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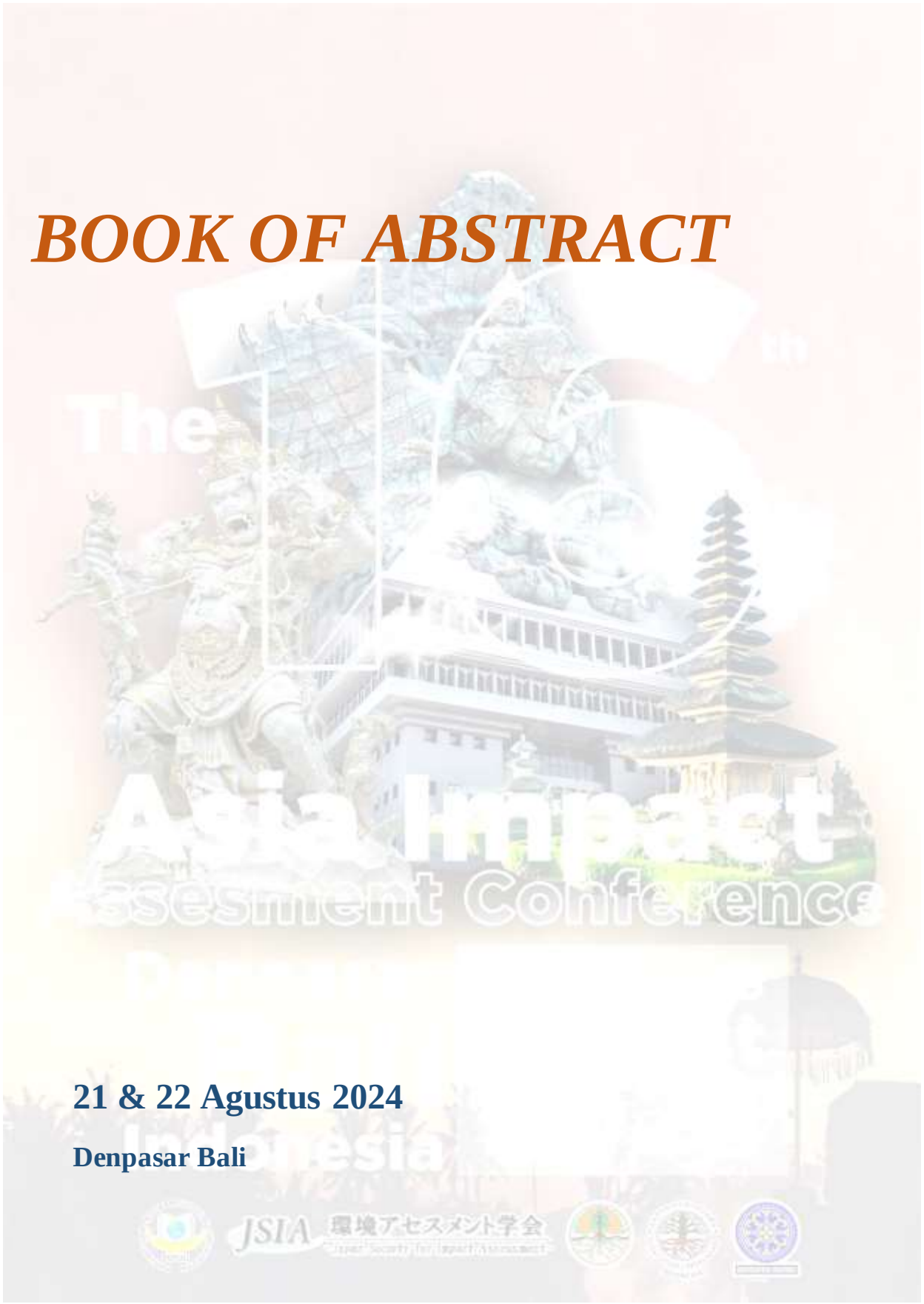
Indonesia
21 & 22
August
2024
IAIA-Japan
JSIA
環境アセスメント学会
Japan Society for Impact Assessment

BOOK OF ABSTRACT



21 & 22 Agustus 2024

Denpasar Bali

BOOK OF ABSTRACTTHE 16TH ASIA IMPACT CONFERENCE(AIC 2024) IN DENPASAR, BALI

"Harmonization of various impact assessment tools for nature positive"

Bali, 21 – 22 Agustus 2024

The 16th Asia Impact Assessment Conference (AIC 2024) in Denpasar - Bali, Indonesia

"Harmonization of various impact assessment tools for "Nature Positive"

Background and Aims

It is an honor for Indonesia to host AIC 2024, and Indonesia will be the first host outside Japan, China and Korea. As in other countries, sustainable development is also a concern of the Indonesian government. EIA in Indonesia has been officially implemented since 1984, but to date various environmental problems are indicated to be increasing and becoming more complex. Issues regarding climate change, biodiversity conservation, health risks, marginalization of communities and various other problems are still our common challenges. It is hoped that AIC2024 will not only be a forum for exchanging information regarding the implementation of environmental impact assessment and various other environmental tools applied in various countries, but also to support the exchange of technology, practices and innovation, opening new horizons in realizing sustainable development in Asia in the future.

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Conference theme

Recently, attention to nature protection and biodiversity has again become a major issue in sustainable development. We realize that human life is very dependent on the existence of biodiversity and its ecosystem, through ecosystem services. EIA can be a tool to realize "Nature Positive " to stop loss, protect, restore and maintain biodiversity and its ecosystems for sustainable development.

We welcome all participants to present various discoveries, innovations, practices and experiences in EIA and other environmental assessment tools related to "Nature Positive".

Chief Executive

Prof. Dr. Nadiroh, M.Pd
(Researcher Population and Environmental Education, Gender,Human Trafficking, and Civics Education, State University of Jakarta)

Prof. Ir. Ida Ayu Astarini, M.Sc., Ph.D (Professor at Udayana University)

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Welcome Message

Welcome to the 16th Asia Impact Conference (16th AIC) held from 21-23 August in Bali, Indonesia. This conference hosted by Indonesian Environmental Science Study Program Association in collaboration with Indonesian Environmental Studies Cooperation Agency, Japan Society for Impact Assessment (JSIA), International Association for Impact Assessment (IAIA), Ministry of Environment and Forestry the Republic of Indonesia, and Udayana University. In the last conference, we believe many researchers have been helped to develop their research work through constructive interaction with experienced academics especially in the field of environmental impact assessment. Learning from mature research and stimulating discussion with academics, practitioners, and more experienced researchers in the conference has turned AIC into a melting pot of multi-generation researchers. We are very excited to have all of you to join in this great event.

16th Asia Impact Conference provides a scientific platform for both local and international scientists, engineers and technologists who work in all aspects of environmental impact assessment. It aims to be a prime international forum for both researchers, government, and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of environmental impact assessment, identify emerging research topics, and define the future of technology to manage the environmental impact of some business plans and/or activities.

We congratulate the authors of papers that made it into the proceedings, for the job well done. We are also blessed to have four distinguished Guest Speakers: Professor Honoris Causa. Siti Nurbaya Bakar Ministry of Environment and Forestry the Republic of Indonesia; Professor Akira Tanaka from Japan; Professor Wei Li form China; and Professor Jin-Oh Kim from South Korea. As always, many thanks are due to all members of Indonesian Environmental Science Study Program Association, Indonesian Environmental Studies Cooperation Agency, and Udayana University committee for their dedication for making this conference a success. Above all, thank you to all of you for participating to this conference.

