | 182                 | 154        | 193         | 56            | 4.344             |
| <b>Oil Palm Plantation</b> | 12         | 310    | 1.027        | 202                 | 130        | 38          | 7             | 1.727             |
| <b>Paddy Rice</b>          | 129        | 30     | 622          | 13                  | 1.325      | 45          | 18            | 2.181             |
| <b>Barren Land</b>         | 1          | 18     | 189          | 4                   | 29         | 55          | 36            | 332               |
| <b>Built-up Area</b>       | 1          | 5      | 28           | 0                   | 1          | 12          | 264           | 311               |
| <b>Area in 2022 (ha)</b>   | 270        | 7.357  | 5.963        | 684                 | 1.770      | 390         | 393           | 16.827            |

"SVM outperforms RF and CART in classifying LULC in 2013 and 2022 with an average accuracy of 90,77% for Overall Accuracy (OA) and 89,16% for Kappa. The most significant change in LULC classification between 2013 and 2022 occurred in mixed garden, showing an increase of 1.619 ha, primarily originating from forest."

# Aquatic Geochemistry status in the South, Central and Highland regions of Vietnam

Authors: Le Phuoc Cuong\*, Luong Van Tho\*\*

\* The University of Danang, University of Science and Technology, 54 Nguyen Luong Bang st., Lien Chieu, Danang, Vietnam  
 \*\*The University of Danang, University of Education, Danang, Vietnam, 459 Ton Duc Thang st., Lien Chieu, Danang, Vietnam

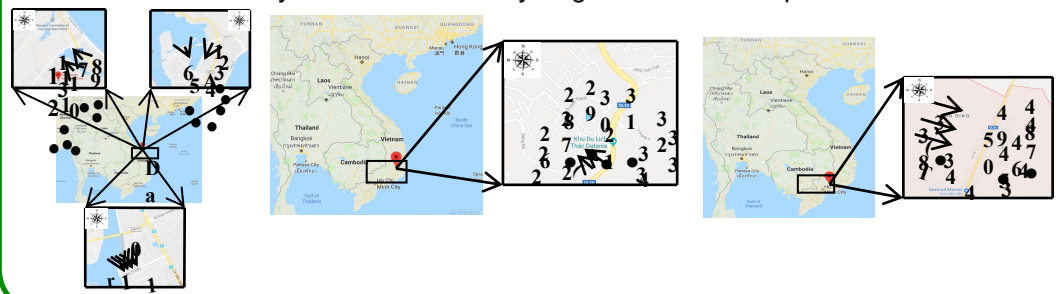


## BACKGROUND

- Groundwater in Vietnam exists in sandstone formations of sandstone, sandy soil, basalt, limestone and several other formations, forming the main aquifers in the North East, Northwest, Northern Delta, North Central, South Central, Highland and Southern delta.
- Among the above water storage structures, the ones in the North and South regions have the most variation.
- The study was aimed (1) to determine the geochemical health status of the holocene aquifer and (2) to assess the correlation between tectonic formation, geochemical composition and groundwater distribution between Central, Highland and Southern regions of Vietnam

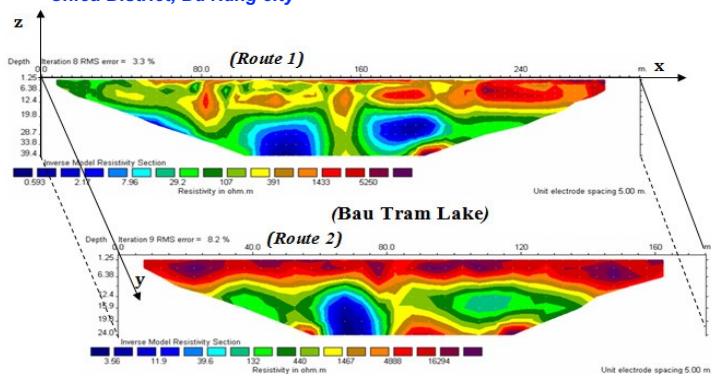
## METHODOLOGY

Questionnaire survey and Chemical analysis ground water samples of 3 areas:

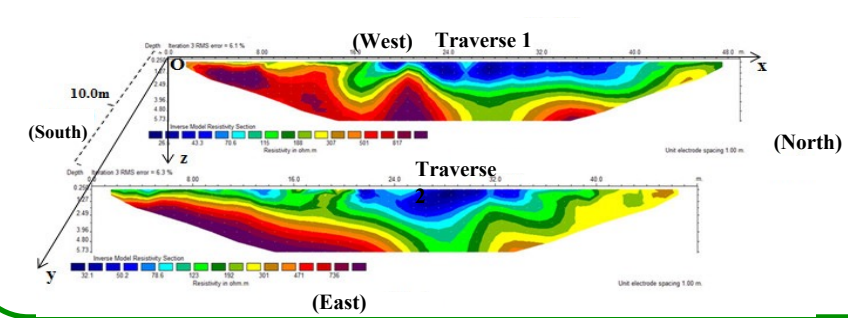


## RESULTS AND DISCUSSION

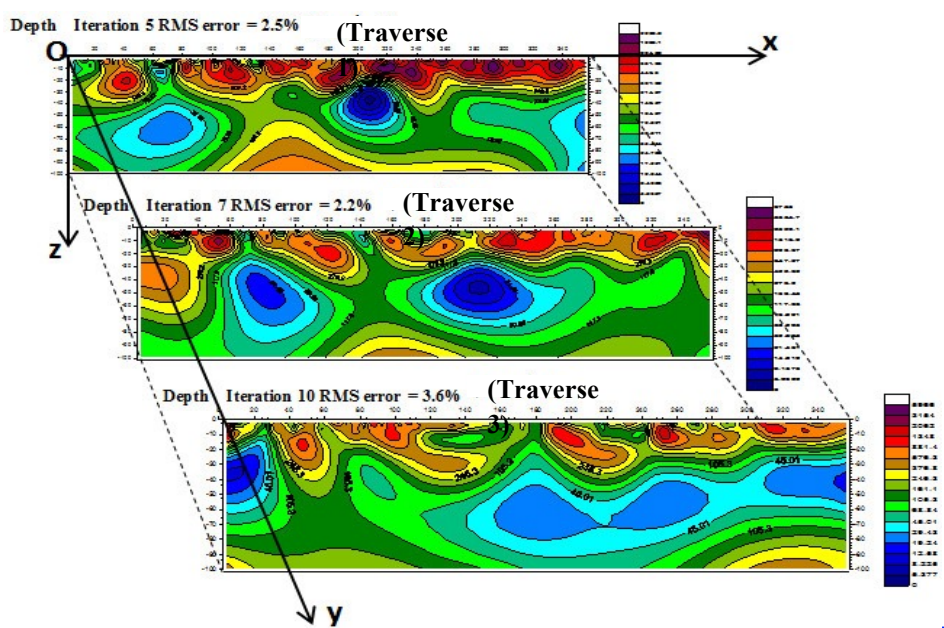
ERT results of Area nearby the Bau Tram lake in Hoa Khanh Industrial Park, Lien Chieu District, Da Nang city



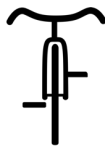
ERT results of Prenn Pass area, Da lat, Lam Dong Province



ERT results of Suoi Ram Hamlet, Long Giao Commune, Cam My District, Dong Nai Province



**Acknowledgments:** Le Phuoc Cuong was funded by the Ministry of Education and Training Fund B2022-DNA-04 and by GSGES 2022 Fund.



# Actual and Perceptual Barriers to Commuting Cycling in Georgia

Authors: Mariam Kvaratskhelia



\* Graduate School of Global Environmental Studies, Kyoto University \*\* Global Environmental Policy Laboratory

## Introduction

## Background

Transport sector is the biggest emitting sector in Georgia, responsible for 24% of Greenhouse Gas Emissions (GHG)<sup>1</sup> and its decarbonization by introducing bicycles is one of national priorities of Georgia.

## Research Gaps

There is no research and accumulated knowledge on cycling as a potential transportation mode in Georgia and related barriers.

## Objectives

Identify actual and perceptual barriers that hinder development of commuting cycling in Georgia.

## Methods

### Mixed Methods Approach

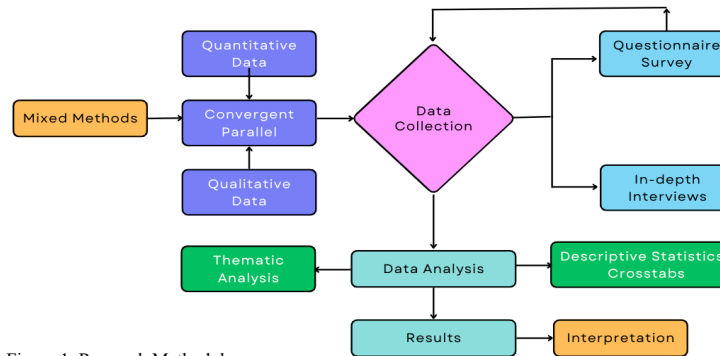


Figure 1. Research Methodology

## Results

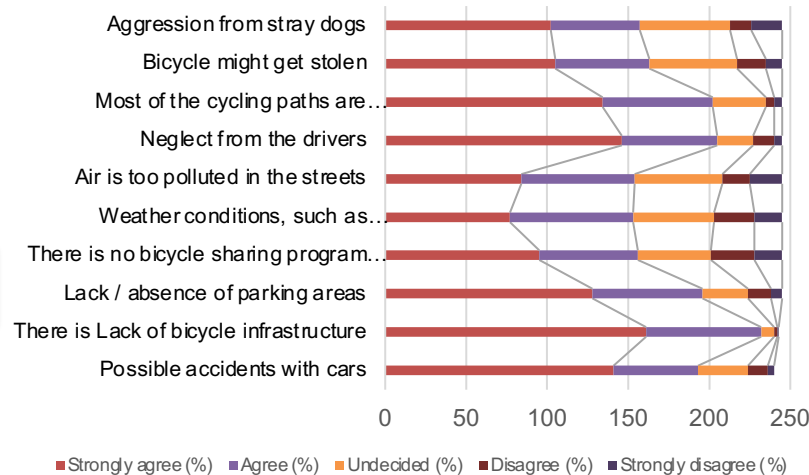


Figure 2. Highly Perceived Barriers (Survey Results)

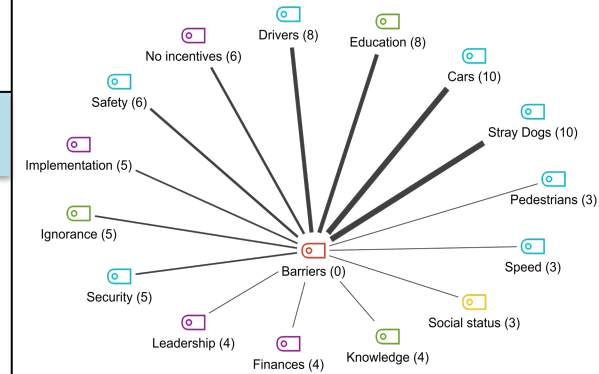


Figure 3. Code-Subcode Model of Identified Barriers

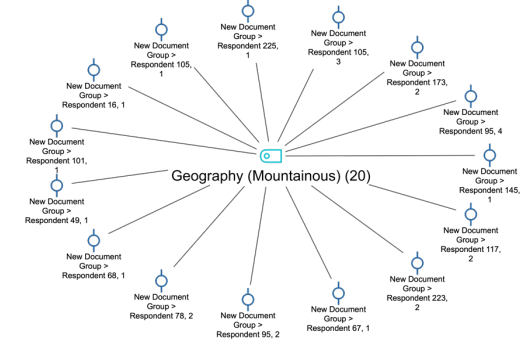


Figure 4. Coded Segment of Survey (Barriers)

## Discussion

Weather conditions and Geography of the city were classified as perceived barriers, as temperature, precipitation, wind and road surface gradient characteristics were suitable for ensuring comfortable cycling conditions.

# Electric mobility transition in India: Mapping out policies at the sub-national level

Authors: Roma KANDPAL\*, Gregory TRENCHER\*

\* Graduate School of Global Environmental Studies, Kyoto University

## 1 Background:

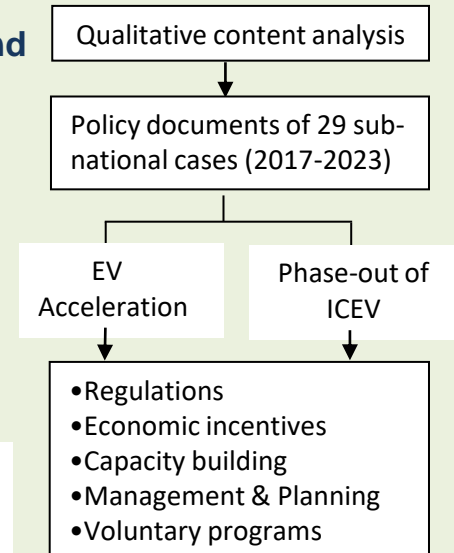
- Electric Vehicle (EV) diffusion is key technology for road transport de-carbonisation. There is exponential growth globally in EV market, but the **developing nations are lagging**.
- India, with multi-tiered governance system has powers divided between national and sub-national (state or union territories) governments.

Sub-national governments  $\xrightarrow{\text{Key actors}}$  Technological transitions

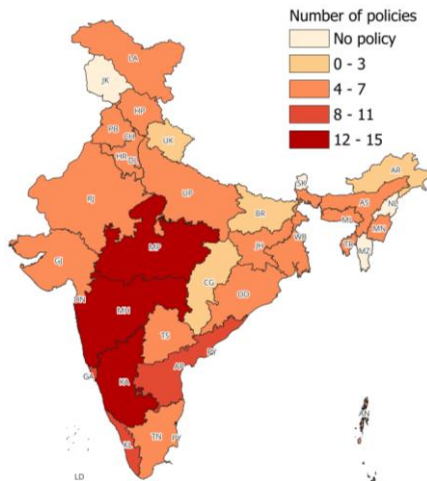
**Gap:** Lack of understanding of policies for the electric mobility transition with focus on phasing out of internal combustion engine vehicle (ICEV) in developing countries, especially in the case of India

**Objective:** To investigate the sub-national variations in policies for India's electric mobility transition, focusing on EV diffusion and phasing-out of ICEV.

## 3 Methods and Materials:

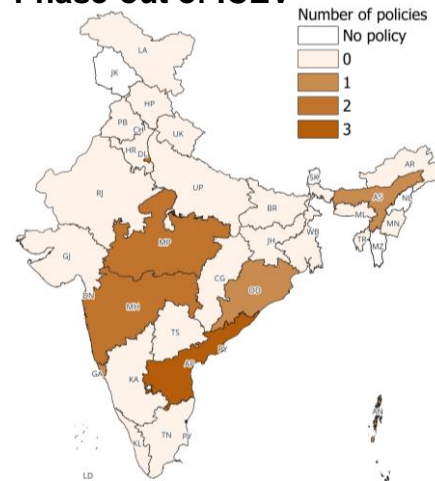


## 4 Results: EV Acceleration



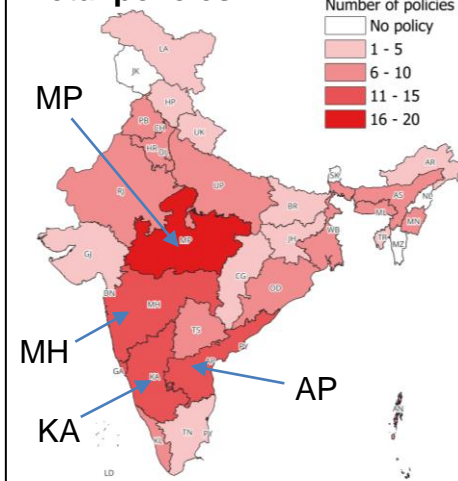
- **Key strategies:** Economic incentives and management & planning.
- The frontrunners also focus on regulations and voluntary programs

## Phase-out of ICEV



**Key strategies:** Dis-incentives and bans

## Total policies



The state of MP leads the electric mobility transition in India, followed by AP, MH and KA

AP (Andhra Pradesh), MP (Madhya Pradesh), MH (Maharashtra) and Karnataka (KA)

## 5 Conclusion:

1. Significant **variation in efforts** across sub-national levels
2. Uneven policy efforts creates **regional imbalances** that slows down the transition.

**Recommendation:** **Collaborations** between laggards and frontrunners can eliminate gaps and accelerate India's transition to electric mobility



# Architectural Fusion and Cultural Harmony: Exploring the Influence of Cultural Diversity on Kampung Baru Historic Mosque Jakarta

Authors: Atie Ernawati\*, M. Prasetyo Effendi Yasin\*\*, Indah Widiastuti\*\* and Widjaja Martokusumo\*\*

\* Doctoral Student of Architecture, \*\* School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung,

## Study Background

As a metropolitan city, Jakarta (661,52 km<sup>2</sup> and a population of almost 11 million people) is known for its rich cultural diversity. Jakarta attracts people from different parts of the Indonesian archipelago and immigrants abroad (van der Linde, 2020). The diversity is reflected in planning and design tradition, especially in architecture, including mosque architecture (Heuken, 2018). Generally, mosques are not only places of worship but also serve as essential community centers and symbols of historical continuity (Jahnkasim et al., 2016). Diversity in architecture is considered important since diversity is essential within the notion of ecology. Masjid Kampung Baru reveals a fusion of various socio-cultural influences in its architectural elements. This research outlines how cultural diversity has influenced mosque architecture as a representative of contemporary cultural dynamics.

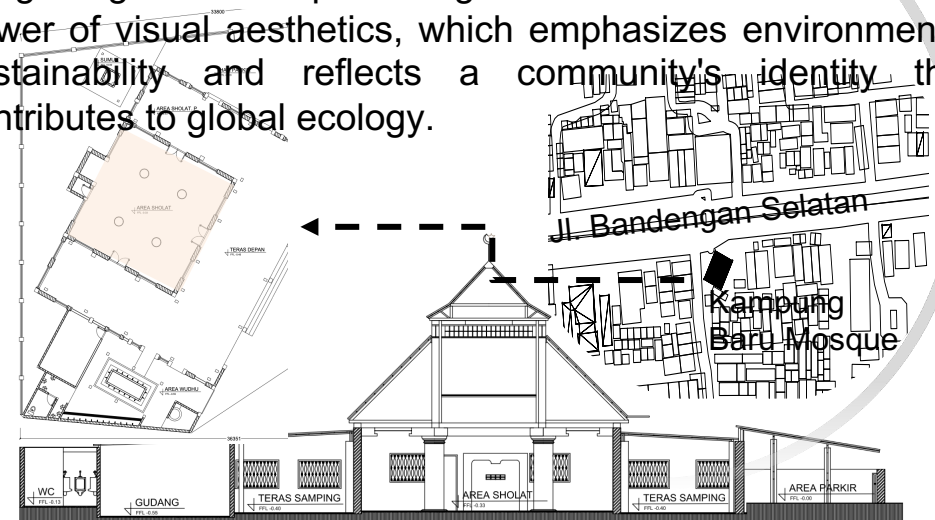
## Methodology

This research uses a multidisciplinary approach, combining architectural, historical, and socio-cultural analysis within a broader urban context. The local community was interviewed to understand their perspective on the Kampung Baru Mosque. Observations and documentation were implemented to record and study the architectural elements of the mosque.



## Result and Discussion

The cultural diversity in the Kampung Baru mosque is seen as a dynamic response to the global ecology. Traditional construction systems combined with environmentally friendly materials are seen as a response to global ecology. Traditional Javanese roofs and Chinese architectural elements display eclectic designs that transcend traditional boundaries, and the 'Soko Guru' roof combines Javanese and European culture in concrete pillars. The spear-shaped Betawi balustrade symbolizes the principle of bamboo life. The mosque uses Tou-Kung-influenced Chinese architecture. Islamic and Javanese styles can be seen in the mihrab and the carved wooden pulpit. Mosques are places of worship and gathering places for the community. By combining the design of the mosque with nature, the power of beauty is increased. Integrating the mosque design with nature increases the power of visual aesthetics, which emphasizes environmental sustainability and reflects a community's identity that contributes to global ecology.



# Adaptability to environmental stresses of local crops used to be cultivated in slash-and-burn fields in the Kyushu Mountains, Japan

KONDO, T.<sup>1,2</sup>, Koga, K.<sup>2</sup>, Nishida, R.<sup>2</sup> and Fujisawa, K.<sup>1</sup> (<sup>1</sup> Graduate School of Agriculture, Kyoto Univ. <sup>2</sup> Faculty of regional innovation, Miyazaki Univ. )

In Kyushu Mountains, Japan, slash-and-burn cultivation used to be practiced, though recently the area is limited. Environmental stresses, such as low P soil, drought, overgrowth of weed, were severe in the slash-and-burn field.

In our studies, **adaptability to environmental stresses of crops used to be cultivated in the slash-and-burn field with traditional cultivation methods were investigated.**

**Expt. 1** Buckwheat grew well with burning under P shortage soil. **With burning, available P in the soil and leaf P increased.**



Table 1 Effect of burning on leaf mineral contents of buckwheat in slash-and-burn field at Kyushu Mountains, Japan.

|          | Leaf mineral content (%) |      |      |      |      |
|----------|--------------------------|------|------|------|------|
|          | N                        | P    | K    | Ca   | Mg   |
| Burned   | 3.12                     | 0.27 | 2.20 | 1.10 | 0.33 |
| Unburned | 3.10                     | 0.12 | 1.83 | 1.44 | 0.30 |
|          | ns                       | **   | ns   | ns   | ns   |

Fig. 1 Effect of burning on buckwheat growth.

\*\* , and ns indicate significant differences at  $p < 0.01$ , and not significant by t-test ( $n=11$ ).

**Expt. 2** Buckwheat is sowed just after burning when the soil is still hot. **With heating to seed, under drought stress buckwheat can keep high stomatal conductance and photosynthesis.**



Fig. 2 Buckwheat is sowed just after burning.

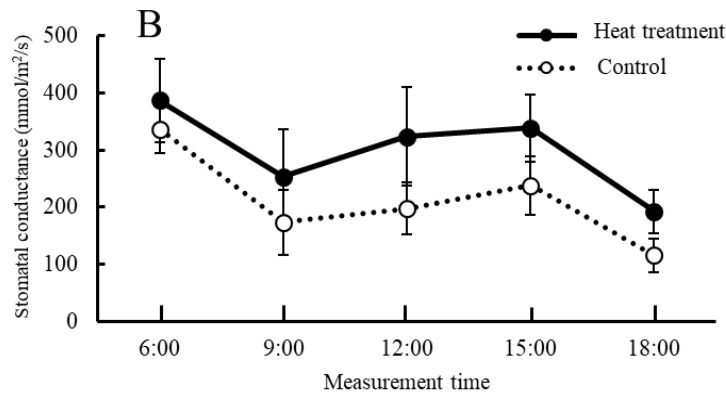


Fig. 3 Effect of heating to seed on stomatal conductance under drought condition.

**Expt. 3** Rice bean used to be cultivated low fertility condition especially low P. **Rice bean can absorb P from AI-P efficiently.**

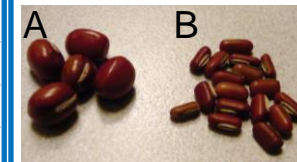


Fig. 4 Adzuki bean (A) and rice bean (B)

Table 2 Leaf N and P content of rice bean and adzuki bean grown under low fertility soil

|             | Leaf mineral content (%) |      |
|-------------|--------------------------|------|
|             | N                        | P    |
| Rice bean   | 4.0                      | 0.08 |
| Adzuki bean | 4.0                      | 0.02 |
|             | ns                       | **   |

\*\* , and ns indicate significant differences at  $p < 0.01$ , and not significant by t-test ( $n=6$ ).

**Expt. 4** **Rice bean inhibited the growth of neighboring plants. It may contribute to weed control (on-going experiment).** There is a local saying; rice bean can suppress the weed



Fig. 5 Effect of mix-cropping with rice bean or adzuki bean on the growth of maize

# A comparison study of PM<sub>2.5</sub> concentrations in Hanoi and Ho Chi Minh City

Authors: Mai-Huong Cao 1\*, Thao-Duong 2\*, Phuong-Ly Trinh 3\*, Lam-Thanh Pham 4\*, Dang-Quang Ha 5\*, Cong-Thanh Trinh 6\*, Quoc-Dat Nguyen 7\*\*, and Bich-Thuy Ly 8\*

\* School of Chemistry and Life Sciences, Hanoi University of Science and Technology, \*\* Graduate School of Engineering, Kyoto University

## Background

Hanoi has a quite similar area, population, GDP (Fig. 1), industry, and traffic to Ho Chi Minh City (HCMC), but its PM<sub>2.5</sub> concentration is much higher. Besides sources, other factors can affect PM<sub>2.5</sub> levels, including meteorological conditions, long-term transportation, and the formation of secondary particles. This study aims to determine the current status of two cities. The temporal variations of PM<sub>2.5</sub> were also investigated to insight into the effects of different factors on PM<sub>2.5</sub> levels

## Methodology

PM<sub>2.5</sub> concentration data at two monitoring locations Hanoi and HCMC during the period of 2016-2022 were collected and analyzed by R software (version 4.3.2) through the Air Now website. GDP and population values were collected in the period of 2019-2022.

## Result

During the investigated period, the annual average PM<sub>2.5</sub> concentration (Fig. 2) in Hanoi insignificantly reduced (except for the period 2016, 2017), and almost doubled the limited level in National Ambient Air Quality Standard (NAAQS) (25  $\mu\text{g}/\text{m}^3$ ). However, those in HCMC were lower than NAAQS since 2020. PM<sub>2.5</sub> in this city were slightly decreased over the year. A similar trend is observed in the number of days that daily concentration exceeds NAAQS (Fig. 3). There is a significant difference in the diurnal pattern of PM<sub>2.5</sub> between the two (Fig. 4).

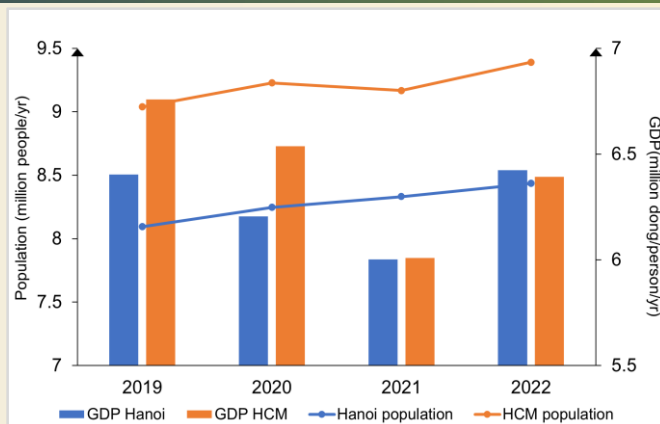


Fig. 1 Population and GDP

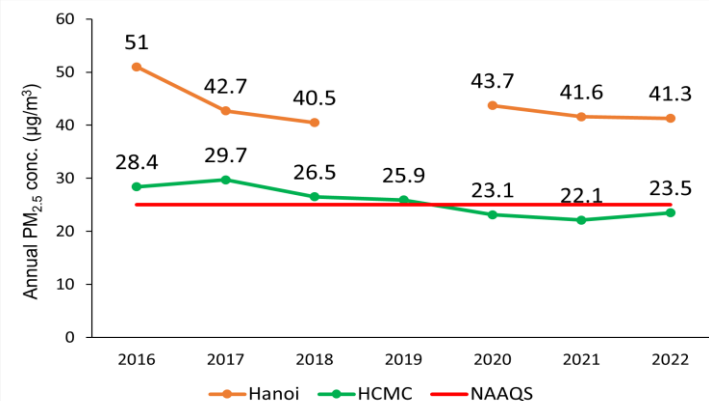


Fig. 2 Annually PM<sub>2.5</sub> concentration

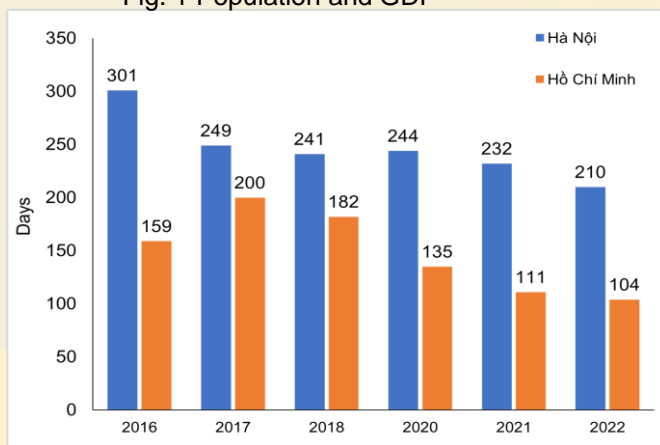


Fig. 3 Days exceed NAAQS

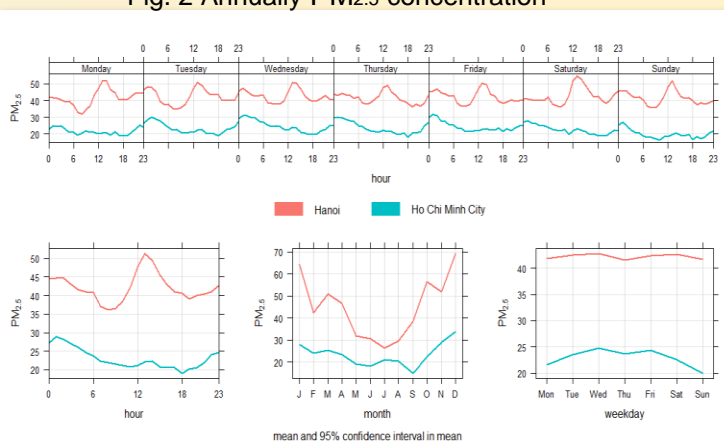


Fig. 4 Daily and monthly PM<sub>2.5</sub> concentration

In Hanoi, the lowest and highest concentrations were observed at approximately 8:00 am and 13:00 pm, respectively. The concentration in HCMC reached the highest level around 1:00 am, then decreased until the bottom was reached in the early evening. The yearly patterns (data not shown) demonstrate that both Hanoi and HCMC have seasonal effects with high PM<sub>2.5</sub> at the end and early of the year and low in the middle of the year.

## Discussion

Diurnal variations in two cities were different than previous research indicating that the factors influencing PM<sub>2.5</sub> concentrations have changed. Further research needs to be conducted on the influencing factors as well as providing methods to manage and improve PM<sub>2.5</sub> levels, especially in Hanoi.

# A study on the investigation of the dominant type of motorcycle in Hanoi, Viet Nam

Authors: Dinh Quoc Huy\*, Nguyen Duy Hung\*\*, Chu Thi Thuc Trinh\*\*, Vu Thi Ngoc Thao\* and Le Thi Phuong Hoa\*

\* School of Chemistry and Life Science, Hanoi University of Science and Technology (email: dinhhuy3396@gmail.com) \*\* SOLEN Environmental Solutions Joint Stock Company

## Abstract

This study investigated the dominant type of motorcycles in Hanoi using questionnaires of 1,005 respondents and counting surveys of 134,624 (on-road) and 1,962 (off-road) motorcycles. The most commonly used motorcycle in Hanoi is the Honda Wave Alpha, followed by Lead, Air Blade, and Vision of Honda.

## Background

In 2022, Vietnam ranked 30 out of 131 in air pollution, and Hanoi was the most polluted city in Vietnam<sup>(1)</sup>. With a large number of motorcycles circulating in Hanoi, they are said to be one of the causes of air pollution. One of the important steps to characterize motorcycles' emissions is to investigate the dominant type of motorcycle.

## Methodology

### Survey by questionnaire

Types of motorcycle people are using were collected through an online questionnaire.

### Survey on off-road motorcycles

Types of motorcycle parked in random parking lots including three locations (a supermarket, a shopping center, a university) were surveyed.

**Table 1.** Off-road motorcycles survey information

| Time        | Sunday, 19 June, 2022          | Sunday, 19 June, 2022         | Monday, 12 July, 2022                      |
|-------------|--------------------------------|-------------------------------|--|
| Location    | Top market Le Trong Tan        | Vincom Pham Ngoc Thach        | Hanoi University of Science and Technology |
| Coordinates | X: 20,999526<br>Y: 105,8 28001 | X: 21,006404<br>Y: 105,841999 | X: 21,006417<br>Y: 105,831671              |

## Survey on on-road motorcycles

Types of motorcycles moving through a specific location at a certain time were collected by recording videos at intersections between the belt and radial routes with heavy traffic density in the four cardinal directions, on weekdays-weekend, morning-evening. Then, the number of each type of motorcycle was counted from these recorded videos.



**Fig.1.** On-road motorcycle survey locations

## Determining sample size

Sample size were calculated using Yamane's formula<sup>(2)</sup> with Hanoi population in 2022 is 8.4 million people<sup>(3)</sup>.

400 or more constituents are needed to have a confidence level of 95% that the real value is within  $\pm 5\%$  of the surveyed value.

## Result and Discussion

### Survey by questionnaire

Out of 1005 respondents, there was 861 people using motorcycles, mostly Honda Wave Alpha with 27% of the total.

### Survey on off-road motorcycles

The total number of off-road motorcycles counted is 1926. The most popular one is Honda Wave Alpha with 26% of the total.

### Survey on on-road motorcycles

The total number of on-road motorcycles was counted at 134,624. The most popular one is Honda Wave Alpha with 17% of the total.

**Table 2.** Results of motorcycle surveys

| Survey forms                   | Wave alpha | Vision | Lead   | Airblade | SH    | Others | Total   |
|--------------------------------|------------|--------|--------|----------|-------|--------|---------|
| Survey by questionnaire        | 232        | 129    | 129    | 86       | 52    | 233    | 861     |
|                                | 27%        | 15%    | 15%    | 10%      | 6%    | 27%    | 100%    |
| Survey on off-road motorcycles | 513        | 321    | 293    | 269      | 147   | 419    | 1,962   |
|                                | 26%        | 16%    | 15%    | 14%      | 8%    | 21%    | 100%    |
| Survey on on-road motorcycles  | 22,478     | 16,642 | 21,803 | 16,657   | 8,012 | 49,032 | 134,624 |
|                                | 17%        | 12%    | 16%    | 12%      | 6%    | 36%    | 100%    |

All the three surveys resulted that there were 5 most popular motorcycles: Wave Alpha, Vision, Lead, Airblade and SH (all from Honda brand). They were making up to at 73%, 79% and 63% from questionnaire survey, off-road counting survey and on-road counting survey, respectively.

## Conclusion

All three surveys showed that the dominant motorcycle in Hanoi is Wave Alpha followed by, but not in order: Vision, Lead, Airblade, and SH.

## References

1. IQAir, World Air Quality Report 2022.
2. Yamane, Taro (1967). Statistics an Introductory Analysis. 2<sup>nd</sup> Edition, New York, Harper and Row.
3. General Statistics Office of Vietnam (2022). Statistical Yearbook of Vietnam 2022.

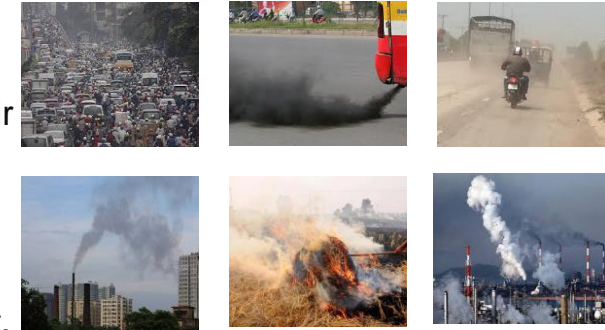
# Studying on dust pollution from traffic activities in Ton Duc Thang – Nguyen Luong Bang street, Da Nang

Authors: Nguyen Phuoc Quy An\*, Tran Thi Thao Trang\*, Hoang Ba Vuong\*, Nguyen Trong Tuan\*, Yoshizumi Kajii\*\*

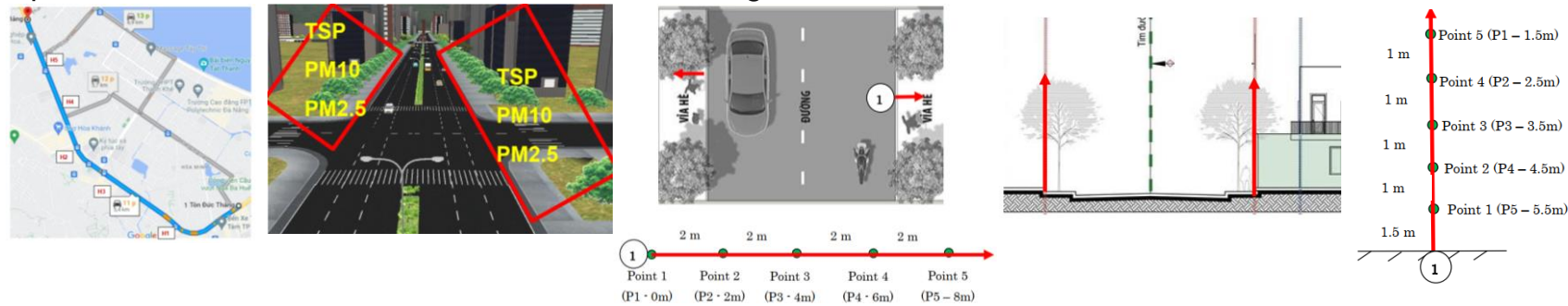
\*Faculty of Environment, Danang University of Science and Technology \*\* Graduate School of Global Environmental Studies, Kyoto University

## Background

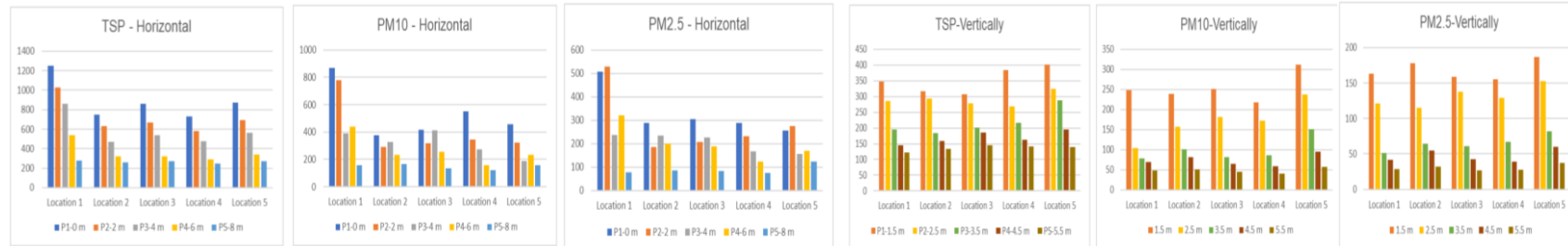
- Air pollution is one of the environmental concerns in many places around the world.
- Urban transportation activities contribute to approximately 70% of air environmental pollution.
- During the operation, vehicles emit a significant amount of dust and hazardous gases (SO<sub>2</sub>, NO<sub>2</sub>, CO<sub>x</sub>)
- This study determines the scope of the impact of traffic activities on particulate matter concentrations in the surrounding air environment.



## The research subject



## Discussion



## Results

- The results show that the TSP decreases with the distance from the road edge, however, the change in PM10 and PM2.5 does not always decrease with the distance, but the concentration of small-sized dust changes increases or decreases. depending on wind direction and wind speed.
- From a vertical perspective, all three parameters TSP, PM10, and PM2.5 tend to decrease with altitude from the ground. At the height of 3.5m, the concentration of dust of all kinds tends to decrease sharply compared to the height of 1.5m and 2.5m

# Determining real-world driving characteristics of motorcycles in Hanoi, Vietnam

Authors: Chu Thi Thuc Trinh\*, Nguyen Duy Hung\*, Dinh Quoc Huy\*\*, Vu Thi Ngoc Thao\*\* and Le Thi Phuong Hoa\*\*

\* SOLEN Environmental Solutions Joint Stock Company (email: trinh.ctt@solevn.com) \*\* School of Chemistry and Life Science, Hanoi University of Science and Technology

## Abstract

This study analysed the real-world driving data to determine 14 representative parameters for the purpose of the typical driving cycle development for motorcycles in Hanoi, Vietnam. The driving data was collected and processed from 96 trips on 14 designed routes. Compared to Edinburgh and Delhi, motorcyclists in Vietnam travel in short, cruising intervals with more idling time.

## Background

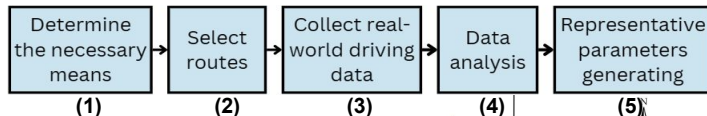
In 2022, Vietnam ranked 30 out of 131 in air pollution, and Hanoi was the most polluted city in Vietnam (IQAir, 2022). With a large number of motorcycles circulating in Hanoi, they are said to be one of the causes of air pollution. To characterize motorcycles' emissions, the real-world driving characteristics need to be determined. Currently in Vietnam, driving characteristics were developed for both buses and motorcycles, however, for motorcycles, the approach needs to be more comprehensive and representative.

## Driving representative parameters

A representative parameter set of a driving cycle is a set of values that provide representative information about driving characteristics related to speed, time, driving behavior, etc.

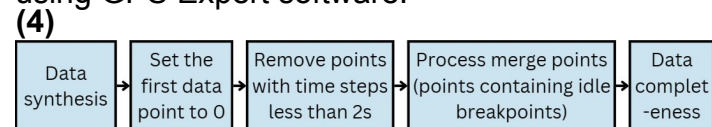
Parameters of typical driving cycles can be selected based on several previous research. There have been many studies on the driving characteristics of motorcycles and a set of 14 representative parameters used consistently shows the driving characteristics. (Table 1)

## Methodology



(1) Motorcycles and Motorcyclists were randomly picked.  
(2) 10 radial routes and 4 belt routes were designed covering the study area (Figure 1).

(3) Real-world driving data was collected using the A-GPS Tracker application on smartphones during weekdays -weekends, morning-evening, outbound-return, making up 96 driving trips. The data was then saved as a GPX file and exported to a .xlsx file using GPS Expert software.



(4) At first, fundamental values were calculated, including distance step, time step, velocity, acceleration and values of four driving modes (acceleration, deceleration, idling, cruising). Then 96 sets of parameters for 96 trips were generated. From these sets, a single set of medians was selected as a representation for real-world driving characteristics of motorcycles.

## Result and Discussion

The representative parameters of real-world driving data for motorcycles in Hanoi are shown in Table 1, comparing to data in Edinburgh and Delhi (Wafaa Saleh et.al., 2010).

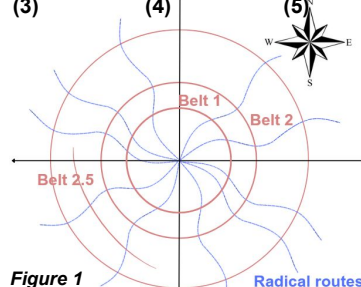


Figure 1

Table 1. Resulted values of the 14 parameters

| No. | Parameters  | Sym-<br>bol  | Unit                | Location |                    |                        |
|-----|---|--------------|---------------------|----------|--------------------|------------------------|
|     |   |              |                     | Hanoi    | Delhi <sup>2</sup> | Edinburgh <sup>2</sup> |
| 1   | Time proportion of driving in acceleration modes                                  | $P_{acc}$    | %                   | 34.23    | 46.83              | 44.45                  |
| 2   | Time proportion of driving in deceleration modes                                  | $P_{dec}$    | %                   | 32.26    | 42.73              | 46.87                  |
| 3   | Time proportion of driving modes in idling  | $P_{idle}$   | %                   | 8.72     | 1.04               | 1.51                   |
| 4   | Time proportion of driving modes in cruising modes                                | $P_{cruise}$ | %                   | 23.58    | 9.44               | 7.24                   |
| 5   | Average speed of entire driving cycle   | $V_1$        | (m/s)               | 7.81     | 9.54               | 9.31                   |
| 6   | Average running speed   | $V_2$        | (m/s)               | 8.76     | 10.17              | 10.79                  |
| 7   | Mean length of driving period   | C            | (s)                 | 134.69   | 847.8              | 769.63                 |
| 8   | Average number of acceleration and deceleration changes within one driving period | M            | (time)              | 49       | 1667               | 1251                   |
| 9   | Average acceleration of all acceleration phases                                   | A            | (m/s <sup>2</sup> ) | 0.65     | 0.73               | 1.28                   |
| 10  | Average deceleration of all deceleration phases                                   | D            | (m/s <sup>2</sup> ) | -0.55    | -0.90              | -2.59                  |
| 11  | Positive Kinetic Energy   | PKE          | (m/s <sup>2</sup> ) | 0.47     | 0.71               | 2.81                   |
| 12  | Root Mean Square Acceleration   | RMS          |                     | 1.00     | -                  | 7.83                   |
| 13  | Total driving time  | T            | s                   | 2992.00  | 8054.71            | 7313.59                |
| 14  | Total driving length  | S            | m                   | 23942.29 | 76841.93           | 68089.52               |

For parameter M, the data in Edinburgh and Delhi are equivalent to 37,9 and 28,4 times of that in Hanoi. This presents that the frequency of velocity changes during a driving period in Hanoi is lower than the other two cities, indicating that motorcycle driving in Hanoi was more cruising. Notable differences can also be observed in parameters C,  $P_{idle}$ , and  $P_{cruise}$ . In Hanoi, motorcyclists travel in short distances, interrupted by many stops, leading to a significant amount of idling time.

