

INTERNATIONAL WORKSHOP

Beyond Interlocal Lessons Learnt on Climate Change: Mapping, Fertilizing and Social Permeating

Presentation Abstracts

Day 1 (September 16th) Poster Presentation
15:30-17:00 (Japan Time), 13:30-15:00 (Vietnam Time)

Zoom A and SpatialChat

General moderator: Dr. ISHIKAWA-ISHIWATA Yuki (Ibaraki University)

<p>15:30-15:35 (Japan Time), 13:30-13:35 (Vietnam Time) Opening and instructions</p>
<p>15:35-15:50 (Japan Time), 13:35-13:50 (Vietnam Time) Brief explanation by presenters (1 minute for each)</p>

Facilitator: Prof. ITO Tetsuji (Ibaraki University)

P1-1	<p>Changes of Short-Lived Climate Pollutants During COVID-19 Pandemic in Hanoi, Vietnam DO Duy Tung[*], KITA Kazuyuki^{**} [*]Vietnam Japan University, Vietnam, ^{**}Ibaraki University, Japan</p>
P1-2	<p>Extensive Forest Fire and Tropospheric Ozone Increase During El Nino Events in Southeast Asia SEKIYA Takumi, KITA Kazuyuki Ibaraki University, Japan</p>
P1-3	<p>Awareness and Willingness to Reduce Single-use Plastic in Hanoi in Relation to Climate Change Mitigation NGUYEN Thi Dang Hue[*], TAKEUCHI Ryo^{**}, TAMURA Makoto^{***} [*]Vietnam Japan University, ^{**}Vietnam, Fukuoka Women's University, Japan, ^{***}Ibaraki University, Japan</p>
P1-4	<p>Factors Affecting to Students Behaviors on GHGs Emission Mitigation (Case Study in Vietnam and Japan) VU Kim Duyen[*], ITO Tetsuji^{**}, TAKEUCHI Ryo^{***} [*]Vietnam Japan University, ^{**}Vietnam, Ibaraki University, Japan, ^{***}Fukuoka Women's University, Japan</p>

Facilitator: Dr. ISHIKAWA-ISHIWATA Yuki (Ibaraki University)

<p>P2-1</p>	<p>Development of a Mathematical Model for a Single Microbial Fuel Cell Reactor Considering the Diversity of Non-Electrogenic Bacteria DENG Jiahao, ZHAO Guangyao, FUJITA Masafumi Ibaraki University, Japan</p>
<p>P2-2</p>	<p>Drought Levels and Land-use Types Effects on Soil Microbial Respiration and Biomass BUI Hanh Mai*, DANG Thanh Tu*, NGUYEN Duc Tam*, TRAN Thi Hang**, DINH Mai Van**, LUU The Anh***, HOANG Thi Thu Duyen* *Vietnam Japan University, Vietnam, **Vietnam National University, Vietnam, ***VNU Central Institute for Natural Resources, Vietnam</p>
<p>P2-3</p>	<p>Building Climate Security Index for Sustainable Development Strategies in the Coastal Area in Phan Thiet City, Vietnam NGUYEN Thi Que*, DOI Thi Loan*, NGUYEN Van Quang*, NGUYEN Thi Thuy Hang*, KOTERA Akihiko** *Vietnam Japan University, Vietnam, **Ibaraki University, Japan</p>
<p>P2-4</p>	<p>Research on Climate-Resilient Livelihoods of Aquaculture Households in Nam Phu Commune, Tien Hai District, Thai Binh Province NGUYEN Ha My*, MAI Trong Nhuan**, NGUYEN Tai Tue** *Vietnam Japan University, Vietnam, **Vietnam National University, Vietnam</p>

Facilitator: Dr. KOTERA Akihiko (Ibaraki University)

P3-1	<p>Research on Proposing Solutions for Sustainable Use of Coastal Wetland Resources in the Context of Climate Change in Dong Rui Area, Tien Yen District, Quang Ninh Province BUI Thi Lan[*], MAI Trong Nhuan^{**,**}, LUU Viet Dung^{**,**} [*]Vietnam Japan University, Vietnam, ^{**}Vietnam National University, Vietnam, ^{***}VNU Key Laboratory of Geo-Environment & Climate Change Response</p>
P3-2	<p>Effects of Water Pollution on Calcifying Benthic Foraminifera in a Low-Lying Coral Reef Island MIURA Nanami, LI Linna, AKTHER Shumona, FUJITA Masafumi Ibaraki University, Japan</p>
P3-3	<p>Strengthening Agricultural Resilience against Saline Intrusion in Mekong Delta NGUYEN Van Duong[*], TAMURA Makoto^{**} [*]Vietnam Japan University, Vietnam, ^{**}Ibaraki University, Japan</p>
P3-4	<p>Comparing the Effectiveness of Protection Options to Adapt to Sea Level Rise in Vietnamese Mekong River Delta PHAM Thi Oanh[*], TAMURA Makoto^{**}, NGUYEN Van Quang[*] [*]Vietnam Japan University, Vietnam, ^{**}Ibaraki University, Japan</p>

15:50-16:10 (Japan Time), 13:50-14:10 (Vietnam Time)
Poster session (first and fourth presenters)

16:10-16:30 (Japan Time), 14:10-14:30 (Vietnam Time)
Poster session (second and third presenters)

16:30-16:50 (Japan Time), 14:30-14:50 (Vietnam Time)
Free poster session

16:50-17:00 (Japan Time), 14:50-15:00 (Vietnam Time)
Wrap up

Day 2 (September 17th), Oral Presentation

Room A, 10:00-13:00 (Japan Time), 08:00-11:00 (Vietnam Time)

Each presentation has been allocated a total of 20 minutes, including 10 minutes for questions and answers.

Zoom A

Chair: Prof. FURUYA Jun (Japan International Research Center for Agricultural Sciences)