Sincerely Yours,
Associate Professor Suyud Warno Utomo
Chairman Indonesian Environmental Science Study Program Association

Welcome Message

The 16th Asia Impact Assessment Conference (AIC 2024), themed "Harmonization of Various Impact Assessment Tools for 'Nature Positive'," marks a significant milestone in our collective efforts towards sustainable development and environmental stewardship. This conference brings together experts, policymakers, researchers, and practitioners from diverse fields to explore and integrate a variety of impact assessment methodologies aimed at achieving a "Nature Positive" future.

In recent years, the concept of "Nature Positive" has gained traction as a holistic approach to reversing biodiversity loss and ensuring the health of our planet. It encompasses not only the mitigation of negative impacts but also the enhancement of natural systems, striving for a net gain in biodiversity and ecosystem services. Achieving this ambitious goal requires the concerted efforts of all stakeholders, utilizing a wide array of tools and methodologies.

This conference serves as a platform for sharing innovative ideas, best practices, and cutting-edge research. It fosters dialogue and collaboration among professionals who are dedicated to advancing impact assessment techniques. By harmonizing various tools and approaches, we can create synergies that enhance the effectiveness and efficiency of impact assessments, ultimately contributing to the broader goal of environmental sustainability.

The proceedings of AIC 2024 encapsulate the rich discussions, groundbreaking findings, and practical solutions presented during the conference. They reflect our collective commitment to integrating environmental considerations into decision-making processes and promoting a balanced relationship between human activities and nature.

We extend our gratitude to all participants, speakers, and organizers whose dedication and hard work have made this conference possible. May the insights and knowledge gained here inspire continued progress and innovation in the field of impact assessment, driving us closer to a Nature Positive future.

Prof. Dr. Anwar Daud, SKM., M.Kes
Head of the Environmental Study Center Coordinating Board (BKPSL)

Chairman SC

Prof. Dr. Erri Noviar Megantara, M.S.,
(Researcher Center of Environmental and Sustainability Science, Padjadjaran University)

Opening Speech

Dr. Siti Nurbaya, M.Sc, Indonesia
Ministry of Environment and Foresty, Indonesia

Keynote Speaker

Dr. Hanif Faisol Nurofiq, S.Hut., M.P.
Directorate General of Forestry Planning and Environmental Management

Invited Speaker :

Prof. Jin-Oh Kim, Korea

Prof. Wei Li, China

Invited Keynote Speaker for AIC2024 in Indonesia

Environmental Impact Assessment System and its Conditions to Achieve "Nature Positive"

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Prof. Akira Tanaka, Japan

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Chair of the International Exchange Committee for Japan Society for Impact Assessment
Vice Representative for the Japan Branch of the International Association for Impact Assessment (IAIA)
AIC2024 International Steering Committee Member

Keywords: Mitigation hierarchy, No Net Loss, Habitat Evaluation Procedure, Biodiversity offset, Biodiversity banking, Satoyama banking

Halo semuanya. Saya Akira Tanaka.

My name is Akira Tanaka, and I recently retired as a university professor this past March. It is a great honor to be here with you today, delivering the keynote speech at the 16th AIC2024.

First and foremost, I would like to express my heartfelt gratitude to Professor Erri Megantara from Universitas Padjadjaran, Professor Anwar Daud from BKPSL, Professor Suyud Warno Utomo from PEPSILI, Professor Nadiroh from Universitas Negeri Jakarta, Professor Ida Ayu Astarini from Universitas Udayana, as well as the two host organizations, BKSL and PEPSILI, for making it possible to hold AIC2024 in Bali, one of

the world's leading resort destinations, renowned for its preserved natural beauty and rich history.

I would also like to extend my sincere thanks to Professor Jin-Oh Kim from Korea and Professor Wei Li from China, who have both contributed significantly to the realization of this conference as representatives of their respective countries on the AIC2024 International Steering Committee.

Now, before we delve into today's theme of Nature Positive, I would like to briefly introduce the history of AIC.

The precursor to AIC was a bilateral EIA workshop between Japan and Korea, proposed by former IAIA President Dr. Sachihiko Harashina, held in Tokyo in 2003. This event later became known as the 1st AIC. Starting from the 6th AIC in 2011, which I chaired, we invited China to join, transforming it into a trilateral conference. In 2018, we held the 12th conference in my hometown, Shizuoka, Japan, home to Mount Fuji. At this point, we opened participation to other Asian countries beyond Japan, Korea, and China and renamed it the Asia Impact Assessment Conference, or AIC in short. This brings us to this year's event in Bali, Indonesia.

The Executive Committee Chairperson, Professor Erri Megantara, and Dwisetia Sagiman, who made this conference possible, were actually participants of AIC2018 in Shizuoka. Their efforts have been instrumental in bringing this event to Indonesia. The growing connections and expanding network of people involved in EIA across Asia is one of AIC's significant achievements, and I am both delighted and deeply grateful for this development.

Now, I would like to share my research findings and experiences on the role of environmental impact assessment systems in realizing our theme of Nature Positive society.

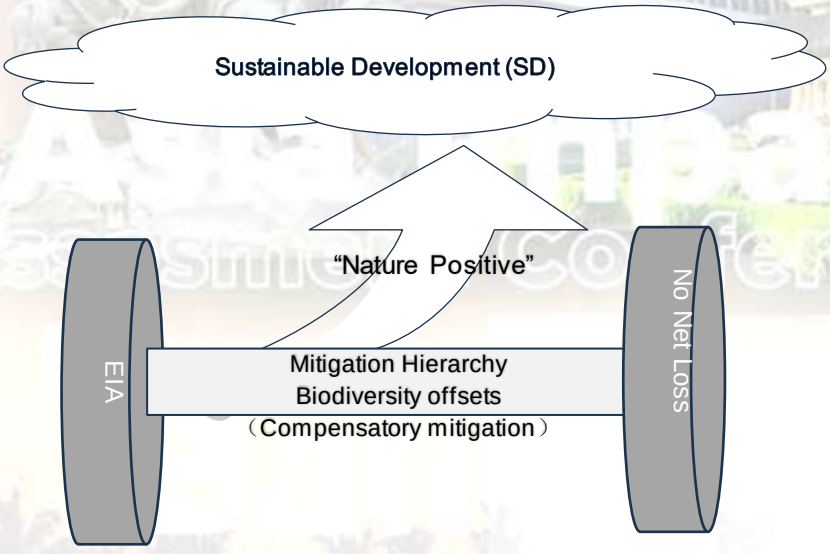
1. Introduction: The Issue of Earth's Surface and Its State

Nature Positive is about halting the ongoing decline of nature on Earth and reversing this trend to be on track for recovery by 2030. Global environmental problems are fundamentally linked to the destruction or loss of the Earth's ecosystems. Healthy ecosystems and nature are the foundation for the survival of all living beings, including us humans. From this perspective, transformation for nature-positive society is not a choice but an imperative for humanity.

The fact that development projects are the primary driver for nature loss on Earth has been universally recognized ever since the United Nations Conference on Environment and Development, also called the Earth Summit, held in Rio in 1992. At that time, problems related to the overdevelopment of nature or exploitation of natural resources became apparent, and we began using the keyword "biodiversity" to describe these serious planetary environmental problems. However, since both nature, which is the foundation of human survival, and development projects, which cause the loss of very nature, are indispensable to humanity, there has been a search for a way to balance development and nature conservation.