## Conclusion

A complete set of 14 representative parameters characterizing the real-world driving of motorcycles in Hanoi was generated. Motorcyclists in Hanoi travel in shorter intervals with more idling time and a higher level of cruising than those in Edinburgh and Delhi.

## References

1. IQAir, World Air Quality Report 2022.
2. Wafaa Saleh et.al. (2010). Driving cycle for motorcycles in modern cities: case studies of Edinburgh and Delhi, World Journal of Science, Technology and Sustainable Development, Vol. 7 Iss 3 pp. 263 - 274.

# Health risk assessment of street food customers: A comparative study in in Danang, Vietnam

Authors: Le Hoang Son, Pham Thi Ngoc Tho, Huynh Thi Minh Hieu

\* Faculty of Environment, Danang University of Science and Technology, Vietnam

## Background

### Street food:

- an affordable option for eating out
- frequently placed in the most congested streets
- may be highly vulnerable to airborne pollutant deposition

## Methodology

### Sampling sites

- Background location: DUT campus
- Informal street vendor location
- Formal street vendor location

### Data collection and analysis

- Real-time measurements were made
- Fine (PM<sub>2.5</sub>) and Coarse Particles (PM<sub>10</sub>)

### Respiratory deposition doses calculation

$$RDD = (V_T \times f) \times DF_i \times PM_i$$

### Multiple-path particle dosimetry

The respiratory system was categorized into three distinct regions: the head airway region (HA), the tracheobronchial region (TB), and the alveolar region (AL).

$$IF = 1 - 0.5 \left( 1 - \frac{1}{1 + 0.00076d_p^{2.83}} \right)$$

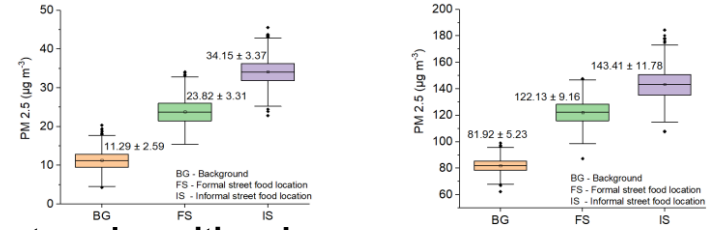
$$DF_{HA} = IF \left( \frac{1}{1 + \exp(6.84 + 1.183 \ln d_p)} + \frac{1}{1 + \exp(0.924 - 1.885 \ln d_p)} \right)$$

$$DF_{TB} = \left( \frac{0.00352}{d_p} \right) \left[ \exp(-0.234(\ln d_p + 3.4)^2) + 63.9 \exp(-0.819(\ln d_p - 1.61)^2) \right]$$

$$DF_{AL} = \left( \frac{0.0155}{d_p} \right) \left[ \exp(-0.416(\ln d_p + 2.84)^2) + 19.11 \exp(-0.482(\ln d_p - 1.362)^2) \right]$$

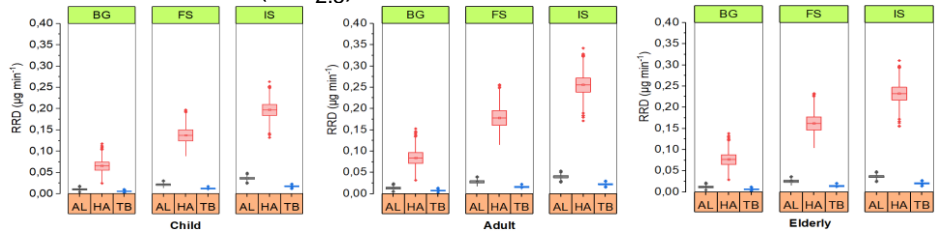
## Results & Discussion

### Particle matter concentration

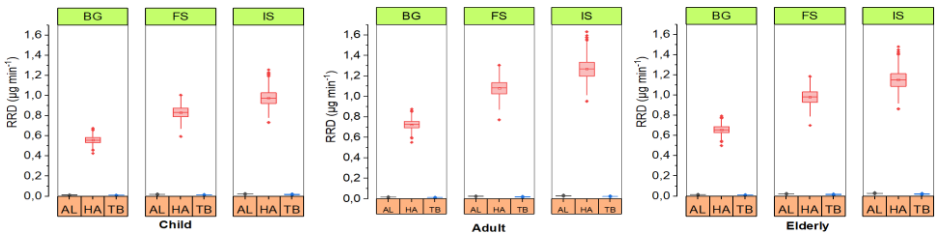


### Respiratory deposition doses

#### ○ Fine Particles (PM<sub>2.5</sub>)



#### ○ Coarse Particles (PM<sub>10</sub>)



### Discussions

- PM concentration was higher than WHO recommendation
- PM concentration were found significantly higher at informal street food location
- Customers may be highly vulnerable to fine and coarse particles deposition in the head air way region.

# Evaluation of Hexabromocyclododecane and Tetrabromobisphenol-A Levels in Indoor Total Dust in Bangkok Metropolitan Area, Thailand

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<sup>1</sup> Graduate Program in Environmental and Water Resources Engineering, Department of Civil and Environmental Engineering, Faculty of Engineering, Mahidol University, Thailand

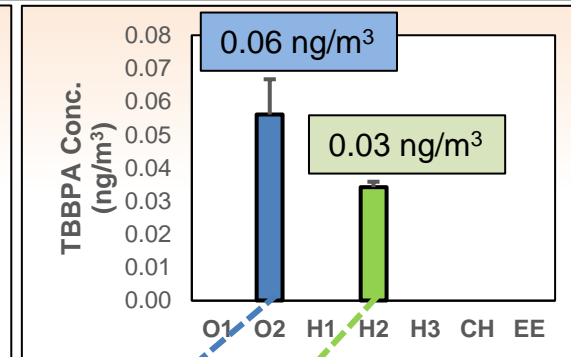
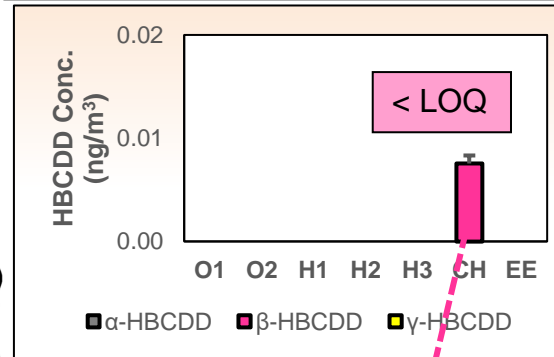
<sup>2</sup> Graduate School of Global Environmental Studies, Kyoto University, Japan <sup>3</sup> Bodhivijjalaya College, Srinakharinwirot University, Thailand <sup>4</sup> Faculty of Environment and Resource Studies, Mahidol University, Thailand

## Background Information

- ▶ Dust is one of the **biggest problems with air pollution**.
- ▶ Hexabromocyclododecane (HBCDD) and Tetrabromobisphenol-A (TBBPA) are **found in small particle** like indoor total dust, this will cause **adverse effects on human health**.
- ▶ This study aims to **evaluate the concentration of indoor total dust associated with HBCDD and TBBPA**.



## Results and Discussion



- Indoor total dust
- HBCDD, TBBPA

## Methodology

### Sample Collection



Air sampling pump

- ▶ A height is around 1.25m.
- ▶ 37mm Glass Fiber Filter
- ▶ Flow rate is 12 L/min.
- ▶ Turn on for 24 hours

### Sample Analysis



Extraction by Ultrasonic Method



Clean up by SPE Method



Analysis by HPLC MS/MS

### Study Area



- 2 Offices (O1-O2)
- 3 Houses (H1-H3)
- 1 Chemical laboratory (CH)
- 1 Electronic repair shop (EE)



**Table 1** Distances between air sampling pump and sources

| Sampling Area | Distances (m) |
|---------------|---------------|
| O1            | 1.20          |
| O2            | 0.17          |
| H1            | 0.70          |
| H2            | 0.19          |
| H3            | 1.50          |
| CH            | 0.48          |
| EE            | 0.38          |

- ▶ HBCDD and TBBPA can be **volatile** in the air.
- ▶ HBCDD found **< LOQ**, confirming its **ban** according to **the Stockholm Convention**.
- ▶ **Decreased distances** between sources = **Increased** the risk of TBBPA exposure
- ▶ The results could provide crucial information about **TBBPA** in indoor total dust and be used for **regulating its use**.

\*Email : Kanitthika128@gmail.com

### References

- Rauert C, Kuribara I, Kataoka T, Wada T, Kajiwara N, Suzuki G, Takigami H, Harrad S. (2016), Sci Total Environ, 77-83  
 Waiyarat S., Boontanon S. K., Boontanon N., Fujii S., Harrad S., Drage D. S., Abdallah M. A.E., (2022), Chemosphere, 302, 134730



# Analysis of plastic waste generation and sorting habits in Da Nang City, Vietnam

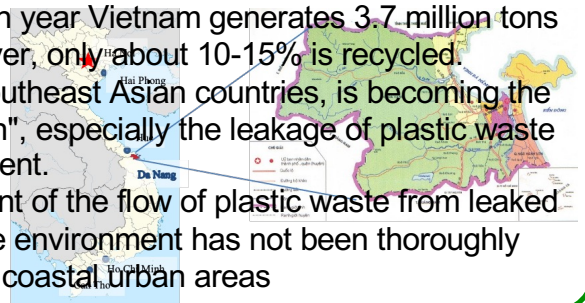
Authors: Tran Vu Chi Mai\*, Le Phuoc Cuong\*, and Ho Hong Quyen\*\*

\* The University of Da Nang, University of Science and Technology, Environmental Protection and Research Center, Vietnam

\*\* The University of Da Nang, University of Science and Technology, Vietnam

## BACKGROUND

- It is estimated that each year Vietnam generates 3.7 million tons of plastic waste, however, only about 10-15% is recycled.
- Vietnam, along with Southeast Asian countries, is becoming the navel of "white pollution", especially the leakage of plastic waste in the marine environment.
- The specific assessment of the flow of plastic waste from leaked sources into the marine environment has not been thoroughly analyzed, especially in coastal urban areas



## METHODOLOGY

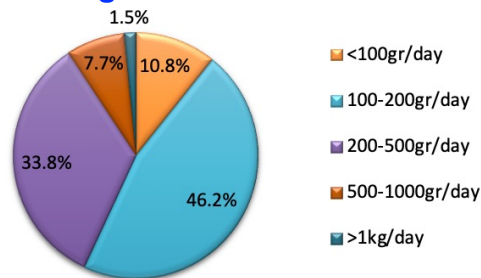
Questionnaire survey and Waste measurement survey



## RESULTS AND DISCUSSION

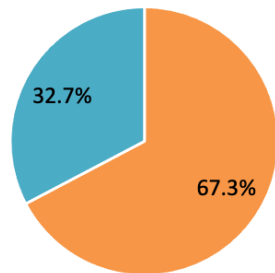
### Household plastic waste generation

The quantity of plastic waste generated from the households

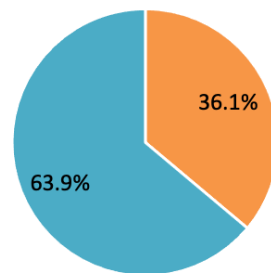


### The separation of household plastic waste

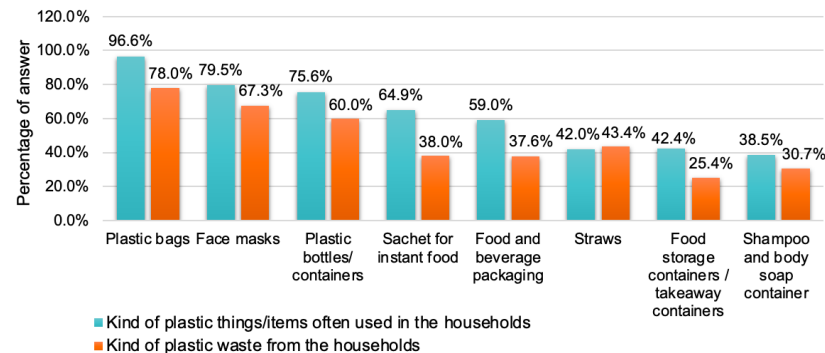
Plastic bottles



Plastic bags



### Kinds of plastic waste from the household



Plastic bag



Face mask



Plastic bottle



Sachet for instant food



Beverage packaging



Straws



Food takeaway container



Shampoo container

**Acknowledgments:** Tran Vu Chi Mai was funded by the Postdoctoral Scholarship Programme of Vingroup Innovation Foundation (VINIF), VINIF.2023.STS.40.



# BIOSYNTHESIS OF SILVER NANOPARTICLES FROM *GLINUS OPPOSITIFOLIUS* EXTRACT AND ITS APPLICATION

Authors: Nguyen Hoang Trung Hieu\*, Tran Thi Minh Nguyet\*, Tran Thi Kim Qua\*, Nguyen Thi Dong Phuong\*, Hoang Hai\*\* and Shuhei Tanaka\*\*\*

\* Danang University of Science and Technology, \*The University of Danang, \*\*\*GSGES, Kyoto University

## BACKGROUND

One of the most widely used nanoparticles is silver nanoparticles (AgNPs). The biological activities of AgNPs depend on factors including shapes, structures, size. *G. oppositifolius* is reported to contain saponin, flavonoid, carotenoid,... which is suitable as reducing agent for the synthesis of AgNPs

## OBJECTIVES

1. Determination of the green synthesis process of AgNPs from *Glinus oppositifolius* extract.
2. Determination of characteristics of the green synthesized AgNPs.

Fig.1. SEM images and corresponding particle size distribution

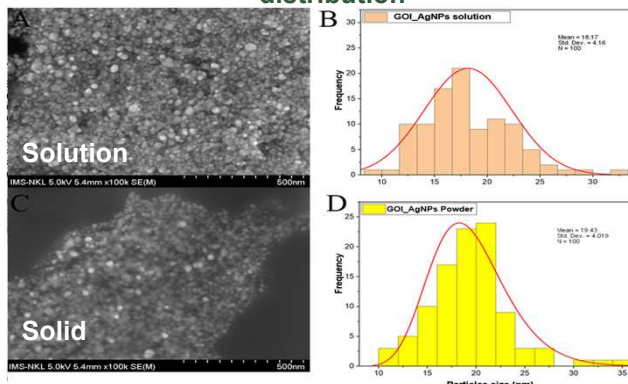
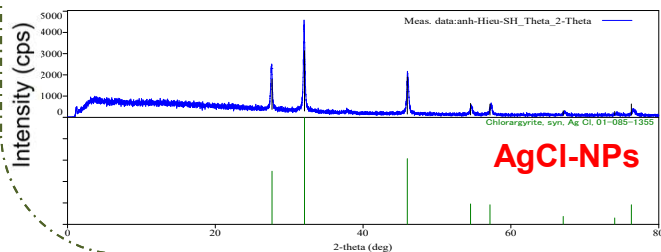


Fig.2. X-ray diffraction pattern of AgNPs



## RESULTS

Fig.3. Antibacterial ring against *S.aureus* depending on pH extract

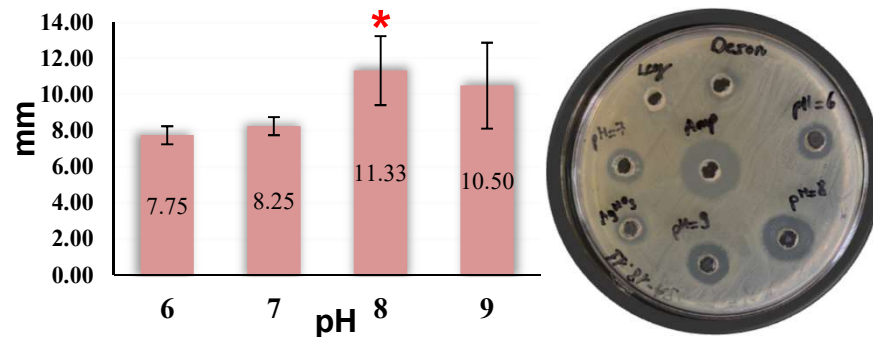
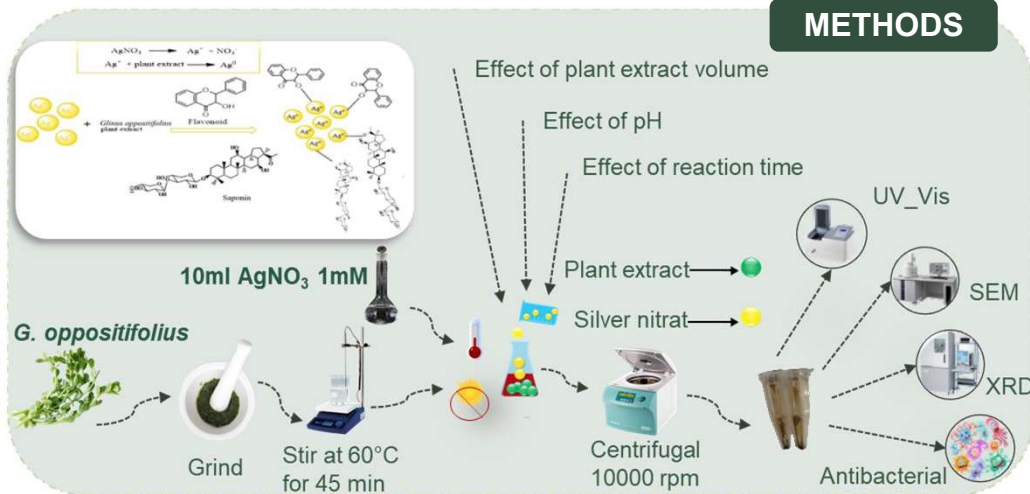


Fig.4. Antibacterial ring against *E.coli*

| Samples                             | GOI_AgNPs 100 µg/ml      | GOI_AgNPs 50 µg/ml        | Commercial AgNPs 100 µg/ml | Commercial AgNPs 50 µg/ml | AgNO <sub>3</sub> 1 mM | Amoxicillin 500 µg/ml |
|-------------------------------------|--------------------------|---------------------------|----------------------------|---------------------------|------------------------|-----------------------|
| Diameter of antibacterial ring (mm) | 11.67 <sup>a</sup> ±0.58 | 10.67 <sup>a</sup> ± 0.58 | 10.67 <sup>a</sup> ±0.58   | 7.83 <sup>b</sup> ±0.76   | 4.5±0.71               | 8.5±0.5               |

Note: \*results have subtracted agar pore size, letters a, b represent significant differences at the confidence level  $p < 0.05$  in the Turkey test.

## METHODS



## CONCLUSIONS

- The optimal conditions for synthesis of AgNPs using leaf extracts of *Glinus oppositifolius* are as follows: AgNO<sub>3</sub> at 1 mM;  $V_{\text{extract}}/V_{\text{AgNO}_3}$ : 500µL/10mL; pH=8; reaction at 60°C for 2h and under dark condition.
- According to SEM, XRD and UV-VIS measurement results, the green synthesized AgNPs is AgCl-NPs with a spherical shape and sizes from 8 nm to 32 nm.
- The optimal AgCl-NPs solution has higher antibacterial activity on *S. aureus* and *E. coli* strains.

## REFERENCES

F. Mai, E. Mahmoud, M. Reda, Hussein, Sameh & M. Mona (2020) Green Silver Nanoparticles Based on the Chemical Constituents of *Glinus lotoides* L.: In Vitro Anticancer and Antiviral Evaluation. 10.26538/tjnpr/v4i10.10

# Composition of biosolids from high organic content wastewater treatment by activated sludge process

Vu Thi Mai Hoa, Pham Nguyet Anh\*, Nguyen Thi Lien, Nguyen Thi Lan Huong

Division of Environmental Engineering and management, Faculty of Chemistry and Environment, Thuyloi University, \*email: anhpn@tlu.edu.vn

## Introduction

- Composition and properties of waste sludge are necessary for the selection of appropriate treatment, proper disposal and management
- Conventional activated sludge process: COD < 1000 mg/L
- Presence of CMs (Catalyst Microorganism Support) – product of Japan (2012): treat high organic content wastewater

## Results and Discussion

- pH = 7.1; moisture: 99% → suitable for composting
- Low organic and nutrient contents
- *E. Coli*: not detected
- *Coliforms*: 83 CFU/g
- *Salmonella*: not detected

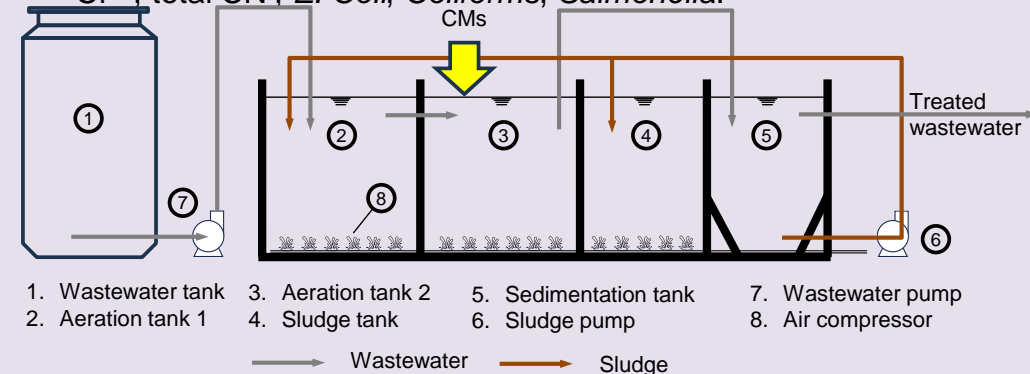
Table 1: Organic and nutrient contents in the biosolids

| Materials   | OM    | Total N       | Total K | Total P   | N <sub>effective</sub> | K <sub>2</sub> O | P <sub>2</sub> O <sub>5</sub> |
|---|-------|---------------|---------|-----------|------------------------|------------------|-------------------------------|
|   | mg/kg |               |         |           | %                      |                  |                               |
| Biosolids in this research                                      | 2.25  | 2,932         | 5,559   | 509       | 47.9                   | 0.67             | 0.002                         |
| Drainage sludge in Danang <sup>(1)</sup>                        | -     | 1,290 – 1,450 | -       | 620 – 920 | -                      | -                | -                             |
| Hanoi West Lake sludge <sup>(2)</sup>                           | -     | 2.2 – 28.2    | -       | 254.7     | -                      | -                | -                             |
| Waste sludge from beverage, sea food manufacture <sup>(3)</sup> | -     | -             | -       | -         | 1,200 – 7,400          | 0.05 – 0.36      | 1.04 – 5.54                   |
| Shrimp raising pond sludge in Nghe An province <sup>(4)</sup>   | -     | -             | -       | -         | -                      | -                | 0.03 – 0.5                    |

<sup>(1)</sup>Thủy et. al, 2017; <sup>(2)</sup>Project Management Unit for construction of water supply, drainage and environment, 2018; <sup>(3)</sup>Phuong et. al, 2016; <sup>(4)</sup>Vân & Duy, 2019

## Materials and methods

- Wastewater: dairy product processing
- Analytical parameters: pH, moisture, total P, total K, total N, Organic matter (OM), N<sub>effective</sub>, K<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, Cu, Cd, Pb, Zn, Ni, Hg, Cr<sup>6+</sup>, total CN<sup>-</sup>, *E. Coli*, *Coliforms*, *Salmonella*.



1. Wastewater tank
2. Aeration tank 1
3. Aeration tank 2
4. Sludge tank
5. Sedimentation tank
6. Sludge pump
7. Wastewater pump
8. Air compressor

Figure: Dairy product processing wastewater treatment pilot

- Metals and toxic substances: under thresholds regulated by MONRE & MARD.

Table 2: Metals and toxic substances in the biosolids

| Materials                                      | Cu   | Zn    | Cd   | Pb   | Ni    | Hg   | Cr <sup>6+</sup> | CN <sup>-</sup> |
|--|------|-------|------|------|-------|------|------------------|-----------------|
| Biosolids in this research                     | 4.06 | 98.35 | 0.05 | 0.32 | 5.07  | 0.02 | <1.6             | <0.18           |
| QCVN 50:2013/BTNMT <sup>(1)</sup>              | -    | 5000  | 10   | 300  | 1,400 | 4    | 100              | 590             |
| QCVN 03:2008/BTNMT (crop soils) <sup>(2)</sup> | 50   | 200   | 2    | 70   | -     | -    | -                | -               |
| TT41/2014/TT-BNNPTNT <sup>(3)</sup>            | -    | -     | <5   | <200 | -     | <2   | -                | -               |

<sup>(1)</sup> National Technical Regulation on Hazardous Thresholds for Sludges from Water Treatment Process

<sup>(2)</sup> National technical regulation on the allowable limits of heavy metals in the soils

<sup>(3)</sup> Regulations for quality and limits in organic fertilizers and other fertilizers

- Biosolids could be co-composting with other nutrient-rich organic materials to obtain good quality organic fertilizer product.

# Developing A Thermal-Composting System for Recycling Bio-solid Waste

Song Toan Pham Phu\*, Misuzu Asari\*\*

\* The University of Danang, University of Technology and Education \*\* Graduate School of Global Environmental Studies, Kyoto University

## Introduction

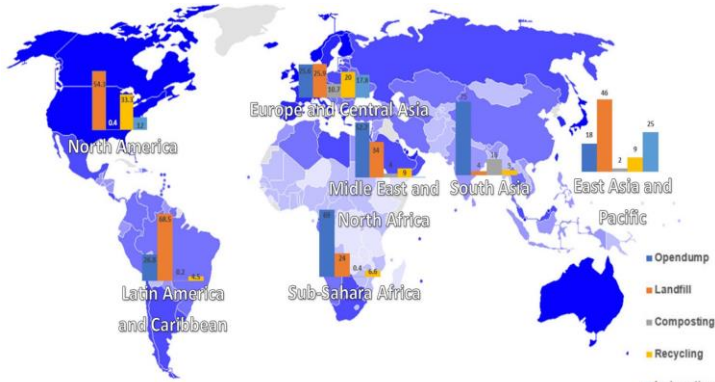


Fig 1. Solid waste treatments in the world

- Municipal solid waste (MSW) is increasing quickly
- Bio-waste accounts for more than **50%** of MSW
- BUT Composting is a NOT exiting solution in Vietnam

New national law of environmental protection (No.72/2020/QH14):

- Waste is required to sort into 3 types: **organic waste**, recyclable waste, and the other waste (Article 72)
- Waste is **separately collected and gathered** at the transfer stations (Article 76)
- **PAYT** and **free of recycling** waste at source (Article 79)

## Methodology

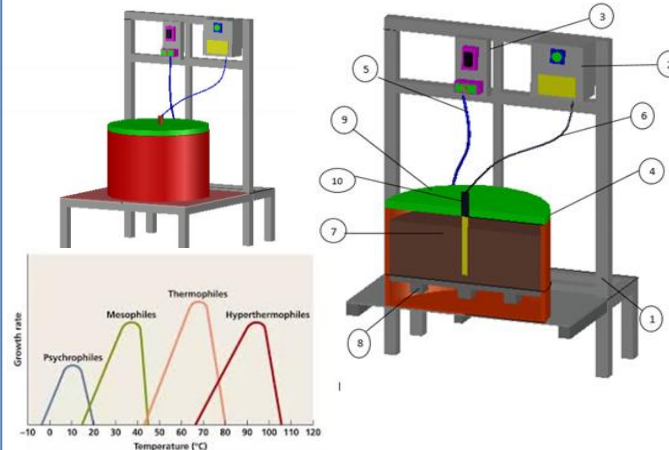


Fig 2. Model of TCOM-HOME system

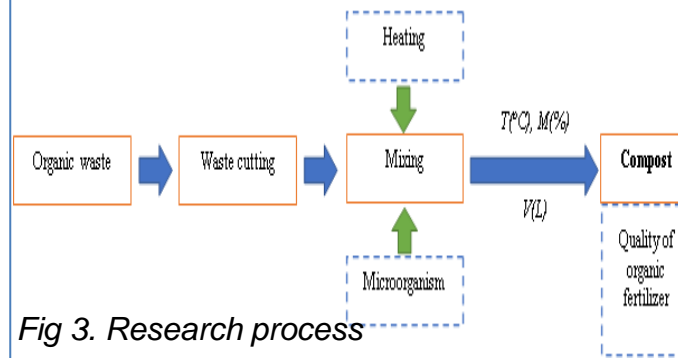


Fig 3. Research process

Table 2. Analysis methods

| No | Parameter | Method     | No | Parameter     | Method     |
|----|-----------|------------|----|---------------|------------|
| 1  | pH        | TCVN 5979  | 6  | Cd            | TCVN 9291  |
| 2  | Total N   | TCVN 8557  | 7  | Hg            | TCVN 10656 |
| 3  | Total P   | TCVN 8559  | 8  | Ni            | TCVN 10675 |
| 4  | K         | TCVN 8580  | 9  | Pb            | TCVN 9290  |
| 5  | Cr        | TCVN 10674 | 10 | Organic mater | TCVN 9294  |

## Results

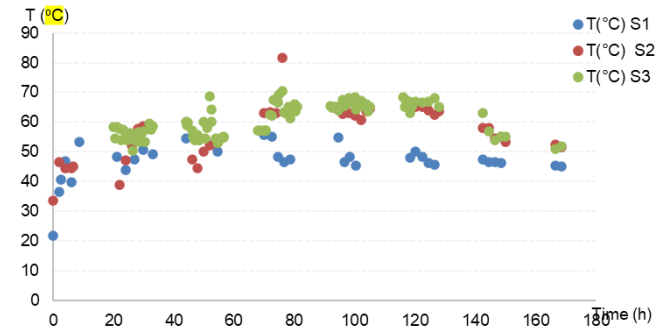


Fig 4. Solid waste treatments in the world

Table 2. Compost quality

| No | Parameter             | Unit  | TCOM-HOME | TCVN 7185:2002 |
|----|-----------------------|-------|-----------|----------------|
| 1  | pH                    | -     | 7.21      | 6.0 – 8.0      |
| 2  | Moisture              | %     | 31.3      | ≤ 35           |
| 3  | Total N               | %     | 0.72      | ≥ 2.5          |
| 4  | Total P               | %     | 0.27      | ≥ 2.5          |
| 5  | Total K               | %     | 1.09      | ≥ 1.5          |
| 6  | Organic               | %     | 57.80     | ≥ 22           |
| 7  | Total Cr (dry sample) | mg/kg | 16.55     | ≤ 200          |
| 8  | Total Ni (dry sample) | mg/kg | 3.58      | ≤ 100          |
| 9  | Total Pb (dry sample) | mg/kg | 1.91      | ≤ 200          |
| 10 | Total Cd (dry sample) | mg/kg | 0.62      | ≤ 2.5          |
| 11 | Total Hg (dry sample) | mg/kg | 0.05      | ≤ 2            |

## Conclusion

- Thermal-Composting System: 12L
- Heating value: 40°C in the first 2 days
- Retention time: 7 days
- Batch/continuous composting
- Compost can be used for farming



# Evaluation of the stabilization effectiveness of dewatered sludge by aerobic incubation experiments combined with a bulking agent

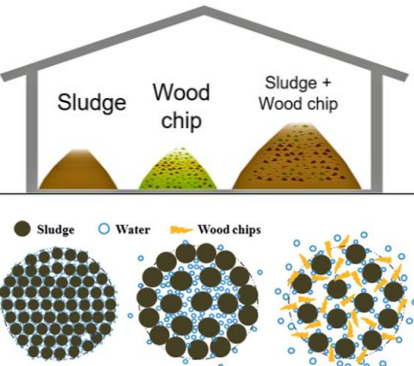
Authors: Diep Ngoc Khoi Vo\*, Shuhei Tanaka\*\*, Van Quang Tran, Nhu Thuc Phan, Ngoc An Hoang, Van Thanh Truyen Nguyen

\* University of Science and Technology, The University of Danang; \*\* Graduate School of Global Environmental Studies, Kyoto University

## INTRODUCTION

## Co-composting

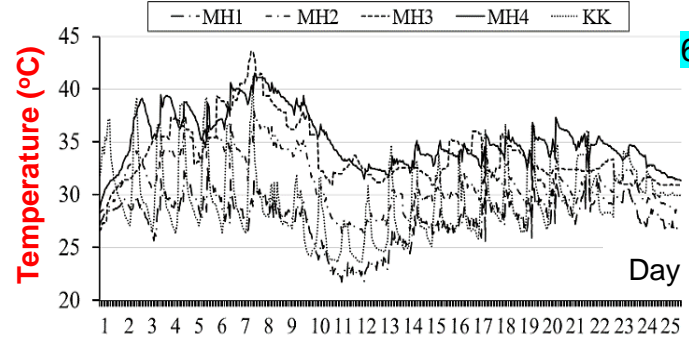
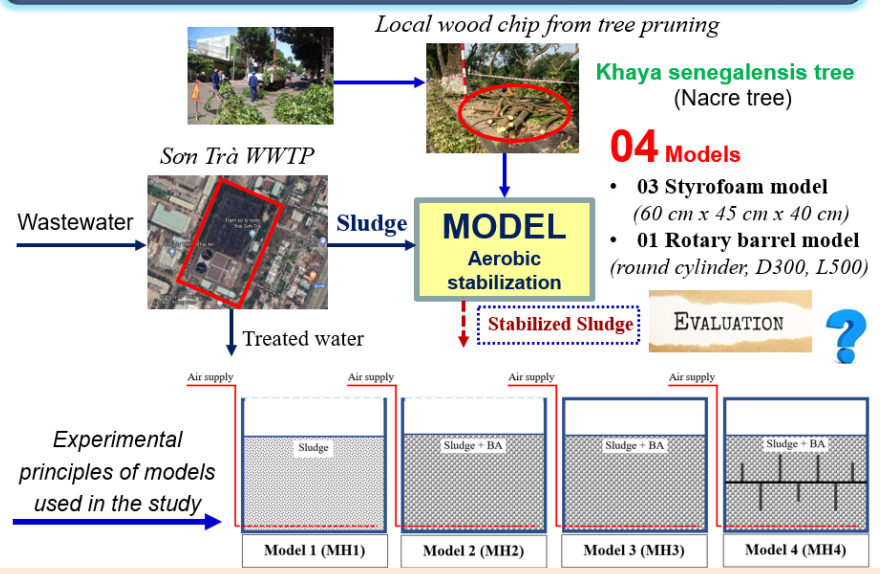
## RESULTS AND DISCUSSION



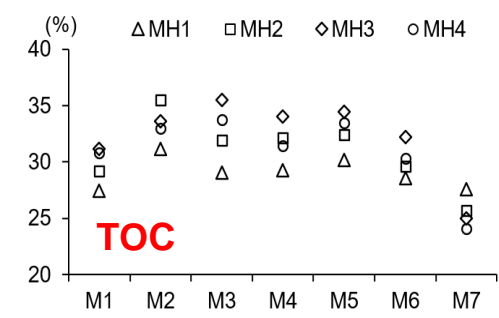
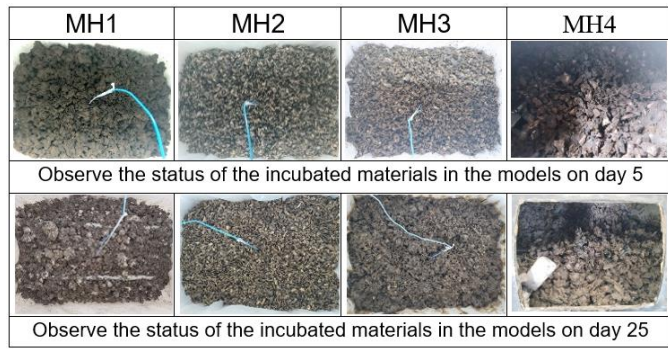
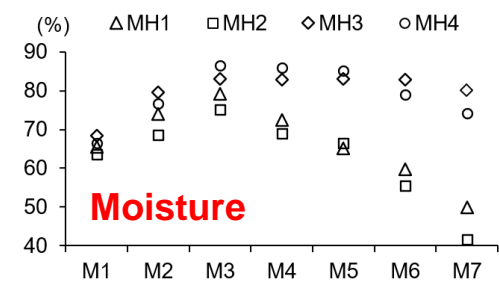
- Moisture reduction
- Free air space (FAS)
- Carbon balance

- Wood chip in Vietnam
- Sludge stabilization
- Ability of reuse

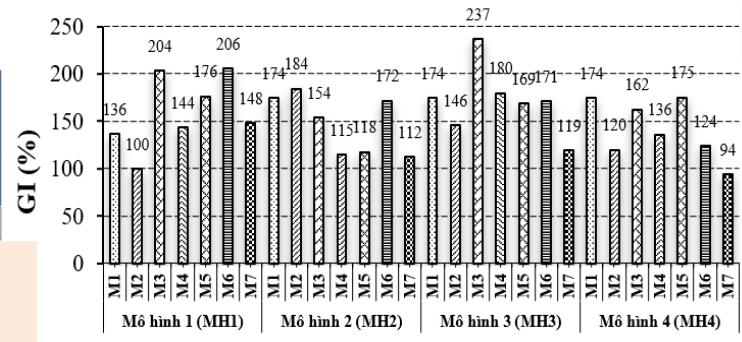
## METHODOLOGY



**pH**  
6.8 – 7.1 (MH1-2); 7,3 - 7,5 (MH3-4)



Sludge reduction effectiveness: 91% (M1), 80% (M2), 76% (M3), 77% (M4)



## CONCLUSIONS

1. Dewatered sludge + Wood chip → Increases sludge stabilization efficiency
2. GI > 80% → "Safe product"
3. Development of the rotary drum (MH4) for the sludge stabilization in WWTP

- Ratio [Sludge + Wood chip] → Moisture: 50 – 60%
- Monitoring: Temperature; Moisture; pH; TDS, TOC

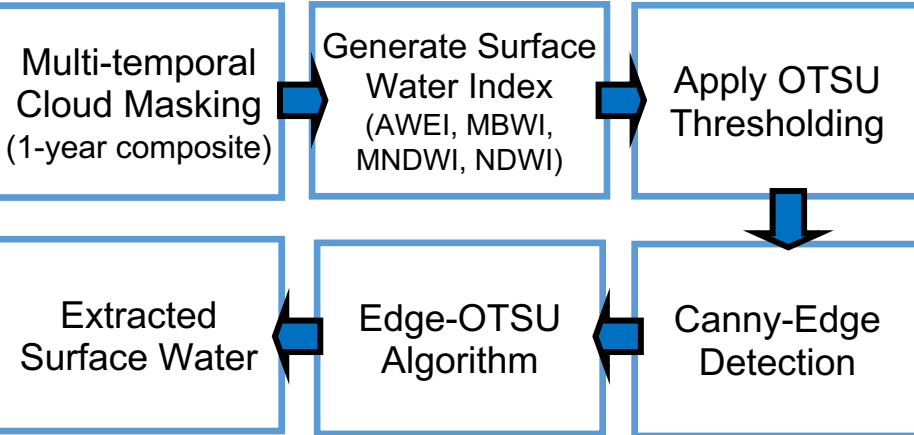
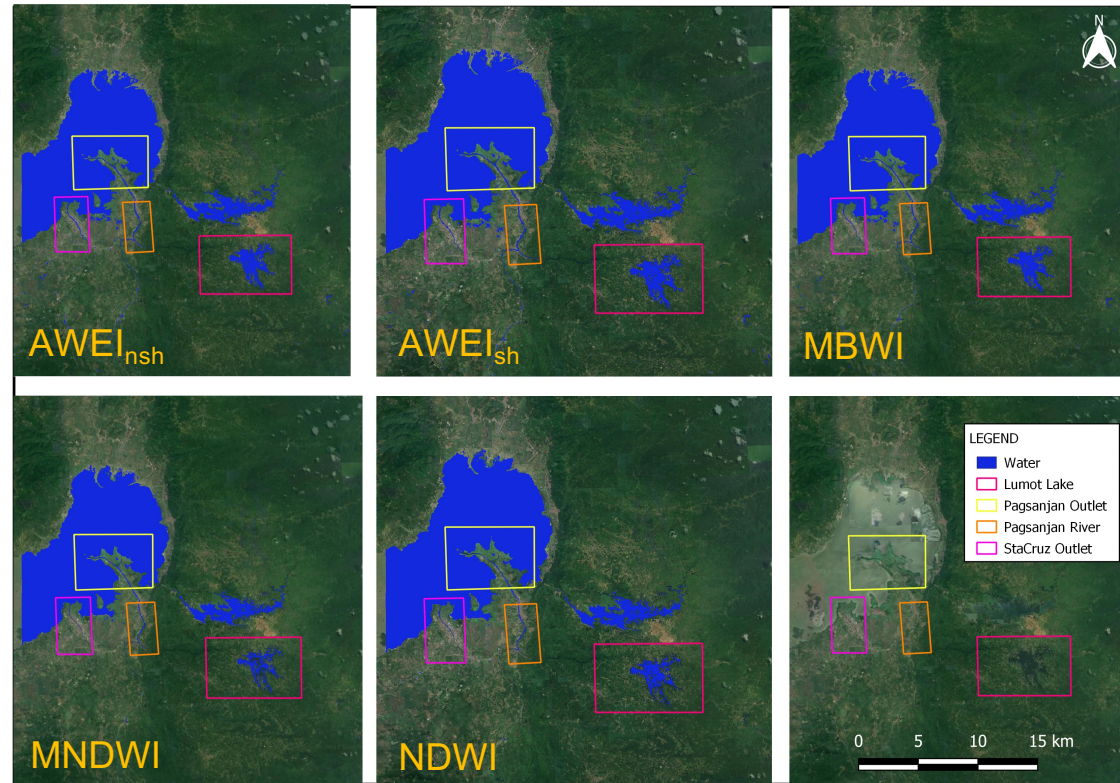
# Assessment of Different Spectral Indices for Surface Water Extraction

Jayson L. Arizapa\*, Cristino L. Tiburan Jr.\* Izuru Saizen\*

\* Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños

\*\* Graduate School of Global Environmental Studies, Kyoto University

**RATIONALE.** This study assessed different spectral indices in detecting and extracting surface water - NDWI, MNDWI, MBWI, and AWEI. An annual image composite was created to obtain a cloud-free Landsat 8 image using Google Earth Engine (GEE). Then, water pixels were automatically extracted using the combination of OTSU Thresholding Approach and Canny-Edge Detection. Outputs were assessed based on the computed area of extracted water pixels and their overall accuracy.



| Focus Area       | AWEI no Shadow |              |           | AWEI shadow |              |                | MBWI   |           |               | MNDWI  |           |           | NDWI      |              |                 |
|------------------|----------------|--------------|-----------|-------------|--------------|----------------|--------|-----------|---------------|--------|-----------|-----------|-----------|--------------|-----------------|
|                  | OA (%)         | Kappa (%)    | Area (ha) | OA (%)      | Kappa (%)    | Area (ha)      | OA (%) | Kappa (%) | Area (ha)     | OA (%) | Kappa (%) | Area (ha) | OA (%)    | Kappa (%)    | Area (ha)       |
| Pagsanjan Outlet | 93             | 85.92        | 2313.77   | 93          | 85.92        | 2301.18        | 93     | 85.92     | 2301.86       | 93.5   | 86.01     | 2277.26   | <b>95</b> | <b>86.49</b> | <b>2227.097</b> |
| Pagsanjan River  | 97             | 73.46        | 38.09     | <b>99</b>   | <b>75.44</b> | <b>42.58</b>   | 97.5   | 73.96     | 38.79         | 96     | 72.35     | 25.79     | 94        | 69.81        | 23.18           |
| Sta Cruz Outlet  | 97             | 87.47        | 337.22    | <b>97</b>   | <b>87.73</b> | 348.25         | 97     | 87.6      | <b>337.07</b> | 95.5   | 87.26     | 319.38    | 96.5      | 87.26        | 311.14          |
| Lumot Lake       | <b>98.7</b>    | <b>86.65</b> | 498.59    | 98.5        | 85.78        | <b>507.396</b> | 98.5   | 85.78     | 502.80        | 89.5   | 83.55     | 288.36    | 93.5      | 84.62        | 338.13          |

# The Effectiveness of the APO (Sea Water Breaker) as Natural Based Solution on Mangrove Restoration in the North Coast of Central Java: a Comparative Study

Authors: Aprillia Findayani\*, Vina Nurul Husna\*, Satya Budi Nugraha\*

\* Department of Geography, Faculty of Social Science and Politics, Universitas Negeri Semarang, Indonesia

## BACKGROUND

Mangroves are critical coastal ecosystems that provide numerous ecological and economic benefits, such as acting as nurseries for marine life, protecting coastlines from erosion, and supporting local fisheries. Alat Pemecah Ombak (APO) is a Nature-based solution for wave breaking involves using natural elements to reduce the energy and impact of waves, which can help protect coastlines and ecosystems.

