PATHWAYS TO PROGRESS:

## ACHIEVING THE SDGS IN ASIA

2023

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ABOUT THE WUN GLOBAL RESEARCH GROUP–SDGS IN ASIA

Chaired by the National Cheng Kung University (NCKU) and supported by the Worldwide Universities Network (WUN), WUN Global Research Group–SDGs in Asia is a group that promotes research aimed at implementing the United Nations sustainable development goals (SDGs) in Asia.

In 2023, the group runs 15 projects in collaboration with 31 institutions across the world, focusing on SDG 3 (Good Health and Well-Being), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Change).

By providing seed funding and a supporting network of scholars and researchers from different regions, we aim to build a shared platform that can eventually produce thorough and comprehensive solutions to SDG-related problems in Asia.

3 GOOD HEALTH AND WELL-BEING

6 CLEAN WATER AND SANITATION

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11 SUSTAINABLE CITIES AND COMMUNITIES

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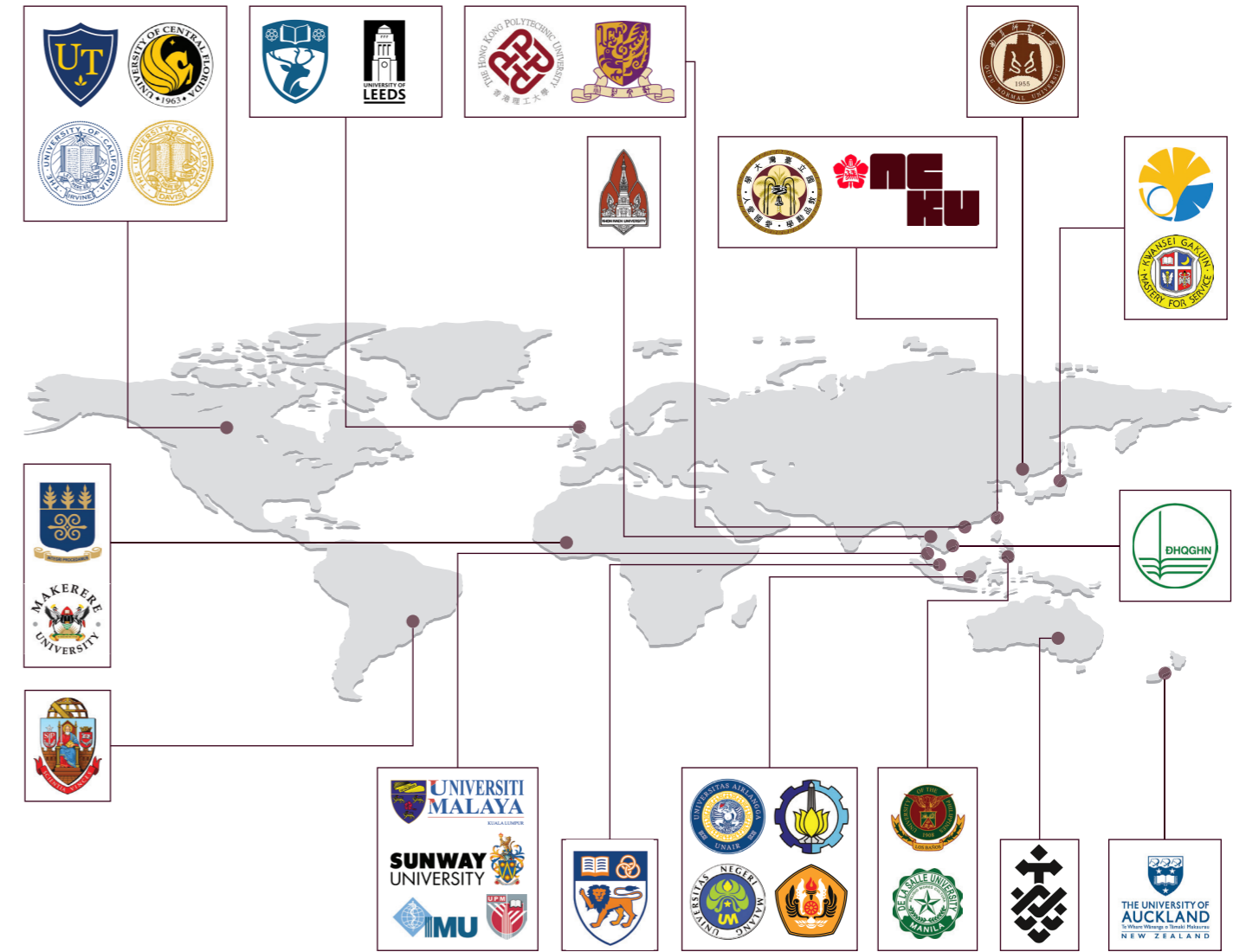
17 Sustainable Development Goals