This led to the integration of "nature conservation" into development projects, resulting in the concept of "Sustainable Development" (SD), which has since become a common goal for human survival and thriving lives globally. The SD in the widely recognized "SDGs" today originates from this concept of "Sustainable Development" from UNCED.

Figure 1 provides a sneak peek at the conclusion of my talk today: "The environmental impact assessment system can be the most effective policy for achieving both Nature Positive and Sustainable Development (SD). And for this to happen, the introduction of No Net Loss policies, the Mitigation Hierarchy, and biodiversity offsets are essential conditions."



EIA and No Net Loss policies are essential components (wheels) that, supported by the Mitigation Hierarchy and biodiversity offsets (the bar), drive the vehicle towards the goal of Nature Positive and Sustainable Development.

(Tanaka, 2024)

Figure 1 Environmental Impact Assessment and "Nature Positive"

2. Mitigation Hierarchy and Biodiversity Offsets

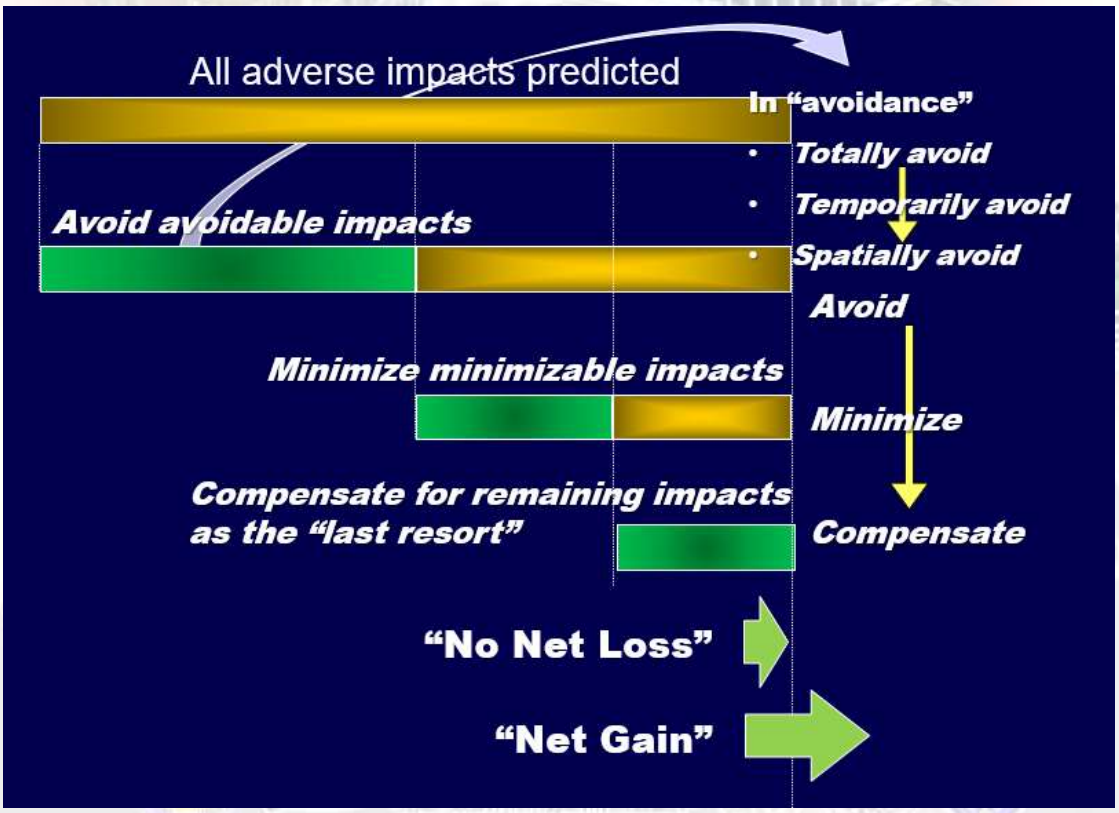
Figure 2 shows the Mitigation Hierarchy, which outlines the types and priority order of mitigation measures which are avoidance, minimization, and compensation to address the negative impacts predicted through an environmental impact assessment.

For example, if a proposed development project is expected to result in the loss of critical components of nature, the first consideration should be avoidance, such as stopping the development (no action) or changing the location of the development.

If avoidance is not feasible, the second step is to review minimization strategies, such as modifying the development plan to reduce the area of nature loss as much as possible.

For any residual impacts on nature that cannot be avoided or reduced, the final step is to consider compensatory mitigation measures. Compensatory mitigation involves actions by the developer to restore or create an equivalent amount of similar natural habitat in a nearby area to offset the loss caused by development. The goal is to maintain the overall state of nature within a project area, a target known as No Net Loss, which I will explain in more detail later. This concept of compensatory mitigation originated in the United States and later spread to Europe and Oceania, where it became known as biodiversity offset.

A strict adherence mitigation hierarchy, which consists of avoidance (including the "no action" plan), minimization, and compensation measures, is a prerequisite for biodiversity offset. It also serves as the basis for evaluating multiple alternative development plans in environmental impact assessments (EIA). This makes it an extremely important policy, forming the backbone of a functioning environmental impact assessment system.



(Tanaka, 1995)

Figure 2 Biodiversity offsets in the mitigation hierarchy

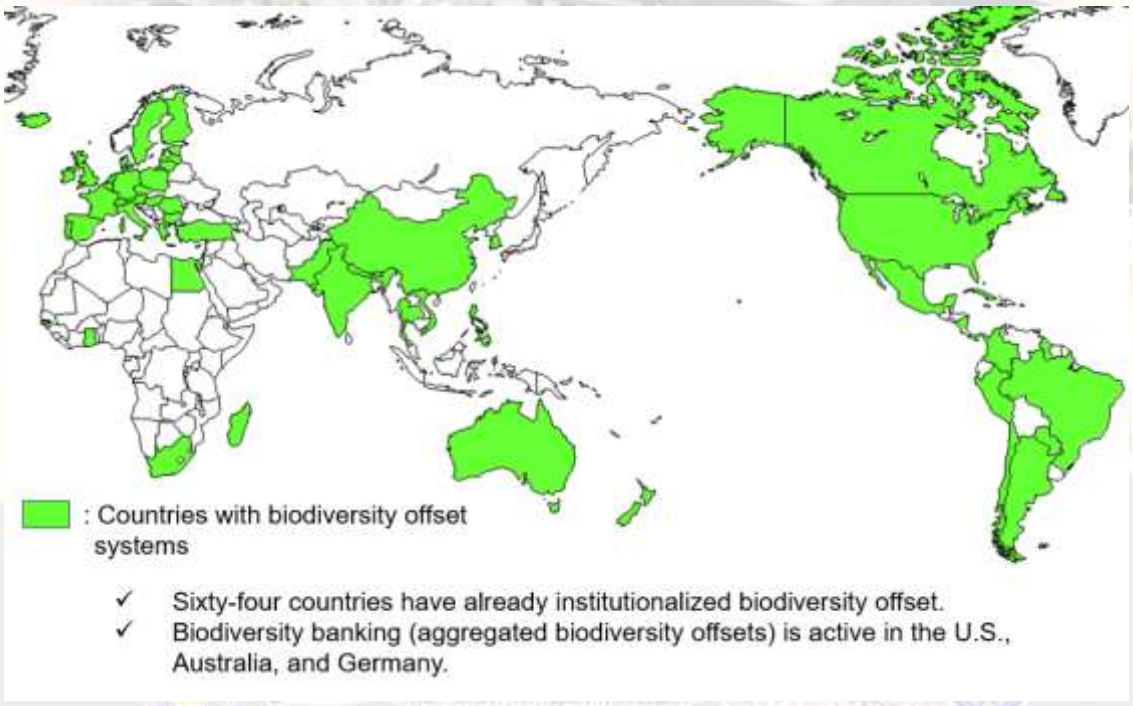
3. No Net Loss Target Underpinning Biodiversity Offsets