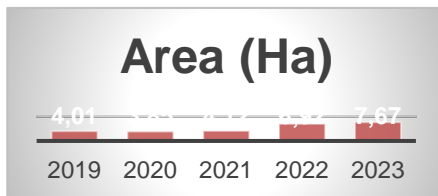
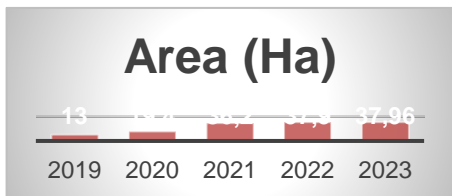
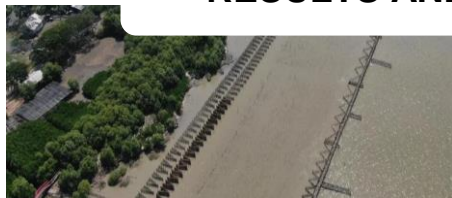
## OBJECTIVE

This research analyzes the effectiveness of APO as Nature Based Solutions wave breaker on the North Coast of Java Island in case of mangrove restoration

## RESEARCH METHOD

1. Landuse and Land Cover Analysis (GIS)
2. Field Survey

## RESULTS AND DISCUSSIONS



## RESEARCH LOCATION

- Semarang, Central Java (HE and Semi-Concrete)
- Karawang, West Java (Shark Tooth Formation)



## DISCUSSION

1. The use of "Formasi Gigi Hiu" (Shark Tooth Formation) in the mangrove restoration program is better than other formations where this idea emerged because mangrove planting carried out on the north coast of Java experienced many failures due to being hit by sea waves which resulted in loss of substrate and uprooting of mangrove plants, resulting in planting failure. These formations reduce the destructive energy of tidal waves on the substrate and mangrove community behind the formation.
2. APO with natural constructions contributes to a sustainable city and improves the mangrove ecosystem by creating a better ecosystem for some species of fish and birds living in this new ecosystem, which affects the increase of community economic activities. This condition also commits to forming coastal ecotourism sites and increasing the area of Green Open Space on the North Coast of Java.

## SUPPLEMENTAL DATA

1. <https://www.pheonwj-pertamina.com/remaja>

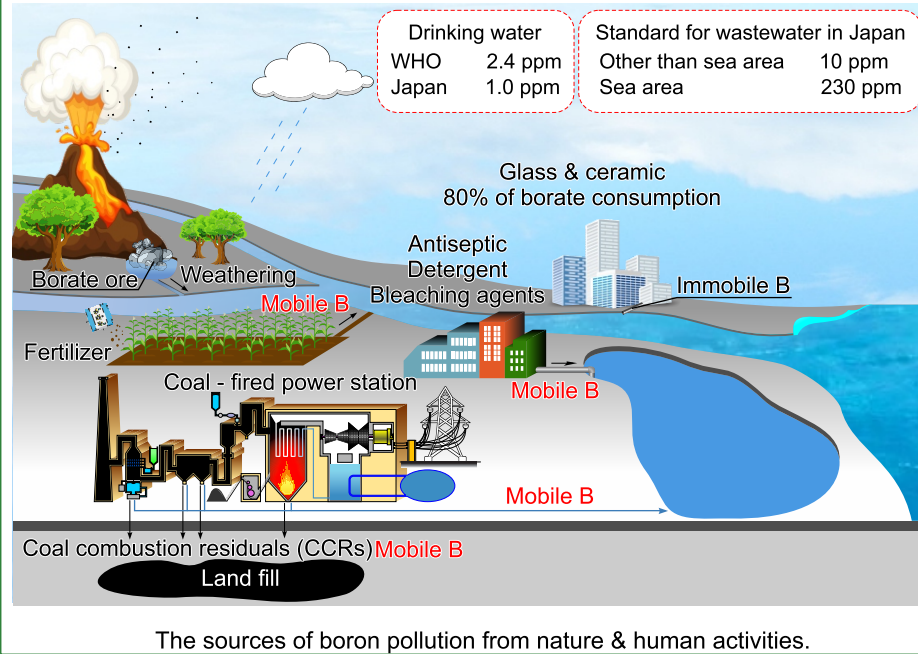
# DEVELOPMENT OF CHITOSAN-BASED ADSORBENT FOR BORON REMOVAL FROM AQUEOUS SOLUTION

Ho Hong Quyen<sup>1, a\*</sup>, Hoang Hai<sup>1</sup>, Tran Vu Chi Mai<sup>1</sup>, Masashi Kurashina<sup>2</sup>, Mikito Yasuzawa<sup>2</sup> and Shigeo Fujii<sup>3</sup>

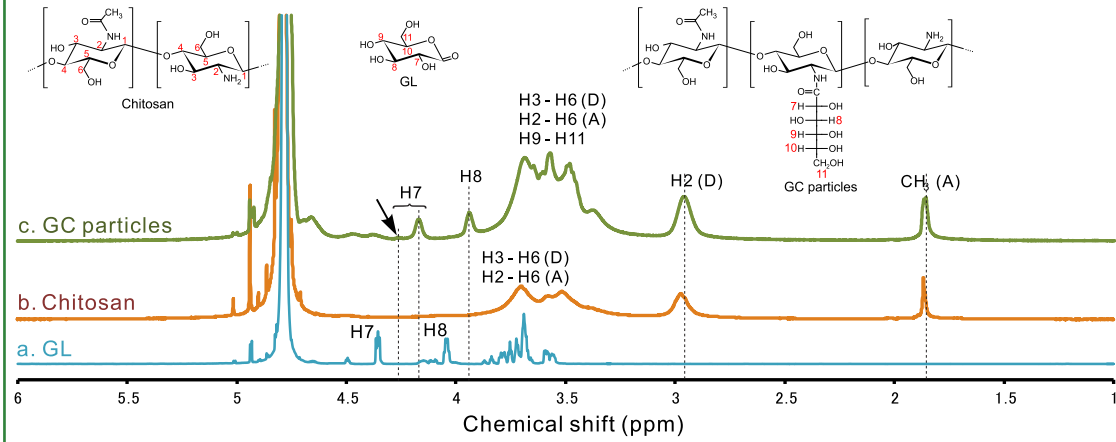
<sup>1</sup>University of Science and Technology, The University of Da Nang, Viet Nam - <sup>2</sup>Tokushima University, Japan

<sup>3</sup>Kyoto University, Japan - <sup>a</sup>hhquyen@dut.udn.vn

## INTRODUCTION

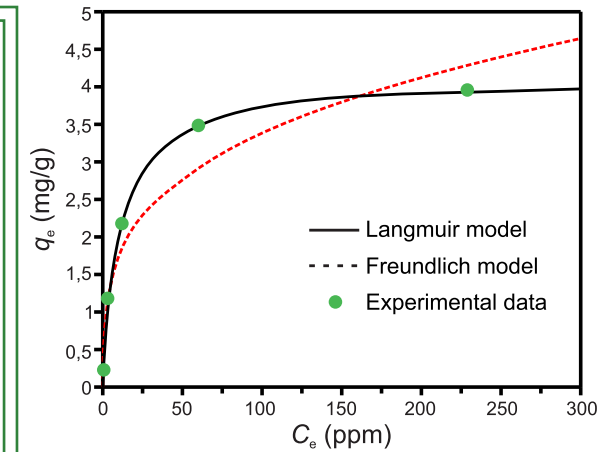
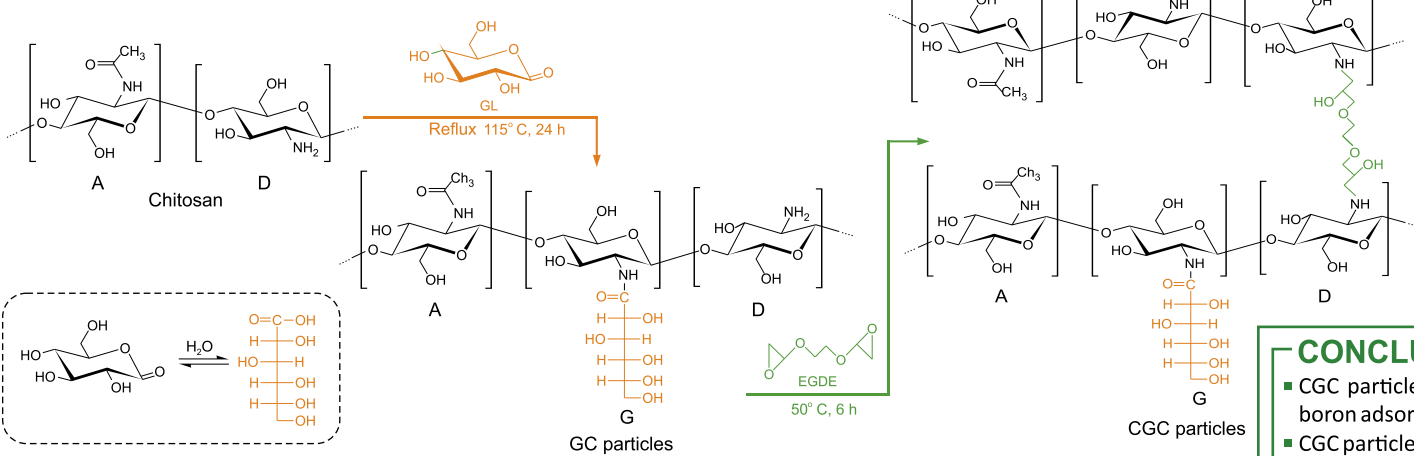


## RESULTS & DISCUSSION



■ The ring of GL was opened and successfully grafted onto the chitosan.

## EXPERIMENTAL



## CONCLUSION

- CGC particles displayed the capability of boron adsorption, and the highest boron adsorption was at 4.13 mg/g.
- CGC particles could be applied for boron adsorption in the aqueous solution.



# Can bio-drying be the solution for DSW-based RDF.

Authors: Hoang Thi Hong Van 1, Nguyen Thi Anh Tuyet 1, Van Dinh Son Tho 2

1 School of Chemistry and Life Sciences, Hanoi University of Science and Technology  
2 School of Chemical Engineering, Hanoi University of Science and Technology

## Background

Previous research on evaluating the ability to recover energy from solid waste in Quang Ngai, Vietnam has shown that: solid waste over 8cm in size with high calorific value (more than 6000kcal/kg) can be produced. RDF co-burns with coal in industrial production; Solid waste smaller than 8cm in size has a small calorific value (about 3000kcal/kg). While the initial humidity of household waste in Vietnam is very high (about more than 60%), it is necessary to find a method to reduce humidity to increase the heat value to be able to produce RDF.

Studies have shown that the biodrying method is suitable for dehumidifying household solid waste smaller than 5cm in size. (Jing Yuan, 2019; Difang, 2018).

Therefore, this study continues to find suitable moisture reduction methods for this type of waste with different sizes.

## Methodology

Daily household solid waste is collected in 3 districts of Phu Ly, Duy Tien, Thanh Liem, Ha Nam province from 6:00 a.m. to 7:00 a.m. the next day at households. This solid waste is divided into 4 types

Type 1: Biodegradable waste

Type 2: Solid waste that can be reused and recycled

Type 3: Other domestic solid waste

Type 4: Bulky and hazardous waste (separately)

30 kg of type 1 waste were transported to the laboratory of the Institute of Environmental Science and Technology and experiments were conducted on the same day.



Picture 1,2: Biodegradable waste

The study determined the composition and some basic chemical properties related to the flammability of MSW, including chemical composition, moisture, ash content, and heating value before and after the biodrying experiment. (they were determined in accordance with ASTM D 3173 standard, ASTM D 3175 standard, ASTM D 3174 standard, TCVN 200:2011 standard).

The test equipment includes Parr 1341 calorimeter.



Picture 3: Parr 1341 calorimeter

- Determine the calorific value of the pellet sample:

$$H_g = \frac{t \cdot W - e_1 - e_2 - e_3}{m}$$

In there:

W: Equivalent heat of Benzoic standard (cal/g)

m: Sample mass (g)

t: Heat increase (°C)

e1 Heat correction of Nitric acid (HNO<sub>3</sub>). = c1 if 0.0709N alkali is used for titration

e2 Heat correction of Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) = (13.7) (c2) (m)

e3 Adjust the temperature of the primer wire

= (2.3).c3 when using Parr 45C10 nickel chromium wire or

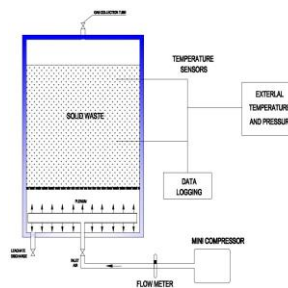
= (2.7).c3 when using No.34 B wire and S.gage iron

c1 ml of alkali standard solution for acid titration

c2 % sulfur in the sample

c3 cm of primer wire when burning

In biodrying, the main drying mechanism is convection evaporation, using heat from aerobic biological decomposition of waste. The moisture content of the waste is reduced through two main stages: (1) water molecules evaporate (i.e. phase change from liquid to gas) from the surface of the waste into the surrounding air; and (2) the evaporated water is transported through the waste layer by air flow and removed by exhaust gases. The amount of water produced can seep through the background waste and be collected at the bottom of the biological drying reactor as leachate. The biodrying experiment was conducted in 1 tank: aerobic digestion.



Picture 4: biodrying equipment

## RESULTS & DISCUSSION

Table 1: Experimental results on changes in volume, temperature and leachate

| Date      | Weight of sample tank (kg) | Leachate from tank (ml) |
|-----------|----------------------------|-------------------------|
| 05/4/2023 | 7.2                        |                         |
| 20/4/2023 | 6.1                        | 300                     |
| 25/4/2023 | 5.3                        | 325                     |
| 6/5/2023  | 4.3                        | 10                      |
| 11/5/2023 | 4.1                        | 10                      |
| 15/5/2023 | 3.9                        | 5                       |
| 26/5/2023 | 3.9                        | 0                       |

Table 2: Data table before biodrying

| Sample      | e3 (cal) | e2 (cal) | t (°C) | m (g) | Hg (cal/g) |
|-------------|----------|----------|--------|-------|------------|
| Sample tank | 17.48    | 0.039    | 1.603  | 1.01  | 3843.74    |

Table 3: Data table after biodrying

| Sample      | e3 (cal) | e2 (cal) | t (°C) | m (g) | Hg (cal/g) |
|-------------|----------|----------|--------|-------|------------|
| Sample tank | 17.3     | 0.039    | 0.836  | 1.01  | 2003.73    |

Humidity before and after the experiment

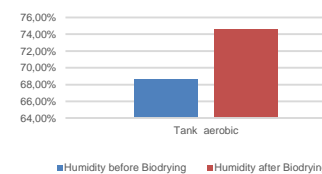


Fig 1: Humidity before and after the experiment

Heat treatment before and after the experiment

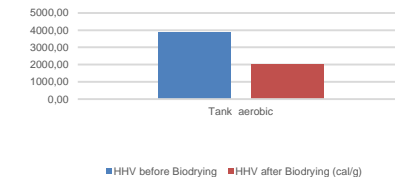


Fig 2: Heat treatment before and after the experiment

The volume of solid waste in tank decreased rapidly in the first period, then the volume decreased slightly. The volume of leachate collected is about 300ml in the first 20 days, then decreases sharply in the next 10 days.

Moisture after biodrying does not decrease. Thermal value after biodrying does not increase but decreases. To explain this problem, it can be seen that the remaining matter is mainly humus after decomposition of organic matter, leaves, and branches with the main component being cellulose. Cellulose contains hydrophobic regions (around the C atom) that have a certain influence on overall properties, including solubility. This substance has a high ability to absorb and retain water (over 80%). Therefore, after the biodrying process, the moisture and calorific value of the waste do not decrease.

## CONCLUSIONS

Initial results show that bio-drying can be effective with DSW at sizes smaller than 5 cm.

# Area source emission inventory for air quality management: a case study of Vinh Phuc province, Vietnam

Pham Nguyet Anh<sup>1</sup>, Pham Huong Quynh<sup>2</sup>, Chu Tuong Mai<sup>2</sup>

<sup>1</sup>Faculty of Chemistry and Environment, Thuyloi University, <sup>2</sup>HaUI Institute of Technology, Hanoi University of Industry

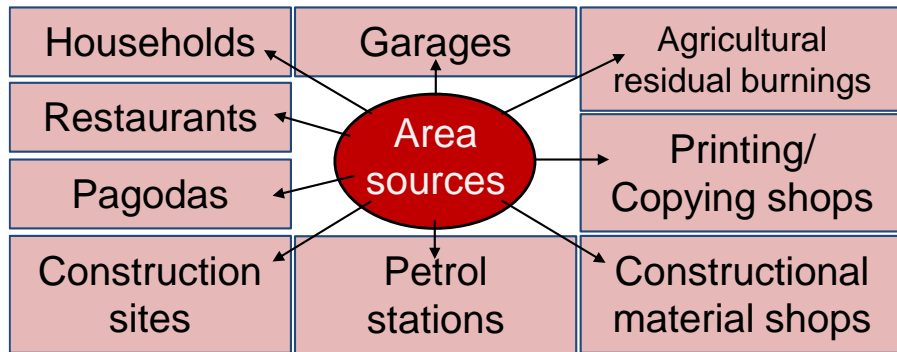
## Introduction

### Air emissions:

- (1) transportations
- (2) industries
- (3) area sources
- (4) biogenic sources



Strategies and Policies for Air Pollution Abatement



## Results and Discussion

- Contribution to total emissions: Agri. Residual burnings > HHs > other sources
- CO, TSP, CH<sub>4</sub>: major pollutants

**Table 1: Pollutant emission loadings by sources**

| Sources                        | Emission loadings (tons/year) |                 |                 |                |                |                 |                   |
|--------------------------------|-------------------------------|-----------------|-----------------|----------------|----------------|-----------------|-------------------|
|                                | NO <sub>x</sub>               | CO              | SO <sub>2</sub> | NM VOC         | TSP            | CH <sub>4</sub> | PM <sub>2.5</sub> |
| Households                     | 116.99                        | 2888.2          | 8.04            | 425.74         | 562.30         | 149.58          | 516.10            |
| Restaurants                    | 3.23                          | 68.44           | 0.17            | 9.09           | 11.03          | 3.90            | 10.14             |
| Petrol stations                | -                             | -               | -               | 2.11           | -              | -               | -                 |
| Garages                        | -                             | -               | -               | 124.60         | -              | -               | -                 |
| Constructional materials shops | -                             | -               | -               | -              | 156,08         | -               | 7.80              |
| Printing/Copying shops         | -                             | -               | -               | 74.47          | -              | -               | -                 |
| Construction sites             | -                             | -               | -               | -              | 302.31         | -               | 15.15             |
| Pagoda                         | 0.16                          | 18.77           | -               | 0.97           | 8.75           | 0.88            | 8.16              |
| Agri. Residual burnings        | 251.71                        | 1026.10         | 19.87           | 772.79         | 1004.63        | 1058.73         | 916.31            |
| <b>Total</b>                   | <b>372.08</b>                 | <b>13242.50</b> | <b>28.09</b>    | <b>1409.78</b> | <b>2045.10</b> | <b>1213.08</b>  | <b>1473.67</b>    |

## Materials and methods

Vinh Phuc province: 2 cities: Vinh Yen and Phuc Yen and seven rural districts: Lap Thach, Tam Duong, Tam Dao, Binh Xuyen, Yen Lac, Vinh Tuong, and Song Lo districts

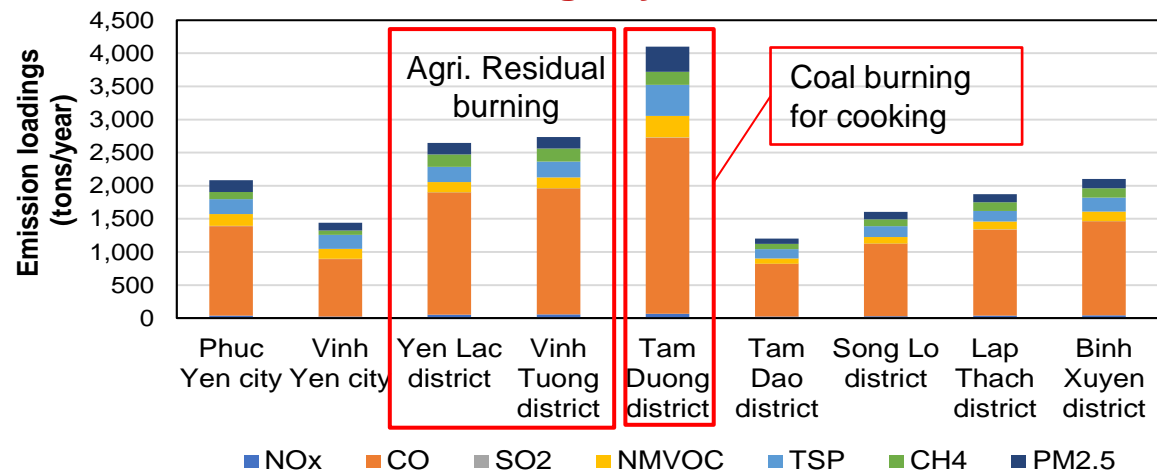
$$\text{Emission (tons/year)} = \text{Production activity (kg/year)} \times \text{Emission Factor (g/kg)}$$

Questionnaires (800 HHs, 277 other sources)      References

Shop area, fuel consumption,

Other collected data: population, agricultural area, crop production, etc.

## Emission loadings by cities/districts



# A Study of the Local Stone Industry and its Use in the Community

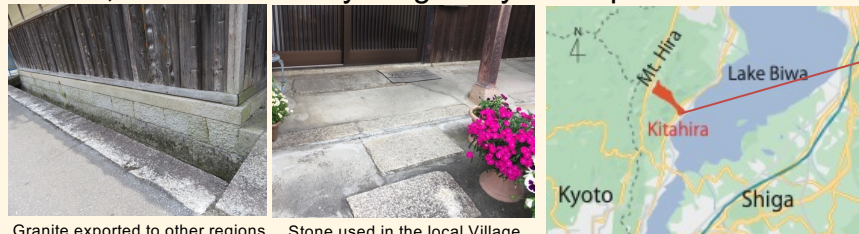
## -A Case Study of Kitahira District

Authors: SATO Keika\*, OCHIAI Chiho\*\*

\* Department of Architecture and Architectural Engineering, Kyoto University \*\*Graduate School of Global Environmental Studies, Kyoto University

### Background

In the Kitahira district, Shiga Prefecture, the stone industry has flourished in the area since old times. The granite was processed by stonemasons and used as a building material for private houses and warehouses, supporting the living spaces of the local village and other areas. In contrast to stones exported as products, locals often used second-rate stones, characterized by irregularity in shape and color.



### Objective

This research intends to document the masonry techniques of local stone industry in the Kitahira area, as well as the usage patterns within the village, and to demonstrate their characteristics and technical and cultural value.

### Methodology

Review of the local documents, and interviews were conducted with local seniors and craftsman to clarify the processes of the stone industry and masonry techniques. With the field survey of the village, I identified the stones of the present village and documented the masonry techniques and regional characteristics.

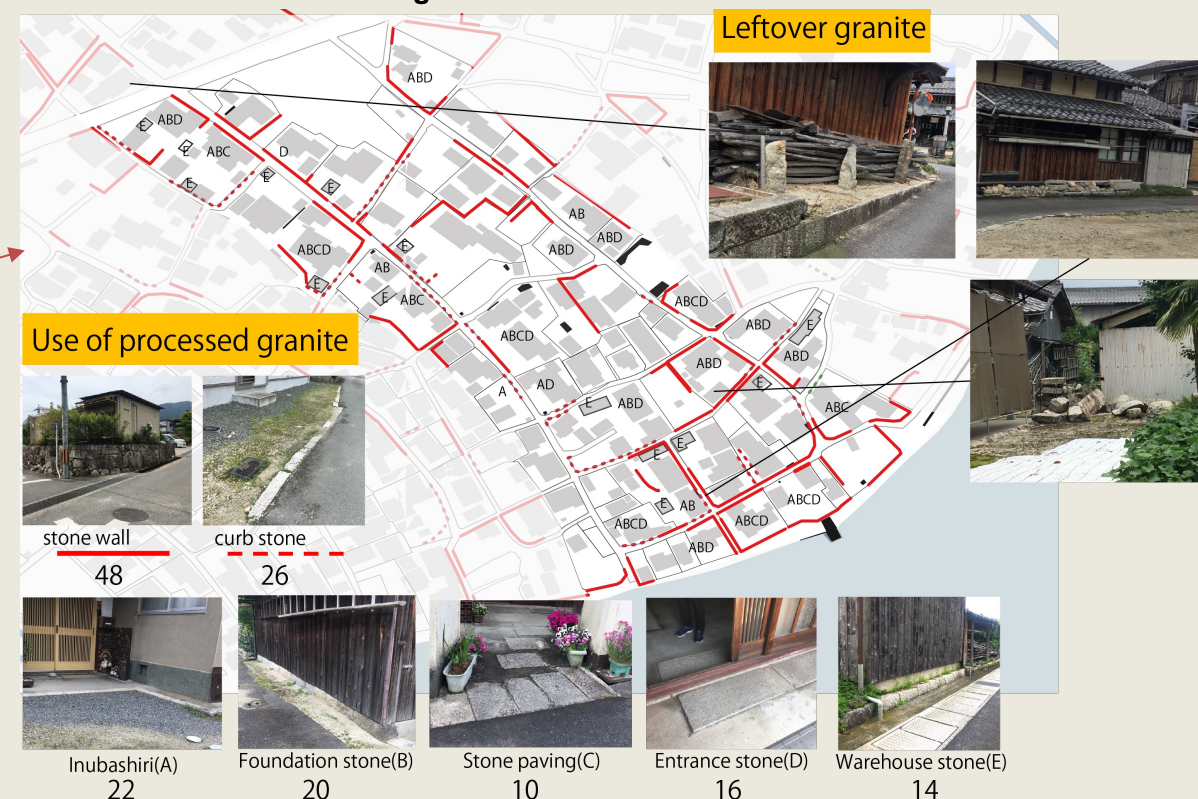
### Discussion

The granite industry in the Kitahira village has shown us the masonry skills that have been cultivated in the face of nature. The village also showed the ingenious use of scraps and second-rate products.

### Result

#### ◎ Stone seen in Kitahira village

Out of **494** current households in Kitahira district, **50 households in the old village** were surveyed.



#### ◎ Characteristic of stone use in Kitahira district



# Architectural and Space Design in Temporary Refugee Camps

Authors: Chawin Chantharasuphit, and Poon Khwansuwan

Graduate School of Architecture, Art, and Design, King Mongkut's Institute of Technology Ladkrabang

## INTRODUCTION

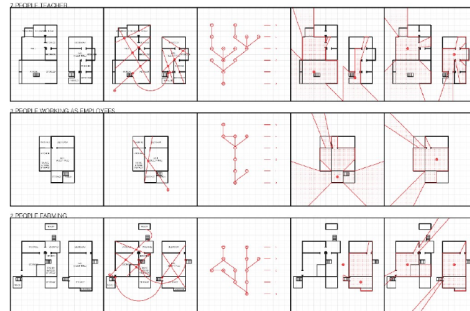
There are 1.2 million refugees from Myanmar affected by civil war and ethnic conflict. Currently, most refugees in Thailand come from ethnic conflicts in Myanmar. Currently, there are approximately 100,000 refugees in Thailand. This Project will focus on improving the quality of life and living conditions of refugees in temporary housing that responds to current refugee behavior. Able to preserve the wisdom of traditional residences in an area with vernacular architectural characteristics. Reduce the impact on the environment and reduce the burden on the destination country. Including developing areas that support social activities and areas that promote sustainability. This allows refugees to be self-reliant, reducing their reliance on uncertain donated funds and equipment.

## METODOLOGY

Study process leading to the design of shelters and infrastructure systems for refugees.

- The study area is Mae La Refugee Camp, Tak Province, Thailand. It is the center of 9 refugee camps and is the largest in Thailand. Located at the northern end of this camp. There are approximately 30 refugee households, 9 student dormitories and 1 kindergarten. The territory is approximately 24,000 square meters, with important places around it such as the main church of the camp. Christian religious school and is next to the C1BB zone, which is like the capital of this refugee camp.

- Study the lifestyle of refugees and collect information on the current habitats of refugees. To design the architecture to suit the residents.
- Study the impact on the environment This is because refugee camps are temporary. But the effects of construction will have a long-term impact.



(Example of Habitats in Mae La Camp Research.)



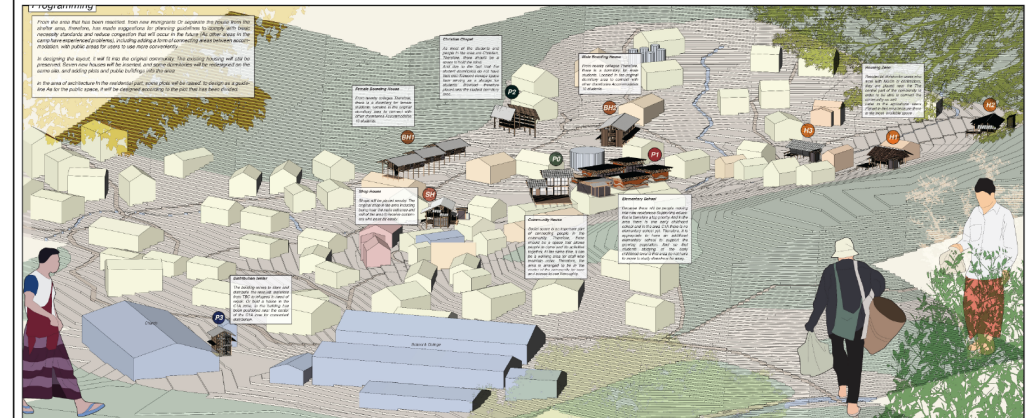
(Material, Environment, and Conditions Study)

## DISCUSSION

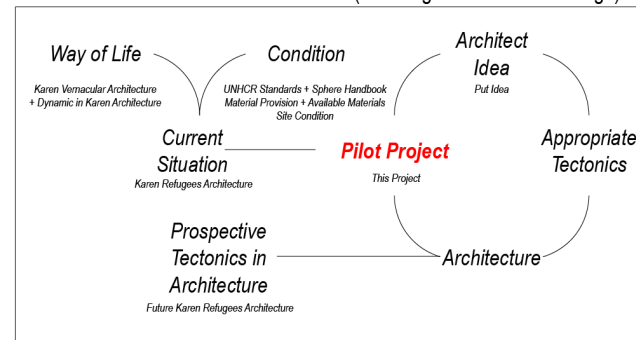
- The way of life of refugees is not different from that of normal people. Although the architectural element are still local, But the way of thinking and the use of space are modern.
- If the distance for transporting construction materials can be shorter than now, it will further reduce the impact on the environment.



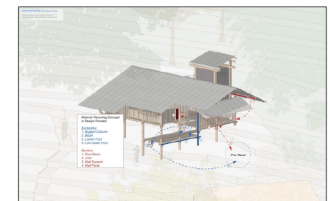
## RESULTS



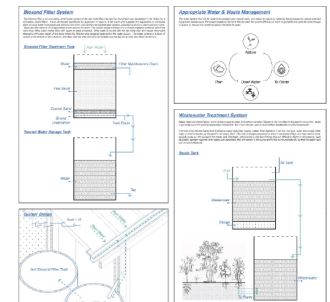
(Planning & Architecture Design)



(Architectural Process)



(Material Recycling Concept)



(Appropriate Tecnology)

The result of the project is the planning and architectural design. Lifestyles and condition determine the design guidelines, and material recycling and appropriate technology have been added to reduce waste generation and environmental pollution. Including reducing costs in the project.

# Preserve or Abandon: A Study on Hearth Transformations of the Wa Ethnic Group in Southwest China under Post-Resettlement Context

Shuwei Yang\* and Satoshi Yokoyama\*

\* Department of Social and Human Environment, Graduate School of Environmental Studies, Nagoya University

## Background

Moving people from their homeland to another place is a highly complicated process, yet 20 million people are being relocated every year, voluntarily or involuntarily. Located in southwest China, H village embodies traditional Wa ethnic group features, with a history spanning over a century and characterized by well-preserved thatched roof houses. In 2018, driven by tourism development, the 105 households of the village were required to relocate to a new settlement. Unlike the thatched dwellings, the new housing adopted modernized layouts, and cancelled the central hearth in consideration of fire safety. This study examines the consequences and impact of hearth cancellation, which was not only a traditional spatial center but also a place for cooking, warmth, religious activities, and social interaction. Thus, the research explores residents' acceptance and resistance to the provided housing in the top-down resettlement approach.

## Methodology

House measurements and interviews were conducted with 41 households in H village. AutoCAD drawings were created, and independence tests were performed on categorical variables.

## Results

Among the 41 surveyed households, 38 (93%) modified their homes, making extensions or changing layouts (Fig. 1). Excluding unoccupied houses, we assessed hearth settings in 37 households. Of these, 28 (72%) reinstated the hearth, while 9 did not. The chi-square test's p-value of 0.012 suggests a significant correlation between hearth installation and the age of the household head. Among the 28 households that reinstated hearths, 11 positioned them at the kitchen corner, and 15 located them centrally or off-center in the kitchen. Only 2 households placed the hearth at the living room center, as was customary in the old village (Fig. 2).

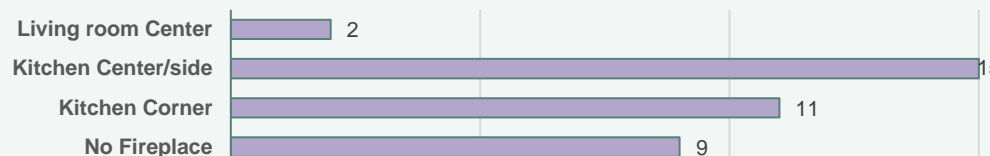


Fig. 2 Location of Hearth

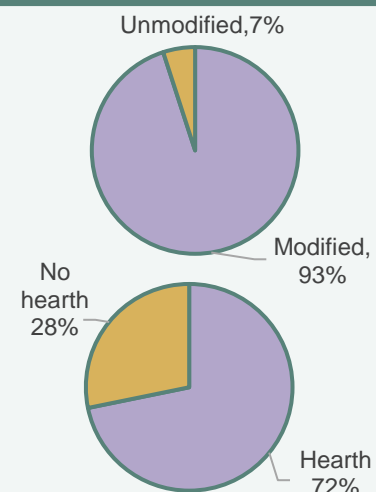


Fig. 1 Proportion of House modifications and Hearth Installations

## Discussion

Firstly, 72% of households have reinstated the hearth, particularly those having seniors aged 70 and above. The primary reason for households not installing hearths is the concern about smoke dirtying the white walls. Secondly, in households that have positioned the hearth at the kitchen counter corner (Fig. 3), the primary use is for cooking merely. Thirdly, the sense of place tied to the central hearth defining where men or women, young or old, should stay, is undergoing a transformation. The shared spatial understanding rooted in villagers' experiences in traditional settings is being deconstructed with the social function of the hearth peeled off (Fig. 4). The findings suggest that the hearth remains important to the Wa people, while the function is transformed to accommodate new environments and lifestyles.



Fig. 3 Example of the hearth setting in the corner

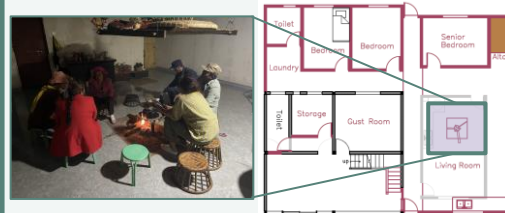


Fig. 4 Example of the hearth setting in the living room center

Acknowledgment: Special thanks to THERS JPMJSP2125 and the Kajima Foundation for supporting this research.

# Renovating Buildings with Carbon Reduction Principles

Authors: Jakkai Srivanichsakulchai

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## STUDY'S BACKGROUND

Activities that occur from the use of buildings are one of the causes that directly and indirectly produce large amounts of greenhouse gases. This makes it important to study the amount of greenhouse gas emissions and control the amount of greenhouse gas emissions from building or architectural use activities. Most studies of greenhouse gas emissions during the building use phase of each research study have a scope of study only on energy use and fuels used. But in reality, activities that emit greenhouse gases occur from the start of construction work, transport of materials, and disposal of construction material waste. As a result, buildings are studied and evaluated from the start of construction and during building renovations. That is necessary to create guidelines for reducing greenhouse gas emissions in current and future construction.

## METHODOLOGY

The standards used to calculate the emissions and absorption of greenhouse gases that are used around the world are the following standards: IPCC Guidelines for National Greenhouse Gas Inventories, ISO 14064 Greenhouse gases - Part 1, and Greenhouse Gas Protocol Corporate. And carbon emission factors values are referenced from the ICE V.3 data source.

## RESULT & DISCUSSION



The building is an old multi-storey concrete building that has not been used for many years. **The first and second floors** will be renovated, with calculations to compare the carbon value between renovating the building and building a new building(kgCO<sub>2</sub>e).

|         | RENOVATE                          | Amount    | kgCO <sub>2</sub> e |             |
|---------|-----------------------------------|-----------|---------------------|-------------|
| Scope 1 | Labor transport & Scrap materials | 498 km.   | 958.53              | 4.03%       |
| Scope 2 | Electricity                       | 789 kw.   | 427.30              | 1.99%       |
| Scope 3 | Construction materials            |           | 22,332.04           | 93.98%      |
|         | Concrete                          | 21 sq.m.  | 10,299.71           | 43.43%      |
|         | Iron                              | 4,800 kg. | 8,075.33            | 33.89%      |
|         | Other Materials                   | 1,710 kg. | 3,957.00            | 16.65%      |
|         | <b>Total</b>                      |           | <b>23,762.87</b>    | <b>100%</b> |



**Carbon Emissions**

From **Renovate** 15.18 kgCO<sub>2</sub>e/sq.m.

From **New Construction** 505.28 kgCO<sub>2</sub>e/sq.m.

\*The amount of carbon released comes from concrete materials. Most of both renovations and new construction.

When comparing renovating a building to building a new one, it is clear that the carbon footprint is quite different. In addition, a lot of recycled building materials were used in the renovation of the building. Demonstrates the need for carbon-reducing building renovations.

|                 | RENOVATE  | NEW CONSTRUCTION |
|-----------------|-----------|------------------|
| Concrete        | 10,299.71 | 731,142.72       |
| Iron            | 8,075.33  | 6,343.89         |
| Other Materials | 3,957.00  | 5,280.63         |
|                 | 22,332.04 | 742,767.24       |

# Survey on piloti architecture in flood-prone areas -A case study from Hitoyoshi City, Kumamoto Prefecture-

Asaka Jobe\*

\*Architecture Undergraduate student, Kyoto University

## INTRODUCTION

Hitoyoshi City has been suffered from flooding for a long time due to the Kuma River. This study examine distribution and living styles of the piloti architecture where the first floor is used as a parking and storage, and the second floor as a residential space.



## DEFINITION

In this study, we define a building form that is presumed to be flood proof as "a building that does not lose its main function even after the first floor is flooded above floor level". This is called that "a flood building".



## CLASSIFICATION

Flood buildings are classified as three categorie based on the build use.

- i) residial ... ①
- ii) residial and commertial ... ②
- iii) commertial ... ③

and as four categorie based on the form of the ground floor. ... ④

| main structure <sup>3</sup> | piloti style <sup>1</sup> |   | garage style |   |
|-----------------------------|---------------------------|---|--------------|---|
|                             | pillar                    |   | wall         |   |
| interior space <sup>2</sup> | x                         | o | x            | o |
| First floor plan            |                           |   |              |   |
| No.                         | 1                         | 2 | 3            | 4 |

\*1: Shutters and fittings are considered not wall but openings.  
\*2: Main structure stands for that comprising the exterior space.  
\*3: Any structure comprising the interior space is acceptable.

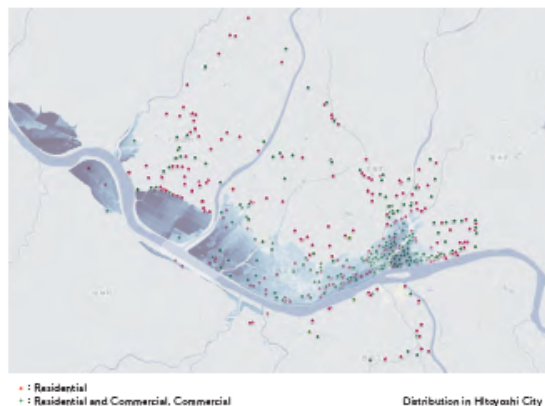
## METHOD

- By street view on google map, the distribution of flood buildings throughout Hitoyoshi City is shown.
- Then, we interviewed the homeowner and took measurements of the distinctive flood buildings.

## RESULT 1.

|  | Flat land | Utilize height difference |     |
|--|-----------|---------------------------|-----|
| Residential                            | 233       | 45                        | 278 |
| Residential and Commercial, Commercial | 246       | 17                        | 263 |
|  | 481       | 62                        | 543 |

Number of buildings using classification ①.



● : Residential  
● : Residential and Commercial, Commercial  
Distribution in Hitoyoshi City

Overlay distribution map and inundation map in 2020.

- Flood buildings are mostly distributed along the Kuma River and tributary rivers.
- They are especially dense at the confluence of the Kuma and Yamada Rivers, that is the city area.

## RESULT 2.

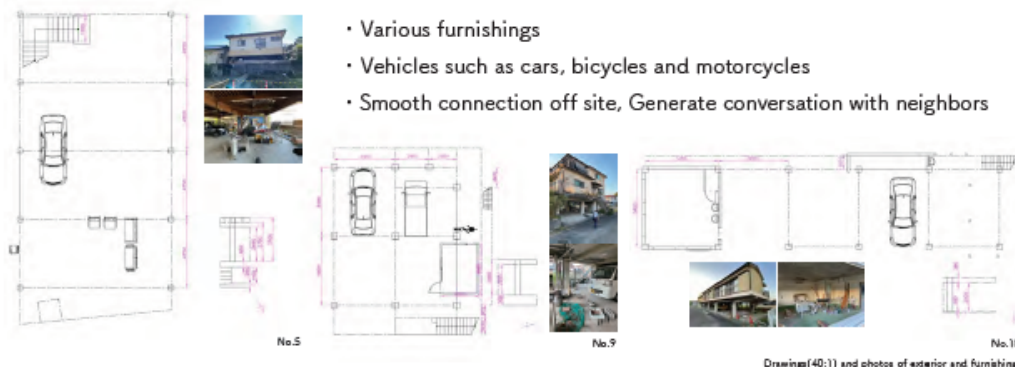
Interviews and actual measurements were conducted mainly in three areas along the Kuma River, namely Onsen-cho, Kamishimoaoi-machi, and Kamishimo-shinmachi, and were compiled into tables and drawings.