O1-1	10:00-10:20 (Japan Time), 08:00-08:20 (Vietnam Time) Vulnerability Assessment of Critical Infrastructures (CI) During Flood Disasters: Case of Regional Government Center at Tuguegarao City, Phil. BALDERAMA Fernando Orland, ANCHETA Ryan Isabela State University, Philippines
O1-2	10:20-10:40 (Japan Time), 08:20-08:40 (Vietnam Time) Global Advanced Bioenergy Potential Under Environmental Protection Policies and Societal Transformation Measures WU Wenchao [*] , HASEGAWA Tomoko ^{**,***} , OHASHI Haruka [†] , HANASAKI Naota ^{**} , LIU Jingyu ^{**,††} , MATSUI Tetsuya [†] , FUJIMORI Shinichiro ^{**‡} , MASUI Toshihiko ^{**} , TAKAHASHI Kiyoshi ^{**} [*] Japan International Research Center for Agricultural Sciences, Japan, ^{**} National Institute of Environmental Study, Japan, ^{***} Ritsumeikan University, Japan, [†] Forestry and Forest Products Research Institute, Japan, ^{††} Shanghai Jiao Tong University, China, [‡] Kyoto University, Japan
O1-3	10:40-11:00 (Japan Time), 08:40-09:00 (Vietnam Time) Retrospective Climate Variability on the Predictability of Oil Palm Yield across Typology in Indonesia OKTARINA Sachnaz Desta [*] , ISHIKAWA-ISHIWATA Yuki ^{**} [*] Indonesian Oil Palm Research Institute, Indonesia, ^{**} Ibaraki University, Japan
O1-4	11:00-11:20 (Japan Time), 09:00-09:20 (Vietnam Time) Development of Early Yield Prediction Models to Combat Extreme Climatic Events (Flash Floods) Using GIS and Satellite Remote Sensing ISLAM Md Monirul [*] , MATSUSHITA Shusuke ^{**} , NOGUCHI Ryozo [*] , AHAMED Tafaal [*] [*] University of Tsukuba, Japan, ^{**} Kyoto University
BREAK	

Chair: Dr. ISHIKAWA-ISHIWATA Yuki (Ibaraki University)

O1-5	<p>11:40-12:00 (Japan Time), 09:40-10:00 (Vietnam Time) Climate Change Effect on Supply and Demand of Potato Production in Bangladesh: A Scenario Assessment JANNAT Arifa^{**}, ISHIKAWA-ISHIWATA Yuki^{***}, FURUYA Jun[†] *Bangladesh Agricultural University, Bangladesh, **University of Tsukuba, Japan, ***Ibaraki University, Japan, †Japan International Research Center for Agricultural Sciences, Japan</p>
O1-6	<p>12:00-12:20 (Japan Time), 10:00-10:20 (Vietnam Time) Biomarker Responses of a Brackish Water Clam to Natural and Global Warming Conditions: A Laboratory and Field Experiments POKHREL Preeti, FUJITA Masafumi Ibaraki University, Japan</p>
O1-7	<p>12:20-12:40 (Japan Time), 10:20-10:40 (Vietnam Time) Coastal Pollution of an Urbanized Atoll in the Central Pacific: Majuro Atoll, the Marshall Islands AKTHER Shumona, MIURA Nami, FUJITA Masafumi Ibaraki University, Japan</p>
O1-8	<p>12:40-13:00 (Japan Time), 10:40-11:00 (Vietnam Time) The Power of Dialogical Tools in Participatory Learning KOTERA Akihiko Ibaraki University, Japan</p>

Day 2 (September 17th) Oral Presentation

Room B, 10:00-13:00 (Japan Time), 08:00-11:00 (Vietnam Time)

Each presentation has been allocated a total of 20 minutes, including 10 minutes for questions and answers.

Zoom B

Chair: Assoc. Prof. TAMURA Makoto (Ibaraki University, Vietnam Japan University)

O2-1	10:00-10:20 (Japan Time), 08:00-08:20 (Vietnam Time) The Practice of Education for Disaster Risk Reduction in Vietnam: Lessons Learned from a Decade of Implementation 2010-2020 TONG Thi My Thi*, NGUYEN Thi Hong Duong*, NGUYEN The Hung**, PARK Tae Yoon*** *Vietnam Institute of Economics, Vietnam, **Hanoi University of Natural Resources and Environment, Vietnam, ***Graduate School of Education, Yonsei University, Korea
O2-2	10:20-10:40 (Japan Time), 08:20-08:40 (Vietnam Time) Integrating Climate Change Education and Disaster Response in Teaching Pedagogical Students Towards School Safety in Vietnam LAI Phuong Lien VNU – University of Education, Vietnam
O2-3	10:40-11:00 (Japan Time), 08:40-09:00 (Vietnam Time) Climate Change Education in Health-related Education Bachelor Program: Adopting International Experiences to Vietnam KIEU Thi Kinh, HOANG Thi Nam Giang The University of Da Nang, Vietnam
O2-4	11:00-11:20 (Japan Time), 09:00-09:20 (Vietnam Time) Integrating Climate Change Education into Biology at the Higher Secondary Level in Vietnam NGUYEN The Hung Hanoi University of Natural Resources and Environment, Vietnam
BREAK	

Chair: Dr. TONG Thi My Thi, (Vietnam Institute of Economics)

O2-5	11:40-12:00 (Japan Time), 09:40-10:00 (Vietnam Time) Management of Non-traditional Security in the Context of Climate Change Toward Sustainable Development BUI Thi Hoa, MAI Trong Nhuan, NGUYEN Van Quang, HOANG Thi Thu Duyen Vietnam Japan University, Vietnam
O2-6	12:00-12:20 (Japan Time), 10:00-10:20 (Vietnam Time) Application of Geo-Information Technology to study Land Use in Mueang District, Phuket Province KUMLOM Tidarat, VONGTANABOON Sukanya, DUMMIT Julalak Phuket Rajabhat University, Thailand
O2-7	12:20-12:40 (Japan Time), 10:20-10:40 (Vietnam Time) Bottom-up Approach for Improving Local Natural Disaster Resilience: Action Research for Environmental Co-Creation and Community Development Through Dialogue ITO Tetsuji [*] , SUGIURA Shoko [*] , SEKIGUCHI Hideyuki ^{**} , BABA Sayaka ^{**} , FUJITA Yumiko ^{**} [*] Ibaraki University, Japan, ^{**} The Japan Atomic Power Company, Japan
O2-8	12:40-13:00 (Japan Time), 10:40-11:00 (Vietnam Time) Assessing Impacts of Climate Change and Sea-Level Rise on Seawater Intrusion in Coastal Aquifers in Ninh Thuan - Binh Thuan Plains PHAM Quy Nhan Hanoi University of Natural Resource and Environment, Vietnam

Changes of Short-Lived Climate Pollutants During Covid-19 Pandemic in Hanoi, Vietnam

DO Duy Tung¹, KITA Kazuyuki²

¹VNU-Vietnam Japan University, Vietnam

²Ibaraki University, Japan

ABSTRACT

The first case of Covid-19 was reported in Hanoi on March 6, 2020. Since then, the number of cases has increased gradually leading to the measures of social distancing and lockdown in Hanoi. This lowered the transportation and mobility of the local people and as the result, the emissions from vehicle exhaust were decreased significantly. In this study, we conducted in-situ observation to measure the changes of black carbon (BC), tropospheric ozone (TO3) and particulate matter (PM2.5) in Hanoi from January 2019 to July 2021. The findings of this research reveal that the concentration of BC and PM2.5 were significantly reduced during lockdowns and social distancing in Hanoi while the impacts were not so clearly in other cities in coastal zones of Vietnam such as Hai Phong, Ha Long, Hue, Da Nang or Ho Chi Minh city. This result implies the significant effect of emissions from vehicles in Hanoi and recommends counter-measures to reduce those emissions.