15 Research projects

71 Researchers

31 Institutions

17 Countries

5 Continents

GOOD HEALTH AND WELL-BEING

The gender role in the relationship between behavioral addictions and mental health

This research project examines the relationship between internet addictions and mental health in Asian countries, focusing on gender differences in addictive behavior. The study collects online survey data from over 4,305 university students and aims to reveal associations between internet addiction and mental health issues. The project has resulted in the publication of seven academic journal papers and one conference paper. The findings can be used to create healthcare programs for intervention and prevention management to encourage healthy internet use. Furthermore, this initiative could be used as a foundation for future research on related topics.

Prof. Chung-Ying Lin
Prime Investigator

Prof. Carol Strong
Co-investigator

Doctoral Student Kamolthip Ruckwongpatr
Co-investigator

Senior Lecturer Samuel Adjorlolo
Co-investigator

Prof. Daniel Kwasi Ahorsu
Co-investigator

Prof. I-Hua Chen
Co-investigator

Dr. Serene En Hui Tung
Co-investigator

Prof. Wan Ying Gan
Co-investigator

Senior Lecturer Wai Chuen Poon
Co-investigator

Senior Lecturer Yan-Li Siaw
Co-investigator

Prof. Ira Nurmala
Co-investigator

Prof. Siti Rahayu Nadhiroh
Co-investigator

Prof. Iqbal Pramukti
Co-investigator

Developing a database for meeting the needs of health promotion among older adults with various lifestyles

The Middle-Aged and Older Chinese Adults' Health and Actigraphy (MOCHA) project has collected data from 300 middle-aged and older Chinese adults to establish a multidimensional dataset of health and mobility data. The project has created diverse older adult profiles and published articles on mental health and aged care robots for Chinese immigrants. The behavioral modules in the project describe potential eHealth needs. The modules are stored for ongoing innovation, prototype testing, and user feedback. The derived information service platform can benefit product developers, older adults, care providers, and academic researchers by providing valuable insights into health, activity performance, and preferences of aging populations.

Prof. Ching-Ju Chiu
Prime Investigator

Prof. Fadzilah Hanum Binti Mohd Mydin
Co-investigator

Understanding the chemistry of millets: Climate smart-crop for food security and health promotion in Asian countries

This research project is focused on the chemistry of millets as climate-smart crops to improve food security and health in Asia. The project involves analyzing the macro- and micronutrient composition of millets, including dietary fiber and minerals in millet flour samples. Initial results showed that the finger millet has high calcium and the pearl millet has high zinc levels. The research will bolster the demand for ancient crops and has the potential to provide new sustainable market opportunities for producers and consumers. The study will continue to examine minerals bound to dietary fibers to understand millet mineral bioavailability and related health advantages.

Postdoctoral Fellow Apramita Devi
Prime Investigator

Senior Lecturer Helen K Chappell
Co-investigator

Prof. Tsair-Fuh Lin
Co-investigator

Regional discrepancies in diabetes progression: Adaptation of diabetes simulation models in East Asia and Southeast Asia

The project aims to address the health and economic burdens of Type 2 diabetes (T2D) and its complications. The study focuses on adapting and improving the Chinese Hong Kong Integrated Modeling and Evaluation (CHIME) model for Taiwanese patients with T2D through a structured framework of adoption, validation, and recalibration. The study shows better results compared to other models in Taiwanese populations, providing valuable insights into health economics and outcomes research. The applicability of the framework can be promoted in clinical and health economic evaluations by adjusting the simulation models to account for variations in patient baseline risks.