The No Net Loss target requires that the quality and quantity of nature in a given project area remain neutral before and after development using biodiversity offsets as a last resort, as shown in the second-to-bottom layer in Figure 2. It can be embedded within the environmental impact assessment system itself or established as a separate nature conservation policy. The No Net Loss target not only provides the rationale for mandating biodiversity offsets in development projects but also offers clear guidance on the extent to which offsets should be implemented, which can be a contested area for interpretation.

Realistically speaking, in any country, it is challenging to stop or change a development project once planned for the sake of nature because economic growth is generally prioritized over conservation. However, if the mitigation hierarchy and the No Net Loss target are enforced alongside the environmental impact assessment system, it becomes feasible to mandate various mitigation measures, including biodiversity offsets, for development projects that are expected to result in the loss of precious nature.

At the same time, the legal enforcement of this target encourages the early consideration of avoidance and minimization mitigation measures since biodiversity offsets can pose a significant economic and time burden for developers, therefore creating additional layer of positive incentives to make sure that the offsets are indeed pursued as the last resort as per mitigation hierarchy.

Figure 3 shows the countries that have institutionalized biodiversity offsets, which numbered over 60 as of 2010.



(Tanaka and Otaguro, 2010)

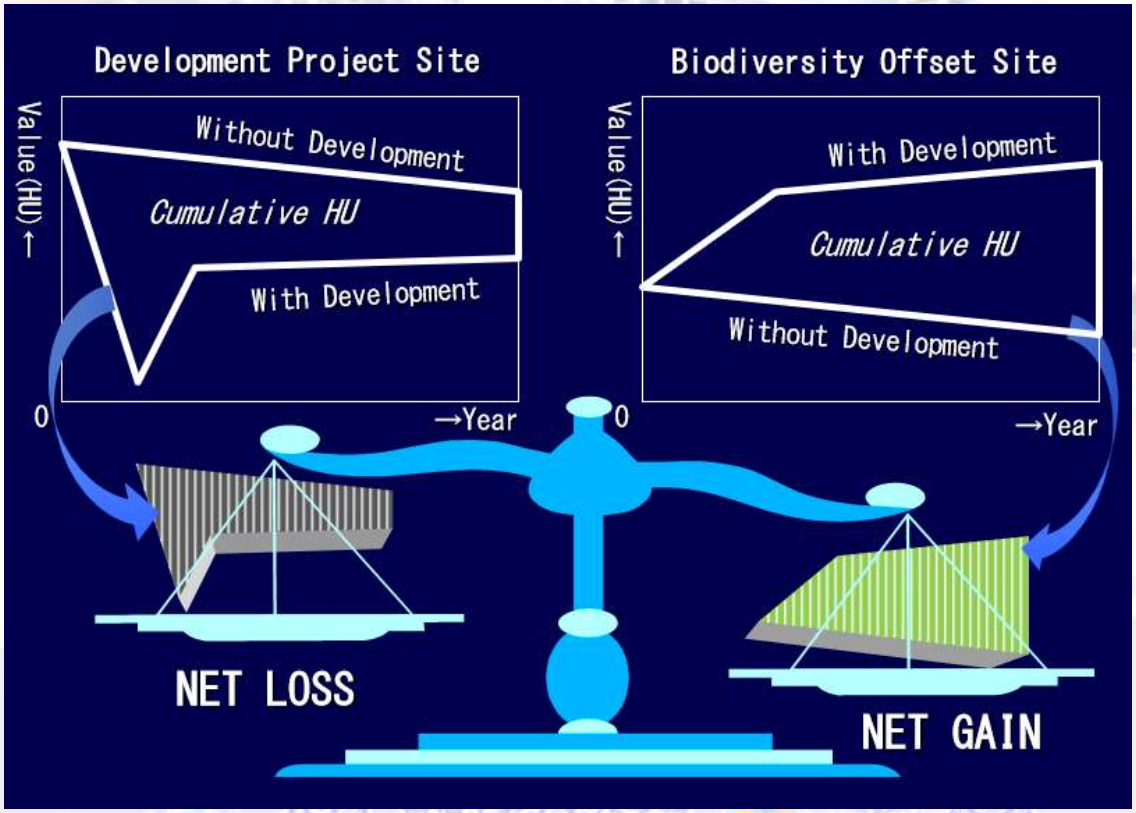
Figure 3 Countries that have institutionalized biodiversity offsets as of 2010

4. Quantitative Nature Evaluation Methodology: Habitat Evaluation Procedure, HEP

To determine whether a development project achieves No Net Loss, it is essential to biologically and quantitatively monitor both the loss of nature due to development and the gain in nature from biodiversity offsets. The Habitat Evaluation Procedure (HEP) is a prominent method for this assessment. Developed in the United States, HEP is the world's first biological and quantitative evaluation method used in environmental impact assessments.

Figure 4 illustrates the No Net Loss evaluation using HEP. The left side of the scale represents the loss of nature at the development site, while the right side shows the gain in nature at the biodiversity offset site. Both sides are quantified using HEP's characteristic metric of "quality × area × time" for wildlife habitats. If the right side is heavier than the left, it indicates a net gain. If the left side is heavier, it indicates a net loss. If both sides are balanced, it signifies No Net Loss.

HEP was the first method in the world to evaluate and compare the loss of nature from development with the gain from mitigation measures in a quantitative and biological manner using the "quality × area × time" metric. This provided a significant breakthrough in our approach to managing environmental impacts. I believe it will become increasingly important in evaluating our progress on the Nature Positive journey.