- Relation between flooding experience and bulging form
- Raise the foundation, mound

| No. Interview | Driving H/M | First plan | Utilize height difference | Parking lot/porch | Mound | Completion date | Expansion/renovation | First floor ceiling height/m | Flood experience | Reason for form | Flood height in 2020/m   |                      |
|---------------|-------------|------------|---------------------------|-------------------|-------|-----------------|----------------------|------------------------------|------------------|-----------------|--------------------------|----------------------|
| 1             | ○           | ○          | △                         | R                 | ×     | ○               | 1973                 | ○                            | 1.8              | ×               | Unknown                  | 2.1                  |
| 2             | ○           | ○          | △                         | RAC               | ×     | ○               | 1966                 | ○                            | 2.8              | ×               |                          |                      |
| 3             | ○           | ○          | △                         | R                 | ○     | ○               |                      |                              |                  |                 |                          |                      |
| 4             | ○           | ○          | △                         | R                 | ×     | ○               | 2021                 | ×                            | 2.95             | 2020            | food measures            | 2.8                  |
| 5             | ○           | ○          | △                         | R                 | ×     | ○               | 1973                 | ×                            | 3.1              | 1965            | workspace                | to the entrance      |
| 6             | ○           | △          | △                         | RAC               | ×     | ○               | 2022                 | ×                            | 2.8              | 2020            | workspace, food measures | 5                    |
| 7             | ○           | ○          | △                         | RAC               | ×     | ○               |                      |                              | 2.75             |                 |                          |                      |
| 8             | ○           | ○          | △                         | R                 | ×     | ○               |                      |                              | 2.75             |                 |                          |                      |
| 9             | ○           | ○          | △                         | R                 | ×     | ○               | 1965                 | ×                            | 2.55             | 1965            | food measures            | above the floor 0.75 |
| 10            | ○           | △          | △                         | RAC               | ○     | ×               | 1963                 | ○                            | 2.2              |                 | Unknown                  | 4.9                  |
| 11            | ○           | ○          | △                         | R                 | ○     | ×               | 1968                 | ○                            | 2.5              |                 |                          | 4.5                  |
| 12            | ○           | ○          | △                         | R                 | ○     | ○               |                      |                              |                  |                 |                          |                      |
| 13            | ○           | ○          | △                         | RAC               | ○     | ×               | 1996                 | ○                            | 2.4              | 1962            | food measures            | above the floor      |
| 14            | ○           | ○          | △                         | R                 | ×     | ○               | 1967                 | ×                            | 2.95             | 1965            | food measures            | below the floor      |
| 15            | ○           | ○          | △                         | R                 | ×     | ○               |                      |                              | 2.8              |                 |                          |                      |
| 16            | ○           | ○          | △                         | R                 | ×     | ○               | 2021                 | ×                            | 3.1              |                 |                          |                      |
| 17            | ○           | △          | △                         | R                 | ○     | ×               |                      |                              | 2.35             |                 |                          |                      |
| 18            | ○           | ○          | △                         | R                 | ×     | ○               | 1973                 | ○                            | 2.38             | 1965            |                          | above the floor 0.5  |
| 19            | △           | ○          | △                         | R                 | ○     | ○               | 1963                 | ×                            | 2.18             | 1962            |                          |                      |
| 20            | ○           | ○          | △                         | R                 | ×     | ○               | 1963                 | ○                            | 2.3              | 1965            | food measures            | 4                    |
| 21            | ○           | ○          | △                         | R                 | ○     | ○               | 1963                 | ○                            | 2.9              |                 | residential parking lot  | 3.2                  |
| 22            | ○           | ○          | △                         | R                 | ○     | ×               | 1973                 | ×                            |                  | 1962            | parking lot              |                      |

○ : floor plan and cross section, △ : cross section  
\*1: R: Residential, RAC: Residential And Commercial, C: Commercial

Overview of Interviews and Field Survey



- Various furnishings
- Vehicles such as cars, bicycles and motorcycles
- Smooth connection off site, Generate conversation with neighbors

## DISCUSSION

- Hitoyoshi City, a flood-prone area, is dotted with buildings, mainly in the coastal areas, that are built in anticipation of flooding above the floor level of the first floor, such as houses with the first floor as a parking lot and the second floor as a residence.
- The space on the ground floor of the building is effectively utilized even during normal, non-flooding times.
- Need to clarify whether or not the flooding experience has had a direct impact. Other factors should be considered as well. For example, money, building trends, area of usage, parking needs, workspace needs

# The transformation of Hakka vernacular architecture—Hakka Weilong House

Authors: LAI Yehong\*, Hirohide KOBAYASHI\*, Chiho OCHIAI\*\*

Graduate School of Global Environmental Studies, Kyoto University

## Background

Weilong House is one of the five traditional residential architecture in China, mainly concentrated in Meizhou City, Guangdong Province. Before 1279 AD, many clans with different family name in Meizhou City began to built there own Weilong House for worshipping ancestors and living. Due to the development of the times, Weilong House is no longer suitable for living. Some of the Weilong Houses have been abandoned, and most of them only used for worshipping.

## Problems:

With the development of urbanization, unlike many well-preserved Weilong House that located in traditional villages and protected by government, Weilong House located in the urban area suffered a great damage. In the past decades, residents and overseas relatives belongs to the same Weilong House began to raise funds for spontaneous reconstruction activities.

## Research purpose

By analyzing residents' spontaneous transformation of traditional houses in urban areas, we can understand the various reasons behind it and raise attention to the status of traditional vernacular architecture in modern society, as well as explore how traditional architecture in urban area adapt to the modern society.

## Methodology

- Quantitative Analysis:  
Select several Weilong houses in Jiaocheng Town, Meizhou City, which is undergoing urbanization. Record the status of these Weilong houses before and after reconstruction, and classify the changes that have occurred.
- Qualitative Analysis:  
Select several Weilong houses and conduct interviews with local residents to understand why they want to reconstruct traditional houses.

## Expected outcome

- Transformation 

|           |            |          |          |
|-----------|------------|----------|----------|
| Structure | Appearance | Material | Function |
|-----------|------------|----------|----------|
- Sociology Architecture 

|          |          |                   |                  |
|----------|----------|-------------------|------------------|
| Economic | Ideology | Culture structure | Family structure |
|----------|----------|-------------------|------------------|



## Discussion

- Does the reconstructed Weilong House match the modern urban style?
- After the huge changes, is the Weilong House still a Weilong House? What are the elements that sustain people's faith?





# A foretold human-made disaster: impacts of mega-events on housing rights and marginalized groups in Rio de Janeiro, Brazil

Authors: Augusto Cesar Oyama\* ; Chiho Ochiai\*

\* Graduate School of Global Environmental Studies, Kyoto University

## Introduction

**Mega-events**, which include extensive ruptures related to financial, institutional, political, symbolic, infrastructural, and social dimensions, circumscribe a set of interventions that establish an **extreme urban condition**. Such mega-events have their most notable manifestation in the Olympic Games.

Despite the possible positive effects, mainly on transport and telecommunications systems, mega-events can also be detrimental, especially in terms of housing rights. The systematization of studies shows that more than two million people were displaced in the last 30 years due to the Olympics. These **dynamics of displacements**, either through iron-fisted displacement or market-driven gentrification, **are a feature of mega-events** and affect mostly marginalized groups.

Rio de Janeiro hosted a variety of sport mega-events, including the Pan-American Games (2007), the World Cup (2014) and the Olympic Games (2016), the latter resulting in the eviction of over 77 thousand slum residents who had their homes and daily lives destroyed.

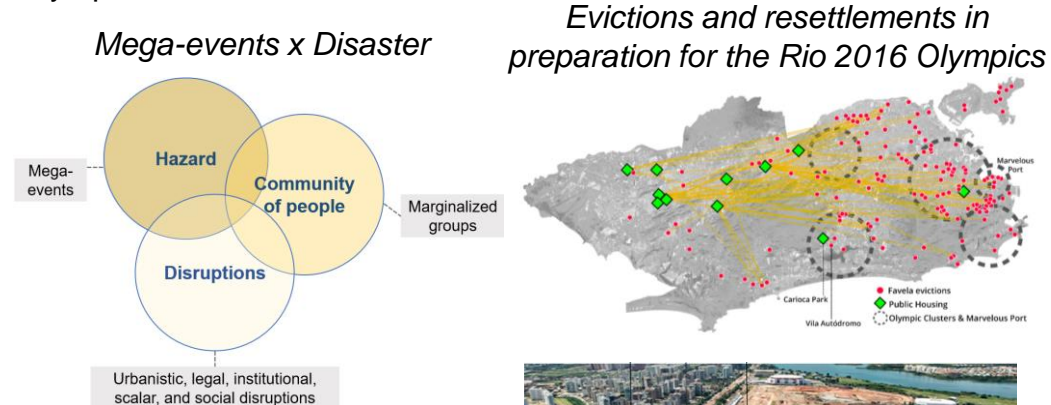
Based on the systematization of disaster models, an interpretative key is proposed: the possibility of **understanding mega-events technically as disasters**.

## Methodology

(i) Literature review related to the multiple impacts of mega-events in several host cities; (ii) semi-structured and oral history interviews with key social actors, such as slum residents affected by mega-events, homeless organizations, social movements, professors, architects, lawyers and journalists researching both positive and negative impacts of the Olympics, and public authorities; (iii) maps produced through Geographic Information System (GIS) and design software to analyze and systematize impacts on housing rights.

## Results

The study result shows: (i) in many cases, **mega-events become human-made disasters**; (ii) the **resistance actions** of the most vulnerable and affected social groups, especially slum residents and homeless people, **made gentrification and intensified marginalization visible in the disastrous context of housing rights violations (forced displacements)** produced and justified in mega-events, especially the Olympics.



*Resistance from the Vila Autódromo community: of the more than 550 families, only 20 remained.*



## Discussion

From this perspective, having a better understanding of the multiple dimensions of what occurs in mega-events, addressing the disruptions of hosting them, especially in terms of housing rights and state-led gentrification, can potentially advance the achievement of Olympic principles and commitments, such as social and urban legacy, while also providing adequate protection to the local citizens.

# Temporary Emergency Shelter: A case study in Maranhão-Brazil

Authors: BRITO SANTOS Jayne Tereza\*, KOBAYASHI Hirohide \*\*

\*Graduate School of Global Environmental Studies, Kyoto University

\*\* Graduate School of Global Environmental Studies, Kyoto University

## BACKGROUND

Maranhão is one of the states with the lowest rate of human development in Brazil. Every year, the rivers overflow and cause flood. During the period from 2017 to 2020, a total of **15.339 people became unsheltered**.

As Brazil has little infrastructure to temporarily shelter people in emergencies, the affected families go to churches, associations, gymnasiums, and schools to shelter themselves.

In addition to being very hot and lacking privacy, these shelters do not have protection against the rain, also, illegal electrical installation and improper use of gas stoves pose a risk of fire on the site.



flood - houses affected - shelter provided

## METHODOLOGY

Analyzing the geographical aspects, rainy periodicity, and witnessing the flood impacts of the site as well as interviewing the affected families was extremely important to develop strategies to assist the object of this research, that is, the unsheltered people.

Additionally, through the literature review, it was possible to study design references and their characteristics concerning low cost, easy feasibility, and adaptability.

## RESULTS

When these references were combined with empirical knowledge of the local rudimentary shelters, our strategy based on a design that called for a foundation and roof to be built around a structural core, leaving families to build the rest of the house as time and funds permit, allowing the occupants to extend the walls to create an additional space.



Flood extension in Santo Amaro city      Brazilian flour house

By modifying the “flour house” into a shelter, we can save time because some parts are already prepared in advance, and it is furnished with basic utensils already. It can be adapted for one family or more allowing people to work and use it as a shelter for themselves, goods, and food during and after flood periods.



core house design



one family

several families

when houses were totally damaged



2 people -

4 people-

6 people

## DISCUSSION

In these situations of disasters, both humanitarian and technical work is required. The temporary shelter project is inserted as a minimizer of social weaknesses. In this context, the proposed project resulted in housing capable of offering shelter in a flexible manner, easy execution, reduced time and at the same time allowing families to continue to work.



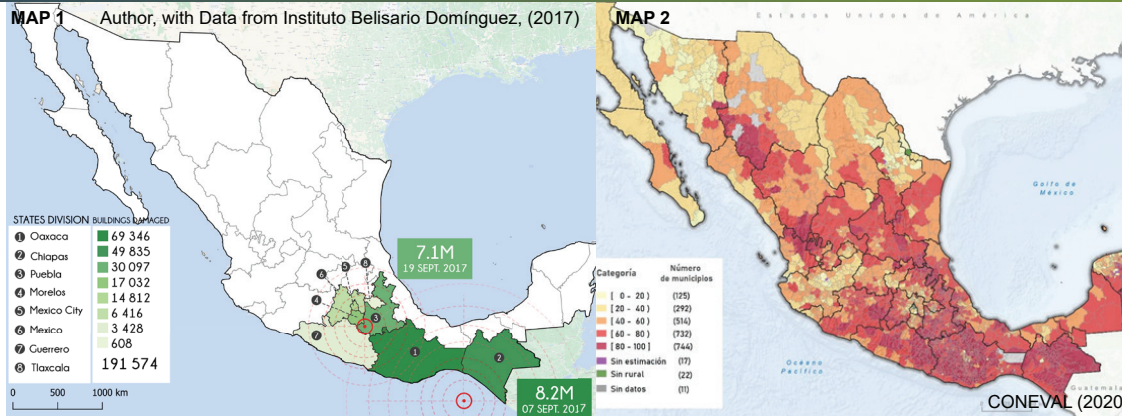
# Post-Disaster Housing Reconstruction in Mexico after the Earthquakes of September 2017

Maria Perez Rodriguez\* Ochiai Chiho\*

\*Graduate School of Global Environmental Studies, Kyoto University

## Background

In September 2017, two strong earthquakes struck the south of Mexico, resulting in **over 190 thousand buildings damaged**, mostly in *rural poor areas*. As a result, multiple stakeholders responded with **Post-Disaster Housing Reconstruction** programs, varying greatly due to challenges related to vulnerabilities and the capacity of the local government.



## Poverty and Inequality:

Two of the biggest challenges in the country, the following *Map 1* shows the most damaged regions, whereas *Map 2* shows the poorest regions.

## Methodology

1) A comprehensive literature review on disasters, hazards, risk and vulnerability and; 2) data processing from official government resources and newspaper article collection for Local PDHR proposal Overview.

## Results

## Discussion

### Government Programs

#### Self-Construction A (Federal Gov.)

Fuerza Mexico 2017-2018  
National Disaster Fund (FONDEN)  
Credit (Bansefi) with 120k MXN  
(6.9k USD) for total Damage

#### Self-Construction B (New Gov.)

More Focus on 2019-2022  
High-Poverty Areas  
Technical Supervision through reconstruction camps  
To attend the families unattended

### State Stakeholders

#### Local Gov. + Private Sector

Confined 2017-2019  
Masonry  
Urban Areas



Gov. of Mexico City (2019)

### Civil Society

#### NGOs

Modern Materials  
High-variation  
Smaller Projects  
Rural Areas

#### Universities

Modern Materials  
Small Projects  
Rural Areas  
Vulnerable Groups

### Non-State Stakeholders

#### CSOs

Local Materials  
Participatory Design  
Rural Areas  
Small Projects



Cooperacion Comunitaria (2022)



Author (2022)

In the affected areas, where the local government was **not ready** to face the disaster, **management related issues** were observed. However, **different actors from the Civil Society**, including CSOs and Universities worked together with the communities to find **local-based solutions**.

# Study on Housing Model to Cope with Flood and Typhoon for Low-income Households in Quang Vinh Commune, Quang Dien District, Thua Thien Hue Province

Authors: M. Arch. Ngo Thi Ngoc Huyen\*, Dr. Nguyen Ngoc Tung\*

\* Department of Architecture, University of Sciences, Hue University

**- Introduction of research site:**  
Quang Vinh commune, Quang Dien district



Quang Vinh commune on October 2023  
(Photo: Thành Trần)



Co Thap - Lai Lam hamlet, Quang Vinh commune on October 2023 (Photo: Hoang Thi Hai Trieu)



## Low level area

“Flooding site” of Thua Thien Hue province. Average level of flooding: 0.5m - 2m comparing with flood level



## Far from sea shore: 9km

Usually effected by typhoon.



## Flooding and typhoon season

Local people always worry about their weak houses



## Poor and near poor households: more than 200

Vulnerable group

**Purpose:** study on household model adapted to flood and typhoon for low-income households

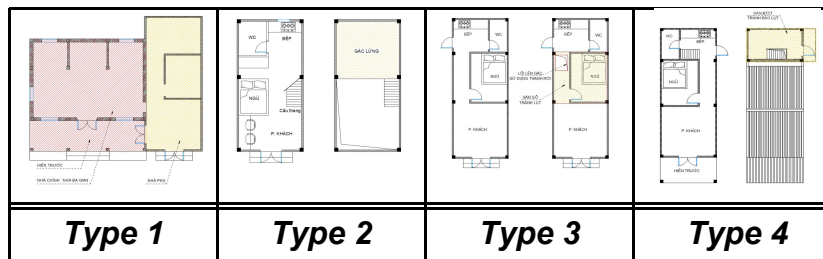
**Methods:** field survey at Dong Lam hamlet, Quang Vinh commune



**Situation:** Decayed, leaking roof, temporary construction



## Classification of surveyed houses: 4 types



Type 1: 3-chamber mainhouse and sub-house

Type 2: Tube house + mezzanine (concrete material).

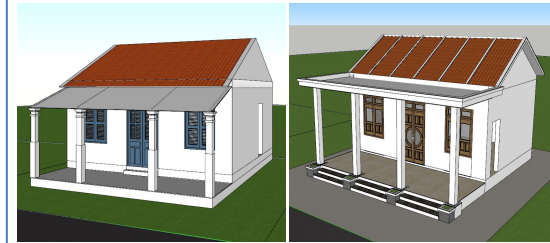
Type 3: Tube house + mezzanine (wooden material)

Type 4: Tube house + 2-story kitchen house for flood protection

**- Solution :** Suggested model



Model expresses high level floor (upper than average flooding level) for Type 1 house



Model expresses renovation of Typ 1 house for typhoon protection



Models of Tube houses for Type 2-4



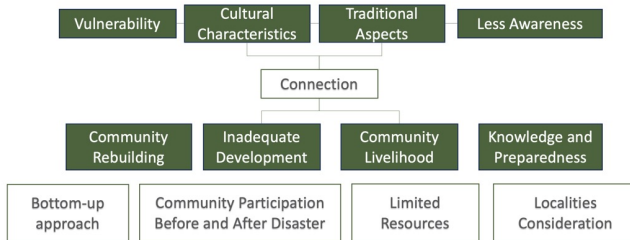
More information, contact:  
[pepappro242@gmail.com](mailto:pepappro242@gmail.com)

# Disaster Preparedness and Local Wisdom for the Community Conservation in a Rural Area of Indonesia

Authors: Amanda Devina Sihombing, Chiho Ochiai

Graduate School of Global Environmental Studies, Kyoto University

## Background Study



*“While Indonesia is prone to disaster due to its geographical conditions, it is also a very diverse area with different cultural backgrounds and needs in each community.”*

## Objectives

- The main objective is to identify the system and suitable approaches in creating disaster-based programs in Indonesia while considering the cultural values and their distinctive local wisdom to fulfill the community's needs.
- To propose suggestions for developing a more sustainable disaster preparedness method in the future.

## Methodology: qualitative method

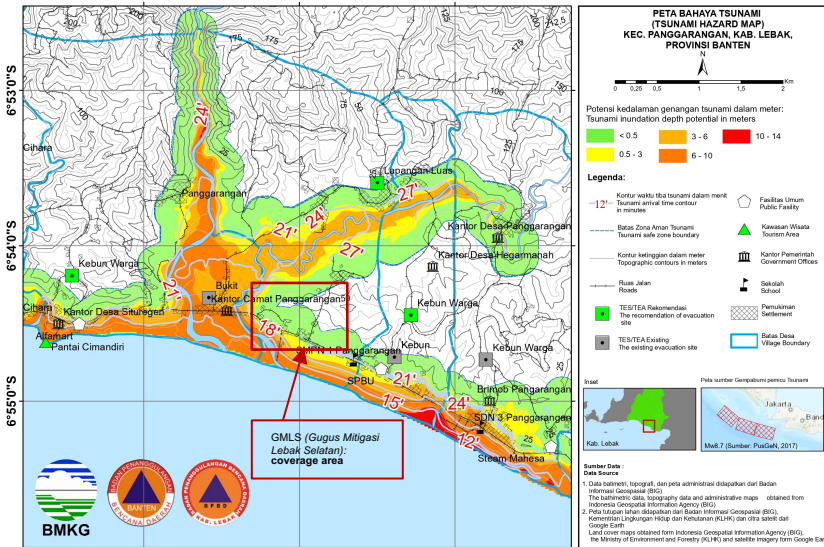
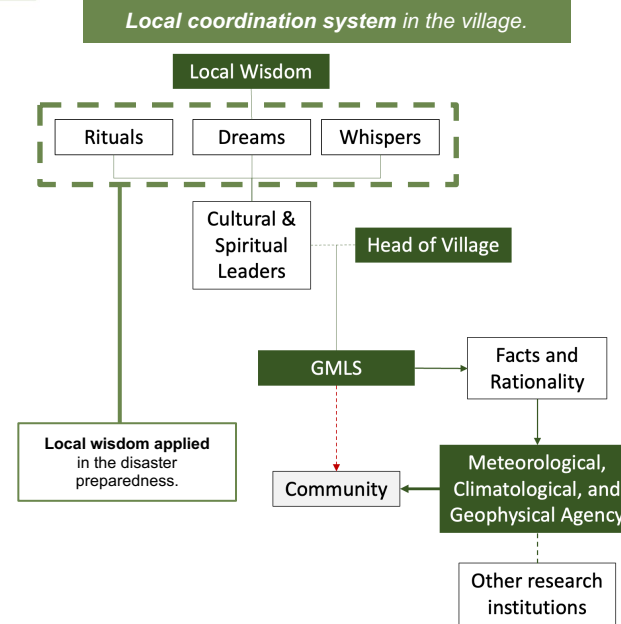
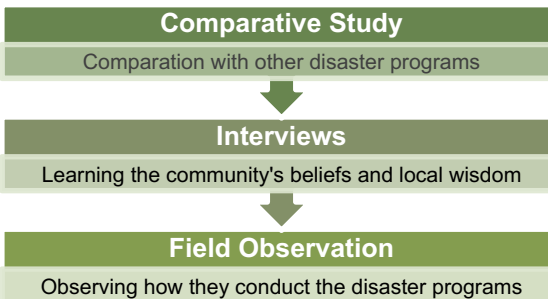


Figure 1. Tsunami Hazard Map (Source: Meteorological, Climatological, and Geophysical Agency)

## Results

- The community applied a bottom-up approach to maintain their localities and create a sense of belonging.
- Limited support and less awareness from the officials.
- Traditional beliefs could be used as a guide to face disasters.

## Discussion

What kind of system and values should be considered in creating the disaster preparedness programs in Indonesia?



# Human Capital Transferring Thatching Technology

## The case study of the Miyama Kayabuki Thatching Company

Authors: Celine Jamin\*, Ayako Fujieda\*\*, Hirohide Kobayashi\*

\* Graduate School of Global Environmental Studies, Kyoto University \*\* Faculty of Global Culture, Kyoto Seika University

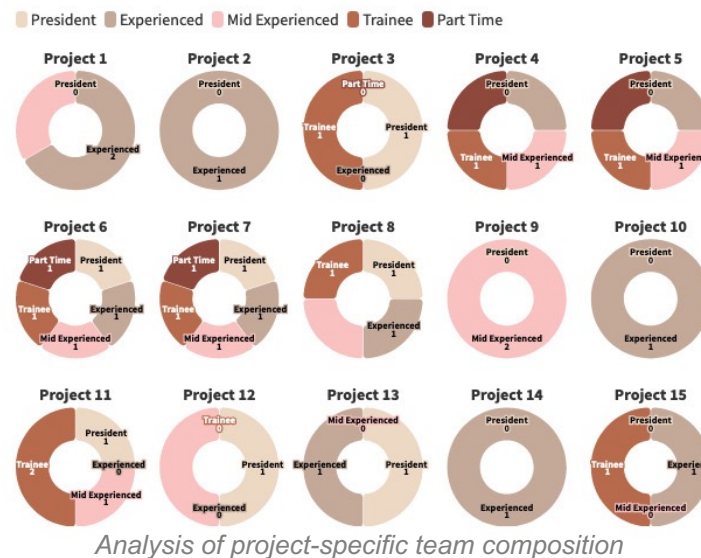
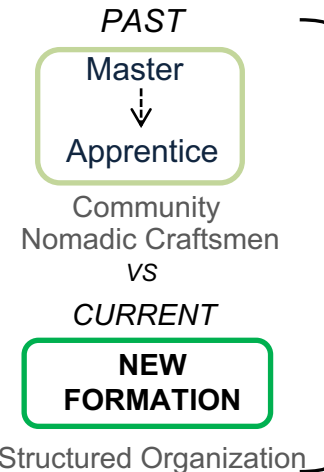
### INTRODUCTION Background

This study focuses on the evolution of human capital within the thatching profession in Japan, from its traditional to contemporary systems with special focus on the Miyama Kayabuki Thatching company (MKTC). The research aim is to investigate and analyze the changes, and their implications, in organizational structures, training, and knowledge transfer methods on the craft sustainability.

### Methodology :

Data from 21 semi-structured interviews with MKTC thatchers experts and trainees (18) from 2020 to 2023, plus insights from other craftsmen (3), yielded a comprehensive understanding of knowledge transfer methods. Extended duration facilitated thorough data collection. Site visits, crucial for live training monitoring, varied from three continuous months to day-long visits.

### RESULTS



| WHO                                 | HOW  | WHERE   | WHEN   | TRAINING OUTPUT  | TRAINING OUTCOME   |
|-------------------------------------|--|---|--|--|--|
| Youth (Under 25)<br>Young graduates | ON SITE<br>Observation<br>Practical<br>Self learning<br>COMMUNITY ACTIVITIES | Local & Regional working site (kansai area)                         | Mid & Long Term sites<br>Year Long<br>Year Long                        | <input type="checkbox"/> Demonstrations<br><input type="checkbox"/> Hours of Training<br><input type="checkbox"/> Masters guidance<br><input type="checkbox"/> Self learning<br><input type="checkbox"/> Gain : Skill Acquisition<br><input type="checkbox"/> Gain : Social skills | <input type="checkbox"/> Mastery of Craft<br><input type="checkbox"/> Innovation /Adaptation<br><input type="checkbox"/> Passing of Knowledge<br><input type="checkbox"/> Community Engagement<br><input type="checkbox"/> Economic self-Sufficiency<br><input type="checkbox"/> Recognition |
| Interest for culture or environment | TRAINING PROGRAMES<br>Different teachers<br>Diverse technics                 | At other thatching companies working site<br>Kansai + Other Regions | Short Time (week long to few weeks)<br>Ponctual events (2 to 3 / Year) | A) Focused & condensed training<br>B) Reduced learning-related stress.   | Aim to develop "Standardized Training Protocols" for all registered thatcher in Japan (None to present day)  |

Analysis and results of current training systems with outcome impacts on the craft sustainability

**DISCUSSION** In contrast to established Japanese crafts like carpentry, with schools for knowledge transmission, **thatching lacks formal training traditions**. Our research reveals new approaches within organizations like MKTC, **adapting to current societal requirements**. These methods signify a **shift** from traditional master-trainee dynamics that deterred youth. They involve on-site learning, community activity participation, and collaborative training with other thatching companies. Site training, especially, are **meticulously devised** through practical team divisions based on the work type. These methods yield short-term outputs and long-term outcomes, ensuring the **craft's continuity and sustainability across dimensions**. Crucially, they prioritize trainees' **safety and mental well-being**.

# Myth and philosophy: Exploring Architectural and Conservation of historic Mosques in Lombok

Yogi Bachtiar\*, Atie Ernawati\*\*, Puput Irfansyah\*, Ambar Trihapsari\*, Diah Mariana\*\*

\*Computer Science Department, \*\*Architecture Department, Indraprasta PGRI University, Jakarta

## Study's Background

This paper discusses the Myth and Philosophy of historic mosques in Lombok. Uses a multidisciplinary approach, the aims of the studies are to explore how the people in Lombok conserved the architecture of the mosque. The results reveal that people recorded cultural and spiritual values because of mythical stories. One problem that often comes up in local culture is keeping its identity. We must work together to keep it alive so the next generation can experience it. For example, the historic mosque is an essential part of Indonesian cultural heritage that needs to be protected because it has crucial spiritual, historical, social, and artistic values. Many cultural heritage items are in danger because of how quick-ly things change. As a result, it is essential to protect old mosques as part of Indonesia's cultural heritage.

## Methodology

This study employs a mixed-method approach, incorporating system development methodologies, computer-based 3D visual reality simulations, and qualitative re-search methods. The data collection process was carried out in multiple regions within the islands of Lombok.

## Results

The study's findings are consolidated into an integrated information system, complemented by a visual representation of the mosque's architecture. This approach aims to foster an appreciation for the mosque's architectural craftsmanship and cultural significance, which is imperative to preserve for future generations. Additionally, incorporating this information system will facilitate users in gaining knowledge about the surrounding environment of the historic mosque, thereby enhancing its appeal to tourists and encouraging visitation.

## Discussion

Prototyping is a research methodology that expedites software development by offering users a preliminary application representation. Based on the outcomes of the design phase, it is imperative to conduct testing to ascertain the relevance of the implemented features to the business process in subsequent iterations. The findings of this study suggest implementing a system that can aid in recognizing cultural heritage. This system would also help identify ancient historic mosques and assess the community's potential.

# Research on the Transformation of Building Space by Changing Society in Changqi Village of South Guangdong, China

Authors: YAO Xiaolan\*, KOBAYASHI Hirohide\*

\* Graduate School of Global Environmental Studies, Kyoto University

## BACKGROUND

Since the economic reform and opening up started in the 1980s in Guangdong province, rural areas in the Pearl River Delta region were affected by the extensive process of urbanization. Changqi village chose to construct another new community by converting the fields, thereby isolating it from the ancient village. Thus far, traditional houses have been in well-preserved condition. On the other hand, traditional houses are facing challenges due to the depopulation and limited living conditions. Since 2014, by the opportunity of the policy of Rural Revitalization, Changqi village has undertaken some of the houses into public spaces.

## OBJECTIVE

This research aims to summarize the characteristics of spatial transformation and evolutionary mechanisms in Changqi Village. It seeks to consider the landscape, other non-traditional houses, and local participation as integral to the community to facilitate revitalization, highlighting that government measures support only is insufficient to foster public involvement.

## METHODOLOGY

### • Literature review

Historical document, historical newspaper, and interview is the only way to get information and help sort out the timeline of events.

### • Fieldwork

Most of the original data in this research is collected by on-site research, including the activities of interviews, measurement, and data collection.

- Measurements: measure the dimensions in living spaces and public interior spaces.

- Interview: Interviews with residents and officials were focusing on the life changes and opinions on the renovation. Semi-structured Questionnaires were also constructed.

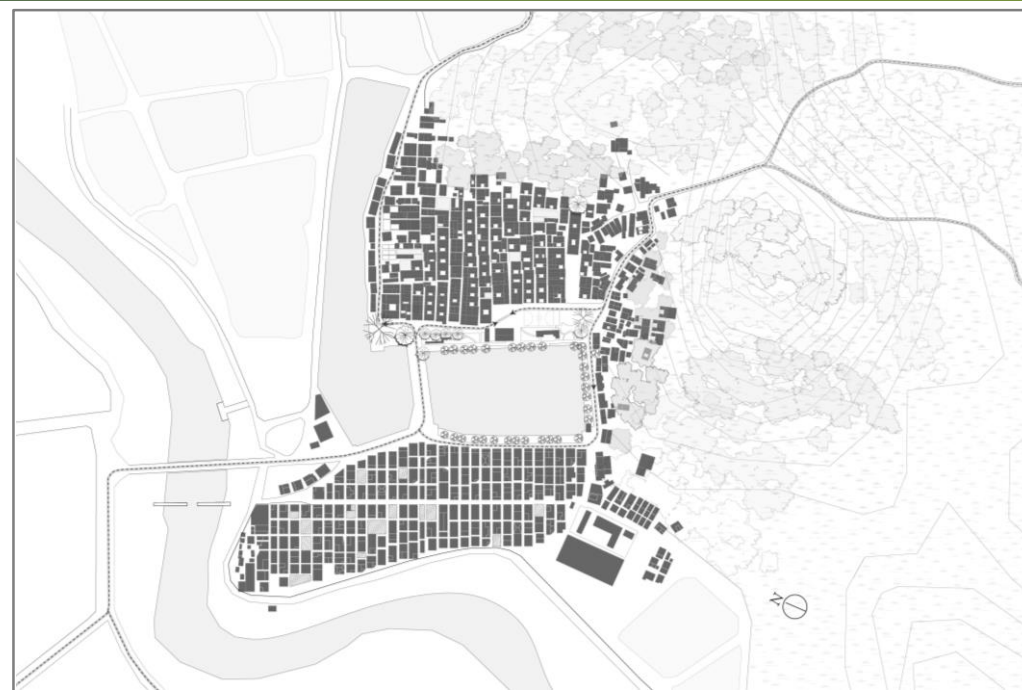
- Mapping: A new method called "Mapping" for doing interviews in the architectural field, directing visual expression for interviewees and more visible in conjunction with a questionnaire is to understand the local memories and contributions.



[Fig1, 2: The map of research location]

### History points in Rural Guangdong

- ~1949 Landlords and farmers: Village Autonomy
- 1949 The Founding of P.R.China
- 1953-1978 People's Commune (State Intervention)
- 1978 People's Commune Dissolved
- 1990s Urbanization, Empty Houses Increased
- 2004 The first rural construction policy released
- 2017 Rural revitalization Policies
- ...



[Fig3: The overview of Changqi village]

## RESULTS & DISCUSSION



[Fig4,5,6,7: The transformation in different architectural types in Changqi]

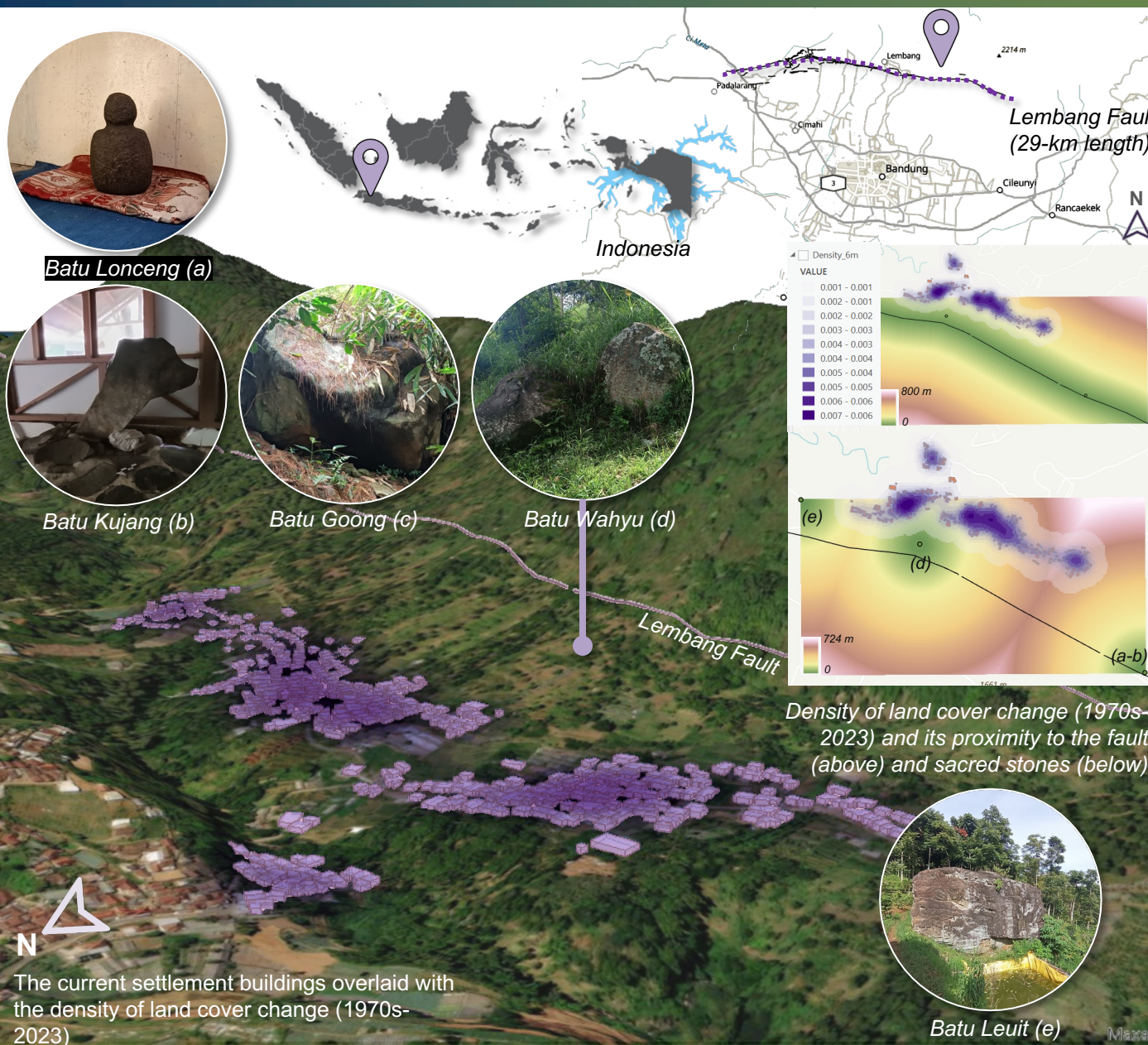
- Built in 1800s-1930s: The oldest houses, dating back 400 years, are no longer inhabited by villagers. The local committee has good preserves and repurposes them into public spaces.
- Built in 1970s-1980s: Constructed with red bricks and featuring one or two floors, houses from this era focus on reconfiguring living spaces to accommodate new habits.
- Built in 1980s-2020s: because of the increased population, the local committee sold the fields and villagers built new concrete houses. Ideological changes and gentrification appeared.



# Land Cover Change Analysis of Kampung Batu Lonceng, Indonesia

Medria Shekar Rani\*, M. Zaini Dahlan\*, Rr.Diah Asih Purwaningrum\*, Budi Faisal\*, Widjaja Martokusumo\*

\* School of Architecture, Planning and Policy Development, Institut Teknologi Bandung, Indonesia



## BACKGROUND

Kampung Batu Lonceng is an earthquake prone settlement located at the northern part of Lembang Fault, Indonesia. Studies have explored how the community has responded to the potential hazards induced by the fault by preserving intangible values from the existence of sacred stones surrounding the area [1]. This research analyses the settlement spatial configuration in relation to the location of the fault and stones, in which the results could provide a deeper understanding of the influence of community resilient in spatial planning.

## METHODOLOGY

Drone photos and interviews were used to identify the current settlement and the buildings in 1970s, respectively. GIS analysis was performed to assess the density of land cover change and its proximity to the fault and the sacred stones.

## RESULTS & DISCUSSION

Higher density development (0,005/ sq m) is mostly located at least 198 m and 134 m from the fault and the nearest sacred stone, respectively. Land borders and allocation were defined by the original three families and the sacred stones, which are believed as protective objects against potential hazards.

## REFERENCES

[1] Perdana (2021). Batu Lonceng as a Reminder of Disaster in the Lembang Fault: Alternative Archaeological Studies

The current settlement buildings overlaid with the density of land cover change (1970s-2023)



# Spatial Distribution and Driving Factors of Land Use Change in Lebak Regency, Indonesia

Authors: Naelis Sazqia Kamalin\*, Dyah Retno Panuju\*\*, Bambang Hendro Trisasongko\*\*

\* Department of Soil Science and Land Resource, IPB University \*\* P4W/CRESTPENT, IPB University

IPB University  
— Bogor Indonesia —

## Background

- Land use should **optimally** be utilized and managed.
- Agricultural lands, including plantations, are **subject to be altered**, despite the fact that these sectors are prominent in some regions, notably in Lebak Regency, Indonesia.

## Objectives

This study aimed to analyze spatial distribution and driving factors of land use change in Lebak Regency.

## Methods



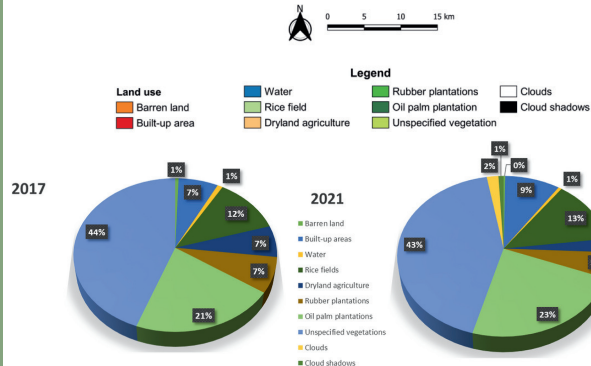
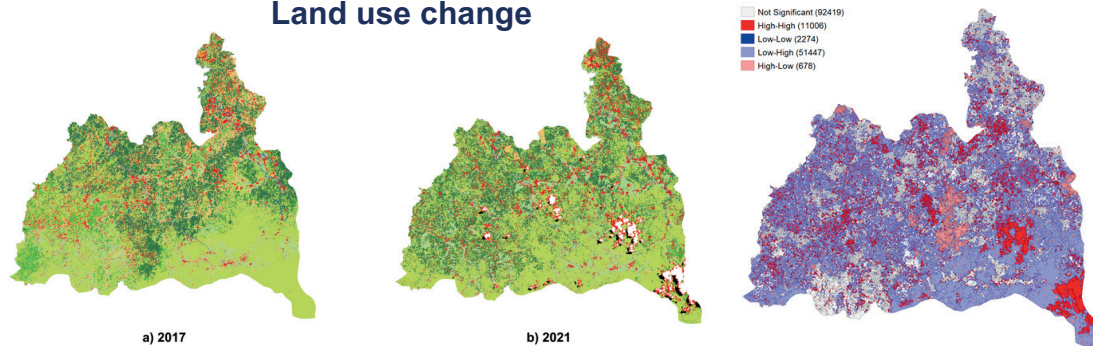
**Study area :** East Lebak Development Region, Lebak Regency

**Tools :**



## Results and Discussion

### Land use change



Rice fields, oil palm plantations, and unspecified vegetation **dominated** land use in this area. In the 2017-2021, the largest **decrease** was in upland/dryland agriculture and barren lands. Meanwhile, the largest **increase** in built-up areas. Land use change was **dispersedly** distributed in East Lebak.

### Driving factors of land use change

| Land Use Change Pattern                        | Significant Variable   | Effect     |
|--|--|------------|
| Change of agricultural land to other land uses | Population growth  | Positive * |
|  | Establishment of education facilities                            | Positive * |
|  | Establishment of social facilities                               | Positive   |
|  | Soil type (Gleisol Distrik & Kambisol Gleik)                     | Negative   |
|  | Soil type (Mediteran Haplik & Kambisol Eutrik)                   | Positive * |
|  | Spatial pattern (protected areas)                                | Negative   |
|  | Spatial pattern (plantations)                                    | Negative   |
|  | Spatial pattern (agriculture)                                    | Negative   |
| Change of crop land to built-up area           | Establishment of education facilities                            | Positive * |
|  | Soil type (Litosol, Mediteran Litik, & Rock)                     | Positive   |
|  | Soil type (Kambisol Eutrik, Podsolik Haplik, & Kambisol Distrik) | Positive   |
|  | Soil type (Latosol Haplik, Gleisol Distrik, & Latosol Oksik)     | Negative   |
| Change of plantations to built-up area         | Population growth  | Positive * |
|  | Establishment of education facilities                            | Positive * |
|  | Soil type (Mediteran Haplik & Kambisol Eutrik)                   | Positive * |
|  | Soil type (Latosol Oksik, Latosol Haplik, & Latosol Umbrik)      | Positive   |

Logistic regression **identified** driving factors for significant land use change patterns. Increasing educational facilities were **consistently** proliferating the probability of all change types (agricultural lands to other land uses, cropland to built-up areas, plantations to built-up areas).

# Suitability assessment of industrial heritage tourism of the towns along Chinese Eastern Railway in Heilongjiang Province

Authors: Qinglong AN 1\*

\* Graduate School of Global Environmental Studies, Kyoto University

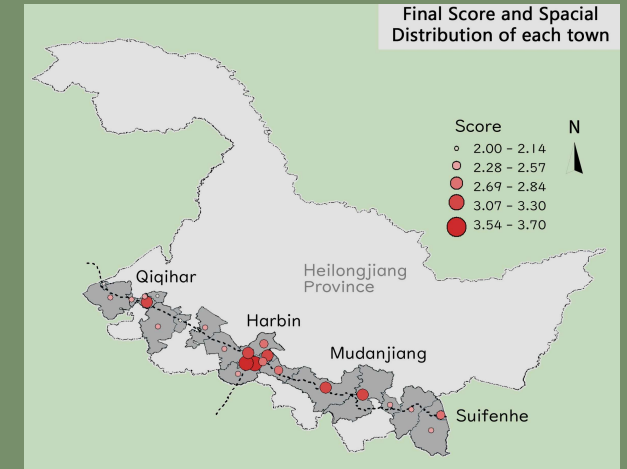
## ① Background

- Chinese Eastern Railway (CER) is a railway built in the 1890s, that connects Northeast China with a T-shaped route.
- Most industrial heritages along the route are facing destruction risk due to the lack of proper use.



## ③ Results

- The evaluation system is composed of 5 criterions (Heritage resource, Natural environment, Social environment, Transportation accessibility, Tourist facilities) and 20 indicators (Heritage Layout, Building Age, Quantity...).
- The suitability scores and spatial distribution of each town are obtained (right figure).
- The 24 towns are divided into four categories according to the characteristics of suitability for heritage tourism development.



## ② Methodology



- Which towns are suitable for industrial heritage tourism development and utilization?
- How can different types of towns improve their suitability for tourism development?

## ④ Discussion

- High-scoring towns: Protect authenticity; prevent over-development.
- Medium-scoring towns: Restoration of damaged heritage, excavation of heritage value; Climate compatibility design; Improvement of tourist facilities.
- Low-scoring towns: Integrate heritage into the community and promote place attachment with the shared historical memory.

# The Sound of Ramadhan: Perceive Affective Assessment of Kampung Kauman, Yogyakarta

Authors: Patricia Pahlevi Noviandri\*, Widjaja Martokusumo\*\*

\* Doctoral Student in Architecture \*\* Chair, Architectural Design Research Group, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung

## BACKGROUND

Kampung Kauman's history and socio-cultural activities reflect Islamic religious values (Depari, 2012). Every year, Kampung Kauman has activities before breaking the fast during Ramadhan, such as the afternoon market, reciting the Quran, and Ramadhan's 7-minute lecture. The afternoon market activities held during the month of Ramadhan make the atmosphere of Kampung Kauman different from usual days. This research explains the sound description during Ramadhan's activities on Kampung Kauman.