Keywords: Air pollutants, Short-lived climate pollutants, Covid-19

Extensive Forest Fire and Tropospheric Ozone Increase During El Niño Events in Southeast Asia

SEKIYA Takumi¹, KITA Kazuyuki¹

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ABSTRACT

Tropospheric ozone is a significant air pollutant, which has harmful effects on human health and plant growth because of its strong oxidizing effect. It is also a strong greenhouse gas, and thus has significant influence on the global warming as a short-lived climate pollutant (SLCP). Biomass burning including forest fire is one of most significant sources of the tropospheric ozone, because it is produced via photochemical reactions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) emitted from burning of fossil fuels and/or biomass.

In this study, we focus on the relationship of the tropospheric ozone increase and extensive forest fires in the equatorial Southeast Asia with the El Niño-southern oscillation (ENSO) activity. The El Niño event occurs in association with weaker Walker circulation, and reduces rain precipitation in the western equatorial Pacific and Southeast Asia regions, leading to the desiccation of forests there and promoting the outbreak of forest fires. Kita et al. (2000) showed that the localized increase of tropospheric ozone in the Southeast Asian region repeatedly occur during the El Niño events.

Following to Kita et al. (2000), the localized increase of tropospheric ozone in the Southeast Asian region was evaluated from satellite total ozone data. Forest fire activity in this region was shown by fire counts derived from satellite infrared data in the global fire map from the Fire Information for Resource Management System (FIRMS). Adopting the Southern Oscillation Index (SOI) as an index of ENSO activity, we compared the variations of the localized increases of the tropospheric ozone and the number of fires. From this comparison, we can see that their increases especially over Sumatra and Borneo islands during the El Niño events. This result showed that measures to prevent forest fires are significant especially during the El Niño events to reduce the tropospheric ozone.

Awareness and Willingness to Reduce Single-Use Plastic in Hanoi in Relation to Climate Change Mitigation.

NGUYEN Thi Dang Hue¹, TAKEUCHI Ryo², TAMURA Makoto³

¹VNU-Vietnam Japan University, Vietnam

²Fukuoka Women's University, Japan

³Ibaraki University, Japan

ABSTRACT

Hanoi as well as other major cities in Vietnam is facing critical challenges in dealing with the increase of diverse waste because of changing lifestyle, population growth, and economic development. Although various programs of waste separation at source and plastic waste reduction have been deployed over the last decades, they have stopped at the level of the movements and have generally not been widely implemented. This study aims to investigate the information relates to Hanoi people's attitudes toward the consumption of single-use plastic products and assessment of their level of willingness to reduce. The questionnaire survey was conducted in Hanoi about consumption, disposal habit, and their willingness to reduce whether differentiated in gender and age. The study found that most of the respondents heard about the harmful of plastic wastes on the environment and consider the environmental issues are important to them. The factors of age, gender, education had impacts on the willingness to reduce of residents. In spite of the fact that there is not much difference in the consumption of single-use plastic products in gender, women show higher eagerness to cut down. Younger people group consume more disposable plastic products but are more willing to reduce and pay attention to environmental issues than the group of older people. To implement solutions, enhancing public environmental education, especially at school and the activities of the Women's Union at different levels, improving the collection and recycling of plastics, and integration of several policies is essential.

Keywords: Single-use plastic, plastic pollution, greenhouse gases, social perception, consumption and disposal, willingness to reduce.

Factors Affecting to Students' Behaviors on GHGs Emission Mitigation (Case Study in Vietnam and Japan)

VU Kim Duyen¹, ITO Tetsuji², TAKEUCHI Ryo³

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ABSTRACT

Create the theory system about students' behavior for GHGs emission mitigation and contribute to climate change mitigation. This system includes definitions, characteristics, structures, behavioral mechanisms, and behaviors of students under climate change response. Analyze the specific students' behavior for GHGs emissions mitigation and the factors impacting their behavior and compare Vietnam and Japan. Find out the main factors that affect students' behaviors in GHGs reduction and climate change mitigation based on considering featured conditions of each region and demographic characteristics. Identify and create action plans for mitigating GHGs emissions in Vietnam with the support and lesson learned from Japan.

Keywords: Climate action; factors; climate mitigation; greenhouse gases emission; students' behavior; Vietnam; Japan

Development of a Mathematical Model for a Single Microbial Fuel Cell Reactor Considering the Diversity of Non-Electrogenic Bacteria

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¹Ibaraki University, Japan

ABSTRACT

The most research on microbial fuel cell (MFC) that can generate electric power through wastewater treatment can be divided into experimental and mathematical models' development. The model development becomes complicated, because various knowledge on microbiology, physical chemistry and electrical chemistry are required to appropriately simulate the MFC performance. In the existing model, Marcus et al. (2007) proposed a biofilm anode model that can simulate the conversion of electric generation after substrate consumption by Exo-Electrogenic Bacteria (EEB). Then it was difficult to reproduce the consumption of the acetate, the change of the current and the Coulomb Efficiency. In other hand, a lot of researchers extended biofilm anode model by consider electrogenic and methanogenic microbial populations and hypothesizing that the reduced and oxidized intracellular mediator for EEB. But most of studies were focus on MFCs' daily change of organic matter removal and maximum power under high substrate concentration conditions. Therefore, in this study, the target was conducted with the objective of developing a model of multi-species microorganisms considering the Non-Electrogenic Bacteria (NEB) to simulate the acetate consumed and electric charge produced in hourly change. In order to improve the simulation results, we used the response experimental data of acetate concentration and current density to calibrate the parameters of NEB into the biofilm anode model. By introducing NEB in the biofilm, the acetate consumption and subsequent current density in the biofilm anode model can be simulated. In contrast, q_{maxC} values increased to be 350% of the default value was improved the simulation results. This indicated that the calibrated parameter values were distinct from those of methanogenic bacteria. In this study, we did not focus only on methanogenic bacteria as NEB but considered of the diversity of the NEB in biofilm, and validity this.