Prof. Huang-Tz Ou
Prime Investigator

Prof. Ji-Kang Chen
Co-investigator

Prof. Emma Chi-Chuan Wang
Co-investigator

GOOD HEALTH AND WELL-BEING

Promoting the healthy and active aging of older people in the community

The Senior Physical Literacy Instrument (SUPPLI) and World Health Organization (WHO) Integrated Care for Older People (ICOPE) projects aim to promote healthy and active aging in older adults in the community. The ICOPE project is an international program developed by WHO, which can assess and promote intrinsic capacity. The cross-sectional study involves analyzing the relationship among intrinsic capacity, social engagement, and self-care capacity of 200 participants from 7 locations. The corresponding results will offer valuable insights for active aging programs and potential cross-border collaborations, including Taiwan, Singapore, and Australia.

Prof. Linda Li-Chuan Lin
Prime Investigator

Prof. Raymond Kim-Wai Sum
Co-investigator

Prof. Jiunn-Jye Sheu
Co-investigator

Dr. Kelvin Tan
Co-investigator

## Integrated care for enhancing well-being with cultural sensitivity in the community

This project in Taiwan seeks to promote healthy aging, improve the quality of life of older adults, and integrate social care into healthcare to address the challenges of a super-aged society. The research includes a comprehensive literature review and empirical studies that explore self-perception of aging, place attachment, social participation, and healthy lifestyle preferences among older adults. The research found a positive correlation between place attachment and self-perception of aging and is ongoing in examining aging attitudes in community programs. Engagement and enjoyment are emphasized for older adults' well-being.

Prof. Li-Fan Liu
Prime Investigator

Prof. Helene Hoi-Lam Fung
Co-investigator
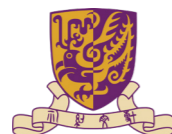
**Prof. Su-I Hou**
Co-investigator

Prof. Carol Ma
Co-investigator

Indolocarbazoles: Promising antifungal compounds

The project aims to develop new antifungal compounds by exploring the potential of staurosporine derivatives. Current antifungal therapy options are limited, and potential drug resistance further complicates the issue. The research focuses on synthesizing and testing new compounds against fungal isolates, with the goal of identifying compounds that are more effective and selective. The study also aims to understand the mechanism of action of these compounds through RNA sequencing. This project holds the potential for developing new antifungal therapies, which is an important public health concern.
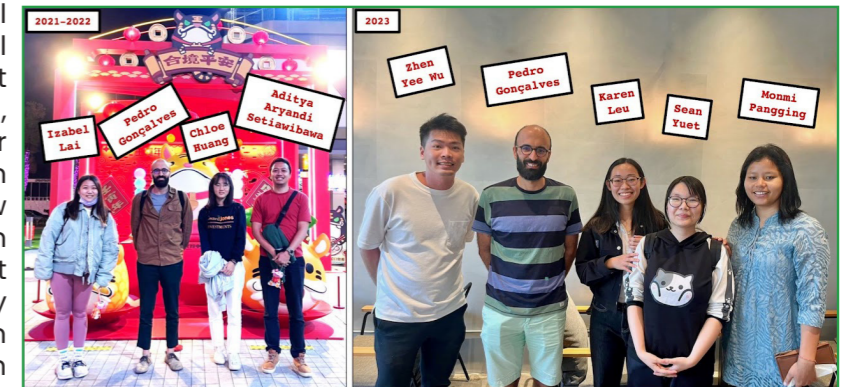
Prof. A. Pedro Gonçalves
Prime Investigator

Prof. Richard C. D. Brown
Co-investigator

Prof. A. Emre Sayan
Co-investigator

Prof. Gustavo H. Goldman
Co-investigator

Contribution to SDG3 – Good Health and Well-Being

The gender role in the relationship between behavioral addictions and mental health