(Tanaka, 1998)

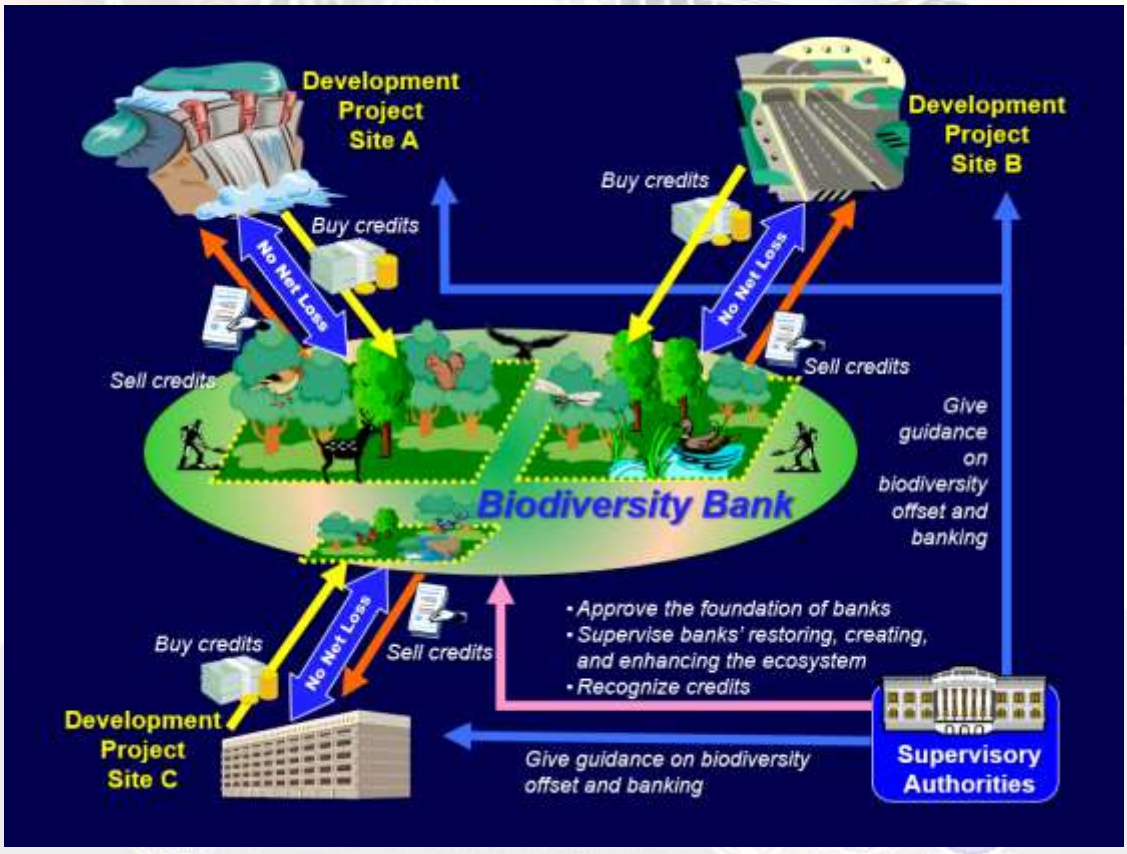
Figure 4 No Net Loss evaluation based on HEP

5. Biodiversity Bank

A "biodiversity bank" or "mitigation bank" is a scheme designed to address the problems arising from individual biodiversity offset projects pursued separately by each development project. It involves conducting nature conservation activities—such as restoration, creation, and preservation—on a large area secured prior to the commencement of development projects and then selling the units of conservation outcomes as credits to nearby developers who are mandated to implement biodiversity offsets.

A biodiversity bank has both ecological and other practical advantages over individual biodiversity offsets. Ecologically, implementing biodiversity offsets on a larger, contiguous piece of land ensures more resilient natural habitats. Developers can also enjoy practical benefits where they can fulfill their obligations by paying a specified amount of money to the biodiversity bank instead of carrying out complex and challenging biodiversity offset activities themselves. For the biodiversity bank operators, this approach can channel substantial funding into what was previously treated only as a cost, turning conservation into a viable business model.

The demand for and hence the market for biodiversity banks arises only when biodiversity offsets are legally mandated. Currently, biodiversity banking is thriving in countries like the United States, Germany, and Australia and is being considered for introduction in the United Kingdom and France.



(Tanaka, 2003)

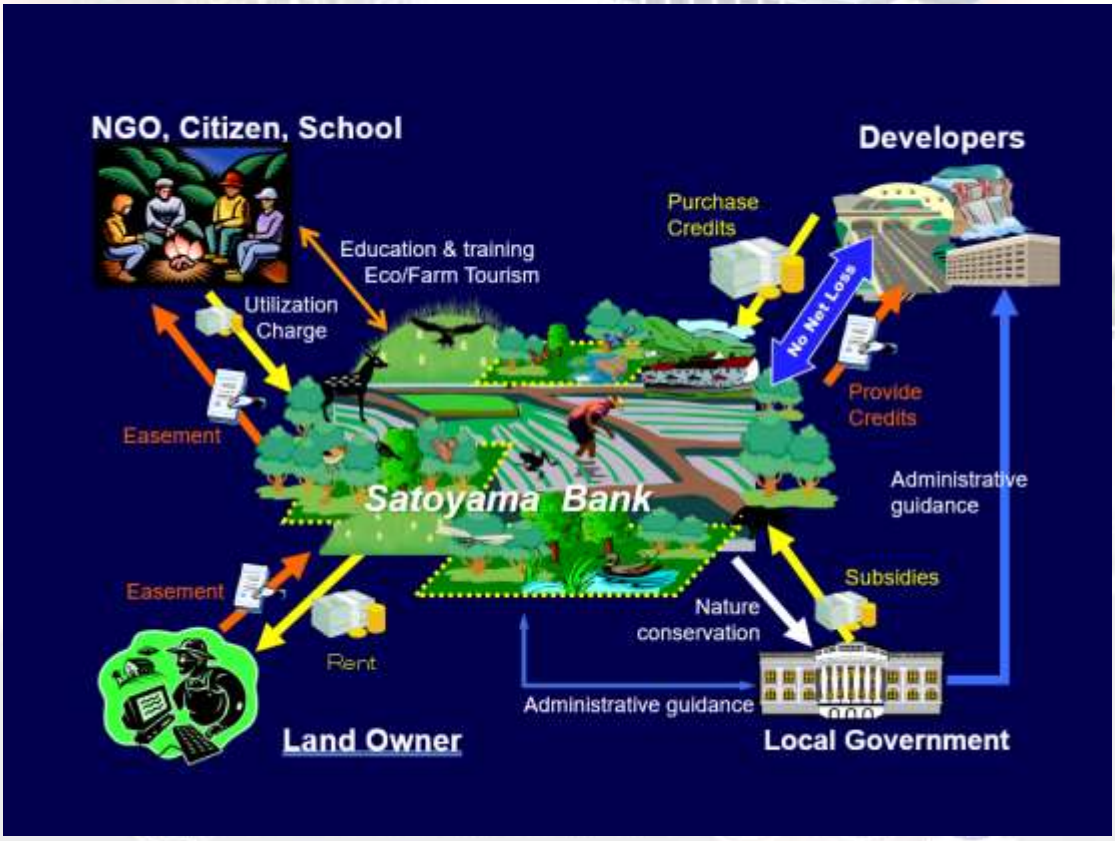
Figure 5 Biodiversity bank (Mitigation bank)

6. Satoyama Bank – A type of voluntary biodiversity bank prior to the institutionalization of offsets

In Japan, biodiversity offsets and banks are not yet legally mandated, meaning that local nature will keep on losing to arguments for economic growth. I proposed the "Satoyama Bank" as an interim measure until biodiversity offsets are legally mandated. "Satoyama" refers to secondary ecosystems, such as traditional rice paddies and coppice woodlands, which form the basis of Japan's natural environment.

Satoyama Bank aims to protect the remaining high-quality natural areas in a large contiguous area, such as a watershed, and achieve economic viability in its management. It brings together currently scattered conservation activities and support from companies, governments, universities, and NGOs to the Satoyama Bank area while also accepting voluntary biodiversity offsets pursued by nearby developers.