Drought Levels and Land-use Types Effects on Soil Microbial Respiration and Biomass

BUI Hanh Mai¹, DANG Thanh Tu¹, NGUYEN Duc Tam¹, TRAN Thi Hang², DINH Mai Van², LUU The Anh³, HOANG Thi Thu Duyen¹

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ABSTRACT

Quang Nam, a province located in the middle of Vietnam, has suffered an increasing drought for many years, which threatens crop production. Drought severity seems to be added in by land-use change from forest to horticultural land but the interactions among drought, land-use change, and soil biological properties remain elusive in this area. Therefore, the research aimed to evaluate the effect of land-use change and drought on soil respiration and microbial biomass. Two hypotheses were proposed as i) Microbial respiration reduces with increasing drought severity but depending on land use types; ii) Water stress (60% to 30% water holding capacity - WHC) induces reduction of microbial biomass which remains no changes as soil moisture reduces from 30% to 10% WHC. Basal respiration (BR) decreased a half as soil moisture declined from 60% to 30% WHC and remained unchanged given the soil moisture decreased to 10% WHC. The dramatic decrease of BR demonstrated a shock of microbial community to altered environment condition. The similarity of BR between two soil types implied more important role of drought impacts than land-use conversion. The decrease of soil moisture resulted in the reduction in nutrient diffusion that causes difficulties for microorganisms to approach available nutrients in soil and negatively affecting microbial biomass synthesis. Higher microbial biomass nitrogen (MBN) in forest than pineapple might suggest that forest soil would be of advantage to sustain soil fertility and microbial activities than crop land in resistance to drought impacts. Briefly, interdisciplinary approach is critical in assessment of climate change impacts on C and N cycles in correspondence to land-use changes.

Keywords: WHC, drought severity, microbial respiration, climate change, microbial biomass

**Building Climate Security Index for Sustainable Development Strategies
in the Coastal Area in Phan Thiet City, Vietnam**

NGUYEN Thi Que¹, DOI Thi Loan¹, OKEH Bernard¹, NGUYEN Van Quang¹, NGUYEN Thi Thuy Hang¹, KOTERA Akihiko²

¹VNU-Vietnam Japan University, Vietnam

²Ibaraki University, Japan

ABSTRACT

Vietnam is considered one of the most vulnerable countries to climate change. Impacts in recent years have been manifesting more and more clearly and severely by more droughts, especially severe droughts, the number of annual heatwaves increased almost nationwide, extreme rainfall decreased significantly in the Northeast region and increased sharply in the South Central Coast and Central Highlands. In Binh Thuan Province, erratic climate changes are impacting strongly and seriously the lives of local people: thousands of people lack fresh water for daily use, and hundreds of coastal households are being eroded by the sea. Under the scope of this project, a set of statistic data was collected to assess climate security in the coastal area of Phan Thiet City where is economic center and capital of Binh Thuan Province. Besides, a GIS tool (ArcGIS Desktop 10.7.1, ESRI, Inc.) was also used to visualize the result of climate security index, and process remote sensing data to analyze land use and land cover changes of the researched area. The results showed that 2 of 10 coastal communes in Phan Thiet City are in low climate security levels (Duc Long and Mui Ne), where are exposure and socio-economic sensibility index are relatively high. At the end, some recommendations are discussed and provided to respond to climate change impacts, focus on promoting sustainable development towards improving regional competitive advantage in tourism, skill training for local people to increase adaptive capacity and building ecological resilience in manmade and natural systems.

Keywords: Phan Thiet, climate security index, GIS, climate change, sustainable development

**Research on Climate-Resilient Livelihoods of Aquaculture Households
in Nam Phu Commune, Tien Hai District, Thai Binh Province**

NGUYEN Ha My¹, MAI Trong Nhuan², NGUYEN Tai Tue²

¹VNU-Vietnam Japan University, Vietnam

²Vietnam National University, Vietnam

ABSTRACT

Although aquaculture contributes significantly to production in coastal areas, it has been detrimentally affected by climate change. This study selected study site as Nam Phu coastal commune, Tien Hai district, Thai Binh province, where rural resident's main livelihood is aquaculture, consisting of intensive shrimp farming and eco-shrimp farming. The objectives of this study are (i) to identify the impacts of climate change on Nam Phu, (ii) to compare livelihood resilience of aquaculture activities, and (iii) to propose solutions to enhance resident's livelihood and protect environment at the same time. Based on similar research and self-proposing criteria, a set of indicators to assess resilience of aquaculture livelihood and livelihood strategy selection was created. Four evaluation components with 24 indicators, including (i) Livelihood capitals, (ii) Self-organization, (iii) Capacity for learning, and (iv) Disaster management capacity, were systematized. For index estimation, 100 questionnaires for aquaculture households were collected and interpreted. The score of overall climate-resilient livelihood in aquaculture households was estimated by Min-Max formula. Results show that: (i) Aquaculture households perceived that Nam Phu has been detrimentally affected by climate change and natural disasters, such as saline intrusion, typhoons and floods; (ii) The median climate-resilient score for aquaculture households was 0.49, which implied a medium-resilient level. Self-organization capacity got a less-resilient level, while the three remaining components were scored as medium-resilient; (iii) The eco-shrimp farming households had an average climate resilient index of 0.49, which was slightly higher than that of intensive farming model (0.44). To conclude, the research emphasized featured livelihood model of eco-shrimp farming, which brings sustainable income and mangrove ecosystems conservation. It also provided useful information for formulating policies to meet the climate change including diversifying eco-livelihoods, improvement of eco-shrimp farming technology and policy support.

Keywords: climate-resilient livelihood, eco-shrimp farming.

**Research on Proposing Solutions for Sustainable Use of Coastal Wetland Resources
in the Context of Climate Change in Dong Rui Area, Tien Yen District, Quang Ninh Province**

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¹VNU-Vietnam Japan University, Vietnam

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ABSTRACT

Vietnam ranked 13th in the overall Climate Risk Index (2021), the country has experienced severe loss and damages caused by climate-induced events, especially in the coastal area. Dong Rui is an island commune of Tien Yen district, Quang Ninh province, beneficial from rich natural resources, notably the wetland resources. Unfortunately, Dong Rui has been facing unexpected and complicated change of climate conditions recently. This research aims to investigate the sustainability of the wetland resources, and based on the assessment results, to propose solutions for sustainable use of the resources in Dong Rui area. The research recommends a new concept of wetland sustainability and a set of indicators for sustainability assessment following the DPSIR model. Field surveys and social surveys were implemented in the area to figure out the driving force, pressure, state, impact, and societal response toward wetlands. The research results show that Dong Rui wetlands have an upper-medium level of sustainability (scored 0.624/1). However, Climate Change (CC) is putting more pressure on the resources both directly and indirectly. CC direct impacts, namely: increase of temperature, change of precipitation regime, and increased frequency of extreme weather conditions, directly affect the ecosystem. Indirectly, CC negatively impacts livelihoods of local people, whereas the majority of Dong Rui's people (67.1%) live on wetland-related activities. As a result, people are exploiting more resources from the wetlands for livelihood improvement. In such a context, it is urgent to promote sustainable use of wetland resources in a way that ensures both human needs and ecosystem conservation. The integration and synergy of institution and policy, science and technology, finance, capacity development and participation enhancement for stakeholders, and international collaboration is highly recommended.