4,305 Participants

Research output

7 Academic papers

1 Conference paper

Developing a database for meeting the needs of health promotion among older adults with various lifestyles

300 Participants

Research output

7 Academic papers

1 Scholarly presentation

Regional discrepancies in diabetes progression—Adaptation of diabetes simulation models in East Asia and Southeast Asia

Research output

1 Oral presentation

Promoting the healthy and active aging of older people in the community

200 Participants

Research output

2 Academic publications

4 Scholarly events

Integrated care for enhancing well-being with cultural sensitivity in the community

484 Participants
226 Final samples

Research output

7 Papers
3 Workshops

4 Industry visits
3 Conferences

CLEAN WATER AND SANITATION

Promoting reusable containers for takeaway food industries to reduce environmental impacts

Single-use plastic food containers pose environmental and health risks. However, reusable containers offer a better solution and promote a circular economy. Many emerging businesses in Taiwan, Japan, and Australia use reusable alternatives, but their scale remains small. A study investigated the behavioral patterns of consumers towards reusable cups and identified attributes that influence usage. Discounts, subsidies, and environmental organization support increased willingness to use reusable cups, but sanitation and hygiene concerns were barriers. "Distance to the store" was the most preferred attribute, followed by "return time" and "rental methods." The study's results have been submitted to the "International Conference on EcoDesign" and accepted for oral presentation. The research findings could inform Taiwan's circular container and plastic reduction policies.
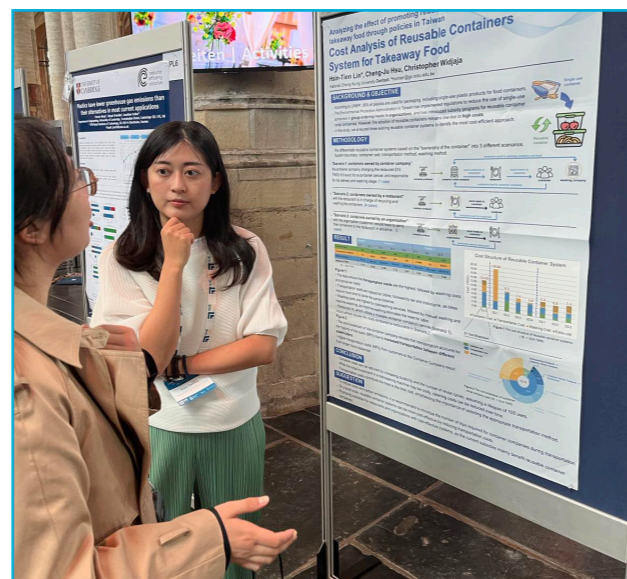
Prof. Hsin-Tien Lin
Prime Investigator

Dr. Monique Retamal
Co-investigator

Prof. Eri Amasawa
Co-investigator

Poster presentation at the 11th International Conference on Industrial Ecology, July 2-5, 2023, Leiden, Netherlands

Balancing water quality and carbon emissions from water treatment plants in Taiwan and Indonesia

The increasing water demand due to population growth, urbanization, and industrial requirements leads to water quality decline. Climate change also poses a challenge for the water sector. Energy consumption for water production is high, contributing to carbon emissions. This research aims to reduce chemicals and energy usage for drinking water production in Taiwan and Indonesia while also considering raw water quality, water treatment technology, and sustainable action plans.

The study will evaluate the correlation between water quality, chemical usage, and energy usage, formulate alternative chemical and energy reduction solutions, and assess the potential for carbon emissions and production cost reductions. The aim is to achieve sustainable drinking water services and enhance collaboration between universities and water sectors. The research project has conducted various studies to achieve these objectives. The expected result is to formulate alternative solutions for chemical and energy reduction, leading to reductions in carbon emissions and drinking water production costs.