The first Satoyama Bank was established in 2022 in Chiba Prefecture, covering a 43-hectare Satoyama area. It is a voluntary biodiversity bank funded by a solar power plant developer. The bank integrates voluntary biodiversity offsets with various economic activities, such as traditional rice farming and forestry, eco-tourism, and rural tourism. I believe the Satoyama Bank can serve as an excellent model for other Asian countries as well.



(Tanaka, 2010)

Figure 6 Satoyama bank

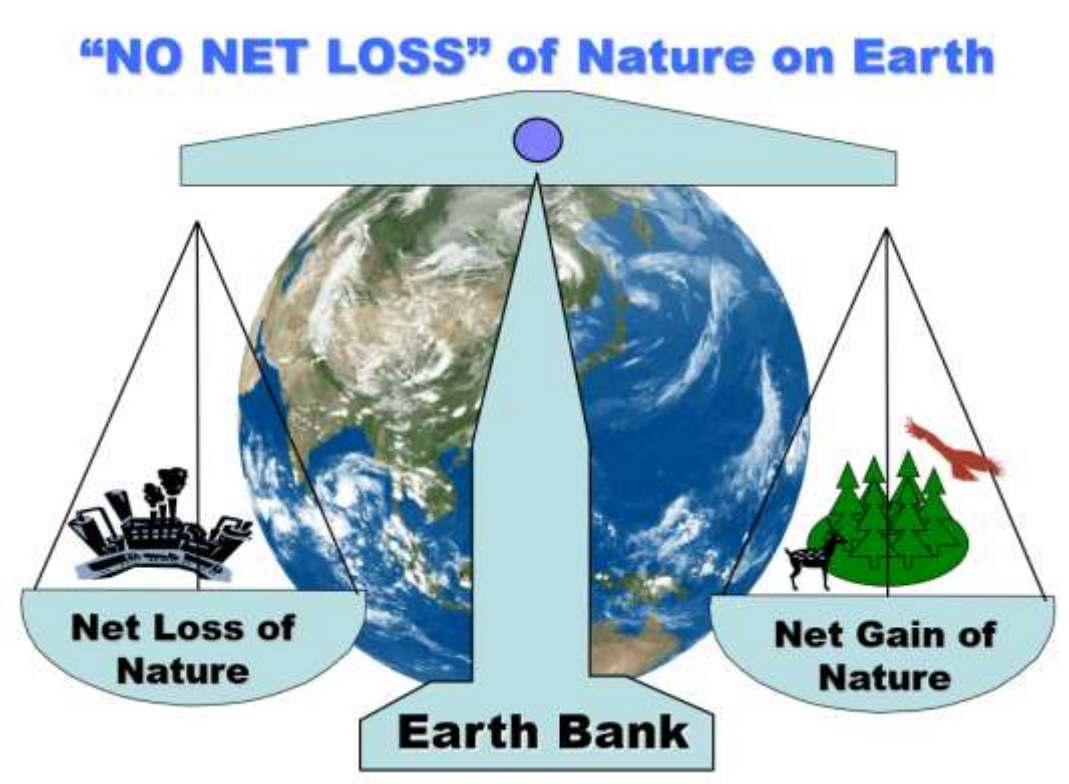
7. Proposal for an Earth Bank

Finally, returning to the discussion of global environmental issues, I propose the concept of an "Earth Bank," as illustrated in Figure 7 (Tanaka, 2010). The ultimate goal of the Earth Bank is to achieve No Net Loss of nature on a global scale.

As a preliminary step, the Earth Bank will provide real-time updates on the changes in the state of nature on the Earth's surface. Imagine that the area of nature on Earth in 2024 is set at 100%, with any increases or decreases displayed continuously on a global electronic billboard or a website, accessible on everyone's smartphones. This aims to address the current lack of widespread understanding regarding the urgency and seriousness of biodiversity conservation.

The goal of the Earth Bank is to create a global market for trading credits related to the loss and gain of nature, similar to the regional biodiversity banks mentioned earlier. Although it may sound like a dream, considering the reality of the accelerated loss of nature—the foundation of human survival—due to human activities such as development projects, I believe it is necessary to take action now.

Businesses can profit from investing in nature, thus creating economic incentives for scaling up conservation activities. This could change the traditional dichotomy of "economic development equals nature destruction" and address the "North-South divide" between developed and developing countries.



(Tanaka, 2010)

Figure 7 Concept of the Earth Bank

8. Conclusion: Environmental Impact Assessment for a Nature Positive Society

So far, I have demonstrated how an environmental impact assessment policy can contribute to sustainable development and building a nature-positive society on a global scale. I also emphasized that for this to happen, it is essential to incorporate the Mitigation Hierarchy into the EIA system, which requires biodiversity offsets as the last resort, alongside the No Net Loss target for nature conservation. Lastly, I introduced measures to support these efforts, such as biological and quantitative evaluation methods like HEP and the provision of economic incentives for businesses to invest in conservation activities through biodiversity banks and Satoyama banks. Furthermore, by operating an Earth Bank and a global, publicly accessible monitoring system that provides real-time updates on the net changes in the status of nature worldwide, the goals of No Net Loss and Nature Positive can be accelerated.

An effective environmental impact assessment system enables individual development projects to achieve No Net Loss. And without realizing No Net Loss in development projects, Nature Positive cannot be achieved. So having a well-functioning EIA system is imperative for a Nature Positive society. I hope that AIC2024 and the AICs in the coming years will serve as a bridge for environmental impact assessment systems and the Nature Positive journey of Asia.

I would like to conclude my talk by expressing my heartfelt gratitude once again to everyone involved in planning and organizing AIC2024. Thank you very much for your attention. Terima kasih atas perhatian Anda.

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TECHNICAL SESSION 1

ID : AIC 2024 A 001

THE INFLUENCE OF LEADERSHIP STYLE, ORGANIZATIONAL CULTURE, AND MOTIVATION ON ENVIRONMENTAL-BASED ORGANIZATIONAL PERFORMANCE: A CAUSAL STUDY AT PT. MALIGI PERMATA INDUSTRIAL ESTATE KARAWANG

Benny Yulius R. Tidja[1], Dian A. Purwandari[2], dan Guspri D. Artanto[3]
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ABSTRACT

Sustainable organizational performance is a major focus in the modern business world. This study aims to examine the influence of leadership style, organizational culture, and work motivation on environmental-based organizational performance at PT Maligi Permata Industrial Estate Karawang. This research uses the Structural Equation Modeling (SEM) method by involving employees as samples. The results of the study are expected to provide insight into how leadership, organizational culture, and motivation contribute to the achievement of superior and sustainable performance, especially in the context of environmental sustainability. This research will also make a significant theoretical contribution to the academic literature regarding the interaction between leadership, organizational culture, and motivation in the context of environmental sustainability, as well as provide practical implications for companies in designing more effective policies and programs to improve environmental-based performance.

Keywords: Organizational performance, leadership style, organizational culture, work motivation, environmental sustainability, Structural Equation Modeling (SEM).