## METHODOLOGY

The data collection used the soundwalk method, in which respondents walked from the gate to observation point one (T1) and then to observation point two (T2). They write down sound sources that they think are positive, negative, and unique. Their answers were analyzed using content analysis methods.

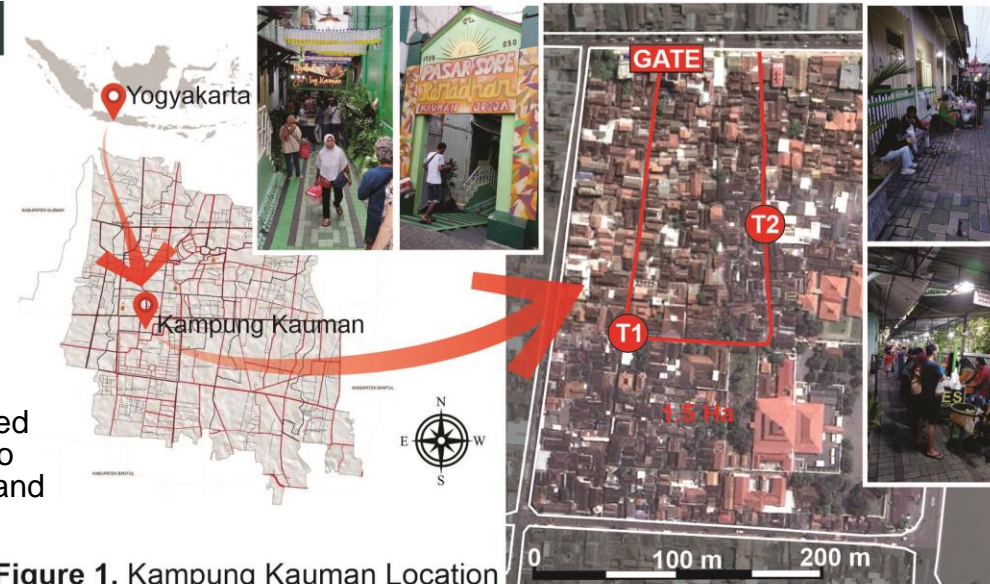


Figure 1. Kampung Kauman Location

## RESULT & DISCUSSION

Description of the soundscape can be seen from positive, negative and unique sounds (Figure 2). The content analysis results found that positive and negative sounds overlap except for nature sounds. Negative sounds are generally sounds that are loud to the human ear such as sounds from a motorcycle, shouting from the seller, people talking loudly, and loudspeaker sounds. All unique sounds are positive with adding detailed explanations. The most unique sounds are the sounds of conversation in Javanese, and the sounds of all kinds of Muslim prayers. The social characteristics of various sounds and the socio-demographic characteristics of users affect the soundscape (Rehan, 2014). Therefore, the context of location, activities, and time creates a different audial character, giving this kampung its own identity through sound.

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Rehan, R.M. 2014. <https://doi.org/10.1016/j.hbrcj.2014.12.005>

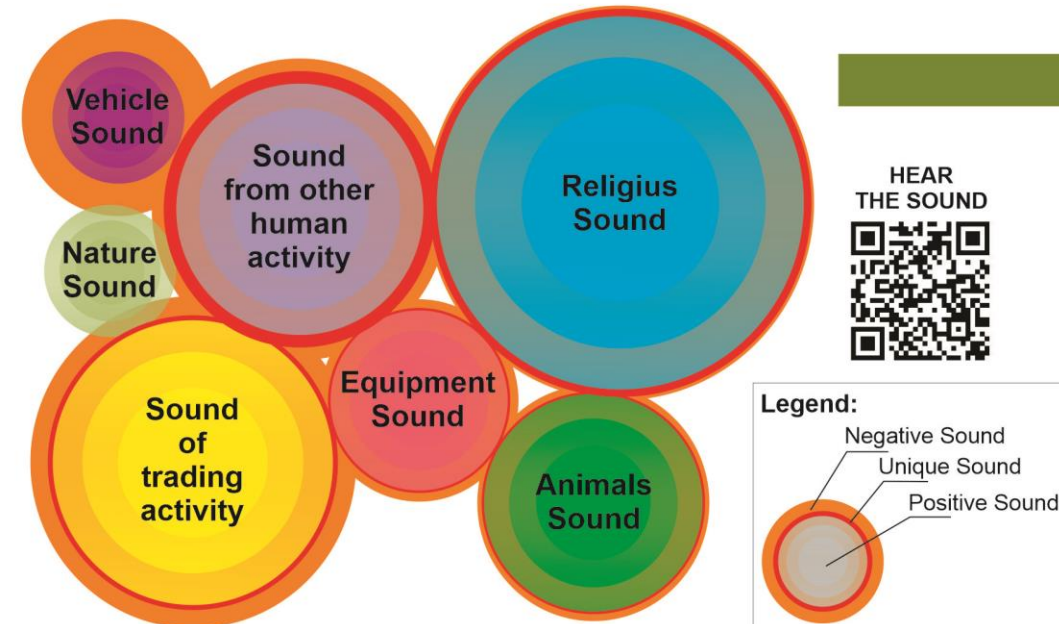


Figure 2. Highlight of Soundscapes Kampung Ramadhan Kauman

# Exploring the Immaterial Qualities of Bandung's Historic Area: Towards a Multi-Sensory-Based Study in Architecture

Eggi Septianto\*, Firmansyah\*\*, Heru W Poerbo\*\* and Widjaja Martokusumo\*\*

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## STUDY BACKGROUND

The interaction of multi-sensory experiences with the environment can enhance the appreciation of the quality of urban spaces (Radicchi, 2018; Abusaada, 2020; Spence, 2020). In the context of urban heritage conservation, this involves assessing not only physical aspects based on visual assessment but also non-physical aspects such as sound, smell, and tactile (Martokusumo et al., 2019). This research explains the relationship between multi-sensory elements other than visuals to appreciate urban historic areas, hoping to guide a more holistic conservation process.

## METHODOLOGY

These research sites were in the urban historic areas of Bandung that were rated as attractive and memorable by the public, namely the historic city centre with well-preserved physical quality historic buildings (area I) and the area around Gedung Sate with beautiful landscape quality (area V). We conducted a regression analysis of the questionnaire responses of 170 participants. The research focused on the correlation of hearing, smell, and touch with historic environment appreciation.



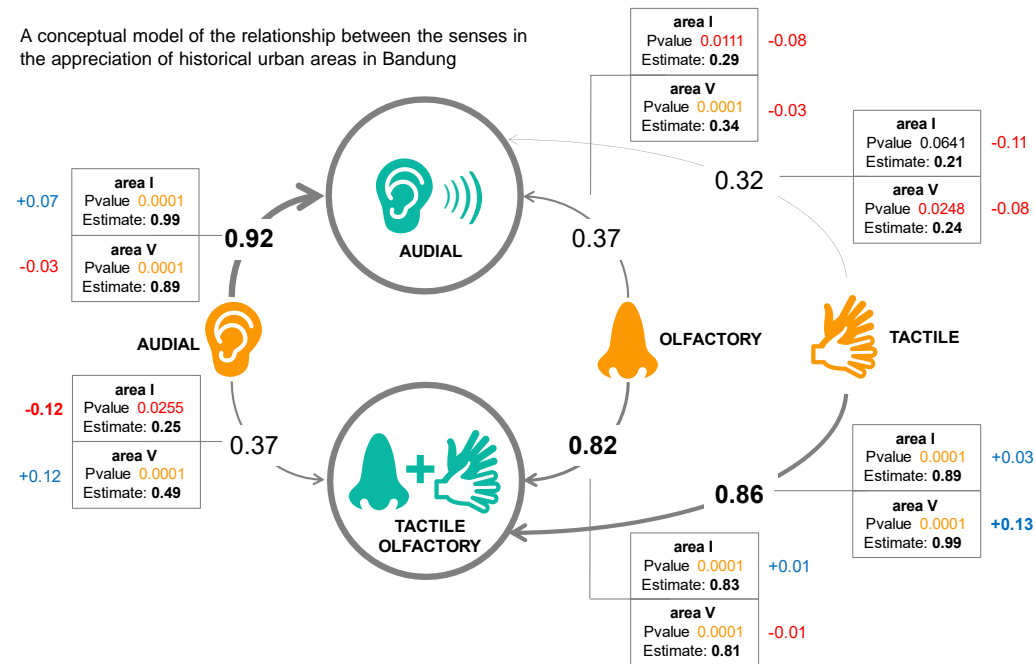
## DISCUSSION

The experience of the sensory environment of an urban historic area is multi-sensory. The visual quality of the physical buildings is not the only factor that influences the positive appreciation of an urban historic area in Bandung. The quality of the sensory environment of sound (animal sounds, human activities), temperature, and smell due to the presence of vegetation significantly influences perceptions in creating a positive experience in urban historic areas.

## RESULTS

There are two main groups of non-visual sensory elements in appreciating urban historic areas in Bandung: audial and tactile-olfactory. The sensory environment of sound, smell, and tactile strongly influences appreciation of the area based on the audial group. In comparison, the tactile and olfactory groups are strongly influenced by the sensory environment of tactile, smell, and sound. The regression value increases and decreases when connected to the location of the historic city centre (area I) and the area around Gedung Sate (area V).

A conceptual model of the relationship between the senses in the appreciation of historical urban areas in Bandung



# Fundamental Studies of Regional Redevelopment

## Towards Sustainable Well-being Vitalizing Local Communities

Mizue HAYASHI\*, Yukitaka TSUCHIYA\*, Ushio SHIBUSAWA\*, Yoshiki NISHIKAWA\*, Katsura HIRATSUKA\*\*  
and Hirohide KOBAYASHI\*\*

\* NTT Social Informatics Laboratories \*\* Graduate School of Global Environmental Studies, Kyoto University

### ■ **Background:** Japan's Depopulating Society affects sustainable regional development

• Population ageing is a global phenomenon.

#### • **Japan:**

- Proportion of elderly: 29.1%

- Basic policy: promoting **vitalization of**

**regional communities** as decentralization reform and groping new models of regional redevelopments.

- Cabinet Office: promoting **Well-being** for both individuals and society.

• What is Well-being?: A state of experiencing complete of physical and mental as well as social contentment.

- For improving them, the importance of the models is indicated for not only the physical but also the mental aspects.

### ■ **Challenges**

• Effects on states of health: Social-structural factors such as social environments, connections (Social epidemiological research) [2]. Studies have explored how to advance concrete actions in support of healthier environments and behaviors through regional development.

• Effects for improving mental Well-being: Some studies have suggested that certain factors, which can ensure the proactive involvements of residents in communities.

• **Extra consideration needs for models of regional development to improve of mental Well-being is essential.**

(Collaborative research of GSGES & NTT)

### ■ **Research objectives**

• This study aimed to **develop models of regional redevelopment to improve the state of mental Well-being.**

• This research attempted to identify and consider factors related to the proactive involvement of residents in regions and develop hypothesis models of regional redevelopments.

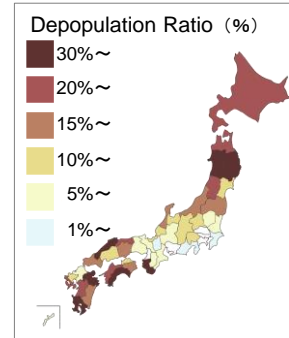


Fig1 : Map of the Depopulation of Japan [1]

### ■ **Methodology**

• Regions in Japan where typical regional issues, such as demographic decline, have occurred were considered as the research subject.

• Analyze activities in the regions: identify elements related to the proactive involvement of residents in regions as case study research

• Develop hypothesis models of regional redevelopments

• Investigate activities in the regions by field studies: determine the impact factors and formulate the models (for future research)

### ■ **Results and Discussion**

• Findings indicated that there are three factors of proactive involvement of residents to regions.

1) For residents: Emphasize and empowerment capabilities of individuals for individual quality of life which based on ideas that people should have opportunities and abilities to live their lives.

2) For regions: Exploring regional resources and implementing a range of community-based activities which is taking advantages of the resources.

3) Connecting residents to activities in regions to improve their Well-being and vitalize regional communities.

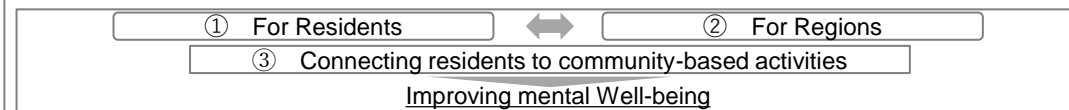


Fig2: Hypothesis models of regional redevelopments

• Social prescribing is a way of connecting patients to a non-clinical interventions in communities to improve their health and is included in Japan's basic policy and promoted nationwide [3]. As structural factors of social prescribing and our hypothesis model is overlapping, attempts to improve social prescribing as a model for regional sustainable development should be made.

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- [3] Bickerdike L, Booth A, Wilson PM, Farley K, Wright K. (2017). Social prescribing: less rhetoric and more reality. A systematic review of the evidence. BMJ Open

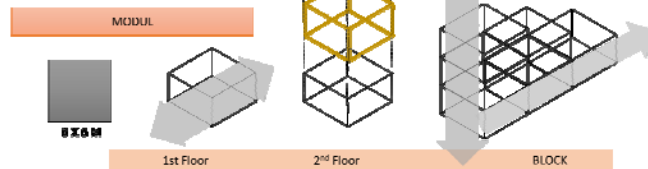
# Upgrading Informal Settlement Concept with Community Based Design (Case Study: Ledok Timoho Settlement)

Authors: Imelda Irmawati Damanik\*, Paulus Bawole \*, Tutun Selari\*

\* Department of Architecture, Faculty of Architecture and Design, Duta Wacana Christian University



1. FINDING THE HOUSE'S MODULE



2. FOCUS GROUP DISCUSSION (FGD) OF MASTERPLAN



3. FOCUS GROUP DISCUSSION (FGD): 3D of MASTERPLAN



The research present the upgrading process for informal settlement, using community based development approach. The community has their own ideas for the house unit, area zoning with certain function and consideration for economic opportunity. Community based design give them the opportunity for participation, so we as architect got consideration for space production and the result is more proper and affordable.

4. Workshop: 3 alternative of masterplan





**MACQUARIE**  
University  
SYDNEY · AUSTRALIA

# Assessment of PM<sub>2.5</sub> morphology and source identification near an industrial area in Thailand using Field Emission Scanning Electron Microscope

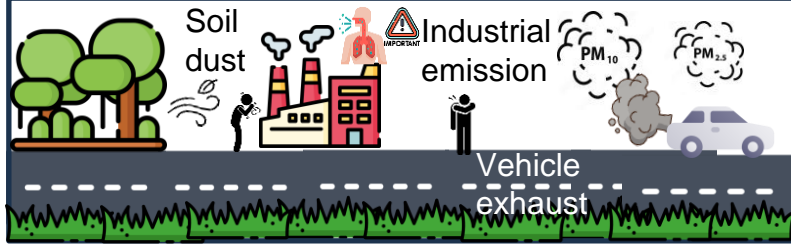
Cathleen Simatupang<sup>1,2\*</sup>, Suwana Kitpati Boontanon<sup>1,3</sup>, Vladimir Strezov<sup>2</sup>, Prapat Pongkiatkul<sup>4</sup>, Narin Boontanon<sup>1</sup>, Ranjna Jindal<sup>5</sup>

<sup>1</sup>Mahidol University, Thailand, <sup>2</sup>Macquarie University, Sydney, Australia, <sup>3</sup>Kyoto University, Kyoto, Japan, <sup>4</sup>King Mongkut's University of Technology Thonburi, Thailand, <sup>5</sup>Asian Institute of Technology, Thailand

\* e-mail: cathleen.simatupang@hdr.mq.edu.au



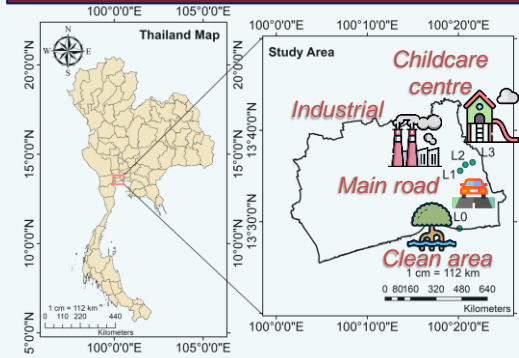
## Background Information



- ❖ Aerosols pose a significant threat to environmental quality and public health, especially in regions with high PM<sub>2.5</sub> levels.
- ❖ Identifying the sources of these particles is essential for enhancing control measures
- ❖ This study utilized a Field Emission Scanning Electron Microscope (FESEM) to analyse the PM<sub>2.5</sub> morphology near an industrial area, providing insights into potential sources.

## Methodology

### Study Area



### Sample preparation



- ♠ Cut 1 cm x 1cm
- ♠ Gold coating

### Sample Collection



- ♠ Cool dry season, Nov 2022
- ♠ Flow rate of 5 L/min, 24 hr
- ♠ 47 mm glass filter paper

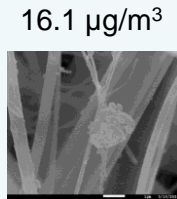
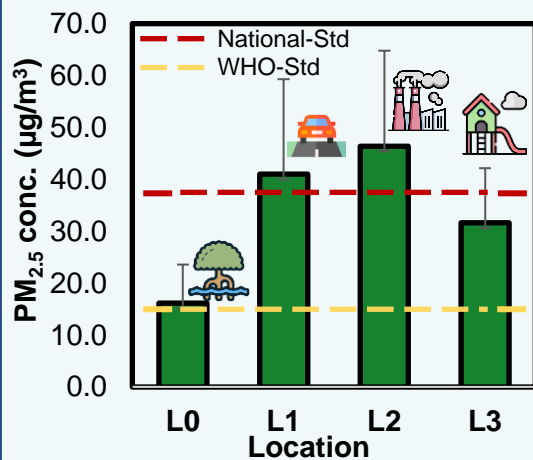
### FESEM Characterization

#### JEOL JSM 7100F FESEM

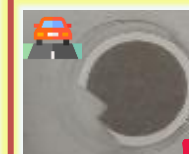


- Distance 10 mm
- Voltage 15.0 kV
- Magnification 15,000x

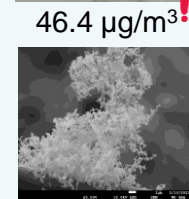
## Results and Discussion



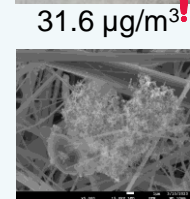
Single crustal  
Clean Area



Cluster of  
fine soot



Free soot



Irregular  
Soot

**Contaminated area**

**Main sources**



- Industrial
- Vehicle

## Conclusions

- ☺ Industrial and main roads had the highest PM<sub>2.5</sub>, while clean area shows the lowest.
- ☺ The possible sources were anthropogenic combustion, such as industrial and vehicular emissions.
- ☺ Regularly monitoring industrial activities, their operational hours, and promoting the use of public transportation are needed in this area.

1.Alves et al., (2015). <https://doi.org/10.1590/1519-6984.00113suppl>  
2.Kendall et al., (2002). <https://doi.org/10.1152/ajplung.2002.282.1.1109>  
3.Li et al., (2019). <https://doi.org/10.1080/02786826.2019.1645292>



# ASSESSING SPATIAL CHANGES AND PREDICTING LAND COVER DYNAMICS IN LA MESA WATERSHED

Authors: Bon Haley R. Gumabay and Jan Joseph V. Dida

Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños

## BACKGROUND

Watershed reservations are essential areas that preserve nature, particularly forests, crucial for conserving water. They play a vital role in maintaining clean water for homes, farms, industries, and nature. However, the La Mesa Watershed in the Philippines, factors like urban growth affected these areas, leading to a drastic loss of forests. As of 1999, the watershed reservoir had lost 75% of its forest cover. This affected millions of people who rely on these forests for water. Challenges have worsened this situation. The study aims to evaluate land cover changes in La Mesa Watershed from 2005 to 2020, project future land cover for the next decade and provide carbon storage comparison from 2020 to 2030.

## METHODOLOGY

The La Mesa Watershed Reserve covering parts of Metro Manila in the Philippines. Using Landsat satellite imagery via Google Earth Engine and processing tools such as QGIS and TerrSet 2020 software. Land cover was classified into categories like forest, built-up, barren land, water, and grassland. TerrSet's Land Change Modeler (LCM) analyzed changes from 2005 to 2020 and predicted transitions up to 2030. The application of InVEST Carbon Stock and Sequestration to determine the change in carbon storage.



Figure 1. Map of La Mesa Watershed

## RESULTS

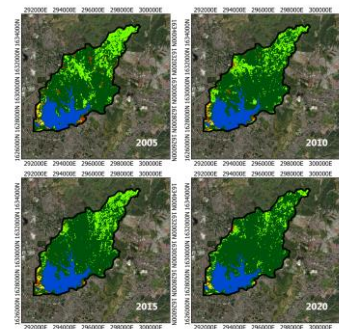


Figure 2. Land Cover Maps of La Mesa Watershed

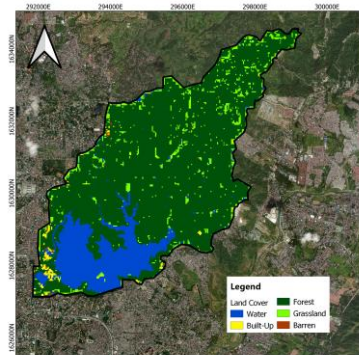


Figure 3. Future Scenario Land Cover of La Mesa Watershed 2030

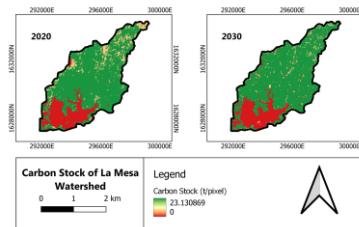


Figure 4. Carbon Storage Comparison of Year 2020 and 2030

## DISCUSSION

The generated land cover changes from each year determined the transition, there was a significant trend that presented an increase of forest land density. From 2005-2030, increasing forest cover (1228.906 to 2012.746 hectares), decreasing grassland (510.229 to 170.286 hectares), a significant reduction in barren land (472.608 to 11.160 hectares), fluctuating water areas (405.195 to 427.426 hectares), and slight variations in built-up regions (38.97 to 30.691 hectares). The increased volume of carbon stock due to the increase of forest cover wherein from year 2020, it had generated 520582.16 megagrams of carbon whereas in 2030, it had generated 531579.68 megagrams of carbon. The predictive model served as a model for future implementations as the foundation in land management planning.

## CONCLUSION

The changes in land cover patterns has provided insights into the future scenario of land cover by 2030. The results underscore the landscape ecology of La Mesa Watershed and its implications on the increase of forest cover density would result in improved estimates of carbon stock. The implication of the study to be used as a model for future reference in aiding for decision-making processes.





# Changes in Soil Fertility: A Case Study From Agricultural Land in Aoral District Kampong Speu Province, Cambodia

Authors: Kheam Soklin 1\*, Pheap Sambo 2\*, Ro Sophanrith 3\*, Hor Sanara 4\*\*, and Wendy Vance 5\*\*\*

\* Faculty of Agricultural Science, Royal University of Agriculture, \*\*Faculty of Land Management and Land Administration, Royal University of Agriculture \*\*\* Murdoch University, Australia



## Background

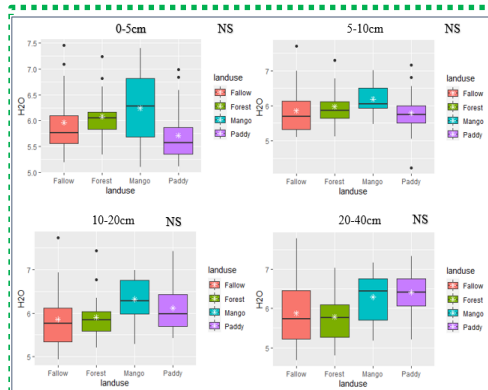
- Changes in land use were critical for the physical, biological, and chemical exchange of soil nutrients (Feng et al., 2010).
- Without proper use of agricultural lands, soil fertility could decline due to crop absorption and erosion (Ma et al., 2009).
- Forest soils, on the other hand, have higher levels of organic matter and nutrients than cultivated soils (Lal, 2002).
- Investigating soil fertility declines based on soil organic carbon (SOC) is necessary to improve an understanding of soil fertility decline at a specific type of agricultural land use.

## Study Location and Methodology

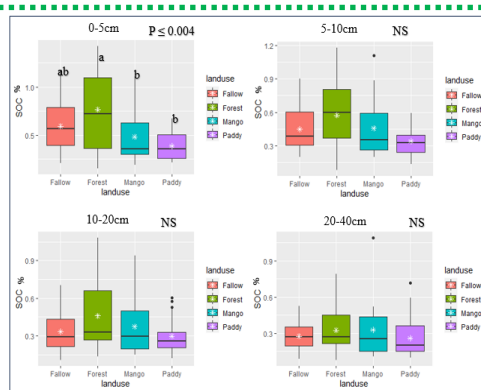
- The study was conducted in Hong Samnang commune (11.5615182, 104.2524782) and Reaksmeay Samaki commune (11.571683, 104.120623) the Aoral district, Kampong Speu province. To compare agricultural land with fallow land and forest land, focusing on soil chemicals: **pH, SOC, Total N, and CEC**.

## Results

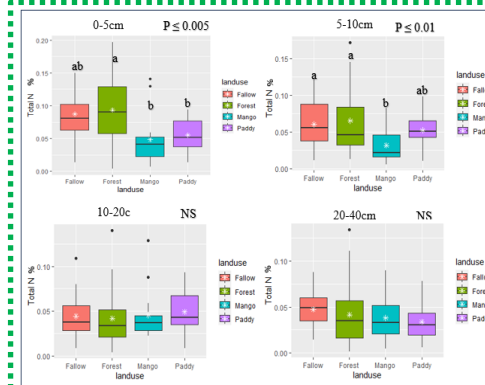
### 1, Soil pH(H<sub>2</sub>O)



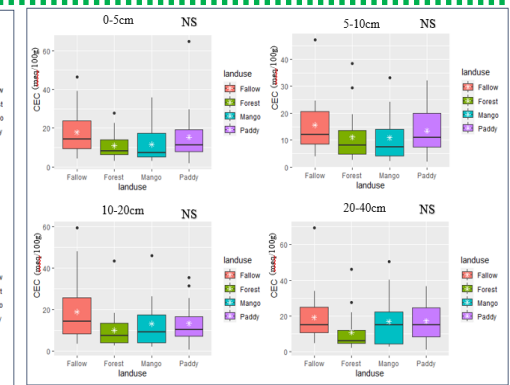
### 2, %SOC



### 3, %Total N



### 4, CEC



## Discussion

- In converting forest land to fallow land, mango, and paddy have a non-significant difference in soil pH (H<sub>2</sub>O).
- Though soil organic carbon is a significant difference in depth 0-5 the forest has higher than fallow, mango, and paddy (P=0.004). And depth 5-10cm 10-20 and 20-40cm is non-significant different.
- Total nitrogen was significantly (P<0.005) on soil depth 0-5cm. The forest land has a higher than Fallow land and agricultural land. At a depth of 5–10 cm was significant (P<0.01) in the fallow land is higher than that of paddy, forest land, and mango. And on soil depths, 10-20, and 20-40cm is a non-significant difference.
- The land use change shows that CEC is a non-significant difference.

## Conclusion

- Different land uses different SOC significantly. SOC was found high in forestland compared to other agricultural lands.
- Total N is associated with SOC; however, The pH (H<sub>2</sub>O) and CEC were non-significant.

# Dynamics of Land Cover, Development Level, and Regional Typology of Central Java Province Based on Sustainable Development Index

A P Wardana, A E Pravitasari, and D R Panuju

1Regional Development Planning Division, Department of Soil Science and Land Resources, Faculty of Agriculture, IPB University, Jl. Meranti, IPB Darmaga Campus, Bogor, West Java, Indonesia, 16680

## Dynamics of Land Cover, Development Level, and Regional Typology of Central Java Province Based on Sustainable Development Index

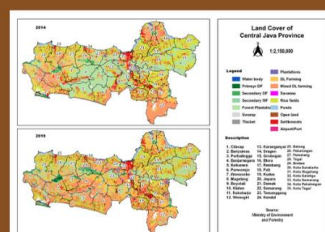
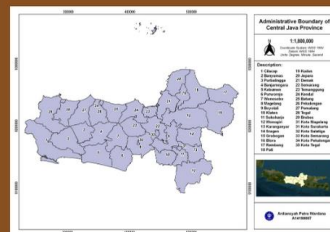
### Background and Objective

The high population in Central Java Province has become one of the factors triggering the dynamics of land cover change and regional development. Uncontrolled urban expansion and development threaten sustainability. This study aims to identify the types and patterns of land cover change, the level of regional development, to analyze the index of sustainable development in environmental, social, and economic dimensions, the typology of regencies/cities based on the index of sustainable development.

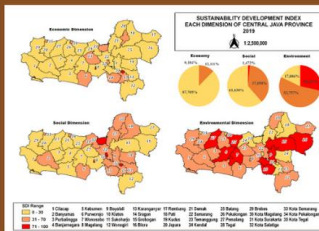
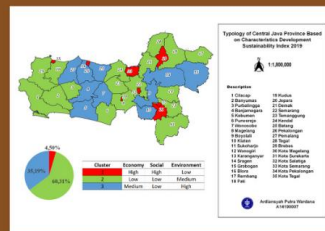
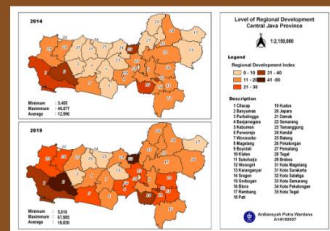
### Method

The research was conducted in Central Java Province from January to April 2023, using land cover data, village potential data, provincial statistical, and administrative maps. Land cover changes were identified using overlay analysis in QGIS. The level of regional development was identified using the scalogram method. The index of sustainable development was constructed using factor analysis, while the regional typology was identified using cluster analysis.

### Results and Discussion



The results show a dynamic change in forest cover with a significant decrease from around 1 million ha to 550.000 ha from 2014 to 2019. Meanwhile, the areas of agricultural land and built-up areas have increased by 312.000 ha and 164.000 ha. The scalogram analysis indicates an improvement in the index of regional development.



The sustainability analysis reveals that, the index of sustainability in the economic dimension is lower compared to the social and environmental dimensions. The cluster analysis shows that about 60.31% of the areas have a low index of sustainability. All urban areas have a high index of sustainability in the economic and social dimensions, otherwise in the environmental dimension

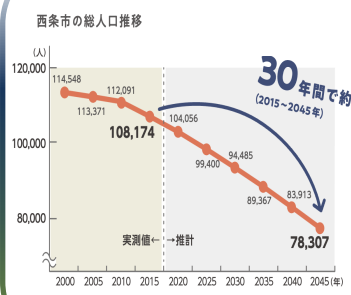
A P Wardana, A E Pravitasari, and D R Panuju

# Spatio-Temporal Dynamics and Prediction of Land Use/Cover Changes in a Depopulating Region: Case of Saijo City, Ehime Prefecture

Thanakon Sukuman<sup>1,2</sup>, Trakarn Prapasongsa<sup>2</sup>, Izuru Saizen<sup>\*,1</sup>

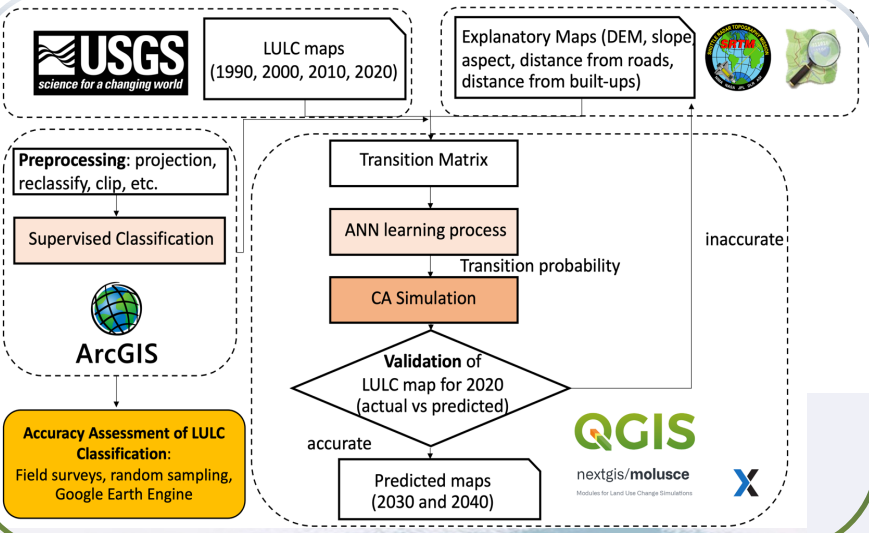
<sup>1</sup>Graduate School of Global Environmental Studies, Kyoto University <sup>2</sup>Department of Civil and Environmental Engineering, Faculty of Engineering, Mahidol University

## 1. Background and Introduction

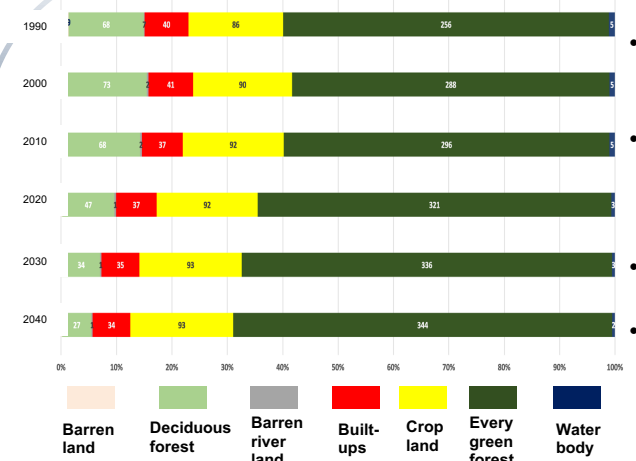


- **Population decline** is a serious issue, especially in rural Japan area
- **Lesser** number of **working people** affect the **economy**
- **No succession** has led to land **abandonment** and close of business
- Effective **land use policy** might be able to help **attracting** more people to move in and **revitalize** the city

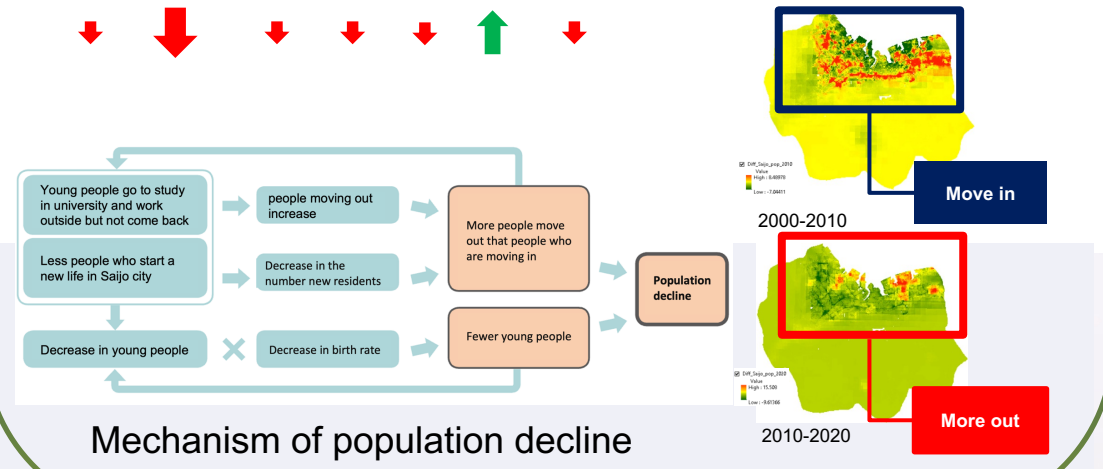
## 2. Methodological Framework



## 3. Results and Discussions



- Decline in **deciduous forest** could be due to the **change** in average **temperature** in the region
- The **increase** in **evergreen forest** might cause by natural land **reclamation** in the absence of **human disturbance**
- There is a lack of **growth** in the **agricultural sector**
- A gradual **decline** of **built-up** area could be a **major factor** that drives population decline



# Land use changes by informal economic activities in Sijunjung Regency, West Sumatra, Indonesia

Authors: Novella Giovanni\*, Izuru Saizen\*, Satoshi Asano\*

\* Laboratory of Regional Planning, Graduate School of Global Environmental Studies, Kyoto University

## INTRODUCTION

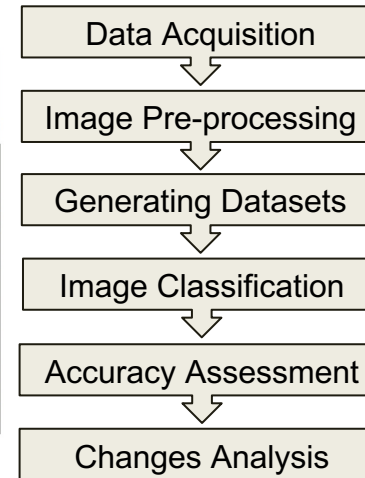


Fig 1. Informal mining activities in Sijunjung Regency

## METHODOLOGY



Fig 2. Study area in Sijunjung Regency, Indonesia



### Data:

- Landsat in **April** 2012, 2017, 2022

### Classified land use:

- Water
- Built-up area
- Crops
- Plantation
- Forest
- Mining area

## RESULTS AND DISCUSSION

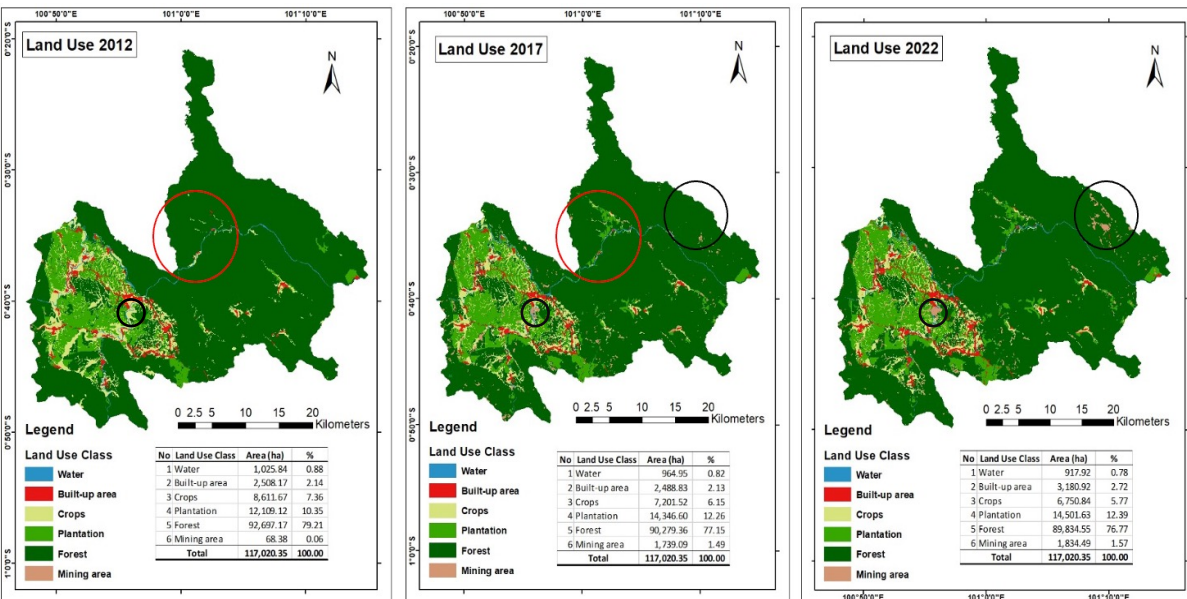


Fig 3. Land use maps of the study area 2012, 2017, and 2022

### Distribution maps:

- Overall accuracy using **Random Forest Classification** is 81.25%, 82.47%, and 81.44%, respectively.
- **Forest** has been dominant. Built-up area, plantation, and crops concentrated in the **west part** of the area.
- The **mining area** developments **occurred near** water, crops, built-up area, and forest.

### Land use changes:

- Within five years, the mining area and plantation have **expanded massively**.
- Within ten years, 8.17% (9,662.74 ha) of land use has **changed** from one to other land uses.
- **Decreased** in water (0.1%), crops (1.59%), and forest (2.44%), and **increased** in plantation (2.04%), mining area (1.51%), and built-up area (0.58%).

# Land Use Transition in Satoyama and Satoumi in Minamisanriku Town, Miyagi Prefecture

Wen Wang\*, Minami Nakai\*, Ayumi Ohara\*, Katsue Fukamachi\*

\* Graduate School of Global Environmental Studies, Kyoto

## BACKGROUND

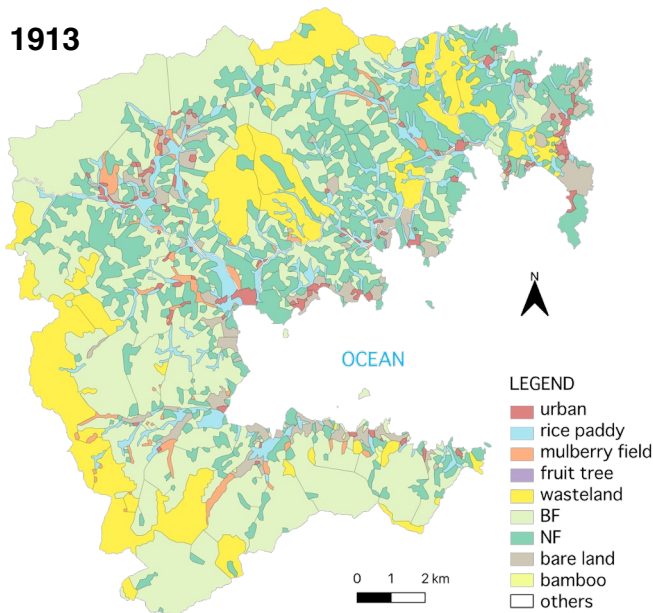
- Minamisanriku Town is surrounded by 300-500m mountains. A rich and diverse natural resources and culture has developed, benefiting from the blessings of Satoyama and Satoumi.
- However, land use (LU) has changed over time, and the Great East Japan Earthquake in 2011 caused damage to traditional LU. We clarified the LU transition and discussed the conservation measures.

## METHODS

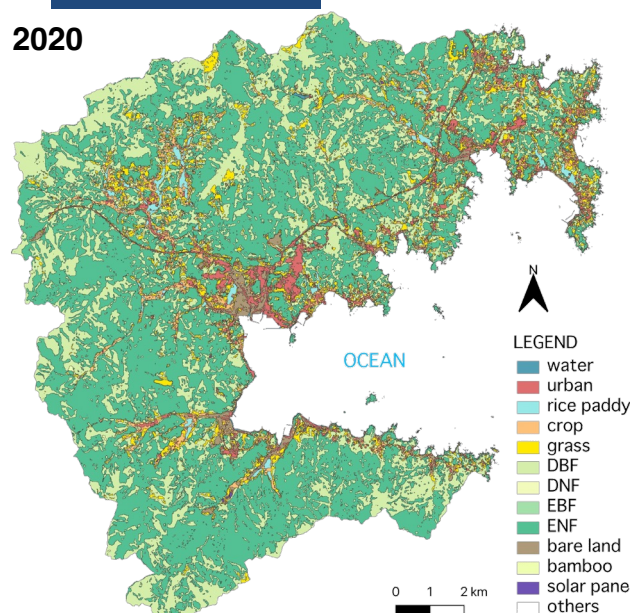
- We utilized the 1913 GSI topographic map, along with the 2020 high-resolution land-use map to elucidate the LU transition.

## RESULTS

1913



2020



LEGEND

- water
- urban
- rice paddy
- crop
- grass
- DBF
- DNF
- EBF
- ENF
- bare land
- bamboo
- solar panel
- others

- In 1913, 10 land use typologies, in 2020, 13 land use typologies were identified. The seashore was predominantly covered by NF and BF, but now showcases urban areas and bare land.
- Changes in lifestyle and energy needs have contributed to the conversion of BF to NF and rice paddies to fields. And the decline in grasslands (due to the decline in grazing activities) poses a threat to the prey and habitat of animals like golden eagles. Mulberry fields have disappeared.

## CONCLUSION

- Reflecting on the changes in LU over the past century, traditional satoyama, satoumi practices, such as the cultivation of BF, grazing pastures, farmland cultivation, red pine forests persist today.
- However, with the dramatically transition of LU, the traditional utilization of natural resources has been changed, the interplay between forest(yama), village (sato), and sea(umi) is delicate.
- Urban areas and bare land have expanded along the coast. It becomes crucial in the future to reintegrate bare land.
- In the future, it is important to conserve the various vegetation and LU pattern with a biodiversity perspective.
- LU considering disaster prevention and mitigation is also important.