Day 1 at the workshop

Day 2 of workshop at PDAM Surabaya

Dr. Ervin Nurhayati
Prime Investigator

Prof. IDAA Warmadewanthi
Co-investigator

Prof. Tsair-Fuh Lin
Co-investigator

Dr. Alison Subiantoro
Co-investigator

Constructive waste is a promising catalyst for wastewater treatment using an advanced oxidation process to achieve sustainability

Recycled construction and demolition waste (CDW) can find use as a catalyst for Fenton-like reactions—a promising organic wastewater treatment reaction among advanced oxidation processes. This study proposes a circular economic wastewater treatment strategy involving advanced oxidation processes. This strategy uses four kinds of recycled porous CDW with different specific surface areas mixed with hydrogen peroxide to decompose methylene blue (MB) wastewater with different concentrations. Also, the Taguchi method was applied to optimize the Fenton-like reaction formulations. The study finds that the porosity and catalyst element content of recovered and reused CDW are essential factors affecting the level of interaction between CDW and H_2O_2, quantified as the synergistic effect index (ξ). CDW-3 is estimated to have excellent MB removal performance in a Fenton-like process, with a specific surface area of 8.45 m^2g^{-1} and a ξ of about 2.16.

Scholarly events (conferences, workshops, symposia, and other events)

Prof. Wei-Hsin Chen
Prime Investigator

Prof. Huu Hao Ngo
Co-investigator

Prof. Wenshan Guo
Co-investigator

Prof. Aristotle T. Ubando
Co-investigator

AFFORDABLE AND CLEAN ENERGY

Sustainable Aquaculture in southeast asia through nutrient recovery and bioenergy production

This sustainable aquaculture project in Southeast Asia focuses on implementing nature-based wastewater treatment systems, specifically duckweed ponds, to address eutrophication caused by untreated aquaculture effluents. The innovative approach involves nutrient recovery and bioenergy production, utilizing duckweed for biological nutrient uptake and biomass production. The project aims to achieve multiple Sustainable Development Goals (SDGs), including clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), and peace, justice, and strong institutions (SDG 16). The research methodology involves native duckweed cultivation, pilot system operation, anaerobic digestion for biomethane production, and knowledge exchange with local communities. Current progress includes establishing a pilot plant, conducting Biomethane Potential tests, and developing an electrocatalytic system for converting CO_2 in biogas into valuable products. The estimated results anticipate the construction of a functional duckweed cultivation pilot plant and optimization of the electrocatalytic system for enhanced CO_2 conversion efficiency.

Prof. Chia-Yu Lin
Prime Investigator

Prof. Yi-Hsuan Lai
Co-investigator

Prof. Miller Alonso Camargo Valero
Co-Prime Investigator

Dr. Franja Prosenc
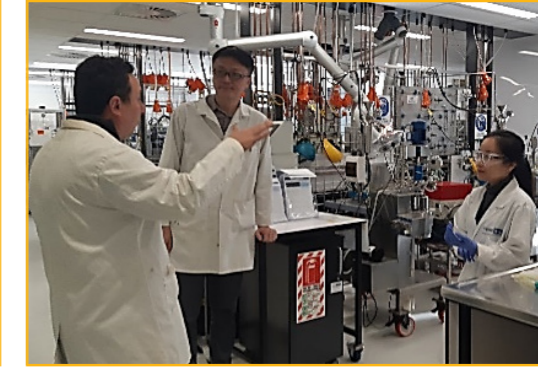Co-investigator

Prof. Alison Baker
Co-investigator

Dr. Anie Yulistyorini
Co-investigator

Mr. Ridwan Muhamad Rifai
Co-investigator

The study of physical characteristics for novel sustainable diesel fuels

This study on hydrogenated renewable diesel (HRD) as a sustainable fuel for heavy vehicle transportation aims to address issues linked to transesterified biodiesel, such as high NOx emissions and storage problems. Research using a combustion chamber and shadowgraph technology has shown that HRD exhibits lower density and viscosity than conventional diesel, potentially improving atomization, combustion, and engine efficiency. The estimated results suggest that HRD could be a viable substitute for traditional diesel, reducing carbon emissions in transportation and industrial processes.