Keywords: climate change, coastal wetlands; wetland sustainability, sustainable use

Effects of Water Pollution on Calcifying Benthic Foraminifera in a Low-Lying Coral Reef Island

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¹Ibaraki University, Japan

ABSTRACT

In Pacific, low-lying, small coral reef islands such as Marshall Islands and Tuvalu are extremely vulnerable to climate changes including future sea level rise. Research has indicated that, coral reef ecosystem is responsible for these islands formation and maintenance. However, in the recent years, coral reef-dwelling organisms e.g., calcifying benthic foraminifera in the coral reef ecosystem are being threatened due to the global as well as local environmental changes. Additionally, local coastal water pollution in the coral reef islands has been crucial and therefore reef-dwelling organisms are adversely affected by water pollution and decreasing. This will accelerate the onset of serious problems associates with future sea level rise. Therefore, to implement mitigation measures of water pollution for the purpose of conservation and rehabilitation of coral reef ecosystem, effects of water pollution on reef-dwelling organisms should be investigated. Therefore, in this experiment, coral reef-dwelling organisms calcifying benthic foraminifera *Baculogypsina sphaerulata* was exposed to untreated domestic wastewater (WW) with 2 dilution levels (1,000× and 10,000×) for 8 days. The photosynthetic activity related parameters such as ($Y[II]$), F_v/F_m and chlorophyll-*a*, and biochemical activity related parameter such as lipid peroxidation (LPO) at cellular-level were examined. Results showed that both dilution of WW stressor inhibited the photosynthetic activity and only 1,000× induced the LPO indicating *B. sphaerulata* photosynthetic activity and cell damaged. A correlation between $Y(II)$ and LPO indicated that 1,000× had a great effect on *B. sphaerulata*. These results highlight that current coastal water pollution in coral reef islands due to WW causes negative influence on calcifying benthic foraminifera. Therefore, an urgent need for the development and implementation of effective WW measures to aim at conservation and rehabilitation of coral reef ecosystem to cope with future sea level rise.

Keywords: Calcifying organisms, Coral reef, Photosynthetic activity, Biochemical activity

Strengthening Agricultural Resilience Against Saline Intrusion in Mekong Delta

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²Ibaraki University, Japan

ABSTRACT

Agriculture plays a crucial role in food security of Vietnam and the world with 15% contribution to GDP in 2020 (WB, 2021) and 12.5% contribution of total global rice export in 2018, only after India and Thailand (GSO, 2019). However, Mekong Delta – Vietnam’s main “rice basket” - has been seriously affected by natural hazards caused by climate change, including sea level rise, heat stress, and saline intrusion. This paper compares rice-shrimp model – a transitional model to response to saline intrusion – with rice monoculture model in terms of economic benefit, impact to environment, risk, and GHG emissions to recommend suitable solutions to increase agricultural resilience against saline intrusion in this region.

Climate change, saline intrusion, agriculture, resilience.

Comparing the Effectiveness of Protection Options to Adapt to Sea Level Rise in Vietnamese Mekong River Delta in 21st Century: A Cost-Benefit Analysis

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¹VNU-Vietnam Japan University, Vietnam

²Ibaraki University, Japan

ABSTRACT

The Vietnamese Mekong River Delta (VMRD) faces sea level rise (SLR) impact under climate change. To adapt to SLR, the Vietnamese government has set up a project to strengthen the protection function of the dike system in this area. However, this project might fail the objective while usually damaged by natural and human activities in the coastal area. In our research, by using the cost-benefit analysis, we present the effectiveness of three protection options for VMRD: an earth dike and mangrove system, a concrete dike system, and a mixing concrete dike and mangrove system to adapt to SLR in the different SSPs scenarios. Our results indicated that VMRD might face enormous damage by permanent inundation by SLR in the 21st century without adaptation. At the end of the 21st century, without adaptation, our estimation indicated that almost all VMRD might be below sea level. The economic loss of the inundation land use can reach up to 341.6 billion US dollars per year (no discount rate). In the same vein, nearly 20 million people might be losing their living area in the highest scenarios. Both three adaptation options have higher benefits than their cost. However, mixing concrete dike and mangrove systems might be a good solution for this area to adapt to SLR which having the highest net present value.

Keywords: sea level rise, impact, cost-benefit analysis, mixing grey and green, adaptation.

Vulnerability Assessment of Critical Infrastructures (CI) During Flood Disasters: Case of Regional Government Center at Tuguegarao City, Phil.

BALDERAMA Orlando¹, ANCHETA Ryan¹

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ABSTRACT

This study seeks to identify and establish the interdependencies of CIs in Tuguegarao City, as well as to assess the susceptibility of CIs during flood hazards. The critical infrastructures were identified by classifying CIs based on the definition of US Federal Emergency Management Agency (FEMA), Cybersecurity and Infrastructure Security Agency (CISA), and the Philippine National Disaster Risk Reduction Management Council (NDRRMC). The identified CIs sectors in the city were categorized into sub-sectors based on the categories created by CISA. The sub-sectors were then used to analyze the interdependencies of CIs in the city. The methodology of SYNEFIA(2016) was followed for the analysis and establishment of interdependency between the identified CIs.

The analysis of interdependency showed that the electric sector and communication sector is highly influential to the city's CI system. The commercial, healthcare, and evacuation centers were found to be the least sectors to exhibit synergistic disruption effect to other CIs. The result further showed that a CI system that works and function independently is highly sustainable.

Further, three (3) flood hazard maps were utilized in the study to assess the vulnerability of the CIs. These flood hazard maps have 5-year, 25-year, and 100-year return periods. On the aftermath of Typhoon "Vamco" in November 12-13, 2020, an ocular survey was conducted to assess the structural exposure to flood. The vulnerability assessment found out that the strategic placement of regional centers in an area with a low flood hazard is the best policy decision made by the government.

The relationship of the vulnerability to flooding and disruption synergistic effect reveals that the electricity sector percentage is not vulnerable to flooding, while the communication sector, on the other hand, is only vulnerable during the 100-year flood.