## Representative Scenery of Minamisanriku Town



# Settlement Development based on Land Capability in Disaster-Prone Area (Case Study: Banda Aceh, Indonesia)

Sylvia Zahara\*, Darmawan\*\*, Boedi Tjahjono\*\*

\* Graduate School of Global Environmental Studies (GSGES), Kyoto University, Kyoto 606-8502, Japan;

\*\* Department of Soil Science and Land Resource Management, IPB University, Bogor 16680, Indonesia.

## Background

Banda Aceh is one of the most populated areas in Aceh Province, Indonesia. Due to its geographical condition, Banda Aceh is **vulnerable to natural disasters** (2004 Indian Ocean earthquake and tsunami). This area needs to be accurately evaluated as the growing demand for the settlement getting higher. This research aims to evaluate the land capability in Banda Aceh for settlement based on the physical aspects.



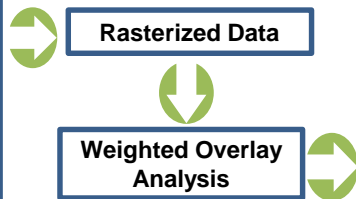
Figure 1. Banda Aceh as part of Great Sumatran Fault

## Methodology

The land capability analysis is referring to the **Minister of Public Works No.20/2007 Regulation** about Technical Guidelines for Physical and Environmental, Economic and Socio-Cultural Analysis in the Preparation of Spatial Planning.

### Data used include:

- Morphological Map
- Elevation Map
- Slope Map
- Soil Type Map
- Rainfall Map
- Disaster Vulnerability Map



- ### Land Capability Unit:
1. Morphology
  2. Ease of Construction
  3. Slope Stability
  4. Foundation Stability
  5. Water Availability
  6. Erosion
  7. Drainage
  8. Waste Disposal
  9. Natural Disaster

$$C = \sum_{i=1}^n w_i x_i$$

where,  
 $w_i$  = The weight of i factor map  
 $x_i$  = Criteria score of class of factor i  
 C = Capability index for each pixel in the map

Analysis is conducted using ArcGIS 10.4. Each individual raster cell is reclassified into Land Capability Unit, multiplied by a weight to allocate a significance level to each, and then added together for the final weight. This can be interpreted as:

Once the Land Capability Unit has been weighted, then determining the development classification for classifying the range value to know the level of development and its availability.

| Interval | Land Capability | Development Classification           |
|----------|-----------------|--------------------------------------|
| 32-58    | Class A         | Low development capability           |
| 58-83    | Class B         | Slightly Low development capability  |
| 83-109   | Class C         | Medium development capability        |
| 109-134  | Class D         | Slightly high development capability |
| 134-160  | Class E         | High development capability          |

## Result and Discussion

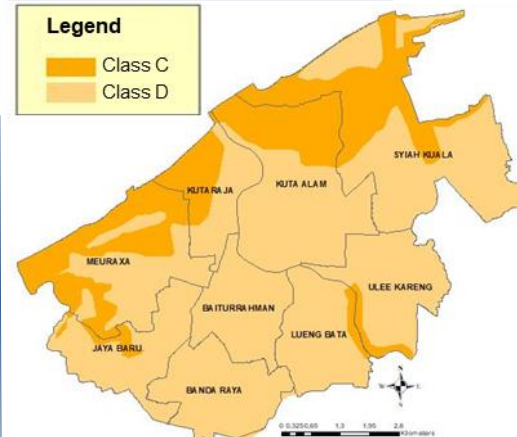


Figure 2. Land Capability Class of Banda Aceh

There is a proportion that regulated by the government dividing the available land for developing the settlement based on the land capability.

Each proportion for available land and unavailable land are **75% : 25% for Class D** and **50% : 50% for Class C** (Minister of Public Works, 2007).

Based on this direction, there is only **1,537 ha (26.03%)** from total area of Banda Aceh which available to be developed as settlement (**Figure 3**).

Based on this range value, Banda Aceh is divided into 2 development classification, Class C (Medium development capability) and Class D (Slightly high development capability) as presented in **Figure 2**.

| Total Value       | Land Capability | Area (ha)    | %          |
|-------------------|-----------------|--------------|------------|
| 89-109            | Class C         | 1,511        | 25.6       |
| 109-124           | Class D         | 4,302        | 74.4       |
| <b>Total Area</b> |                 | <b>5,903</b> | <b>100</b> |



Figure 3. Available Land for Settlement Development

# Temporal analysis of NDVI in a highly disturbed area in Albay, Philippines

Marie Jessica C. Gabriel\*, Cristino L. Tiburan Jr.\*, Izuru Saizen\*\*

\*Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños, College Laguna, Philippines

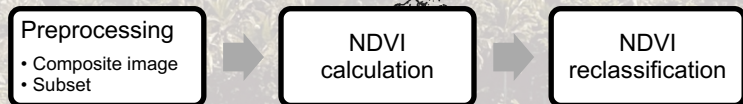
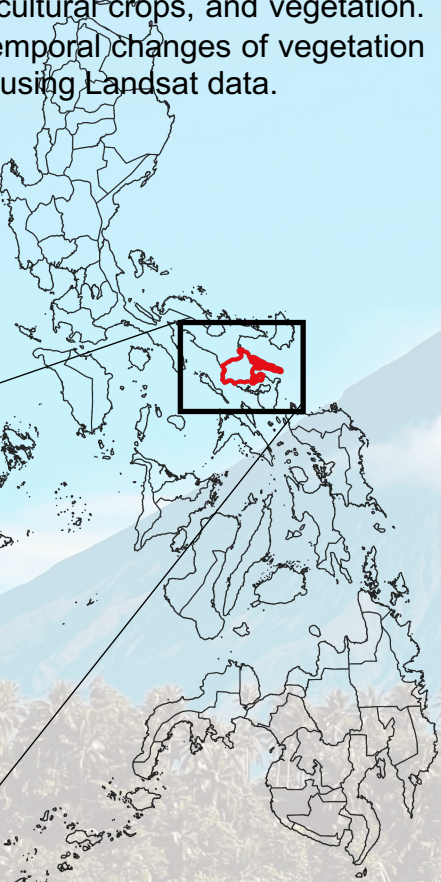
\*\*Laboratory of Regional Planning, Graduate School of Global Environment Studies, Kyoto University, Japan

## Background

Volcanic eruptions are important natural phenomena that shape our environment. It provides fertile soil, can be used as geothermal energy, and source for important minerals. However, volcanic eruptions can also pose damage to properties, agricultural crops, and vegetation. This study examined the temporal changes of vegetation in Albay from 2000 – 2021 using Landsat data.

## Methodology

This study was conducted in the municipality of Albay, Philippines. It is where Mayon Volcano, one of the most active volcanoes in the country.



## Results and Discussion

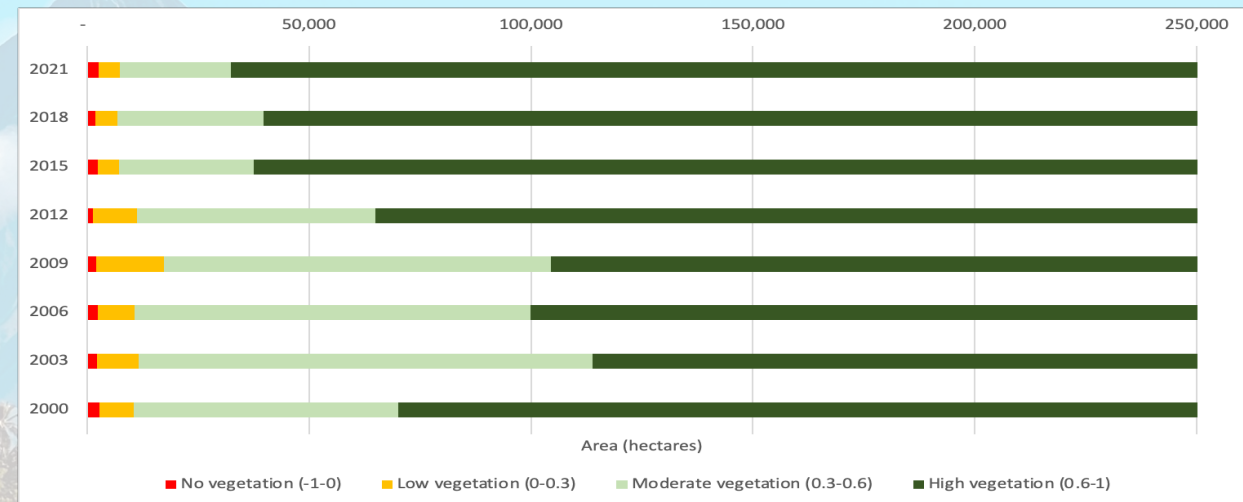
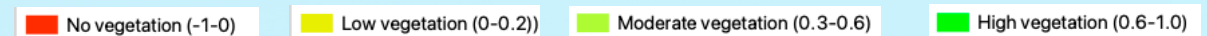
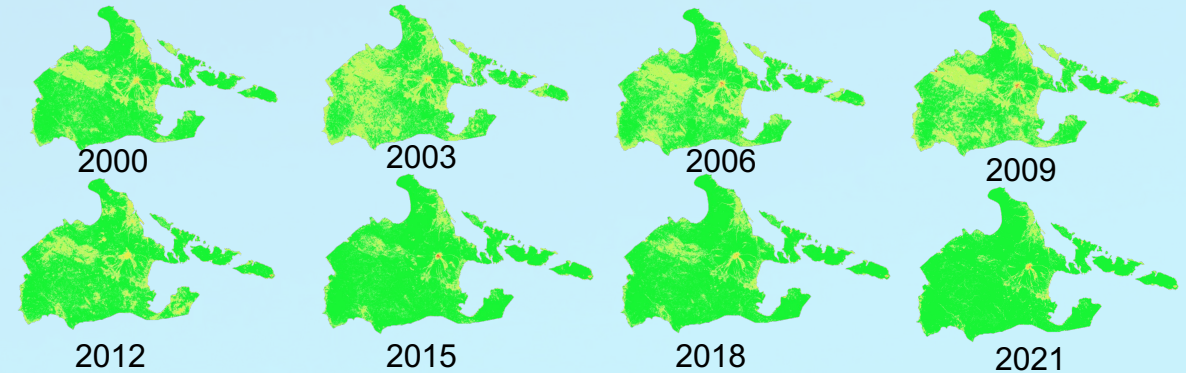


Figure 1. Changes in vegetation in Albay from 2000 to 2021.

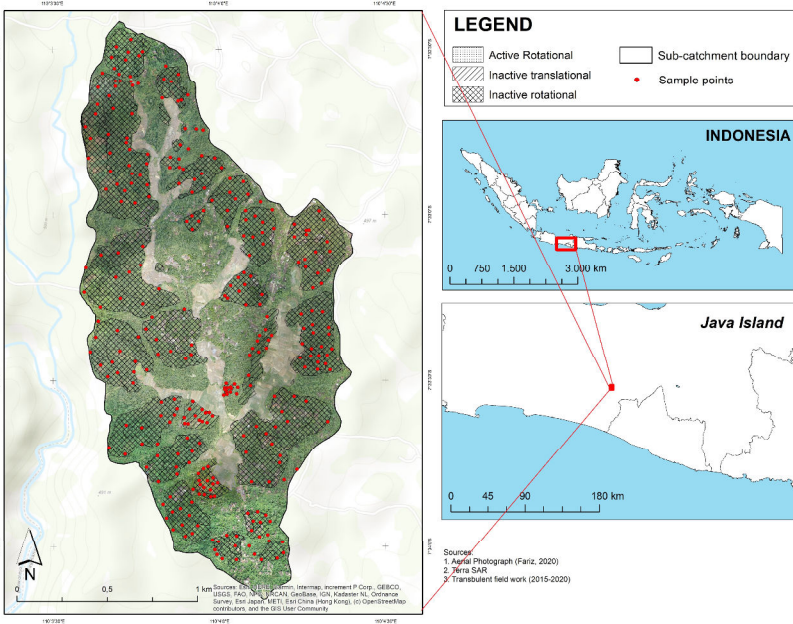
- Majority of the municipality of Albay has high vegetation.
- Vegetation in the area is highly dynamic. Significant decreased in vegetation is observed in the years 2003, 2006, and 2009 which coincide in years with eruption.



# Surface Soil Moisture on Landslides Prone Area: How's the distribution?

Authors: F. Asri\*, J. Sartohadi\*, and M.A. Setiawan\*\*

\*Graduate School of Environmental Science, Universitas Gadjah Mada \*\*Faculty of Geography, Universitas Gadjah Mada



## 02. Methodology

This research was carried out in a sub-catchment with an area of 300 acres, where more than 60% of the area is active and inactive landslides. Using time domain reflectometry (TDR), in situ measurements of surface soil moisture were made at 313 sites during the dry season of 2023. Identification of landslide type is carried out by interpreting aerial photos and field surveys. Sentinel-2 satellite images were used to generate the Enhanced Vegetation Index (EVI).

## 04. Discussions

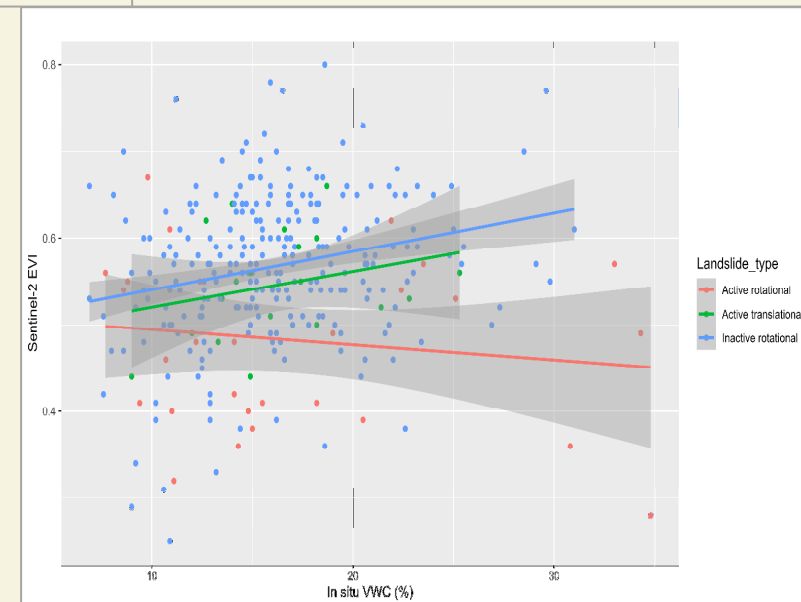
- The relationship between surface soil moisture (indicated by the volumetric water content VWC value) and vegetation density (indicated by EVI) tends to be weak in the three types of landslides.
- However, the average soil surface moisture in the rotational active landslide type is the highest (17.3%) even though the EVI value is the lowest. This is caused by a landslide process which causes the soil to turn over, so that the lower soil layer (*altered andesite breccia*) is exposed. This type of soil contains more than 65% clay, so it is able to store water longer than other types of soil.

## 01. Introduction

- Surface soil moisture fluctuates quite greatly in space, which is influenced by many factors, including vegetation cover and micro topography. Landslides are one of the disasters that can change micro-scale morphology, which is thought to influence the distribution of soil moisture.
- Bompon sub-catchment is situated in the transitional zone, where the soil in Bompon sub-catchment is dominated by clay texture, and is prone to landslide.
- Identifying landslide types using aerial photography and detailed in situ sampling is expected to be an input for land management in hilly areas with thick clay content.

## 03. Results

The results of aerial photo interpretation and field observations show that Bompon sub-catchment has 3 types of landslide activity, namely rotational active landslides (12.2 acres), translational active landslides (1.8 acres), and rotational inactive landslides (178.2 acres). The number of sample points for active rotational is 30 points, active translational is 19, inactive rotational is 264.



# Identification of Inclusive and Sustainable Water Provision in Coastal Slums towards Realizing a Healthy City in Bandar Lampung

Authors: Warid Zul Ilmi\* and Berliana Adinda\*\*

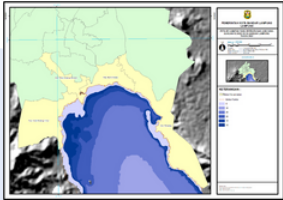
Research and Advocacy Officer, Center for Indonesia's Strategic Development Initiative\* and Master Student of Urban and Regional Planning, Lampung University\*\*

## STUDY BACKGROUND

The coastal development complexities in Bandar Lampung, marked by slum areas due to restricted access to vital facilities, are exacerbated by the climate crisis, heightening vulnerability, particularly in terms of clean water and sanitation. Urgent measures for inclusive and sustainable urban water solutions are imperative to address these challenges effectively and realize a health city.

## METHODOLOGY

Location



The scope of this research is the coastal area in Bandar Lampung City, it is one of Metropolitan Cities in Indonesia which have directly adjacent to the bay, Especially at 4 sub-districts:

1. Bumi Waras
2. Panjang
3. East Teluk Betung
4. South Teluk Betung

### Analysis Method

The research utilizes a qualitative descriptive data analysis method, focusing on characteristics and inclusive, sustainable efforts in responding to the climate crisis. The study aims to achieve an inclusive, sustainable, and healthy city, emphasizing adherence to specific standards for drinking water quality and sustainable concepts for water used for hygienic sanitation purposes, as outlined in the regulations (Permenkes RI No. 32 of 2017). And also, one specific indicator is the Healthy Infrastructure Settlement Area as outlined in Minister of Health Regulation No. 34/2005 on the Implementation of a Healthy City.

## RESULTS

- **50 percent** of the total area is plagued by **slums**. **risks of poor sanitation, and insufficient clean water**. Half of the total slum area, **mainly in settlements on illegal land**, indicates heightened vulnerability to climate impacts, especially regarding inclusive and sustainable water supply.
- Like **Bumi Waras and Panjang districts**, **using refillable water gallons or driers transported by water carts**, as obtaining well water is no longer feasible; however, this practice is not universally accessible due to the dense and often illegal settlements, posing challenges for the PDAM piping network.
- **The economic reliance on purchasing water refills and gallons, allocating almost 50 percent of incomes**, emphasizes the urgency of targeted urban water initiatives, particularly for residents with lower economic conditions lacking essential subsidies.

Data collection

Primary data

- interview-based questionnaire **384 Residents**
- observations to observe patterns, forms and mechanisms of local community adaptation and mitigation to the impacts of the climate crisis itself and other vulnerability

Secondary Data

- literature and document review

## DISCUSSION

We need an inclusive and sustainable urban water supply initiative in the city of Bandar Lampung to integrate protected water resources to address challenges in coastal slum areas. By adapting to local characteristics, it ensures equitable access to clean water and develops a holistic and sustainable model for urban water management. Through informal and formal means to enhance the quality of life for the local community.

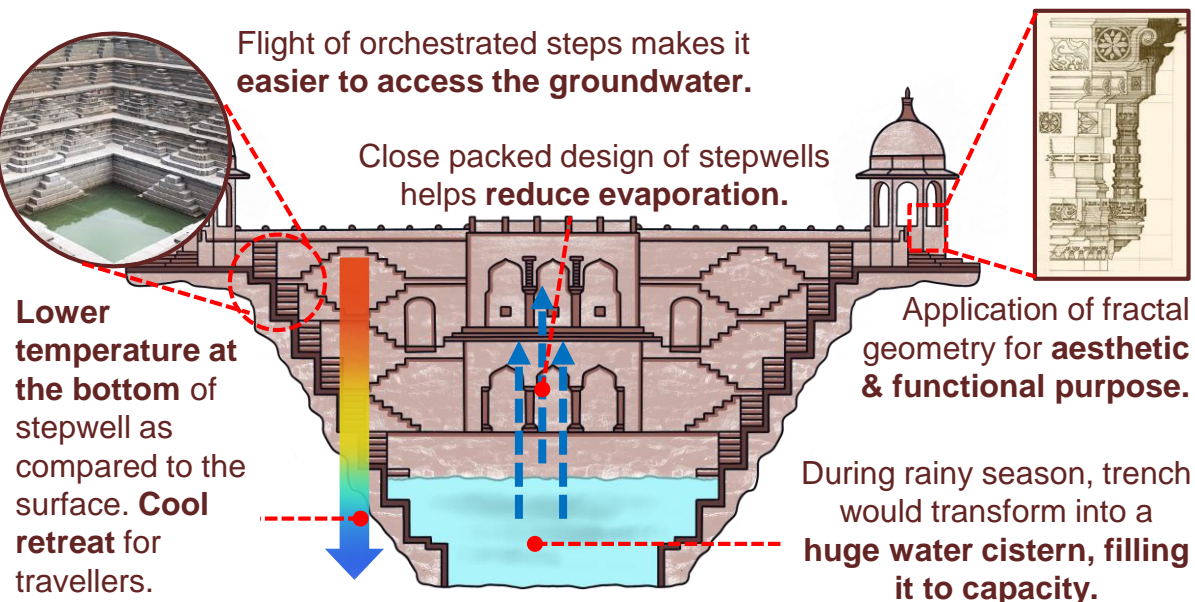
# Reviving Traditional Water Management Systems in Semi-Arid Regions of India: A Case Study of Jaipur, Rajasthan

Author: Kanika Bimrah

Graduate School of Global Environmental Studies, Kyoto University

## RESEARCH BACKGROUND

Stepwells are commonly found in semi-arid regions of India. They were mostly built along natural slopes and acted as rainwater catchment areas.



## METHODOLOGY

- Land-Use Mapping
- Ground Water Level Mapping and Analysis
- Stepwell Mapping and Primary Survey for Functional and Structural analysis

## RESULTS

1972 To 2016

- Decrease in **Aquifer Recharge** by 41%
- Increase in **Urban Area** by 1813%
- Increase in **Surface Run-off** by 918%



## DISCUSSION

Before Mid 20th Century

Community Space for gathering and festivals



Water supply for drinking, bathing and agriculture



Symbol of traditional architecture



Intrinsic



Religious places

Mid 20th Century - Today

Over-exploitation of ground water



Increasing Population & Urbanization

Lack of community participation



Neglected



Change in natural drainage pattern

This Is In Our Hands



Community space, Heritage tourism

Potential

Mitigating impacts of climate change



Restoration of traditional water systems for providing water supply to local communities

# Study on Urban Green Development in Siem Reap Town, Siem Reap Province, Case Study on Public Space

Authors: Chhe Sokhieng\*, Hor Sanara\*, Pok Sophak\*\* and Yin Chan Eng\*\*

Royal University of Agriculture, Faculty of Land Management and Land Administration

## Background

- Siem Reap, a hub of cultural heritage and tourism, is at the core of plans for its sustainable development outlined in the **"Land Use Planning in Siem Reap City Vision 2035."**
- The planning emphasizes the creation of public and green spaces along the Siem Reap River and National Road 6, aiming to preserve 90% greenery on plots and committing to maintaining 30% green space.
- This study addresses the pressing need for more urban green space by exploring feasibility, identifying challenges, and understanding public perceptions that align with sustainable cities and communities.

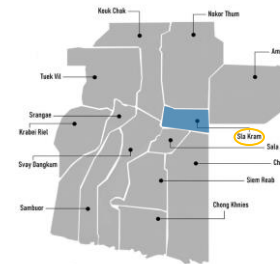
## Objectives

- To investigate the feasibility of introducing more public and green spaces in Siem Reap city
- To identify challenges hindering the creation of green spaces in specific communities within the city
- To comprehend public perceptions and common attitudes toward the creation and preservation of green spaces

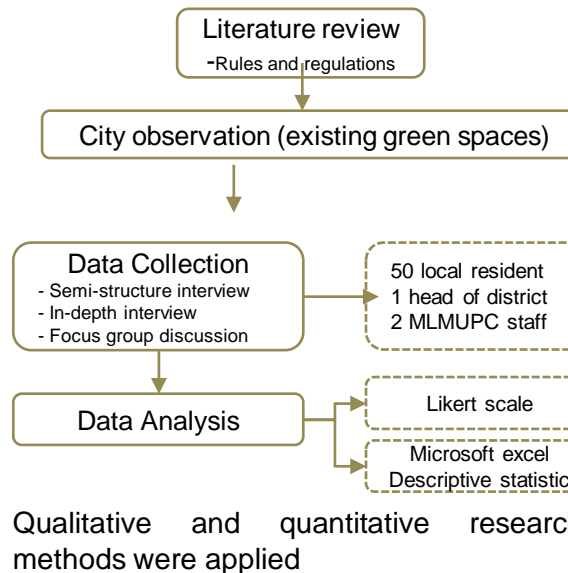
## Methodology

### Study Area

- The study area was located in Siem Reap City, Slor Kram District



### Method



## Result (Preliminary)

- The government rules and regulations provided opportunities to establish more urban green space in Siem Reap Town.

### Rules & Regulation

- Land Use Planning Policy
- Environmental Conservation Principles
- Land Development Regulations
- Road Traffic Law
- Land Law of 2001
- Civil Code regarding Property
- Etc....



- Local people understand the benefit of urban green spaces which are for well-being and tourist attraction
- State public land in the urban area played the most important for developing urban green space.
- Road site trees and other public awareness related to urban green space for human well-being shall be considered.

## Discussion

### Research Studies:

- Promises novel insights for Siem Reap's communities
- Focuses on city-proximate areas for development
- Aligns with outlined principles and inquiries

### Anticipated Results:

- Creation of public spaces and infrastructure
- Understanding community involvement
- Conducting comprehensive studies

### Potential Implications:

- Shaping future sustainable development studies
- Delving into the community involvement aspects
- Scientific foundation for future in related studies

# Historical and Current Use and Management of Mangrove Resources in the Maldives: Case Study of 3 Islands in Noonu Atoll

Authors: Umaira AHMED\*, Izuru SAIZEN\*, Satoshi ASANO\*

\* Graduate School of Global Environmental Studies, Kyoto University

## Introduction

In the past decade, islands in the Maldives have undergone rapid development, leading to the destruction of mangrove forests. Against this backdrop, this study aims to elucidate the ways local communities utilize and manage mangroves in order to understand the importance of mangrove resources to local people.

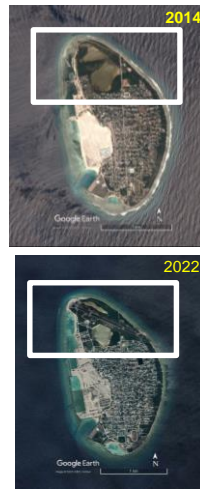


Fig 1. Mangrove destruction

## Study Area



Fig 2. Study area

Table 1. Area and population of case study islands (Maldives Bureau of Statistics)

| Island        | Area (km <sup>2</sup> ) | Population |
|---------------|-------------------------|------------|
| Kendhikuhdhoo | 2.08                    | 1285       |
| Maalhendhoo   | 0.484                   | 633        |
| Landhoo       | 0.53                    | 652        |

## Research Methods

Semi-structured interviews – 19 interviews between Dec 2022 and Jan 2023

Guided Tours

Document Review

Thematic Analysis

## Discussion

Historically, mangrove resources were used for subsistence. At present, mangrove resources are mainly used for non-essential consumption and recreation.

The social norm of foraging from the ground is an important factor in the sustainable management of mangrove resources. However, this norm is currently being eroded on one island and is creating a void in the management of mangroves and terrestrial forests, more broadly.

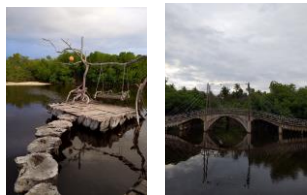
## Results- Mangrove Resource Use

### Historical

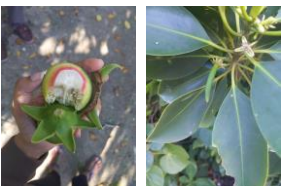


Milkfish (*Chanos chanos*) culture in mangrove ponds

### Current



Nature-based recreation



Source of food: mangrove apples, propagules of *Bruguiera cylindrica*



Steeping coconut husks in mangrove ponds to make coir

## Results- Management of Mangroves

### Formal Rules

Restrictions on resource gathering:

Resource gathering only allowed on certain days within a specific time period (historical and current)

### Social Norms

Foraging from the ground:

Resources from plants were taken after they had fallen to the ground naturally and not directly harvested (historical and current).

# Effects of Vinasse Waste Application for Plant Growth, Soil Physical Properties, Soil Chemical Properties, and Soil Quality

Authors: Neysa Yumna Callista\*, Latief Mahir Rachman\*, Arief Hartono\*

\* Department of Soil Science and Land Resources, Faculty of Agriculture, IPB University

## INTRODUCTION

### BACKGROUND

- Bioethanol is a renewable energy source. One of the residual ethanol, called Vinasse.
- Positive effect: can be used as an alternative organic fertilizer
- Negative effect: are highly pollutant

### OBJECTIVE

- **Vinasse** waste from bioethanol production with sorghum
- **Oil palm plants** as an indicator of plant growth
- **Soil sample** used is a type of Latosol Dramaga (Inceptisol)
- **Soil physical and chemical properties**



Fig.1 The oil palm plants sample

Fig.2 The Vinasse waste sample

## PURPOSE

To analyze effects of Vinasse waste treatment on soil and the plant growth, based on the physical, chemical, and soil quality index.

## METHODOLOGY

### Field Research



Fig.3 Measurement of plants



Fig.4 Experimental plots

| Treatment | Ingredients on pot          |
|-----------|-----------------------------|
| P 12      | Vinasse <sub>m</sub> 150 ml |
| P 13      | Vinasse <sub>m</sub> 75 ml  |
| P 14      | Vinasse <sub>m</sub> 15 ml  |
| P 15      | Control                     |

### Data analysis

1. Laboratorium Analysis for Soil Physical Properties, Soil Chemical Properties
2. Data Analysis of Soil Quality Index from Soil Physical Properties, Soil Chemical Properties

## RESULTS AND DISCUSSION

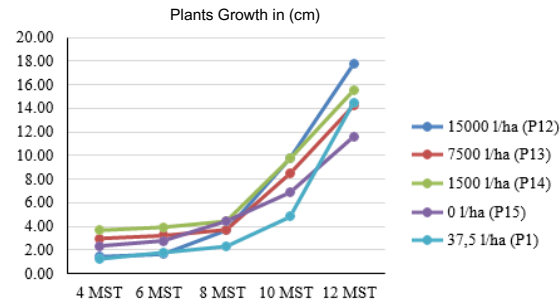


Fig.5 Graph of Oil Palms Growth on Vinasse application dosage

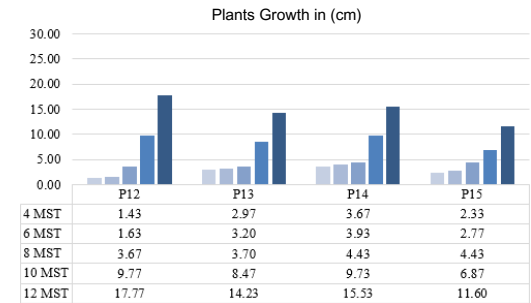


Fig.6 Graph of Oil Palms Growth on Vinasse application effects

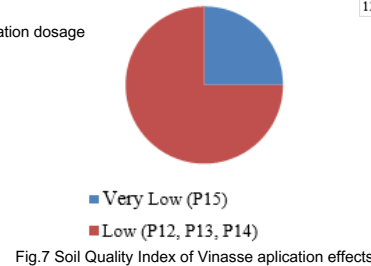


Fig.7 Soil Quality Index of Vinasse application effects

## CONCLUSION

- The application of organic fertilizers and Vinasse waste can improve soil quality, it has a positive effect on plant growth. However, the application of Vinasse waste should be evaluate after application to avoid environmental contamination.
- Suggestion for more optimum plant growth is needed a combination between organic and inorganic fertilizers with the right dose.

# Strengthening climate resilience of urban regions in Central Vietnam through nature-based solutions for heat adaptation and air quality improvement

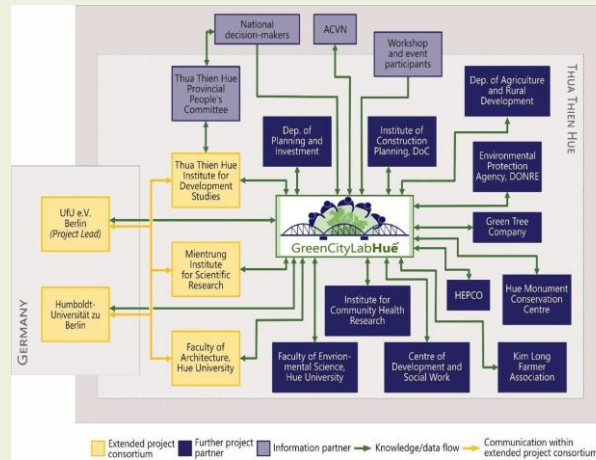
Authors: Fabian Stolpe\*, Niklas Müller\*, Nicole Wozny\*, Sebastian Scheuer\*\*, Jessica Jache\*\*, Luca Sumfleth\*\* Hoang T. B. Minh\*\*, Nguyen D. H. Long\*\*, Nguyen N. Tung\*\*\*\*, Nguyen V. Minh\*\*\*\*, Nguyen P. Canh\*\*\*\*, Nguyen N. Y. Nhi\*\*\*\*\*, Pham T. A. Thu\*\*\*\*\*

\* UfU, Germany \*\* HUB, Germany \*\*\* MISR, Vietnam \*\*\*\* HUSC, Vietnam \*\*\*\*\* HUEIDS, Vietnam

**Central Vietnam** suffers regularly from extreme events of storms, severe precipitation, and extreme heat, and environmental issues due to rapid population and urban growth, such as air pollution. **Huế** has great potential to forget its own path in terms of climate adaptation by pursuing growth that relies on nature-inspired urban planning measures and leverages ecosystem services provided by natural elements to increase the sustainability and resilience of the city and its residents.

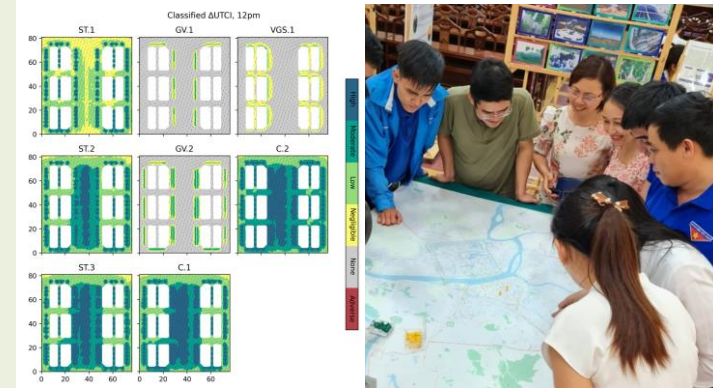
**Nature-based solutions** (NBS) are planning concepts and designed interventions that are inspired by nature and intend to cope with ecological and social challenges. The NBS aims at improving, expanding and connecting elements of **Green-blue infrastructure** (GBI), a strategically planned network of natural and semi-natural areas covered with vegetation or water that provide a wide range of ecosystem services to increase the sustainability and resilience of the city and its residents.

**GreenCityLabHuế** is a consortium of research institutes and think tanks from Vietnam and Germany aiming at a more sustainable, resilient, inclusive, and greener future for Huế through NBS, thereby focusing on the development of GBI and its effects on thermal comfort and air quality of the city.



**The GreenCityLabHuế consortium and stakeholders**

The project applies **data-driven simulations** to explore the impact of different **city-wide greening scenarios** and **microclimatic models at site level** to develop best-practice recommendations for decision-makers. The project also conducts **education and capacity-building activities** and events, works with relevant stakeholders to develop visions for green urban development, and discusses with decision-makers how GBI can be integrated into urban development.



**Systematic assessment of greening interventions using ENVI-met**

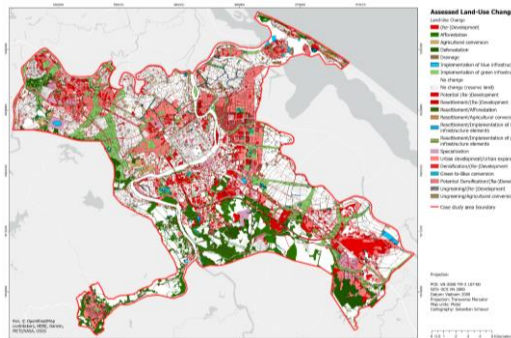
**Public event on GBI development in Huế**

Also, the implementation of examples for **small-scale greening measures** is promoted through a design competition and evaluated in cooperation with stakeholders and citizens.



**Showcase of green-blue infrastructure development**

Find more information at: <http://www.greencitylabhue.com>



**Integrated perspectives on land-use changes 2019 - 2030**

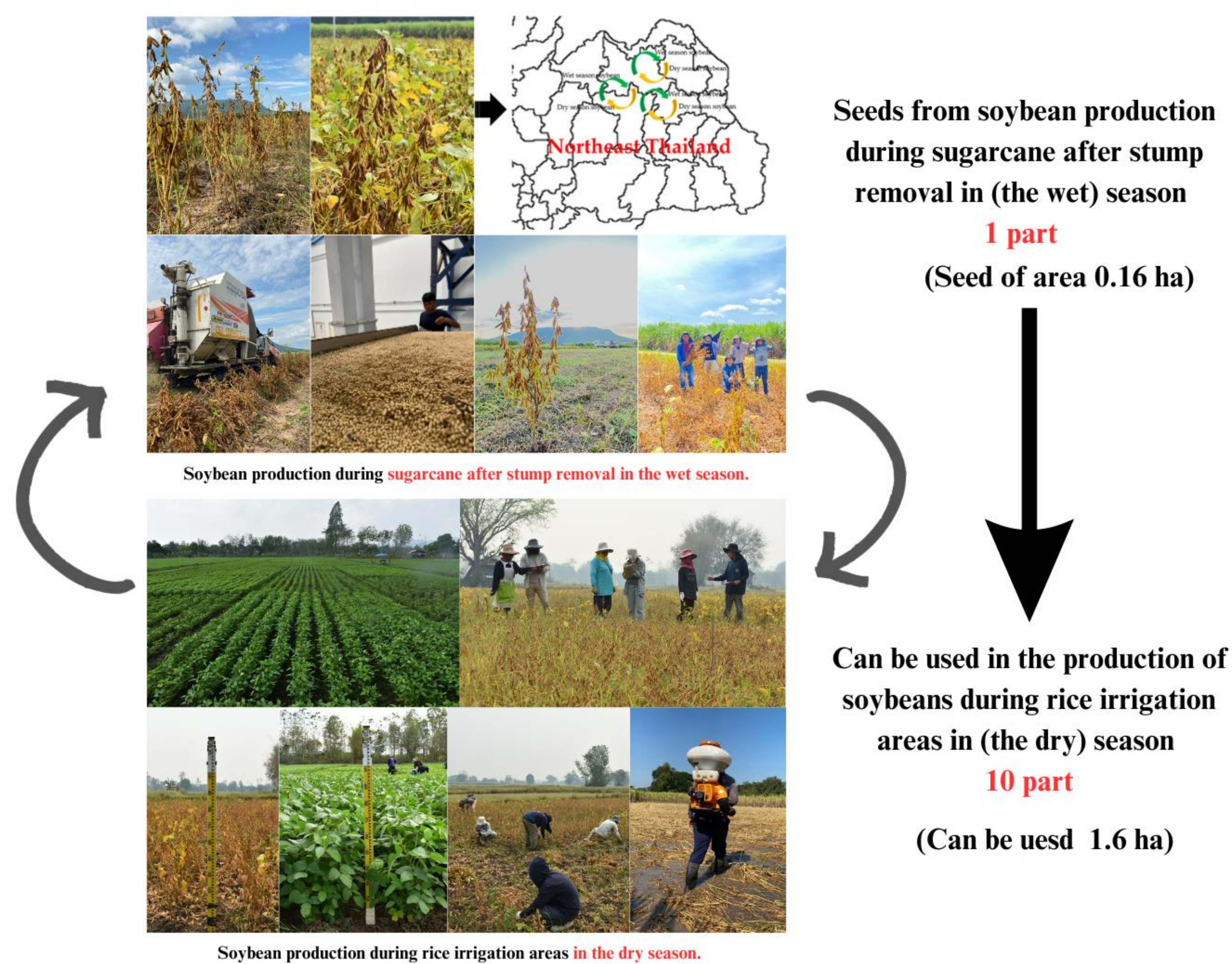


# Duo-Environments: The Cropping System for Year-Round Morkhor 60 Soybean Variety Production in Northeast Thailand

Adisak Taiyawong, Chompoonut Sritongtae, Chankaew Sompong, Tidarat Monkham and Jirawat Sanitchon  
 Department of Agronomy, Faculty of Agriculture, Khon Kaen University, Khon Kaen, 40002 Thailand.

## Introduction

- Soybean is one of the most important crops for the food industry of Thailand, Both humans and livestock are included.
- Thailand's major soybean production areas are in the north and northeast.
- The production area of soybeans has been decreasing consistently over the past 10 years, due to the average age of farmers increasing. and production technology, the problem of shortage of soybean seeds for production, because soybean production was limited due to a lack of specific adaptation.
- Duo-environments cropping system in fallow sugarcane and rice field in the northeastern region have the potential for year-round soybean production in Northeast Thailand
- Soybean variety Morkhor 60 is suitable for production and seed rotation in these areas in both the wet and dry seasons. (Sritongtae et al. 2021)



## Result

**Table 1.** The yield of seed rotation in areas in wet and dry seasons.

| Varieties/line | The cropping system in follows sugarcane. (Wet seasons) |    | The cropping system in rice field (Dry seasons) |                         |
|----------------|---|----|---|-------------------------|
|                | Yield (T/ha)  |    | Location 1 Yield (T/ha)                         | Location 2 Yield (T/ha) |
| 1. SJ5         | 1.50  | C  | 1.42  | 0.99                    |
| 2. Morkhor 60  | 1.82  | A  | 1.12  | 1.02                    |
| 3. 223xLh-85   | 1.59  | BC | 0.92  | 0.54                    |
| 4. CM60        | 1.69  | AB | 0.95  | 0.45                    |
| Mean           | 1.65  |    | 1.10  | 0.75                    |
| F-test         | *   |    | **  | **                      |
| CV%            | 6.38  |    | 9.62  | 14.83                   |

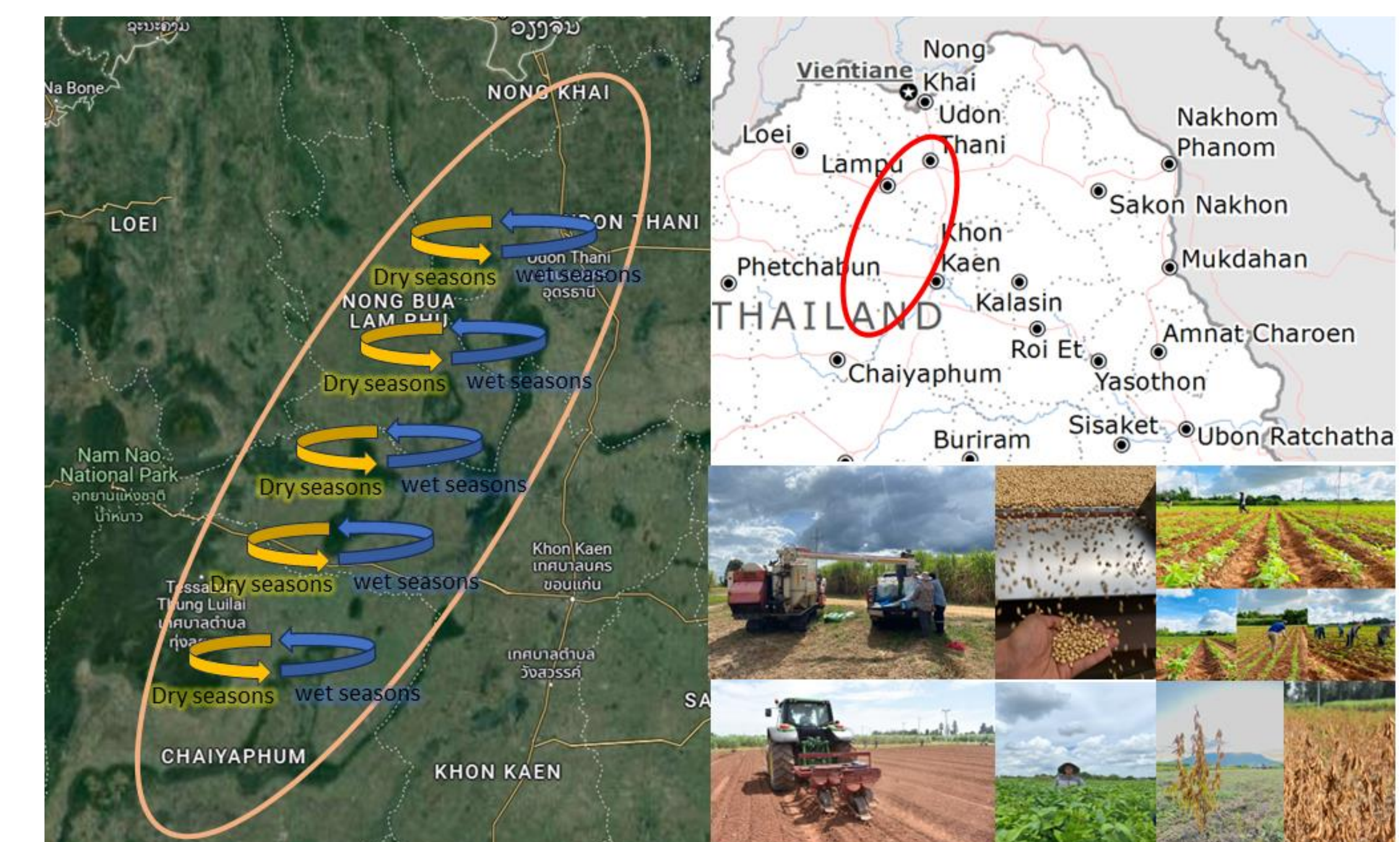
Note \* and \*\* were statistically different at the 95% and 99% confidence levels, respectively, ns were not statistically different the mean with the same letter in the same column was not statistically different, and LSD compared the mean at p = 0.05.