ID : AIC 2024 A 029

THE ENVIRONMENTAL CONCERN OF INFLUENCES AND INTENTION TO ACT OF ELECTRIC VEHICLES

Hery Susanto [1], Nadiroh [2], and Henita Rahmayanti [3]
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ABSTRACT

The use of electric vehicles has been proven to reduce carbon emissions and be an environmentally friendly solution for energy use in the transportation sector. Therefore, the development of the battery and electric car industry in Indonesia must continue to be encouraged with a mature strategy, implementation of appropriate quality management methods, and support from conducive government policies. This research aims to determine organizational culture and the influence of environmental concerns on the intention to act regarding electric vehicles among Jakarta Special Regional Government employees to use battery-based electric vehicles. The research was conducted within the Regional Secretariat of the Jakarta Special Region Provincial Government. The population in this study consisted of all echelon I, IIA, IIB, IIIA, and IIIB employees. This research method is a survey method with a quantitative-causal approach. This research design is grouped into descriptive research to provide an overview of the phenomena that occur factually in Jakarta Special Region Provincial Government Employees regarding the influence of Organizational Culture and environmental concern on the intention to act regarding electric vehicles of Jakarta Special Region Provincial Government Employees.

Based on these results, it can be concluded that to develop the intention to act regarding electric

vehicles, factors such as organizational culture and environmental awareness need to be improved

because the higher the organizational culture and environmental awareness, the greater the impact on the intention to act regarding electric vehicles.

Keywords: Intention to act electric vehicles, organizational culture, environmental concern

ID : AIC 2024 A 013

EFFECTIVENESS OF THE MAGGOT CULTIVATION PROGRAM IN REDUCING HOUSEHOLD CARBON EMISSIONS IN THE COMMUNITY: A CASE STUDY OF "MAGGOT CULTIVATION IN NORTH JAKARTA"

Agnesia Putri[1], Dian A. Purwandari[2], and Nadhiroh Azizah[3]
1,2,3 Postgraduate Program, State University of Jakarta, Indonesia

ABSTRACT

The presence of waste in human life today often becomes a disaster for society, especially in Indonesia. Waste management has not become part of daily life for the community and is often considered solely a government issue. Law No. 18 of 2008 defines waste as the remnants of human activities or natural processes in the form of solid or semi-solid materials, either organic or inorganic, which are considered useless and discarded into the environment. Government Regulation No. 81 of 2021 mandates that everyone reduce and manage waste through waste reduction, recycling, and waste handling. Although regulations are in place, data shows that the amount of waste generated in Indonesia in 2023 reached 23,375,260.34 tons per year, with Jakarta contributing 13% of the national total. Most of this waste comes from household activities. Various waste management methods have been attempted, including composting, and maggot (Black Soldier Fly larvae) cultivation. Maggot cultivation has proven effective in several programs in Jakarta, but its success in reducing overall emissions still requires more studies and broader implementation, particularly linking maggots to the amount of carbon that can be reduced.

Keyword: Waste, Waste Management, Organic Waste, Maggot (Black Soldier Fly Larvae), Carbon Emissions, Organic Waste Management Method

ID : AIC 2024 A 017

PREVENTING ENVIRONMENTAL DAMAGE THROUGH THE MERDEKA MENGAJAR PLATFORM (PMM) AS A MAINSTREAM MOVEMENT

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Abstract

The escalating environmental damage in Indonesia necessitates a novel approach that integrates education and tangible action. The Merdeka Mengajar (PMM) platform presents an opportunity to incorporate environmental education into the school curriculum by leveraging technology and innovative pedagogical methods. Teacher-Leaders, as key agents of change within the education system, play a pivotal role in this implementation. The primary challenge lies in the low awareness and understanding of environmental issues among both educators and students, leading to a lack of initiative and concrete action. This research aims to assess the level of awareness among Teacher-Leaders regarding environmental issues before and after using PMM, analyze changes in their behavior and actions related to environmental conservation, and identify the factors that influence the effectiveness of PMM in this context. This research used a qualitative approach involving Teacher-Leaders from several high schools in Jakarta as samples. Data were collected through in-depth interviews, field observations, and analysis of relevant learning materials. The research results show that PMM contributes significantly to increasing the awareness of teachers toward environmental issues. Apart from that, PMM also encourages changes in behavior and real action for teachers to implement environmentally friendly practices in their schools and communities. PMM can be effective for environmental education if supported by adequate resources, including teaching materials and modules, technology and infrastructure, training and professional development, financial support, collaboration and networking, and partnerships with environmental organizations.

Keywords: Independent Curriculum; Teacher-Leaders; Environmental Education; Merdeka Mengajar Platform.

ID : AIC 2024 A 022

TANTANGAN DAN PELUANG *GREEN JOBS* DI INDONESIA:

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ABSTRAK

Green jobs adalah pekerjaan yang berfokus pada industri atau sektor yang memprioritaskan keberlanjutan lingkungan dan pengurangan jejak karbon. Pekerjaan ini seringkali terkait dengan upaya untuk melindungi atau memperbaiki lingkungan, mengurangi emisi gas rumah kaca, meningkatkan efisiensi energi, dan mengembangkan teknologi terbarukan. Contoh pekerjaan dalam bidang ini termasuk instalasi panel surya, desain arsitektur berkelanjutan, penelitian energi terbarukan, manajemen limbah, transportasi ramah lingkungan, dan lain-lain. Konsep green jobs terus berkembang seiring dengan meningkatnya kesadaran akan perlunya bertransisi ke ekonomi yang lebih berkelanjutan secara lingkungan. Masuknya *green jobs* memiliki dampak yang positif, tidak hanya pada arus produksi barang dan jasa saja melainkan juga pada tingkat kualitas lingkungan, ketersediaan sumber daya alam, dan juga pada pertumbuhan ekonomi. Hubungan yang terjadi antara antara jumlah penduduk, pertumbuhan ekonomi, barang sumber daya, barang sumber daya alam dan lingkungan dan *green jobs* adalah dengan berkembangnya jumlah penduduk, perekonomian pun harus lebih banyak menyediakan barang dan jasa demi mempertahankan atau bahkan meningkatkan taraf hidup bangsanya. Pekerjaan yang layak dan ramah lingkungan dimaksudkan untuk mengurangi dampak lingkungan yang timbul akibat dari perusahaan-perusahaan dan sektor ekonomi hingga ke tingkat yang mampu melestarikan lingkungan hidup. Dalam hal ini yaitu mencakup pada pekerjaan yang dapat membantu melindungi ekosistem dan biodiversitas, mengurangi energi, materi, dan konsumsi air melalui strategi yang memiliki tingkat efisiensi yang tinggi, dekarbonisasi perekonomian, serta mengurangi atau mencegah pembuatan segala bentuk limbah dan polusi.

Kata kunci: tantangan dan peluang; *green jobs*.

ID : AIC 2024 A 033

THE DILEMMA OF CRYPTO VS ENVIRONMENTAL SUSTAINABILITY IN DEVELOPMENT

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ABSTRACT

Crypto and the environment in the discourse of sustainable development are often positioned as two opposing entities. This is because, amid the rising value of Crypto, it is considered a threat to the environment and disrupts economic recovery during the ongoing global financial crisis. In fact, current issues require crypto instruments for fund distribution and monitoring, and to attract investor involvement through high returns. From this phenomenon, we feel the need to further examine the trajectory of Crypto, which ultimately falls into a dilemmatic framework. It is contrasted with the concept of the environment within the discourse of sustainable development. Therefore, this research uses the phenomenological method and requires a critical approach to explain the reality shaped by historical, social, economic, and ecological processes. The data collection method uses a Literature Study approach, sourced from various books, government documents, published reports, and all other types of relevant information sources to build a critical review of the targeted topic. We find that the Crypto mining process, which requires high energy, is often considered a significant carbon contributor. However, with the acceleration of the world's energy transition program, Crypto miners are starting to use renewable fuels and engage in environmentally friendly financing. These findings indicate that Crypto and sustainable development can support each other, especially in financing and investing in environmental projects.