Keywords: CI's, flood vulnerability, interdependency, typhoon Vamco

Global Advanced Bioenergy Potential Under Environmental Protection Policies and Societal Transformation Measures

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ABSTRACT

Bioenergy plays an important role in low greenhouse gas stabilization scenarios. Among various possible sources of bioenergy, dedicated bio-crops could contribute to most of the potential. However, large scale bio-crop deployment raises sustainability concerns. Policies to alleviate the pressure of bio-crops on the terrestrial environment can affect bioenergy potential and production costs. Here, we estimated the maximum bioenergy potential under environmental protection policies (biodiversity and soil protection) and societal transformation measures from demand and supply side (demand-side policy includes sustainable diet; supply-side policy includes advanced technology and trade openness for food) by using an integrated assessment modelling framework, which consists of a general equilibrium model (Asian-Pacific Integrated Model/Computable General Equilibrium) and a spatial land use allocation model (Asian-Pacific Integrated Model/Platform for Land-Use and Environmental Model). We found that the global advanced bioenergy potential under no policy was 245 EJ/year and that 192 EJ/year could be produced under US\$5/GJ. These figures were 149 EJ/year and 110 EJ/year, respectively, under a full environmental policy. Biodiversity protection has a greater impact than soil protection due to its larger coverage and stronger implementation. Societal transformation measures effectively increase them to 186 EJ/year and 143 EJ/year, respectively, even under full environmental policies. These results imply that the large-scale bioenergy deployment possibly needed for the climate target to limit the global mean temperature increase well below 2°C compared to the preindustrial level might face a trade-off with environmental protection targets and that possible mitigation pathways in harmony with other environmental issues need to be explored.

Retrospective Climate Variability on the Predictability of Oil Palm Yield Across Typology in Indonesia

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ABSTRACT

The examination of climatic indicators to the interannual yield variability has been widely conducted in oil palm commodities. Yet not many discussed how it will affect the yield of its specific landholding. Smallholder contribution to Indonesian oil palm total production is not negligible. More than 40% of total oil palm holdings belong to the smallholder and so as the private/estates sector (53%). This study attempted to reveal to what extent the climatic variables and climate mode might impact the yield across both typologies. Explorative and regression analysis of monthly-averaged daily temperature and monthly-aggregated daily precipitation data from 1990 to 2018 as well as Equatorial Southern Oscillation Index of Indonesia SLP (Sea Level Pressure) were processed to satisfy the quest. The retrospective climatic data were pre-processed to align with oil palm inflorescence development stages that require 3 years span from its first leaf initiation to the ripening of the fruit bunch. It was suggested that the smallholder sector is vulnerable to climate anomalies. One level increase in the SOI index will result in on average 0.2 MT/ha decrease in smallholder yield per year. This is because the smallholder is much less climate-resilient in contrast to the private sector. Unless appropriate climate-smart practice is implemented, the smallholder wellbeing might be exacerbated.

Keyword: smallholder, Equatorial Southern Oscillation Index (SOI), yield, oil palm

Development of Early Yield Prediction Models to Combat Extreme Climatic Events (Flash Floods) Using GIS and Satellite Remote Sensing

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ABSTRACT

Climate change has various effects on various parts of the globe, with the majority of them impacting natural resources, particularly agriculture. Bangladesh, which has the world's eighth-largest population, is experiencing enormous difficulties securing agricultural output, which has been particularly harmed by the flash floods in the *Haor* region. The flash floods caused by the sudden flow of rainwater from the adjacent Indian Hills of Assam and Meghalaya pose a high risk of damage to the standing winter Boro rice crop just 2 to 3 weeks before harvesting. In this regard, an attempt was made to generate rice yield prediction models based on satellite remote sensing-based vegetation indices at the optimal harvesting period possible before flash floods. Several empirical yield prediction models for rice were developed using five key vegetation indices. Sentinel-2A images with a spatial resolution of 10 m were utilized for this study in Bangladesh's *Haor* (wetlands). In simple regression models, the best-predicted results for the RGVI ($R^2 = 0.44$), NDVI ($R^2 = 0.63$), NDVI ($R^2 = 0.55$), and NDVI ($R^2 = 0.67$) were observed for 2017, 2018, and 2019, as well as the average of seasons from 2017 to 2019. The best-performing vegetation indices for developing boro rice yield prediction models using multiple regression were the composite NDVI-RGVI ($R^2 = 0.65$), NDVI-NDWI ($R^2 = 0.56$), and NDVI-MSI ($R^2 = 0.69$) vegetation indices. However, utilizing a simple regression method ($R^2 = 0.84$) and multiple regression analysis ($R^2 = 0.91$) of the average NDVI-MSI composite index, NDVI showed better accuracy in the ANN-based machine-learning findings for the average boro rice season (2017-2019). Therefore, early yield prediction models of boro rice can be helpful for farm risk management, insurance premium assessments, and related stakeholder decision-making to minimize the impacts of severe flash flood occurrences.

Keywords: Yield prediction, vegetation indices, satellite remote sensing, flash flood, boro rice, artificial neural network, regression.

Climate Change Effect on Supply and Demand of Potato Production in Bangladesh: A Scenario Assessment

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ABSTRACT

Understanding the effects of climate change on potato production, which is vital for food and nutritional security, this research attempted to assess the influences of climate change on potato production in Bangladesh through the supply and demand model. The production of potato in different regions of Bangladesh is impacted differently by climate changes. To discern those effects, there is a need to assess the effects of climate variables on the potato yield, area and its variability in Bangladesh using district-level time series data grouped into seven climate zones. To generate outlook on the variation of supply and market price of potato under climate change, yield, area, import, and demand functions were developed. Temperatures above and below the optimal range (18–22 °C) resulted in lower yields, according to the findings. During the potato maturity stage, low rainfall and low solar radiation make it difficult to grow potatoes. The production is expected to increase from 88 to 111 million metric tons (MT) and the equilibrium farm price is estimated to be 155 to 215 US dollars/MT for the simulation period. Due to the changing diet pattern, the per capita consumption of potato is projected to increase 49 to 55 kg between 2014 and 2030. By the estimated equilibrators, scenario analyses had implemented that combine the different dimensions of Representative Concentration Pathways (RCP) and Shared Socioeconomic Pathways (SSP) scenarios which revealed that potato production and consumption can be boosted slowly in near future. This study will be helpful for the policymakers to encourage farmers to produce new cultivars and shifting areas according to the changing climate situation as well as fix the pricing policy for the sustenance of potato producers as well as a food supply to the consumer.