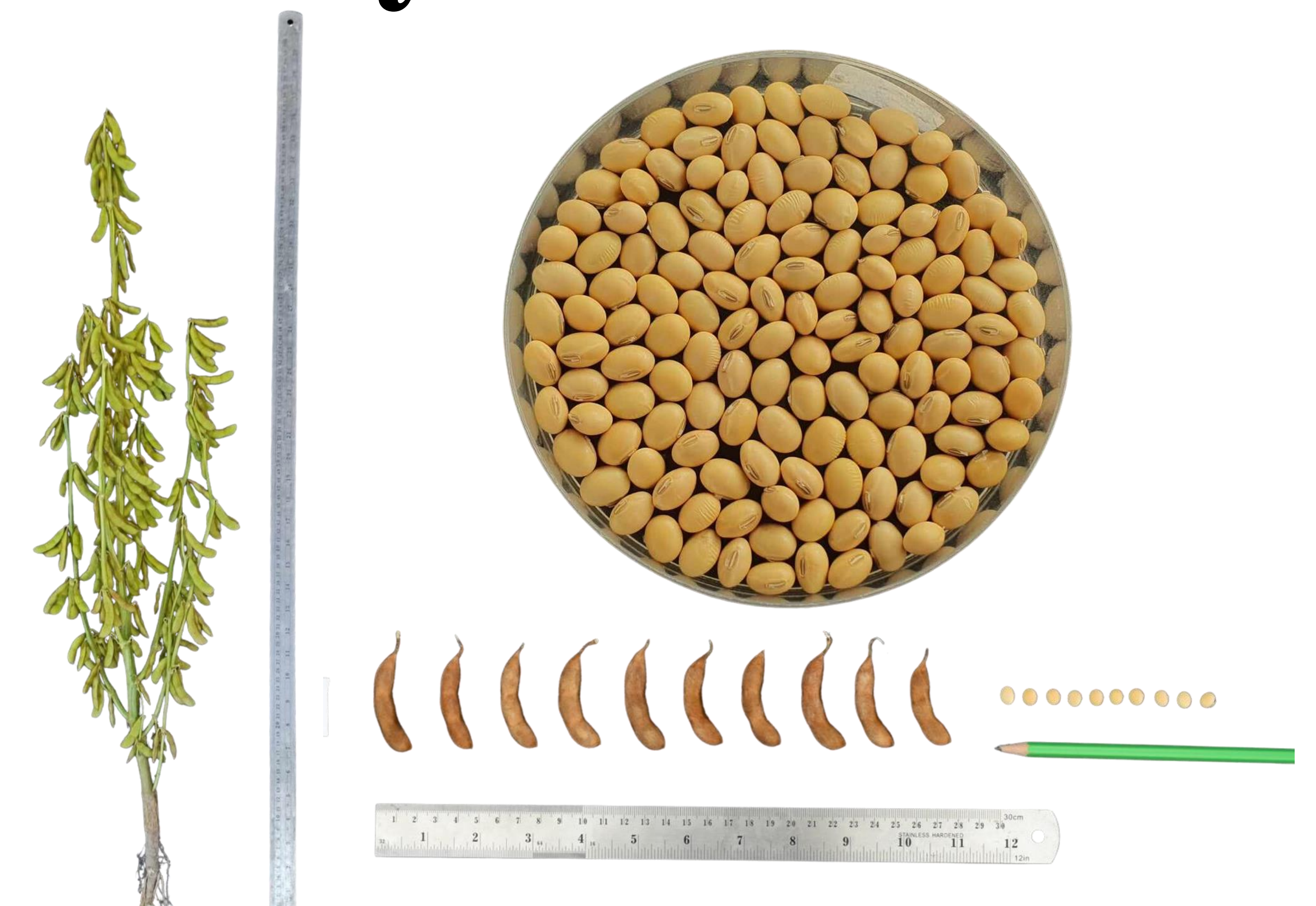
Morkhor 60      SJ5      CM60      223xLh-85

## Target area and seed rotation

The Morkhor 60 soybean variety has the potential and stability of yield in both production sites and can be planted in seed rotation in the Northeast. The appropriate system is planting soybeans in the rainy season in upland areas and in areas where the fields have been removed, removing stumps, and waiting for planting sugarcane to use the produce as seeds to plant in the area after the irrigation rice farming in the dry season. A recent experiment with the rotational planting system found that the seed of Morkhor 60 soybean variety can rotate in the area. The target areas for promoting soybean cultivation in the future are Phu Khiao District, Khon San District, Chaiyaphum Province, Chum Phae District, Phu Pha Man District, Khon Kaen Province Suwannakhuha District Nong Bua Lamphu Province and Kut Chap District Nong Wua So District, Nam Som District, Udon Thani Province.



## “Soybean road”



## Morkhor 60: New soybean variety of Thailand

The Morkhor 60 soybean variety has a high protein content in the seeds (41 %). Pods do not shattering when physiological maturity. It has fast growth and occupies space, has a wide canopy, uses a seed rate of 0.09 (T/ha), and has a suitable population size for planting. 300,000 (plant/ha), yields an average of 1.91 (T/ha) in the rainy season and 1.8 (T/ha) in the dry season. Resistant to powdery mildew. Stem height 80-95 cm. Can be easily harvested using both human labor and agricultural machinery. It is a variety that has a medium harvest time of 95-100 days after planting. It has good adaptability and can be grown in both sand and clay soil series and can be planted in rotation with other crops such as rice, sugarcane, and corn both in the Northeast and Other regions of the country.





# Impact of Methane Fermentation Waste Fluid Application Rates on Maize Growth and Nitrogen Fate: A Soil Texture Perspective



BUI Ngoc Tan<sup>1,5\*</sup>, SHIBATA Matoko<sup>1,2\*</sup>, MATSUBARA Keisuke<sup>3</sup>, LYU Han<sup>1</sup>, FUKUSHIMA Keitaro<sup>4</sup>, MATOH Toru<sup>3</sup>, FUNAKAWA Shinya<sup>1,2</sup>

<sup>1</sup> Graduate School of Global Environmental Studies, <sup>2</sup> Graduate School of Agriculture, Kyoto University, Japan; <sup>3</sup> Kyoto Agriculture Research Institute (KARI) Co. Ltd., Japan; <sup>4</sup> Faculty of Food and Agricultural Sciences, Fukushima University, Japan; <sup>5</sup> Faculty of Agronomy, Vietnam National University of Agriculture, Vietnam.

## Introduction

Efficient nitrogen (N) management is critical for improving fertilizer utilization in crop cultivation. Methane fermentation waste fluid (MFW) has been shown as a promising biofertilizer for the cultivation of maize (*Zea mays* L.). However, a comprehensive understanding of the maize growth and N pathway resulting from various MFW application rates across different soil textures remains poorly understood.

## Method

Table 1: Soil properties

| Soil type                | Sandy loam (SL) |      | Clayey loam (CL) |      |
|--------------------------|-----------------|------|------------------|------|
|                          | 2021            | 2022 | 2021             | 2022 |
|                          | pH              | 5.8  | 5.8              | 6.8  |
| TC (g kg <sup>-1</sup> ) | 17              | 28   | 17               | 19   |
| TN (g kg <sup>-1</sup> ) | 2.0             | 2.3  | 1.6              | 2.0  |
| C/N                      | 8.0             | 12   | 10               | 10   |

Table 2: MFW properties

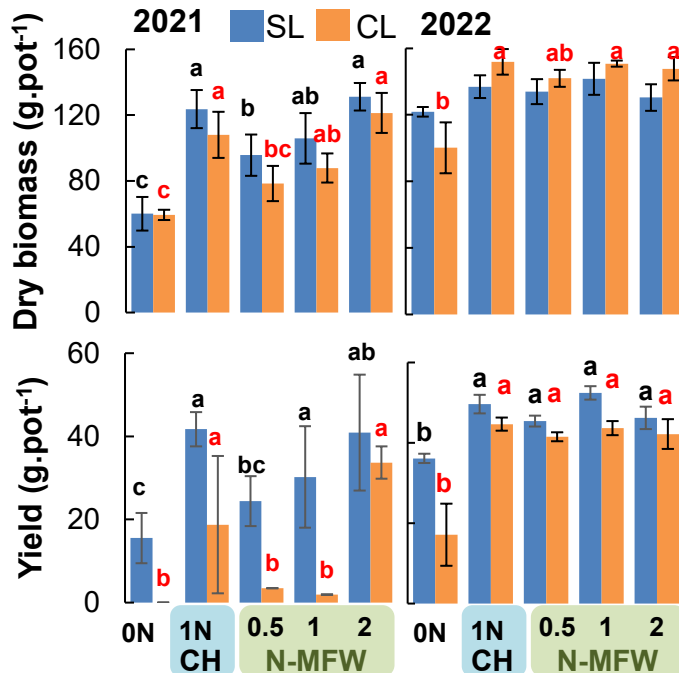
| Parameters                    | 2021 | 2022 |
|-------------------------------|------|------|
| Dry mass % (w/w)              | 4.6  | 3.0  |
| pH                            | 8.8  | 7.9  |
| NH <sub>4</sub> -N (mg/kg FW) | 2150 | 2520 |
| TN (mg/kg FW)                 | 3100 | 3150 |
| TC (g/kg FW)                  | 19.0 | 12.0 |
| C/N                           | 6.0  | 4.0  |

Table 3: Experiment design

| Treatments | Total N (pot <sup>-1</sup> ) |
|------------|------------------------------|
| 0N         | Control                      |
| 1N- CH     | 750 mg N-NH <sub>4</sub> Cl  |
| 0.5N- MFW  | 375 mg N                     |
| 1N- MFW    | 750 mg N                     |
| 2N- MFW    | 1500 mg N                    |

20% of inorg.N was substituted by <sup>15</sup>NH<sub>4</sub>Cl for tracing the fate of N.

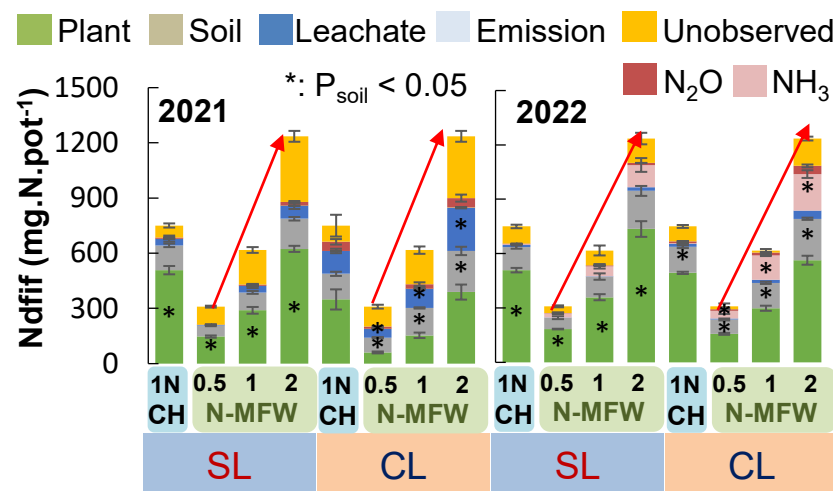
## Results



|             | Two-way ANOVA | Soil   | MFW    | Soil x MFW | CH x MFW | Soil x Fer. type |
|-------------|---------------|--------|--------|------------|----------|------------------|
| Dry biomass | 2021          | <0.01  | <0.001 | ns         | <0.01    | ns               |
|             | 2022          | ns     | <0.01  | ns         | ns       | ns               |
| Grain yield | 2021          | <0.001 | <0.001 | ns         | <0.001   | <0.05            |
|             | 2022          | <0.01  | <0.001 | <0.05      | ns       | ns               |

- MFW enhanced the biomass and yield.
- Its impact was not lower than 1N-CH.
- SL enhanced the yield better than CL.

## N derived from inorganic fertilizer (Ndfif) in different treatments for two years



- Ndfif increased linearly with MFW rates,
- SL soil enhanced N uptake by the plant,
- CL soil raised N retained in soil and N loss,
- 1N-CH had the highest N recovery (plant + soil).

## Conclusion

- The impact of soil textures on maize growth and N fate from MFW applications was significant.
- Optimal MFW rates are required for mitigating N emissions and inhibiting nitrification, especially in CL soil.

# INFLUENCE OF SPATIAL SOIL HETEROGENEITY ON CROP RESPONSE TO URINE FERTILIZER APPLICATION

Jabulani Nyengere, Yuki Okamoto, Shinya Funakawa, Hitoshi Shinjo

Graduate School of Global Environmental Studies, Kyoto University

## Introduction

- Soils are spatially heterogeneous.
- This affect soil quality (example -clay heterogeneity)
- Fertilizer, especially urine (U) fertilizer likely to be affected

### Objectives

1. Assess spatial heterogeneity of soil properties.
2. Analyze effect of soil texture on crop response to U application

## Methodology

### 1. Spatial soil heterogeneity

- Soil sampling (115 samples)
- Geostatistical analysis
- Drone & Questionnaire survey

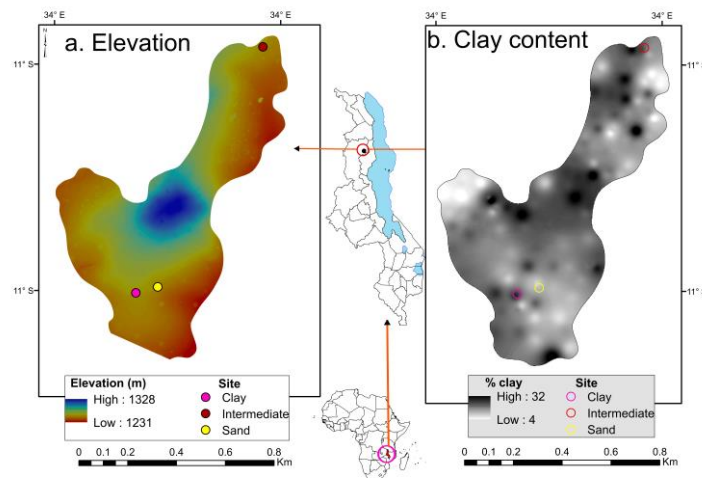
### 2. Maize experiment

- Ecosan & urine collected from farmers toilets
- Field trial at 3 levels of clay content with 4 treatments: urine (U), chemical fertilizer (CF), ecosan (E) & control (C)

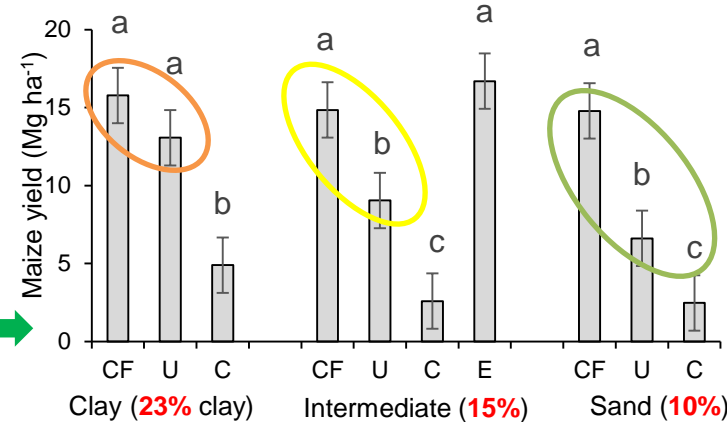


## Results

### 1. Spatial soil heterogeneity



## 2. Maize experiment



## Discussion 2

- The U & CF performed nearly equally in clay
- Yield sig. differences between sites ( $p < 0.05$ )
- Maize performance -Clay > Intermediate > Sand
- Possibly higher N leaching in sand than clay

## Discussion 1

- Soils varied at spatial range between 68 to 228 m.
- Clay showed strong spatial dependency leading to differences in clay content (Map b)
- More clay in large slope gradient because of aggregation of clays
- Steeply sloping areas are more occupied by non-agricultural activities, where only stable aggregates containing more clay are left.

## Conclusion

- Differences in soil texture affect yield
- High N loss in sand
- Heterogeneity influence maize response to U fertilizer application
- Consider textural heterogeneity in U application



# Niaw Dam Chaw Mai Pai 49: The genetic resource to new ideotype of rice breeding

Authors: Thanarote Sricha, Myo San Aung Nan, Tidarat Monkham, Jirawat Sanitchon and Sompong Chankaew

Department of Agronomy, Faculty of Agriculture, Khon Kaen University, Khon Kaen, 40002 Thailand

## Genetics resources

- **NDCMP-49**, a colored rice variety local to Thailand's southern region, has been collected by the Pattani Rice Research Center since 1996.
- This variety's distinct traits pose a specific multispikelet cluster phenotype that consists of 2–3 spikelet clusters on a single rachis.
- It is a native black glutinous rice that is photoperiod sensitive, with an average yield of 2.27 T/ha and a height of roughly 135 cm.



- It is excellent in nutritional value. It contains vitamins B1, B3, B6, and E, as well as anthocyanin.



## Monogenic inheritance of multispikelet clusters in NDCMP-49

In this study, the inheritance pattern of multispikelet clusters, the minimum number of genes, and the mode of gene actions were investigated over six generations, namely,  $P_1$ ,  $P_2$ ,  $F_1$ ,  $F_2$ ,  $BCP_1$ , and  $BCP_2$  from two different crosses, i.e.,  $NDCMP-49 \times 'LLR316'$ . The presence of  $F_1$  phenotypes and the segregation of spikelet phenotypic clusters in the  $F_2$ ,  $BCP_1$ , and  $BCP_2$  generations revealed that the multispikelet cluster traits of NDCMP-49 are controlled through monogenic inheritance with incomplete dominance (Aung Nan et al., 2019).



**Fig. 1.** Comparison of the spikelet types of the  $F_1$  and segregated  $F_2$  populations of the parents NDCMP-49 and 'LLR316' (A)

**Table 2.**  $\chi^2$  tests of segregation and the minimum number of genes estimated for the multispikelet cluster phenotype in  $F_2$ ,  $BCP_1$ , and  $BCP_2$  populations derived from crosses between NDCMP-49  $\times$  'LLR316'.

| Crosses                    | Populations | Phenotypic classes* |    |    | Total | $\chi^2$ test** | P-value | Number of genes of phenotypic classes 2 and 3 |
|----------------------------|-------------|---------------------|----|----|-------|-----------------|---------|---|
|                            |             | 1                   | 2  | 3  |       |                 |         |   |
| NDCMP-49 $\times$ 'LLR316' | $F_2$       | 23                  | 54 | 18 | 95    | 2.33            | 0.312   | 1.65  |
|                            | $BCP_1$     | -                   | 19 | 25 | 44    | 0.82            | 0.365   |   |
|                            | $BCP_2$     | 16                  | 25 | -  |       | 1.97            | 0.161   |   |

\*Phenotypic class means (1) nonspikelet clusters, (2) nonspikelet clusters and two spikelet clusters, and (3) nonspikelet clusters with two- and three spikelet clusters in a single panicle.

\*\*  $\chi^2$  tests for the pinnacle ratio in each population.

## Rice breeding

### Increasing yield by improving rice varieties.

In study was to develop rice genotypes with high anthocyanin yield. The ideotypes should be small, black seeds with three seeds per inflorescence. Six  $F_4$  rice lines derived from pedigree selection were selected and preliminary yield trial.



3 spikelet clusters



non spikelet clusters



**Fig. 2.** Ten panicles of six improved rice line, 13-1, 145-1, 151-2, 374-1, 662-2, and 903-3, and NDCMP-49 (ULR416), and (LLR059).

# Rice foodshed of Indonesia's new capital and its rice self-sufficiency towards regional sustainable food system

Authors: Annisa Hasanah\*, Izuru Saizen\*

\* Graduate School of Global Environmental Studies, Kyoto University

## INTRODUCTION

- The capital of Indonesia is in the progress to be relocated from Jakarta to East Kalimantan
- The new developed city projected to gain more than 1.6 million population in 2045, triggering the question of how this region prepare the sufficient food to feed those extremely rising population.
- This study aims to assess the rice self-sufficiency level and measure whether Kalimantan region has the capacity to meet the consumption needs by its own production instead of buying rice from other islands.

## METHODOLOGY

The Metropolitan Foodshed and Self-sufficiency Scenario model is used to identify the foodshed area and Self-Sufficiency Level (SSL) by incorporating the production and consumption aspects.

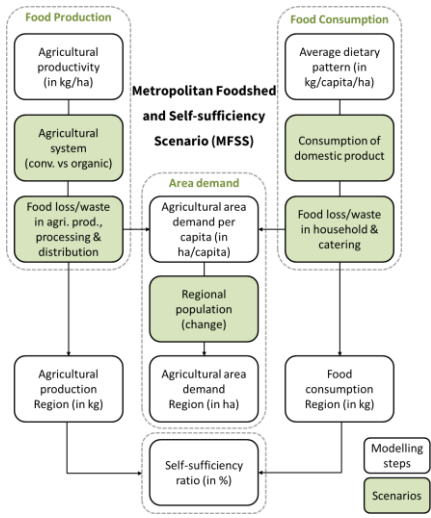


Fig 1. Metropolitan Foodshed and Self-sufficiency Scenario (MFSS) Model

$$SSL = \frac{\text{The rice cultivation available area}}{\text{The rice cultivation area demand}}$$

## RESULTS

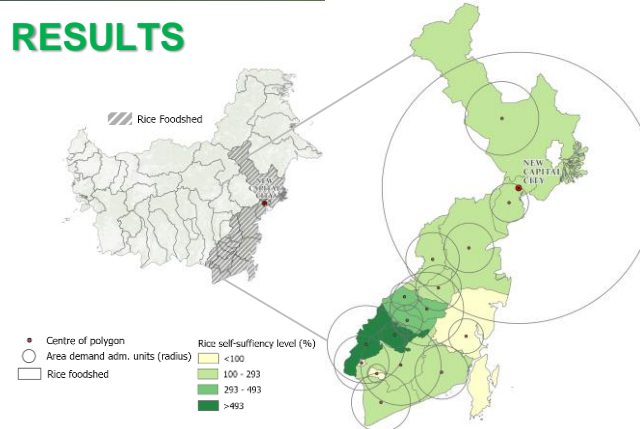


Fig 2. Metropolitan foodshed of the new capital (2018)

The results for the 2022 period show that the whole foodshed area requires 1,366.25 km<sup>2</sup> of rice cultivation to meet the population demand, whereas the available rice cultivation is 3,717.13 km<sup>2</sup>.

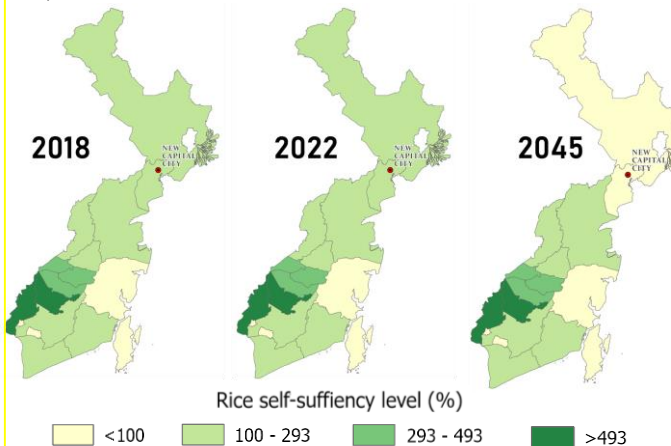


Fig 3. Rice self-sufficiency level on three different years

SSL of 100% and more indicate the ability to achieve self-sufficiency and thus able to sell the rice to food stress areas.

Table 1. Self-sufficiency level of regencies in the study area in 2045

| Regencies           | Estimated Population | Estimated Area Demand of Rice Cultivation (km <sup>2</sup> ) | Estimated Rice Cultivation Available Area (km <sup>2</sup> ) | rs <sup>*</sup> (km) | SSL (%)    |
|---------------------|----------------------|--|--|----------------------|------------|
| Balangan            | 160,061              | 49.14  | 75.68  | 34                   | 154        |
| Banjar              | 701,836              | 220.10   | 475.80   | 59                   | 216        |
| Barito Kuala        | 384,777              | 132.08   | 1,142.55   | 58                   | 865        |
| Hulu Sungai Selatan | 269,948              | 67.53  | 290.36   | 23                   | 430        |
| Hulu Sungai Tengah  | 296,563              | 68.95  | 244.35   | 55                   | 354        |
| Hulu Sungai Utara   | 264,520              | 59.85  | 227.90   | 20                   | 381        |
| Kotabaru            | 395,268              | 97.15  | 61.61  | 27                   | 63         |
| Tabalong            | 304,051              | 74.02  | 90.94  | 39                   | 123        |
| Tanah Bumbu         | 399,083              | 95.41  | 109.27   | 44                   | 114        |
| Tanah Laut          | 407,647              | 125.55   | 270.79   | 47                   | 216        |
| Tapin               | 225,091              | 57.73  | 313.07   | 20                   | 542        |
| Banjarbaru          | 334,318              | 81.65  | 19.24  | 16                   | 24         |
| Banjarmasin         | 689,031              | 171.42   | 25.95  | 40                   | 15         |
| Kutai Kartanegara   | 1,242,040            | 266.46   | 182.76   | 55                   | 69         |
| Paser               | 323,783              | 71.75  | 92.21  | 39                   | 128        |
| Penajam Paser Utara | 1,224,384            | 319.91   | 94.65  | 36                   | 30         |
| <b>Total</b>        | <b>7,622,401</b>     | <b>1,931.86</b>  | <b>3,717.13</b>  | <b>219</b>           | <b>192</b> |

\*) Foodshed area radius

In 2045 the insufficiency is found in more regions, including five regencies: Kutai Kartanegara, Penajam Paser Utara, Kotabaru, Banjarbaru and Banjarmasin. The first two regencies mentioned is also included the new capital, representing the inability of the capital to fulfill the rice demand for future growing population.

## DISCUSSION

Some scenarios can be proposed to achieve higher self-sufficiency, such as increase the shifting of rice diet as staple food or widely known as food diversification. However, the shift to more regional diets would only be possible when the supply is diversified. Kalimantan people tend to still treat rice as the main diet, and consume yam or corn as snack.



# Stigma exsertion creates weedy rice developing phenotypically mimicry to cultivated rice

Authors: Thanapon Putjaiko, Monchita Ponsen, Kularb Loasatit, Tidarat Monkham, Jirawat Sanitchon, Peerapon Moung-ngam and Sompong Chankaew

## Weedy rice

is seriously weed affected rice production in Thailand. The weedy rice management was limited by the similar morphology with cultivated rice. Stigma exsertion and synchronization flowering creates weedy rice developing phenotypically mimicry to cultivated rice. The prevention of out-crossing in weedy rice considered in future weedy rice management.



## ☑ Weedy rice materials

Samples of weedy rice were collected throughout northeast Thailand (Figure A) during the flowering stage to make it easier to spot and differentiate the characteristics between weedy rice and cultivated rice by its awn (Figure B). The number of samples in each population was not equal, being dependent on the size of the weedy rice population and the different morphological characteristics identified.



Based on the stigma exsertion of weedy rice, a strong likelihood exists of outcrossing up to 9.769 % (Ponsen et al., 2023) and high introgression between weedy rice and cultivated rice over time in the same area. These results demonstrate that why some weedy rice samples mimic the morphological characteristics of cultivated rice, such as seed morphology and panicle architecture (Figure C-G).



# Winged bean: a genetics diversity to duo- purpose utilization

Authors: Tepratan Rakvong, Sasiprapa Sriwichai, Sompong Chankaew, Tidarat Monkham and Jirawat Sanitchon

Department of Agronomy, Faculty of Agriculture, Khon Kaen University, Khon Kaen, 40002 Thailand

## Duo- purpose

Ten accessions of winged bean were used in this study. Data, including total pod weight, number of pods, pod length, 10-pod weight, and tuber weight were recorded.



Table 1. Yield of winged bean pods and tubers and protein content in tubers of winged bean varieties with good yield potential.

| Accessions | Yields (T/ha) |       | Protein contents % |
|------------|---------------|-------|--------------------|
|            | Pod           | Tuber |                    |
| W099       | 23.60         | 15.20 | 20.92%             |
| W018       | 18.36         | 15.50 | 21.04%             |

“The results indicated that superior genotype and appropriate environmental conditions are key elements in successful winged bean production for both pod and tuber yields.” (Sriwichai et al., 2021)

## Utilization in the animal feed industry

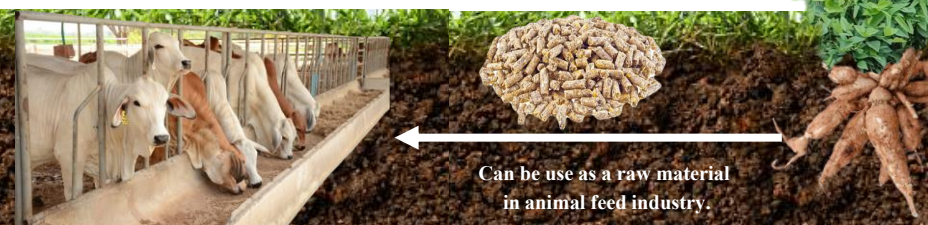
- Yeast-fermented winged bean tubers were found to have a seven-fold higher protein content than unfermented ones.
- The amount of starch in winged bean tuber when processed by steaming was found to reduce the digestion rate of the starch by up to 36.4%. (Suntara et al., 2020)

Furthermore, portions of winged bean leaves can be silage and fed to cow as fodder & additional ruminants.



## Discussion

- The high potential accessions for the two traits which can be a source of food and feedstuff. However, further evaluation under diverse environments will depict the availability of accession throughout the country.
- Research results on winged bean tuber used in the animal feed industry are laboratory results. It is still necessary to confirm the results of its use in animals.



Can be use as a raw material in animal feed industry.

An alternative crop for staple food and feed is shed some light on the impact of winged bean. In this study reported that the superior genotype of winged bean for duo-purpose production in both pod and tuber yields. The utilization in human consumption and animal feed industry also discussion.

## Genetics diversity

The genetic diversity and population structure.

- 60 domestic (Thai) and 64 imported winged bean accessions.
- Assessed via their comparative morphological traits and 13 gene-based simple sequence repeat (SSR) markers.
- Thai accessions represented the overall allele or gene diversity of the winged bean.
- Establishing Thailand as a center for winged bean diversity.
- Molecular-based grouping was unrelated to geographical origin.
- The winged bean possesses moderate genetic diversity. (Sriwichai et al., 2022)

Majority of the Thai and imported winged bean accessions showed the same qualitative traits, including leaf shape, flower color, pod color and pod shape.



## Discussion

- These suggested the winged bean growers' similar preferences and selection of winged beans in different geographical regions.
- The admixture within the genetic base of the winged bean indicates the need for the management of future breeding programs.



# Title: Agricultural and Livelihood Trajectories of Upland farmers In Northwestern, Cambodia



Authors: Dyna CHIN \*\*, Sanara HOR \*\*, Sophak POK \*\*, Lyhour HIN \*\* and SHINJO Hitoshi\*

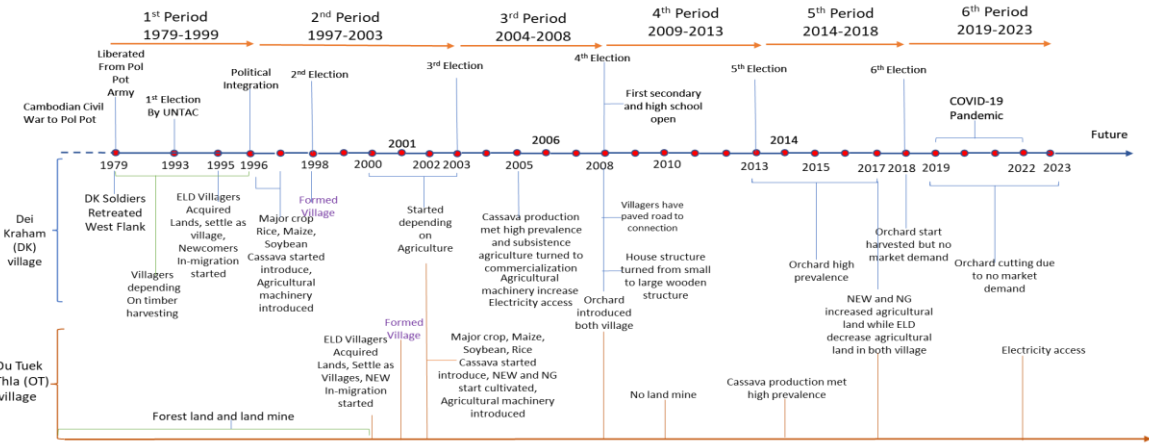
\* Graduate School of Global Environmental Studies, Kyoto University \*\* Royal University of Agriculture, Cambodia

## 1. Background and objective

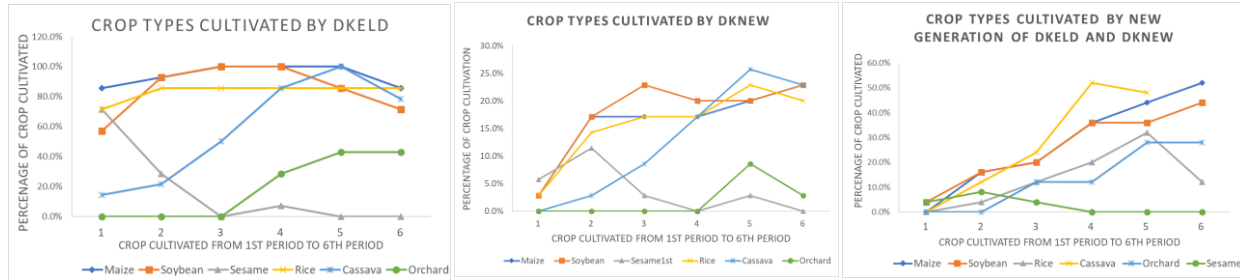
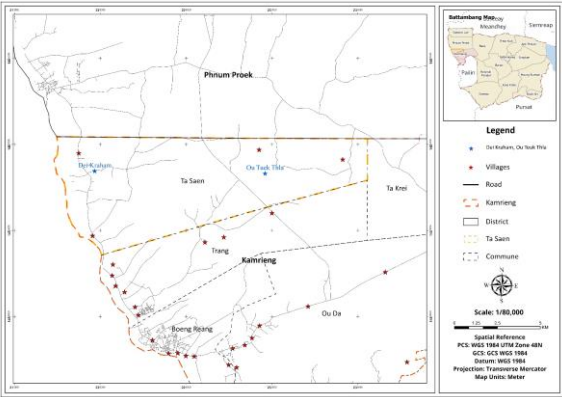
Cambodia has embraced a series of trade liberalization measures to fulfill its commitment to freer trade. Though smallholder commercialization has been underway for several decades in Cambodia, and the commercial crop boom for over a decade, a little is known about the dynamics and the impacts of commercial boom on rural livelihoods, and the objective of study is diversity of farming and their trajectories with reference to laws, trading and policies established since 1990s.

**2. Methods:** 123 Households (HH) were selected by using stratified random sampling from 2 villages in Dei Khrama (DK), 74, and Ou Tuek Thla (OT), 49 located in Kamrieng district, Battambang province. A questionnaire survey and key informant interviews were used in this study.

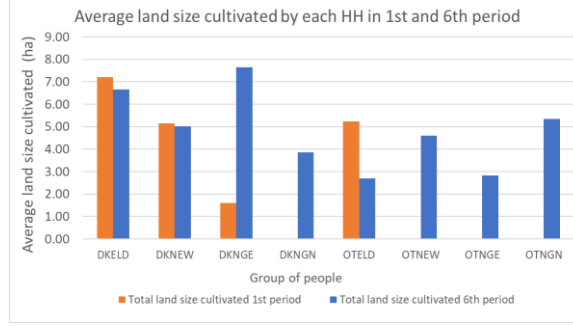
## Livelihood trajectory diagram



The figure below illustrates the change in crop type cultivated from the 1st to 6th period. 1st period, ELD over 50% cultivated. While DKNEW and DKNG cultivated less than 10%. The crop type changed to commercial crop since the 3rd period and changed among crop types have been grown as maize, soybean and cassava.



**3. Result:** The livelihood trajectory diagram illustrates that elder villagers (ELD) had the first opportunity to acquire land resources since the beginning. In contrast, Newcomers (NEW) accessed through purchased land. Since then, land resources have been underscored as the most important resources shipping the local livelihood of the villager groups.



## 4. Conclusion:

The Elder and Newcomer cultivation area in two villages increased initially but declined in the sixth period, contrary to the trend observed in the New generation, as shown in the left figure. Despite DK village predating OT, no substantial differences in crop types among demographic groups, governmental policies and historical factors village livelihoods.

# Assessing the Situation of Impoverished Farming Households' Livelihood Capital in Vulnerable Eco-regions - A Case of Ulanqab City, China-

Authors: Peiting HAO, Richa KANDPAL, Satoshi ASANO, Izuru SAIZEN



Graduate School of Global Environmental Studies, Kyoto University

## Introduction

Chinese government has implemented long-term poverty alleviation projects, which have resulted in **reducing the poverty population**.

**BUT** There is a phenomenon of returning to poverty

It is important to develop a **sustainable form of livelihood** for the impoverished farming households.

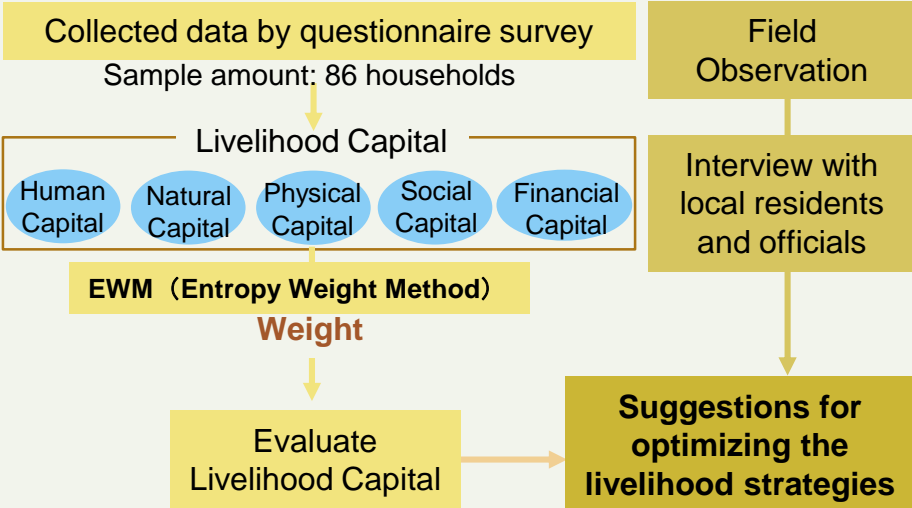
## Objectives

- Construct an indicator system to assess the Livelihood capitals in vulnerable eco-regions.
- Attempt to provide a scientific basis for optimizing the livelihood strategies.

## Study Area / Methodology



Fig.1: Study Area



## Key Findings

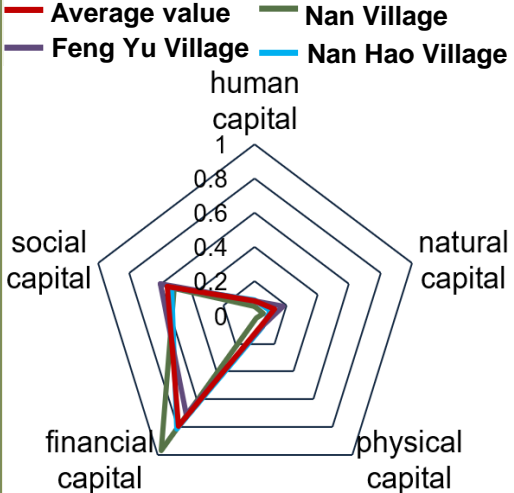


Fig. 2: Comparison of Livelihood Capital in Study Area

| Livelihood capital | Mean value | Causal factor   |
|--------------------|------------|---|
| Human capital      | 0.085      | •Ageing<br>•Labor outflow   |
| Natural capital    | 0.125      | •Ecological degradation<br>•A phenomenon of unfair land distribution    |
| Physical capital   | 0.066      | •Overgrazing policy management  |
| Financial capital  | 0.791      | •Government allowance<br>•Income diversity                              |
| Social capital     | 0.556      | •Lack of understanding the construction of social relationship networks |

## Discussion

How to help impoverished households retain a **sustainable way of living**?

- Human Capital**
  - Enhance the educational level
  - Provide technical training
- Natural Capital**
  - Increase the utilization of natural capital
  - Popularize modern agricultural technology
- Physical Capital**
  - Optimize existing financial subsidy measures
  - Improve impoverished households' capacity
- Social Capital**
  - Improve the local infrastructure
- Financial Capital**
  - Optimize household resilience
  - Create more advantageous physical capitals



# Situation and solutions to develop community-based tourism in Thua Thien Hue

Tran Thi Quynh Tien\*, Le Chi Hung Cuong\*, Katsutoshi Onaka\*\*

\* University of Agriculture and Forestry, Hue University; \*\* Graduate School of Environmental and Life Science, Okayama University

**Background:** Thua Thien Hue has broadened Community-Based Tourism (CBT) to enhance cultural values and tour connectivity, yet the experimental nature of local models impedes development. Implementation is slow, lacking systematic adherence to CBT principles.

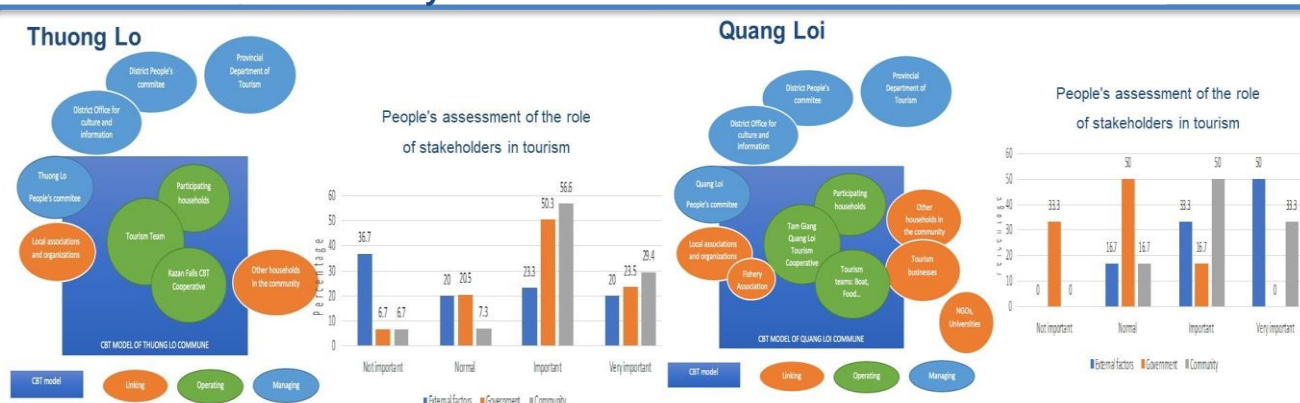
**Methodology:** The study delves into Thua Thien Hue's CBT development, analyzing Thuong Lo commune (mountainous, ethnic minorities) and Quang Loi commune (lagoon, coastal) from 2019-2022. Employing large-scale surveys and structured questionnaires through mixed sampling, the research aims to comprehend current conditions and conduct a SWOT analysis to identify strengths, weaknesses, opportunities, and threats within the CBT context.