Prof. Wei-Cheng Wang
Prime Investigator

Prof. Mohammed Farid
Co-investigator

Dr. Rex Demafelis
Co-investigator

Sustainable high-performance energy storage based on low-cost eco-friendly materials

This project aims to develop sustainable and eco-friendly materials for high-performance energy storage systems to replace conventional lithium-ion batteries. The research involves designing conductive electrode materials with minimal toxic metals, utilizing polymeric porous materials for battery electrodes, and developing ionically-conductive functional materials as solid-state electrolytes. The progress includes breakthrough discoveries in metal-free organic small-molecule-based electrode materials, nitrogen- and carbonyl-rich molecules, and a stable covalent triazine framework, all of which exhibit unprecedented electrochemical performance. The goal is to address environmental and geopolitical concerns associated with current battery technologies and transition to renewable energy sources.

Prof. Watchareeya Kaveevivitchai
Prime Investigator

Prof. Teng-Hao Chen
Co-investigator

Prof. Thanh V. Truong
Co-investigator

Prof. Nonglak Meethong
Co-investigator

Dr. Shanghai Wei
Co-investigator

Contribution to SDG 7 – Affordable and Clean Energy

Sustainable aquaculture in southeast asia through nutrient recovery and bioenergy production	The study of physical characteristics for the novel sustainable diesel fuels	Sustainable high-performance energy storage based on low-cost eco-friendly materials
Research output — 1 Forum group discussion	**Research output** — 1 Academic paper, 1 Conference paper, 1 Workshop	**Research output** — 4 Academic papers, 2 Conference papers

SUSTAINABLE CITIES AND COMMUNITIES

From disaster self-reliance to sustainable communities

This project focuses on exploring the transition of disaster self-reliance communities towards sustainability, emphasizing the importance of effective disaster management and community development. The research involves field trips to Taiwan and Japan, where forums and focus group discussions are conducted to understand the dynamics of self-reliance communities and their potential for sustainable development. The purpose is to assess the effectiveness of disaster self-reliance community development and examine how these communities can be sustained. The estimated results anticipate mutual learning, understanding, and future collaboration for the development of sustainable communities based on the insights gained from diverse community experiences.

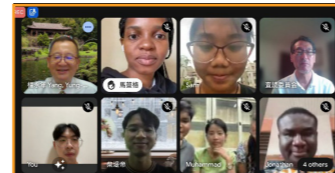**Prof. Yungnane Yang**
Prime Investigator

Mu-Chi-Liao Community Development Forum

Dr. Isaac Kofi Biney
Co-investigator

Dr. Jonathan Odame
Co-investigator

UNIVERSITY OF GHANA

Prof. Junichi Nagamine
Co-investigator

Online forums for Ghana's Galamsey issue for application of WUN's research project

Contribution to SDG 11 – Sustainable Cities and Communities

Research output

2
Academic papers

3
Forums onsite

2
Forums online

CLIMATE ACTION

Climate change education: The role of gender in mitigation and adaptation

This project delves into climate change education, focusing on gender's role in mitigation and adaptation. It analyzes Taiwan, Indonesia, and Uganda to understand integrating gender into climate policies and education systems. The project primarily focuses on university-community collaborations to advance climate change education with a gender equality lens, aligning with SDGs 11, 13, and 5.

The primary objectives of the project include forming strong university-community partnerships emphasizing gender, roles, facilitating knowledge exchange on gender and laying the groundwork for empirical research on gender and climate change education for future exploration. This initiative aims to generate knowledge to support empowering women and enhance their participation in climate change adaptation and mitigation efforts.

Senior Lecturer Josephine Esaete
Prime Investigator

Prof. Alice Merab Kagoda
Co-investigator

MAKERERE UNIVERSITY

Prof. Shan-Hui Hsu
Co-investigator

Dr. Moses Glorino Rumambo Pandin
Co-investigator

Contribution to SDG 13 – Climate Action

Research output

1
Academic paper

1
Conference paper

Project details

6
Meetings

Textbook analyzes that revealed lack of gender integration in climate change education:

- **Uganda**
  2 primary Grade 6 Social Studies and English textbooks
- **Taiwan**
  4 textbooks

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