Keywords: Climate variability; econometric model; outlook; potato market dynamics

Biomarker Responses of a Brackish Water Clam to Natural and Global Warming Conditions: A Laboratory and Field Experiments

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ABSTRACT

Brackish environments are strongly influenced by natural environmental changes such as salinity fluctuations during high tides. Additionally, these environments are becoming a major concern regarding the potential impacts of climate change, that is due to an increase in sea water temperature, salinity changes due to sea level rise, and an increase in food availability due to CO₂ emissions. For this reason, we investigated the biomarker responses of a brackish water clam *Corbicula japonica* to natural and global warming conditions based on laboratory and field experiments. For natural factors based on laboratory-scale experiments, we selected different food availability and salinity levels. Laboratory-scale experiments showed that oxygen radical absorbance capacity (ORAC) in *C. japonica* is strongly affected by food availability and salinity levels. Field experiments proved that these natural influencing factors shouldn't be neglected in ORAC assay for *C. japonica* when anthropogenic impacts are assessed. Furthermore, we conducted a full factorial-design experiment to test different water-temperature levels (20 °C and 25 °C), salinity levels (5 and 20 psu), and food-availability levels (0.5 and 2.0 mg suspended solids (SS)·ind⁻¹·d⁻¹) to investigate biomarkers representing the physiological and biochemical responses of the brackish-water clam *C. japonica*. Increase in water temperature significantly decreased superoxide dismutase (SOD) and catalase (CAT) activities and ORAC, leading to lipid peroxidation (i.e., oxidative damage). Salinity activated or inhibited these biochemical markers. Food availability supported a detoxification mechanism against oxidative stress. Principal-components and cluster analyses revealed that a total of eight experimental conditions fell into three groups related to water temperature and/or salinity. Integrative biomarker approaches suggested deleterious effect in the health of clam species due to the global warming related factors. We conclude that future habitat changes driven by global warming can be a significant issue for the clams, because local anthropogenic disturbances are further added to natural ones.

Keywords: Bivalves, Antioxidant response, Oxidative damage, Principal component analysis

Coastal Pollution of an Urbanized Atoll in the Central Pacific: Majuro Atoll, the Marshall Islands

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ABSTRACT

Pacific atolls are extremely vulnerable to the effects of climate change. Coral reef ecosystems, which are responsible for the island formation and maintenance, can potentially keep pace with rising sea levels. Such ecosystems are sensitive to pollution; however, the sources and levels of atoll pollutants caused by urbanization have rarely been investigated. In this study, we assessed the heavy metal pollution (Cr, Mn, Ni, Cu, Zn, Cd, and Pb) of coastal sediments to evaluate the effects of urbanization on Majuro Atoll, the Marshall Islands. The densely populated area had the most significant pollution with high levels of Pb, Mn, Zn, and Cu due to road traffic activity. Domestic wastewater, a major pollution source in Pacific atolls, was not identified. Remarkably, the Zn and Pb levels in the remote island area were 697–1539 and 22–337 times higher, respectively, than in the natural area of Funafuti Atoll, Tuvalu. Thus, the remote island and sparsely populated areas were significantly polluted because of the maritime traffic activity in the lagoon and debris accumulation in/around the lagoon. This pollution resulted from improper municipal solid waste management of the main island. The contamination factor, pollution load index, and geo-accumulation index indicated high levels of heavy-metal pollution in these areas. Urbanization of the atoll clearly resulted in a distinct heavy-metal composition and high pollution levels compared with Funafuti Atoll. These findings emphasize the importance of pollution management in the conservation and rehabilitation of urbanized atolls threatened by future sea-level rises.

Keywords: Coral reef sediment, Heavy metal, Remote islands, Road traffic, Maritime traffic, Debris

The Power of Dialogical Tools in Participatory Learning

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ABSTRACT

A new tangible bit was designed to encourage mutual dialogue in the participatory learning activities. One of the factors that inhibit dialogue in this activity is the means of communication of scientific knowledge and information. Various devices and tools, such as geographic information maps and illustrations, have been used to convey information in an easy-to-understand manner. However, in many cases, the very tools that are supposed to provide useful information unintentionally interfere with the dialogue with the participants because their expertise is not translated well. By overlaying scientific information as needed and projecting it onto a 3D terrain screen, the new device allows users to intuitively grasp not only topographical and hydrological information such as the slope and elevation of mountains and the direction of water flow, but also a variety of other content, unlike conventional paper maps. Furthermore, by touching and sliding your finger on the surface of the 3D screen, users can sense the information intuitively. The tool has been used in the field of collaborative water resources management with community participation in Indonesia. Although we have conducted similar learning using paper-based media in the past, the significant change that we observed using this device was the atmosphere of the place, which clearly led to meaningful and prolonged dialogue. Even participants who do not usually speak up began to participate actively in the dialogue. This was triggered by the moment when each participant, including scientists, felt that they could intuitively understand the information (i.e., happy), and at the same time, were convinced that we were sharing the same feeling (i.e., fun). The fun was in the serious dialogue among us, and we believe that the same feeling was conveyed and shared by the participants. This is the power of dialogical tools.

**The Practice of Education for Disaster Risk Reduction in Vietnam:
Lessons Learned from a Decade of Implementation 2010-2020**

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ABSTRACT

The increasing damage caused by natural disasters, particularly climatic disasters such as typhoons, floods, droughts, and heatwaves, threatens the development of all sectors in Vietnam. In particular, the impact of natural disasters on the education sector affects thousands of students and teachers through education interruption and reduced educational quality. At the same time, education is increasingly being viewed as being more essential for mitigating risk and for strengthening people's capacity to respond to disasters. Since the beginning of the 2010s, numerous education projects on climate change response and disaster risk reduction have been conducted throughout Vietnam. Most of these projects promote two main initiatives; making schools safer, and mainstreaming climate change and disaster risk reduction into the school curriculum. Before the National Action Plan on disaster risk reduction was adopted by the education sector, disaster risk reduction education (DRRE) initiatives were mainly implemented by NGOs and other organizations outside the government. The DRRE topics focused mainly on climate change education, disaster risk reduction, and a combination of both themes. This study reviews the DRRE initiatives over one decade of implementation (2010–2020). The findings draw upon the lessons learned from DRRE by various stakeholders, including government and non-governmental organizations.

Integrating Climate Change Education and Disaster Response in Teaching Pedagogical Students Towards School

Safety in Vietnam

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ABSTRACT

Integrating climate change and disaster response education into teaching is considered one of the important tasks of the education program promulgated in 2018 in Vietnam. Every year, Vietnam suffers many bad impacts from natural disasters caused by tropical monsoon climate such as storms and floods. Therefore, the Government of Vietnam upholds the importance of integrating climate change and disaster response education into education curricula and ensuring school safety. In order for education to take place effectively, pedagogical students, who are the future teachers who will teach the program, need to practice and hone in on relevant knowledge and skills. The article presents the theoretical and practical foundations of integrating climate change education and disaster response in teaching students majoring in pedagogy and proposes policies for the education sector to towards school safety goals.

Climate Change Education in Health-Related Education Bachelor Program: Adopting International Experiences to Vietnam

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ABSTRACT

Effect of climate change on health has become the biggest global health challenge of the 21st century. An estimation of 94% of diarrheal disease, 42% of lower respiratory infections, 44% of unintentional injuries are attributable to environmental factors such as unsafe drinking-water, poor sanitation and hygiene, indoor and outdoor air pollution. There are about 38 000 additional deaths in elderly people due to heat exposure and 95 000 additional deaths due to childhood undernutrition per year between 2030 and 2050 according to WHO estimation. There is a need to enhance resilience of each region to cope with climate change and prepare health care workers to address the health impacts of climate change. Thus climate change related topics have been embedded in the medical training programs in many countries. This research firstly reviews how climate change is integrated into medical syllabi worldwide then it proposes strategy to boost climate change education in medical education in Vietnam.