## Results:

### Tourism activities community participate in

| Thuong Lo   |      | Quang Loi   |      |
|---|------|---|------|
| Activities  | %    | Activities  | %    |
| Participating in local festivals serving visitors | 40   | Leading the way for tourists                          | 63.3 |
|   |      | Transporting tourists                                 | 43.3 |
|   |      | Other (Renting boats, bicycles, speakers for karaoke) | 43.3 |
| Participating in community cultural exchanges     | 33.3 | Guiding tourists                                      | 36.7 |
|   |      | Welcoming tourists at home, garden, or farm           | 23.3 |
| Producing and selling souvenirs                   | 23.3 | Providing food service                                | 23.3 |
|   |      | Participating in community cultural exchanges         | 16.7 |
| Guiding tourists                                  | 10   | Producing and selling souvenirs                       | 13.3 |
| Leading the way for tourists                      | 6.7  | Renting rooms & accommodation                         | 3.3  |
| Providing food service                            | 6.7  | Participating in local festivals serving visitors     | 3.3  |
| Other   | 6.7  |   |      |

### Analysis of stakeholders in CBT



### SWOT matrix on CBT development in Thua Thien Hue

|   |   |
|---|---|
| <p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- Favorable weather to organize types of tourism;</li> <li>- Famous, unspoiled tourist spots;</li> <li>- Propitious geographical location;</li> <li>- Rich cultural identity;</li> <li>- Plentiful ecotourism resources;</li> <li>- Stable political security system.</li> </ul> | <p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- Limited tourism service infrastructure;</li> <li>- Lack of diversity in tourism products;</li> <li>- Weak human resources;</li> <li>- Deficient support in CBT activities;</li> <li>- No linking in organizing cultural - festival tours;</li> <li>- Restricted travel businesses.</li> </ul> |
| <p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Many adopted policies related to ecology-environment;</li> <li>- La Son - Tuy Loan expressway;</li> <li>- Attention for CBT;</li> <li>- Many CBT development policies.</li> </ul>  | <p><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Sensitivity to the environment;</li> <li>- The risk from the Covid-19 epidemic;</li> <li>- Slow capital recovery.</li> </ul>   |

### Conclusion:

Thua Thien Hue's CBT holds potential for diverse tourism, requiring attention, investment from various government levels, and travel businesses.

Case studies reveal practical limitations, suggesting solutions should center on building linkages and enhancing stakeholder roles.

**Solutions to develop CBT:** Developing specific products, diversifying products and services; Developing and planning infrastructure; Attracting local communities to participate in CBT, improving labor quality; Promoting CBT; Exploiting CBT associated with tourism environment conservation & protection.

# Climate vulnerability of coastal communities in Da Nang City, Vietnam

Trang LE, Izuru SAIZEN

Graduate School of Global Environmental Studies, Kyoto University

## BACKGROUND

### Climate change and gender justice

most impacted by and will be even more vulnerable to climate change



effective and powerful actors of change

### Climate change and coastal communities



### Vietnam



Top 10 most affected in 1999-2018

*Global climate risk index, 2020*

Top 5 most vulnerable

*USAID, 2022*

### Da Nang City



*Vietnam's Natural Resources and Environment Newspaper (2023)*

## METHODOLOGY

### QUANTITATIVE STUDY

Assessing the climate vulnerability of households in a coastal community in Da Nang



- Applying Livelihood Vulnerability Index (LVI) approach
- Conducting household questionnaire surveys (in March and September 2023)

### QUALITATIVE STUDY

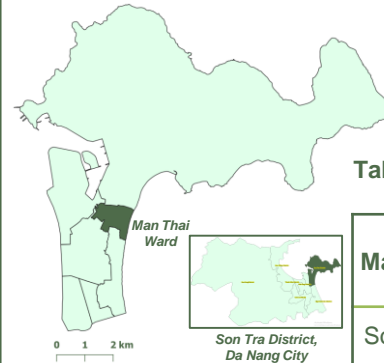
Exploring current status and effectiveness of existing policy on climate change considering gender aspects



- Conducting policy research
- Conducting key informant interviews (in September 2023)

**Acknowledgement:** Special thanks to those who provided valuable comments and insights, shaping the clarity and impact of my research. Additionally, heartfelt appreciation to all participants who generously shared their perspectives through the survey, contributing essential data to this study.

## Case study location



## RESULTS & DISCUSSION

66

66

132

Table. LVIs of male-headed and female-headed households in Man Thai Ward

| Major components             | Male-headed HHs | Female-headed HHs | Overall     |
|------------------------------|-----------------|-------------------|-------------|
| Socio-demographic profile    | 0.36            | 0.33              | 0.32        |
| Knowledge and skills         | 0.46            | 0.44              | 0.45        |
| Livelihood strategies        | 0.46            | 0.48              | 0.47        |
| Social networks              | 0.22            | 0.21              | 0.21        |
| Health                       | 0.13            | 0.18              | 0.15        |
| Food                         | 0.02            | 0.02              | 0.02        |
| Water                        | 0               | 0                 | 0           |
| Housing and household assets | 0.26            | 0.09              | 0.18        |
| Climate variability          | 0.26            | 0.09              | 0.17        |
| <b>Overall</b>               | <b>0.26</b>     | <b>0.21</b>       | <b>0.23</b> |

### Key findings

- No trainings on climate change adaptation and disaster risk reduction
- No income during extreme weather events (small home-run shops, casual work)

- Some women are flexible in earning additional incomes (housekeeping, store assistance, on-demand services, home-made food).

### Proposed intervention

- Provide training for local people, including women
- Diversify livelihood strategies

## - A case of Hong Ha commune, Vietnam –

Authors: Yamasaki Sosuke\*, Saizen Izuru\*, Asano Satoshi\*, Kandpal Richa\*, Le Van An\*\*, Tran Thanh Duc\*\*, Le Minh Duc\*\*, Vu Tuan Minh\*\*

\*Graduate School of Global Environmental Studies, Kyoto University

\*\*Hue University of Agriculture and Forestry

### I : Background

In Vietnam, many rural areas started tourism business for creating new income resource. Eco tourism project was started by Hong Ha commune in 2016.

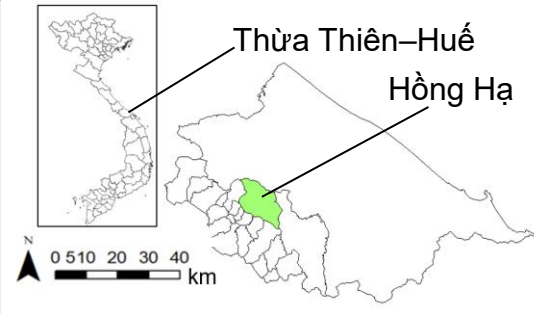


Fig. 1 Study area



Fig. 2 Regional resources in Hong Ha

### II : Objectives

1. Appropriate evaluation of regional resources used for the tourism.
2. Identify problems in the effective use of regional resources.
3. Development of suggestions for improving the current condition of the tourism.

### III : Methodology and Framework

#### Calculation of Weight

Collect opinions about tourism from local people and apply AHP method to them.

AHP: Analytic Hierarchy Process

#### Evaluation

Each of regional resource is evaluated using calculated weight.

#### Data Analysis

The scores calculated for each resource are used for comparison.

#### Discussion

From the result, infer problems.

### IV : Results

Table1. Calculated weight (63 people)

| Function for | Sustainability | Capacity      | Education  | Symbolism   | Creativity  |
|--------------|----------------|---------------|------------|-------------|-------------|
| villagers    | 0.190          | 0.156         | 0.297      | 0.179       | 0.178       |
| Value for    | Quality        | Accessibility | Governance | Originality | For Outside |
| tourist      | 0.142          | 0.209         | 0.239      | 0.223       | 0.187       |

Table2. Evaluation result

|                        | Traditional Community House | Modern Community House | Parle Waterfall | A Doi Stone  |
|------------------------|-----------------------------|------------------------|-----------------|--------------|
| Function for villagers | 3.984                       | <b>4.057</b>           | <b>3.462</b>    | 3.577        |
| Value for tourist      | <b>3.824</b>                | 3.712                  | 3.771           | <b>3.315</b> |
| Total Score            | <b>7.808</b>                | 7.769                  | 7.233           | <b>6.891</b> |

### V : Discussion

- For improving internal function, Parle waterfall **should be utilized in more roles.**
- For tourism development, **improvement in infrastructure system** to A Doi Stone is required.
- **Maximum utilization of the value of each resource is important for tourism industry and contribution to the sustainable development of the local economy.**

# Exploring The Role of Women Self-help Group in Building Rural Community Capacity

Authors: Adzani Ardhanareswari Ameridyani \*, Izuru Saizen \*

\* Graduate School of Global Environmental Studies, Kyoto University

## BACKGROUND

**STUDY AREA: ARENG VILLAGE, West Bandung District, West Java, Indonesia.**

- Areng Village's has been facing **environmental problem due to cattle manure pollution from cattle farming.**
- Biogas is installed to reduce manure runoff, however it still generates slurry.
- **Rural women of Areng Village independently produce worm fertilizer using slurry and worm.**
- **Rural women established Kelompok Karya Ibu (KKI) self-help group (SHG) to sell worm fertilizer communally and create secondary income.**



Slurry (Biogas By-product)



Worm Fertilizer

## RESEARCH QUESTION

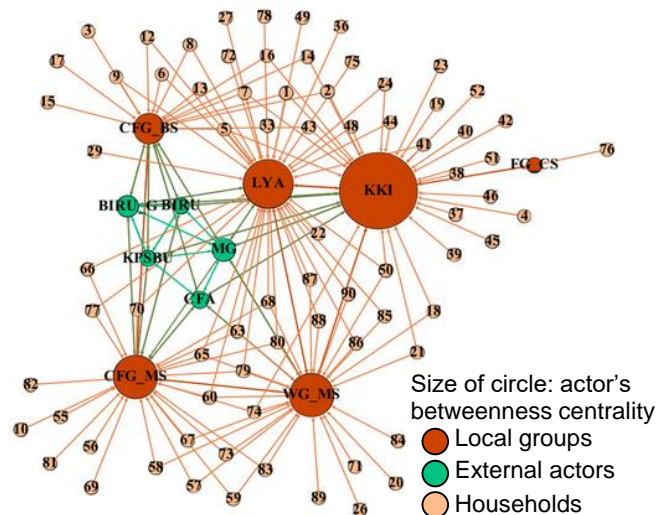
In KKI's case, what is rural women roles and how they contribute to rural development?

## METHODOLOGY

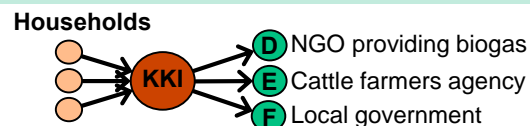
The collected data from questionnaires (126 households on September, 2017) and key informant interview (13 local actors on October, 2017) were analyzed using Social Network Analysis (SNA) and supported by descriptive analysis.

## RESULT

**1. KKI'S ROLE: THE BRIDGE OF ARENG VILLAGE SOCIAL NETWORK** is proven by KKI's highest betweenness centrality.

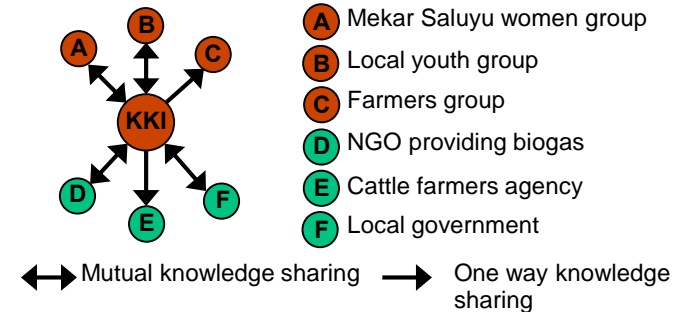


**2. KKI's contributes in building cohesive social network of Areng Village**



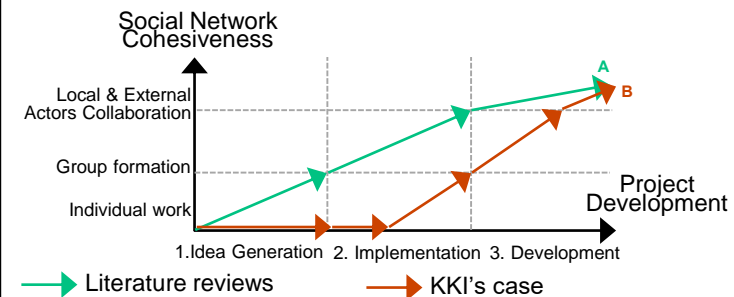
Seeing KKI's achievements, stakeholders are interested to collaborate with KKI. KKI then uses opportunity to voice people's feedback regarding agriculture and biogas implementation issues. Thus the stakeholder have better understanding on the actual condition of rural community.

**3. Mutual knowledge sharing between KKI and external actors**



Unlike most women group cases that passively received support from government and NGOs, KKI mutually shares their skill and knowledge acquired from worm fertilizer practice.

## DISCUSSION & CONCLUSION



Previous studies argue that project implementation begin with complex network. However, **this study highlights the possibility of small-scale rural innovation initiated by women SHG. Furthermore, the formation of women SHG strengthens rural community network, and improve resource and knowledge distribution.**

# Social Network Analysis Approach to Improve Regional Islands Connectivity: A Case Study in Maluku Archipelago Area, Indonesia

Authors: Nur Hidayah Djaimin , Izuru Saizen

Laboratory of Regional Planning, Graduate School of Global Environmental Studies, Kyoto University



**Inter-island connectivity** is essential to improve the regional development in the archipelago area for people mobility and economic activity.

## Aims :

- Evaluate the current islands' connectivity by applying the SNA (social network analysis) and identify the area that is still unconnected to passenger, pioneer, and ferry ships.

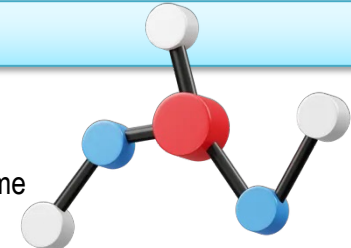
**"Contribute to improving island's connectivity in rural and regional development"**

## 1. INTRODUCTION

### Problems :

- Inadequate inter-island connectivity.
- Suboptimal basic services of resource-based potentials and Maritime Infrastructure.

**"Regional disparities between islands in the Maluku area, Indonesia"**



## 2. METHODOLOGY

This research applies SNA to the concept of sea transportation and quantifies the values of Degree centrality and Betweenness centrality using GepHI software version 0.9.7.

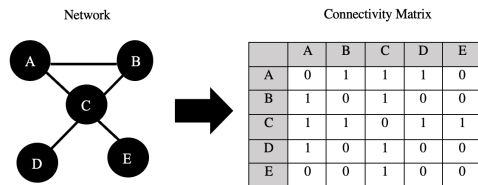


Figure 1: Network & Adjacency Matrix

*Adjacency Matrix shows interconnected ports whether it has a direct connection or not (yes: 1 or no: 0)*

- Research Variables: 121 port level in a urban and rural area, and 68 passenger ship trajectories in Maluku area.
- Degree centrality : Measure the total connection in each port (unconnected ports will be identified), highest network = highest degree
- Betweenness centrality: Find the most central ports, the value close to 1 is the most central, interval (0 > X < 1)

## 3. RESULT & DISCUSSION

- High degree centrality → Tual port : 26 degree, Yos Sudarso: 20 degree, Saumlaki: 18 degree
- High betweenness centrality: 0.24156 in Tual port
- Total evaluation ports : 76 connected and 45 Ports are not connected to the passenger, pioneer ships and ferries shipping lines.

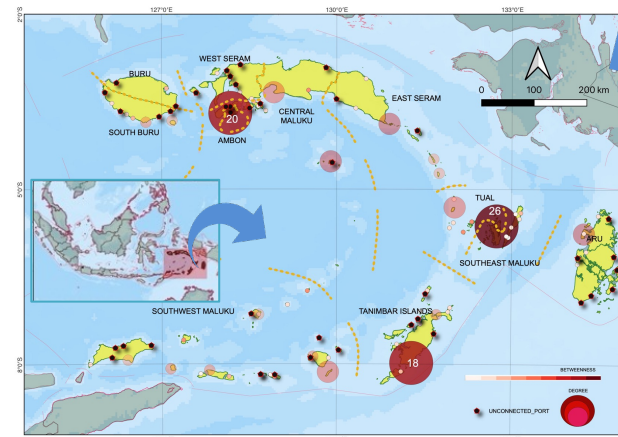


Figure 3: Spatial Distribution of Island's Connectivity

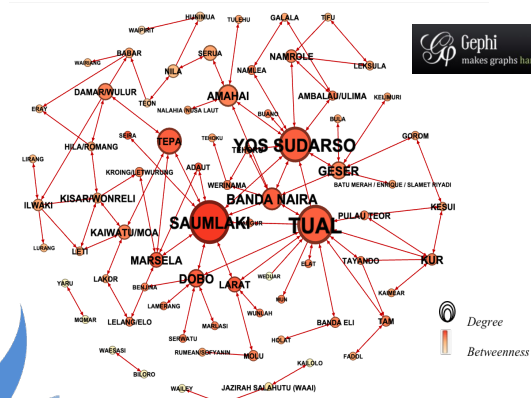


Figure 2: Result of Data Elaboration and Network Visualization By GepHI Software

## 4. CONCLUSION

The unconnected port area is mostly found in the frontier area of Maluku, which implies the level of services in passenger ships is relatively low in those areas. To accelerate regional development and reduce island connectivity disparities, 45 unconnected areas can be considered for further evaluation.

\*References: LU, Wen., et al (2018) , Tovar, et al (2015), Borgatti., et al (2018) , El-adaway et al (2016)

# ASSESSMENT OF ECOSYSTEM SERVICES AT KYOTO UNIVERSITY

*cities growing rapidly*

URBANIZATION TREND

BUILD SUSTAINABLE CITY

ROLE OF UNIVERSITY

using I-Tree Eco, measuring **589 trees** in 50 plots



$$H' = -\sum_{i=1}^S (p_i \ln p_i)$$

*the result*  
biodiversity index at Kyoto University categorize as **very high**



CARBON STORAGE

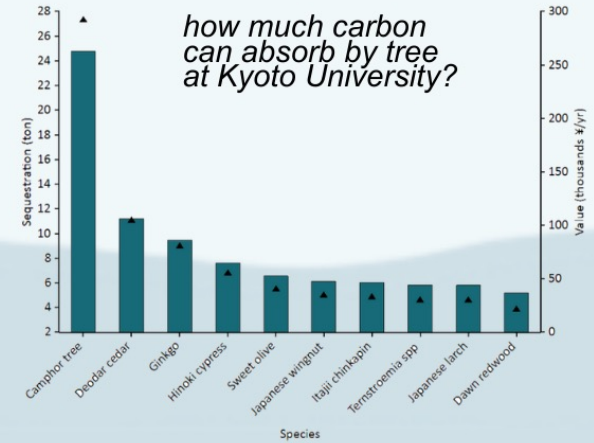


BIODIVERSITY

could it cover the carbon offset?

**589 TREES = ABSORB 7.4 TONS CARBON/YEAR**

**1 TREES = ABSORB 0.12 TONS CARBON/YEAR**



*how much carbon emit by student and staff at Kyoto University?*

ELECTRICITY

GARBAGE

TOTAL



**3.713**  
tons/person/year

**0.01**  
tons/person/year

carbon footprint by academia  
**3.72 tons/ person/year**

*could trees in Kyoto University cover all the carbon footprint?*



**1 TREES = ABSORB 0.12 TONS CARBON/YEAR**



carbon footprint by academia  
**3.72 tons/ person/year**

**needs 380 tree/person to offset the carbon emission.**

MUTIARA DEWI | SHOZO SHIBATA | KYOTO UNIVERISTY

# Diversity of the Annonaceae in Phong Dien Nature Reserve, Thua Thien Hue Province

Dinh Dien<sup>a,b</sup>, Doan Quoc Tuan<sup>c</sup>, Tran Nam Thang<sup>b</sup>, Van Thi Yen<sup>b</sup>, Le Van Huong<sup>a</sup>

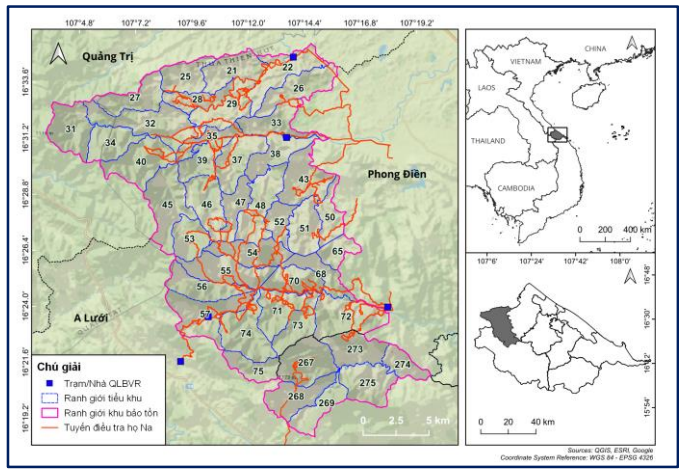
<sup>a</sup> Phong Dien Nature Reserve; <sup>b</sup> Hue University of Agriculture and Forestry; <sup>c</sup> Hue University of Medicine and Pharmacy

**BACKGROUND**

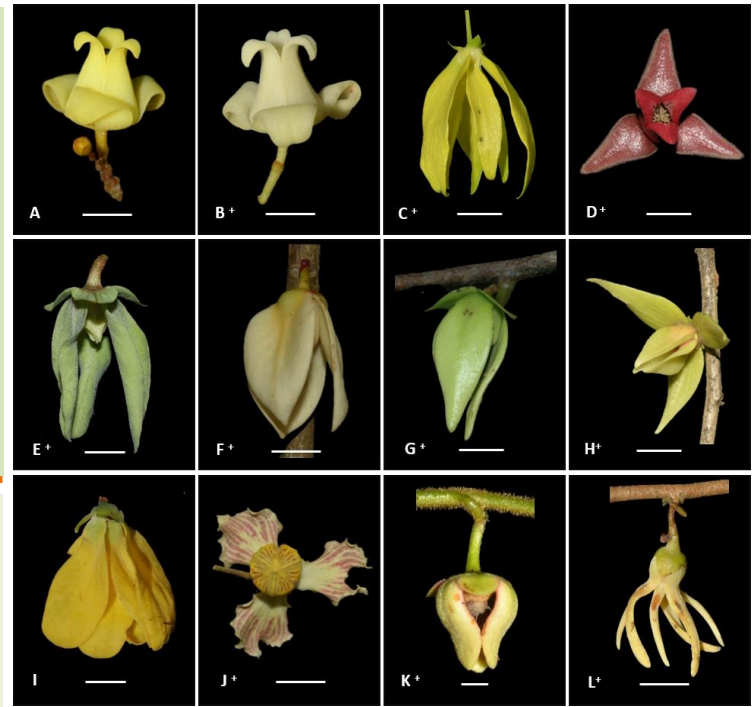
The Annonaceae is a family of Angiosperms, distributed in the lowlands, including 2,430 species of 107 genera in worldwide (Yang et al., 2022). In Vietnam, around 210 species and subspecies, belonging to 29 genera are recorded (Ban, 2000).

Phong Dien Nature Reserve (NR) is recognized as an important biodiversity area globally (Birdlife, 2022). Regarding the Biodiversity Assessment Report of USAID (2018), the flora of this NR has 145 families, 755 species, of which the Annonaceae has 9 genera, 14 species. Nevertheless, there is a lack of detailed information on the status and the species value. Moreover, many species of Annonaceae are considered as Endangered level (IUCN, 2023; VNRB, 2007). Thus, it is necessary to add the detailed information on the species diversity and distribution areas.

**METHODOLOGY**



**Fig.1.** Map of transect survey

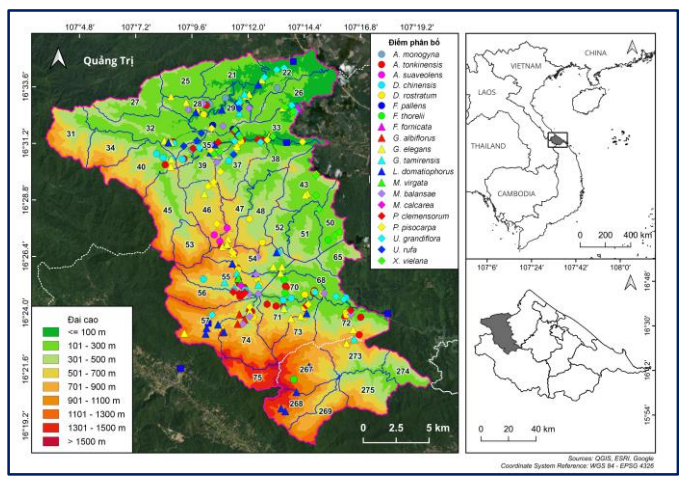


Identified 30 species belonging to 15 genera of the Annonaceae family. Added the distribution of 6 genera, 16 species to the flora.

A- *Alphonsea monogyna*; B- *A. tonkinensis*; C- *Desmos chinensis*; D- *Fissistigma pallens*; E- *Friesodielsia fornicate*; F- *Goniothalamus albiflorus*; G- *G. elegans*; H- *Meiogyne virgata*; I- *Leoheo domatiophorus*; J- *Mitrephora calcarea*; K- *Polyalthia clemensorum*; L- *Xylophia vielana*.

Scale: A-B = 0,5 cm; C = 2 cm; D = 1.5 cm; E = 1 cm; I-J = 2 cm; K = 0,5cm; L = 3 cm.

**RESULTS & DISCUSSION**



**Conclusions**

There are three species-rich genera of the Annonaceae: *Alphonsea*; *Goniothalamus*; *Polyalthia*. The genus *Goniothalamus* is the most diverse with 5 species, occupied 25% of the total 20 recorded species in Vietnam.

**Acknowledgments**

The work of Dien Dinh was funded by the Master, PhD Scholarship Programme of Vingroup Innovation Foundation (VINIF), code [VINIF.2022.ThS.012]

**Fig.2.** Distribution map of species in Annonaceae based on altitude

# Have publicity and educational activities on Japanese giant salamander conservation in Kyoto raised public awareness of biodiversity conservation?

Authors: Kanon Tanaka and Kanto Nishikawa

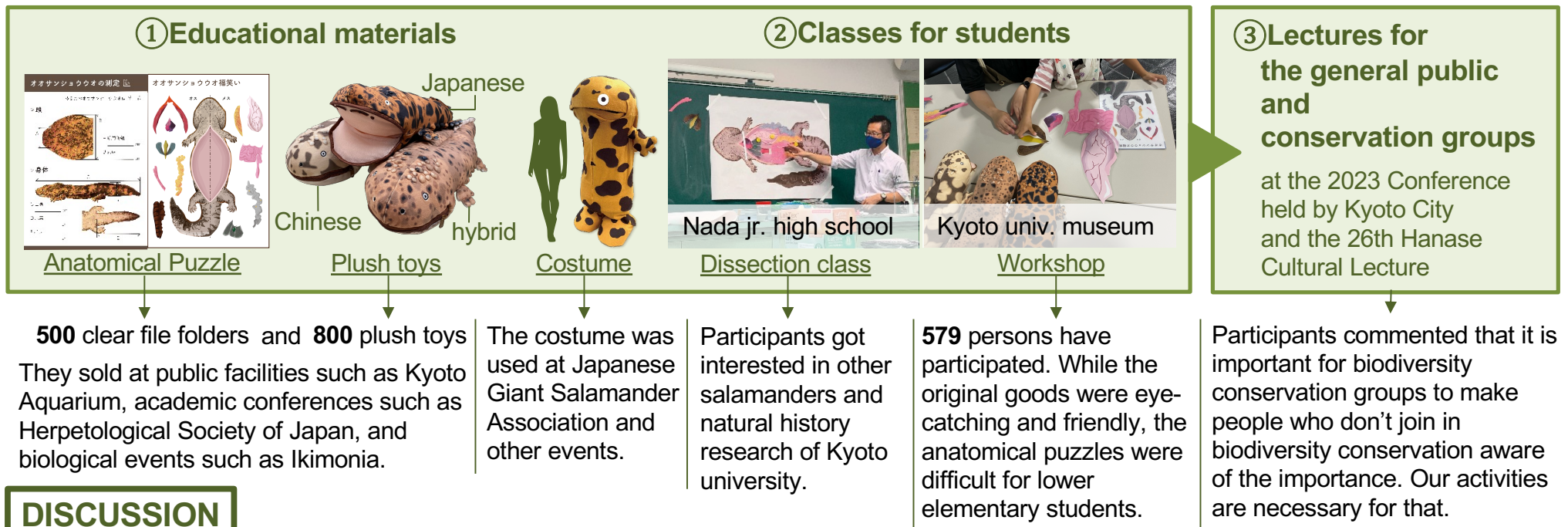
Graduate School of Global Environmental Studies, Kyoto University

## BACKGROUND

Kyoto city has abundant nature, but the citizens have little interest in that, and there are few city policies about biodiversity conservation. As a first step of biodiversity conservation, we need to make people aware of what organisms inhabit Kyoto and what problems they face.

## METHODOLOGY AND RESULTS

Japanese giant salamander positions at the top of the ecosystem and has an impact on many organisms. In addition, it is a nationally protected species, so has a high recognition and popularity among Kyoto citizens. Therefore, Japanese giant salamander is thought to be an appropriate subject for promoting awareness of biodiversity in Kyoto.



## DISCUSSION

We considered our publicity and educational activities were appropriate in terms of getting people interested in biodiversity conservation, because the successful introduction of original goods led to academic discussions, and the class and workshop provided an opportunity to bring salamander diversity and natural history research under the participants' awareness. We contributed to the development of young researchers. On the other hand, we thought that we need to learn the level of knowledge of biology in each of the current elementary and junior high school grades. Then, educational activities should be tailored to each level.



# Estimating Leaf Area Index of Cassava Plantation using Aerial Imagery

Authors: Mol Pengkheang\*, Hor Sanara\*\*, Pok Sophak\*\* and Chea Chetha\*\*

\* Graduate School, Royal University of Agriculture \*\* Faculty of Land Management and Land Administration, Royal University of Agriculture

## Background

- Cassava played a major role in supporting rural livelihood in Battambang province after political integration in 1996.
- After 1996, monitoring cassava expansion has never been made to understand its spatial distribution.
- In this study, we aim to produce a cassava map by applying a spatial modeling technique to obtain LAI Layer.
- The method applied in this study will help in monitoring and evaluating cassava cultivation to support local farmers.

## Study Location and Methodology

- The study deliberately selected Battambang Province (13°05'39.45", 103°12'07.94") due its high cassava presence.
- Aerial images from six cassava trials were taken using the Parrot Sequoia Sensor aboard DJI M100 at an altitude of 100m. The images were processed with Pix4DMapper, producing orthophotos with a 10cm resolution.
- NDVI, EVI2, OSAVI, GCL, and REGCL were applied for LAI layer generation using the Random Forest Algorithm.
- In-situ data was collected at each cassava trial using LAI-2200c with 50 samples in average.
- 70% of training data were used for training the model and 30% for validation using OLS, R<sup>2</sup>, and RMSE.



Fig. 1, 2, 3: Field Work for Aerial Imaging and LAI Data Collection

## Preliminary Result

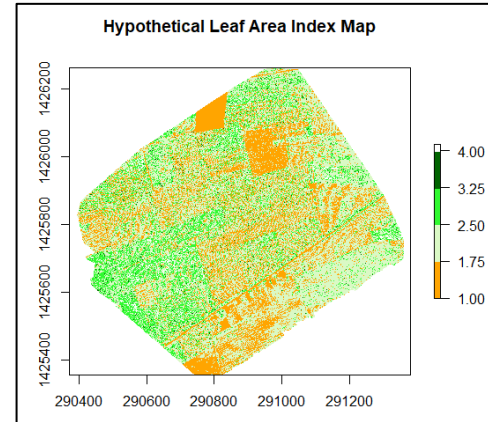


Fig. 4: LAI Layer Generated from NDVI

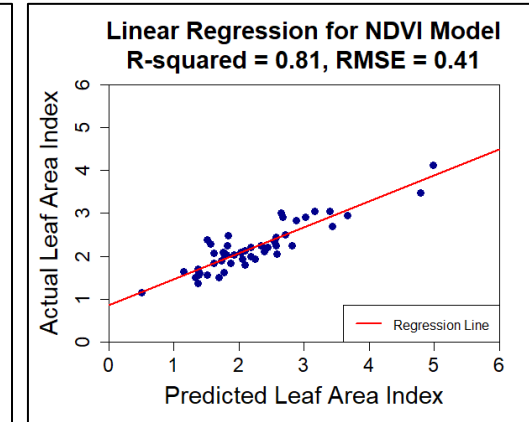


Fig. 5: Regression model using Metrics Package in R

## Results from statistical test using OLS, RMSE and R<sup>2</sup>

|           | Ordinary Least Square (OLS) |            |         |          |      | Single Test |                |
|-----------|-----------------------------|------------|---------|----------|------|-------------|----------------|
|           | Estimate                    | Std. Error | t value | p value  | Sign | RMSE        | R <sup>2</sup> |
| Intercept | 1.1679                      | 0.163      | -7.167  | 6.52E-09 | ***  |             |                |
| NDVI      | 0.4548                      | 0.245      | 1.856   | 0.0702   |      | 0.41        | 0.81           |
| EVI2      | 0.4685                      | 0.2554     | 1.834   | 0.0734   |      | 0.44        | 0.77           |
| OSAVI     | 0.2388                      | 0.247      | 0.967   | 0.339    |      | 0.45        | 0.75           |
| GCL       | 0.1324                      | 0.2011     | 0.658   | 0.5137   |      | 0.43        | 0.76           |
| REGCL     | 0.7157                      | 0.1049     | 6.824   | 2.07E-08 | ***  | 0.43        | 0.79           |

## Conclusion

- OLS resulted in a smaller than 0.001 of p-value while multiple R<sup>2</sup> was 0.91 and Adjusted R<sup>2</sup> was 0.9.
- RMSE and R<sup>2</sup> illustrated 0.41 and 0.81 for LAI prediction using NDVI which the results were better than other indices.

# Genetic Identification and Population Structure of Houndshark (Hoshi-zame) in The Sea of Japan

Authors: Muhammad Ghozaly Salim\*, Yoshiaki KAI\*\*

\* Graduate School of Global Environmental Studies, Kyoto University \*\* Maizuru Fisheries Research Station, Field Science Education and Research Center, Kyoto University

## Background

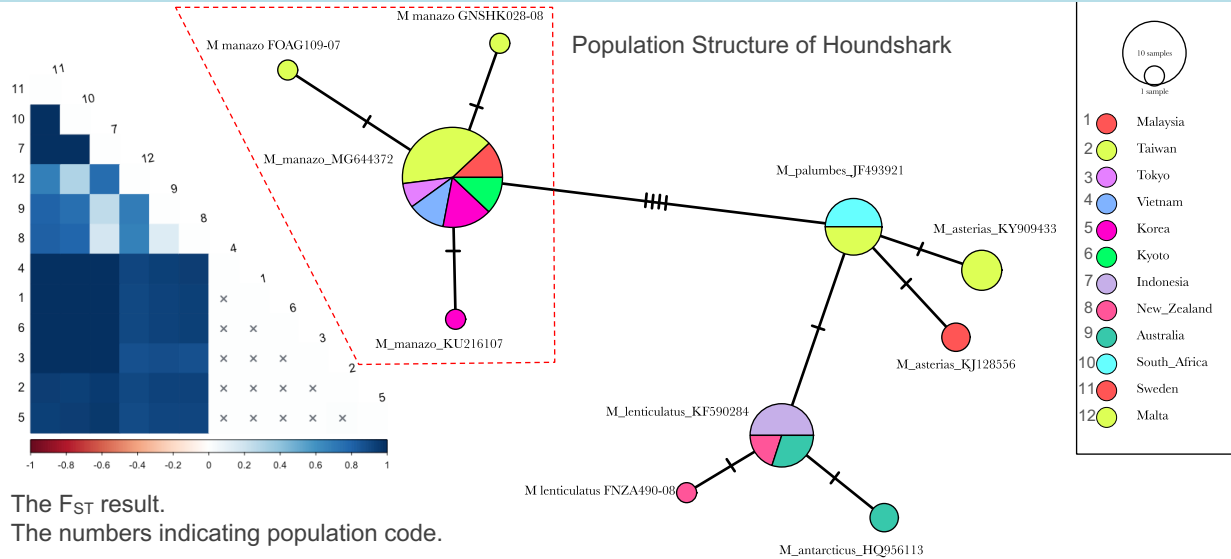
According to the IUCN in Japan, 47% of shark species are threatened and 5% are critically endangered, primarily due to fishing pressure, cryptic diversity, and limited knowledge of species distribution. Genetic analysis was employed to identify species and assess population structure, providing insights for conservation efforts.

## Methodology

Shark specimens were collected and preserved in alcohol. DNA extraction and PCR amplification were performed to target the COI gene of mitochondrial DNA. A 600bp region was used for the analysis. Population structure was investigated by expanding the dataset downloaded from GenBank to include six similar species from 12 regions. The data was analyzed using Arlequin 3.5 and PopArt software.



## Result



Haplotype network analysis identified 10 haplotypes in Houndshark. Among these, four haplotypes were found in *Mustelus manazo* with no significant differences. The remaining haplotypes formed clusters based on their geographic distribution, suggesting distinct populations of Houndshark in different regions. Low  $F_{ST}$  values between *Mustelus manazo* (1 – 6) populations from different regions (East Asia and Indochina), indicating an extensive gene flow between populations.

## Discussion

These findings underscore the importance of species-specific conservation efforts for *Mustelus manazo* and highlight the need for further research to delineate precise conservation boundaries and develop effective management strategies.

# Morphological characteristics and distribution status of *Aquilaria banaensae* Phamh. in Hue Saola Nature Reserve

Van Thi Yen<sup>a</sup>, Duong Thanh Thuy<sup>a</sup>, Doan Quoc Tuan<sup>b</sup>, Tran Nam Thang<sup>a</sup>, Dinh Dien<sup>c</sup>

<sup>a</sup>Hue University of Agriculture and Forestry, Hue University; <sup>b</sup>Hue University of Medicine and Pharmacy, Hue University; ; <sup>c</sup>Phong Dien Nature Reserve

BACKGROUND

*Aquilaria banaensae* Phamh. is an endemic species (Thymelaeaceae) of Vietnam which only found in Da Nang (IUCN, 2018) and Thua Thien Hue province (Nha et al. 2019). *A. banaensae* is listed as one of the species that can produce agarwood, but there has been no research on the agarwood ability of this species (Ng et al. 1997). The study of Van et al. (2023) showed the anti-bacterial properties from essential oils extracted from the stems and leaves of this species. The detailed research and information on the morphological characteristics and distribution of *A. banaensae* is incomplete. There are few published works in Vietnam and worldwide. Thus, this research provides basic information for the conservation and development of endemic and rare genetic resources.

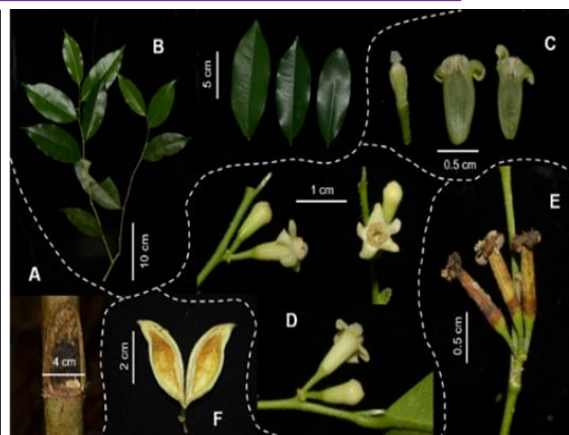
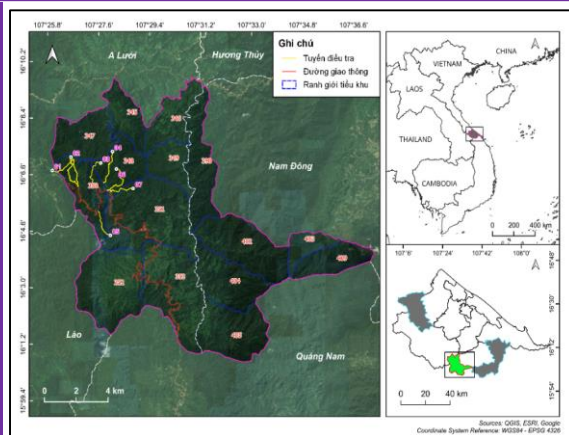
METHODOLOGY

**Data collection:** 07 transects, designed plots (200 m<sup>2</sup>) next by next on each transect and from 1 - 2 plots 200 m<sup>2</sup> per transect (high density of *A. banaensae*) were extended to 1000 m<sup>2</sup>. In each plot 200 m<sup>2</sup> and 1,000 m<sup>2</sup>, the mature trees, regeneration of *A. banaensae*, forest status, altitude, threats, etc. were recorded. Five leaves/trees (10 mature trees) were collected for measuring morphological characteristics. Besides, 1,000 images were captured by ImageJ for counting stomatal density.

**Table 1.** Morphological traits of *A. banaensae*

| Characteristics | Leaf length (cm) | Leaf width (cm) | Leaf area (cm <sup>2</sup> ) | Stomata/ mm <sup>2</sup> |
|-----------------|------------------|-----------------|------------------------------|--------------------------|
| Average ± StDv  | 14.8 ± 1.8       | 5.8 ± 1.0       | 57.0 ± 15.8                  | 144.5 ± 34.8             |
| Range           | 11.2 - 19.0      | 3.4 - 7.7       | 29.1 - 88.9                  | 79.4 - 222.3             |

RESULTS & DISCUSSION



**Table 2.** Distribution structure of *A. banaensae* and other tree composition

| Description                | Individuals | Average density (trees/ha) | D <sub>∞</sub> ± StDv (cm) | D <sub>1.3</sub> ± StDv (cm) | H <sub>vn</sub> ± StDv (m) |
|----------------------------|-------------|----------------------------|----------------------------|------------------------------|----------------------------|
| <i>Aquilaria banaensae</i> | 177         | 79.70                      | 3.02 ± 1.10                | 1.96 ± 0.81                  | 2.50 ± 0.92                |
| Other tree composition     | 312         | 445.70                     | -                          | 16.80 ± 12.70                | 13.10 ± 5.50               |

**Fig. 1.** Distribution map of *A. banaensae*

**Fig. 2.** Morphological traits of *A. banaensae*

## Acknowledgments

This research was facilitated by grants (#169430, #194004) from the Swiss Programme for Research on Global Issues for Development (R4D Programme) co-funded by the Swiss National Science Foundation (SNF) and the Swiss Agency for Development and Cooperation (SDC).

CONCLUSION

*A. banaensae* distributes at an altitude of 800 - 950 m. The average leaf area and stomatal density are 57.0 ± 15.8 cm<sup>2</sup> and 144.5 ± 34.8 (stomata/mm<sup>2</sup>). The average height and diameter are 2.50 ± 0.92 m and 1.96 ± 0.81 cm. Population density is relatively low.

# Growth, Yield Components, and Nutritional value of Tropical grass and Leucaena Grown for Use as Roughage in Goat Fattening

Bounthavy Vongkhamchanh\*, Songyos Chotchutima\*\*, Le Van An\*\*\*

\* Faculty of Agriculture and Forestry, Champasack University \*\* Department of Agronomy, Faculty of Agriculture, Kasetsart University Ladyao, Chatuchak, Bangkok 10900, Thailand. \*\*\*Faculty of Animal Sciences & Veterinary Medicine, Hue University of Agriculture and Forestry (HUAF)

## INTRODUCTION

China and Vietnam have been in high demand for goat meat in the past five years. Laos produced many goats exported to Vietnam but not enough to meet the demand. Although Laos has sufficient natural grassland for grazing which results in low production costs. However, the yield and quality of roughage used in goat farming were low because it is native grass. Thailand has potential in forage and silage production technology, especially tropical grass and forage tree legumes which are the main cost of fattening goat production. Thailand is also a seed hub of forage seed production in the region and is a source of good quality fattening goat production. Therefore, the enhanced skills in forage crop production and silage production, fattening, and distribution will help ensure the quantity and quality of beef goats are sufficient to meet the needs of the countries of the R12 route. and help farmers in this region earn a sustainable income in the long run.



- OBJECTIVES:**
1. To evaluate growth, yield, and yield components of tropical grass and Leucaena varieties in Lao PDR.
  2. To determine the nutritional value of tropical grass and Leucaena varieties for use as roughage in goat fattening systems of Lao PDR.

## MATERIALS AND METHODS

### Seed preparation

Leucaena seed Grass seed



**Grass: 5 varieties:** Ruzi, Mulato II, Purple, Mombaca, Moon river

**Leucaena: 5 varieties:** Peru, Cunningham, Taramba, KU15, KU56

### Experimental plot dividing and Water system management



Five treatments, four plots/treatment

### Transplanting of Grass and Leucaena and data collection



Plant height, Tiller/clump, Leave/plant, Stem diameter, Biomass yield, (Fresh and DM, kg/ha), Chemical compositions (CP, Ash, EE, NDF, ADF, ADL...)



## MATERIALS AND METHODS

### Dry matter analysis



### Preparation of seedling and house



## MATERIALS AND METHODS