Keywords: climate change education, medical education program, syllabi, Vietnam

Integrating Climate Change Education Into Biology at the Higher Secondary Level in Vietnam

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ABSTRACT

Climate change education does not exist as an independent field but rather as an integrated component of environmental education and sustainable development education. In Vietnam, the introduction of environmental education in the national education system has been determined as one of the main targets by the Central Executive Committee since 1998. Climate change is the challenge of all humanity. Vietnam is considered to be the 10 most affected countries of climate change. However, the subject on climate change does not exist in the national curriculum in the general education system in Vietnam. Therefore, the content of climate change needs to be integrated into the teaching and learning activities at all levels. Biology is a potential subjects with many advantages for the intergration climate change education in the high school program. Thiss article presents three basic contents of integration of climate change education at high schools: (i) Objectives of climate change education for Biology subjects in high school; (ii) Principles of climate change education in teaching high school students; and (iii) Establishments and requirements in choosing integrated teaching methods.

Management of Non-traditional Security in the Context of Climate Change Toward Sustainable Development

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ABSTRACT

Non-traditional security related to climate change includes climate security, food security, water security, energy security, social security, poverty reduction, gender equality, and public health protection in the context of climate change. Faced with challenges of climate change, non-traditional security in general and security related to climate change in particular are increasingly important for traditional security, political, economic, and social stability, sustainable development, prosperity, and safety of the nation. It is necessary to synchronously apply solutions to maintain and develop non-traditional security related to climate change for sustainable development and safety in Vietnam: (i) Integrating synchronous non-traditional security - environmental protection - climate change response - sustainable development; (ii) Raising awareness of the nature, trends, impacts and responsibilities of stakeholders in implementing solutions to prevent non-traditional security threats; (iii) Proactively and actively preventing and responding to non-traditional security threats related to climate change; (iv) Strengthening and enhancing the effectiveness of international cooperation on the prevention, control, and response to non-traditional security threats; (v) Mobilizing and efficiently using of diversified financial resources; (vi) Promoting scientific research, developing technologies, and transferring knowledge on non-traditional security, environmental protection, and climate change response for sustainable development and safety; (vii) Enhancing the capacity and roles of stakeholders in synchronous integration of non-traditional security systems in association with environmental protection and climate change response for sustainable development and safety.

Keywords: non-traditional security, climate change, sustainable development.

**Application of Geo-Information Technology to Study Land Use
in Mueang District, Phuket Province**

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ABSTRACT

This research aimed to study land use in Mueang District, Phuket Province during the year 2005 and 2020. The satellite images were derived from Landsat 5 in 2005, and Landsat 8 in 2020. The satellite images were classified based on land-use type and overlay technique was applied to compare the changes of percentage and total area of land cover. The results of the study found that in 2005 the maximum land use in Mueang District, Phuket Province was community and building area as 57.17 square kilometres (32.85 percent) and the minimum land use was water source area as 6.54 square kilometres (3.76 percent). In 2020, the maximum land use was community and building area as 74.10 square kilometres (42.59 percent). Land use change during the year 2005-2020 was found that agricultural and miscellaneous area tended to decrease while water area, forest and community area tended to increase.

**Bottom-up Approach for Improving Local Natural Disaster Resilience:
Action Research for Environmental Co-Creation and Community Development Through Dialogue**

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ABSTRACT

The typhoons that hit Japan annually may be getting more severe due to climate change, potentially resulting in unexpected damage. For example, Typhoon No. 19 (Hagibis) traversed eastern Japan in October, 2019 and caused enormous damage over a wide area, including in Ibaraki Prefecture, where Ibaraki University is located. The typhoon was reported to be a category 5 super typhoon, and despite repeated alerts calling for serious caution in advance and countermeasures to be taken in various places, 105 people were killed and 3 people were reported missing. In order to deal with similar situations in the future, it is necessary to create areas that are more resistant to the effects of disasters and to improve local resilience. For these purposes, a top-down approach mainly related to the “hardware”, or physical infrastructure, such as the maintenance of embankments is clearly necessary. At the same time, a bottom-up approach centered on the “software”, or the communities in which the inhabitants are the main characters, is also required. In this study, we developed an action research approach to promoting "environmental co-creation and community development through dialogue", which benefits the residents of communities not only during natural disasters but also in their everyday lives. This is an ongoing polyphonic project, wherein photographs of the local environment and narratives of the residents are plotted on a local map, thus generating a “bottom-up” map of the area. Interactive workshops can also be developed using this generated map. As a result, the ways in which local people view and understand the local environment may change. The main areas of the map are Mito City, which the Naka River flows through, and Daigo Town, which the Kuji River flows through, both in Ibaraki Prefecture, Japan. This study demonstrates a new form of community-based climate change adaptation.

**Assessing Impacts of Climate Change and Sea-Level Rise on Seawater Intrusion in Coastal Aquifers
in Ninh Thuan - Binh Thuan Plains**

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ABSTRACT

Vietnam is a country with a long coastline and high population density living in the coastal plains. Climate change and sea level rise have had harmful effects on the lives of people in these regions. The coastal plain of Ninh Thuan - Binh Thuan is the largest dry area in Vietnam and always lacks water in the first months of the year (Jan., Feb., Mar., and Apr.). Groundwater is an extremely valuable resource for supplies at this time. Therefore, the objective of this study is to assess the impact of climate change and sea level rise on seawater intrusion in coastal groundwater systems in this region. Scenarios of climate change and sea level rise are extracted from Scenarios of climate change and sea level rise for Vietnam of the Ministry of Natural Resources and Environment launched in 2016. Groundwater model for a 2-layer aquifer system with variable density flow SEAWAT is built for predicting impacts of climate change and sea level rise on the study area. According to RCP 4.5 scenario, predicted results of fresh and salt groundwater distribution over time showed that up to the year 2100, the area of groundwater with TDS>1g/L decreased in Ninh Thuan plain are 3.50 km² and 4.70 km² in Holocene and Pleistocene aquifers, respectively whereas in Binh Thuan plain are 8.93 km² and 11.65 km² in Holocene and Pleistocene aquifers, respectively as well. According to the RCP 8.5 scenario, the fresh and salt groundwater distribution does not change much compared to the RCP 4.5 scenario.

Keywords: Seawater intrusion, Climate change and Sea level rise, Groundwater, Coastal aquifers