Keywords: Sustainable Development, Crypto, and Green Finance

ID : AIC 2024 A 030

IMPLEMENTATION OF THE GREEN ECONOMY IN EFFORTS TO INCREASE COMMUNITY DOMESTIC INCOME

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ABSTRACT

From various description in on, can concluded that draft Green economy is a concept of economic development based on environmental sustainability. Green economy is a concept of economic behavior that pays attention to economic growth along with the concept of preventing damage environment natural And decreasing quality environment. Which resulting in increased human welfare and social welfare. One concept of preserving the environment is through the use of home yard land which can be used according to tastes and desires, for example by planting plants productive like plant horticulture And drugs. And role in preserving the environment in the form of coolness, freshness, beauty, biodiversity, and even helping to mitigate greenhouse gases in residential areas in a sustainable manner. Not only that, the use of yard land currently focuses on cultivating vegetables that can meet family needs and are sold to increase family income. By preserving the environment, family income increases, human welfare and social welfare will be fulfilled.

Keywords:
Green Economy; Community Domestic Income; and Environment.

ID : AIC 2024 A 031

SUSTAINABLE ENVIRONMENTAL MANAGEMENT ANALYSIS IN ONLINE MEDIA (CASE STUDY OF KUMPARAN)

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Abstract

This study aims to identify and analyze the sustainable environmental management practices implemented by the online media platform Kumparan. This case study highlights policies, strategies, and operational practices related to environmental management as well as their sustainability impacts and performance. The research methodology employed includes content analysis and in-depth interviews with relevant stakeholders at Kumparan. Data were collected through policy documents, surveys, and interviews to gain a comprehensive understanding of environmental management efforts. The results indicate that Kumparan has clear environmental policies and measurable performance targets. The implementation of these policies encompasses various initiatives such as energy management, waste management, and emission reduction programs. Performance evaluation shows a significant improvement in the effectiveness of environmental management. Recommendations for further improvements are also presented based on the research findings.

Keywords: Sustainable environmental management, online media, Kumparan, environmental policy, performance evaluation.

ID : AIC 2024 A 032

PRO-ENVIRONMENTAL BEHAVIOR IN DOMESTIC WASTE WATER UTILIZATION AS FORM CLIMATE VILLAGE MANAGEMENT AT DESA TLAJUNG UDIK KECAMATAN GUNUNG PUTRI KABUPATEN BOGOR PROVINSI JAWA BARAT

Gandring Suryo Marenda

Abstract

Public understanding of environmental concerns is fundamental, so it is necessary to apply pro-environmental behavior to provide public knowledge of the importance of sustainable environmental management, which is the domestic wastewater utilization as a component of climate assessment and can used for watering plants or infiltration. Therefore, pro-environmental behavior and domestic wastewater utilization support the Climate Village program activities, which have become a prestigious national-level event in environmental management.

Keyword: Domestic Wastewater, Utilization, Pro-Environmental Behavior, Climate Village

ID : AIC 2024 A 023

ROLE THE WOMEN AND DEMOCRACY IN SUSTAINING FOREST INDONESIA: A DYNAMIC PANEL APPROACH

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ABSTRACT

Women's participation and democracy are two important issues raised in this study, as the causes of deforestation are investigated in relation to economic and technological variables. Using the EKC conceptual framework and IPAT approach, deforestation per capita as a proxy for environmental variables. The method used is a dynamic panel approach based on 8 years of regional data, which accommodates adjustments to per capita deforestation, which is influenced by long-term behavior and data diversity in the regions in Indonesia. The results of this study show that the role of women in parliament is positive, but when the role is quadratic, it can reduce deforestation. This confirms that the role of women has not yet reached its peak, still in the early stages of women's contribution so that it has not been able to reduce deforestation. Similarly, income per capita is positively related to deforestation per capita, meaning that economic and social success in Indonesia has not been able to improve environmental sustainability. Meanwhile, democracy proxied by using a comprehensive democracy index has a higher contribution than the role of women. The variable that has the largest contribution to reducing deforestation per capita in Indonesia is technology.

Keywords: deforestation, women, democracy, technology, dynamic panel

ID : AIC 2024 A 012

TAR DERIVED FROM MUNICIPAL SOLID WASTE (MSW): COMPOSITION ANALYSIS AND POTENTIAL APPLICATIONS

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ABSTRACT

Gasification technology has promising prospects in processing municipal solid waste (MSW) into energy. The main gasification product produced is syngas which is utilized as an energy source. However, the gasification process still causes contaminants (by-products) such as tar. Tar is a thick liquid which is a mixture of various heavy hydrocarbon molecules and aromatic compounds. The compound components in tar have the potential to contaminate the environment if not managed properly. This study aims to identify the compound components in MSW gasification tar. Tar samples were extracted using organic solvents and analyzed by GC-MS, FT-IR, and XRF. The results showed that the Tar from MSW gasification contained many alkane and polycyclic aromatic compounds. Tar has the potential to be utilized because it mostly has paraffin-like compound components. This study analyzed further utilization and mitigation strategies of tar based on the compounds in it.

Keywords: gasification, municipal solid waste, tar, compound

ID : AIC 2024 A 038

THE IMPACT OF ENVIRONMENTAL LEADERSHIP OF COMPANY LEADERS IN INDUSTRIAL (DESIGNATED) AREAS OF BREBES REGENCY ON ENVIRONMENTAL PRESERVATION

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ABSTRACT

The aim of this research is to determine 1) the positive impact of the development of industrial designated areas in Brebes Regency, 2) the impact of environmental leadership of company leaders in industrial (allocated) areas on environmental preservation in Brebes Regency. The benefits of this research are very important an strategic as policy input in developing areas intended for healthy and comfortable industry, so that residents living in these areas can experience and obtain a higher quality environment. From this research, it is hoped that output can be obtained in the form of articles that can be published in both national and international journals. The research results show that company leaders in the Brebes Industrial Area have environmental leadership that is very pro-environment. However, their real actions in preserving the environment are in the low category. Thus, it can be concluded that the environmental leadership of company leaders in industrial designated areas has a low impact on environmental preservation in Brebes Regency.

Keywords: Environmental Leadership, Company Leaders, Environmental Conservation.

TECHNICAL SESSION 2

ID : AIC 2024 A 003

ENVIRONMENTAL MANAGEMENT STRATEGY ON SMALL ISLANDS BASED ON SUSTAINABLE DEVELOPMENT GOALS (SDGs)

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ABSTRACT

Small islands are often vulnerable to environmental changes, which can harm the ecosystem and the sustainability of the lives of the island's residents. Small island Environmental management strategies must be based on the Sustainable Development Goals (SDGs). An SDG-based environmental management strategy for small islands is essential and relevant because small islands are often vulnerable to climate change and other environmental challenges. By implementing the SDGs, small islands can ensure that their environmental management is sustainable for the long term and in line with global sustainable development goals. This research aims to identify the elements that have the most influence on SDGs-based environmental management in the small island area of the Spermonde Islands. This research discusses environmental management strategies on small islands based on SDG goals through Interpretative Structural Modeling (ISM) analysis. The research results show that out of the 17 sub-elements of the SDGs, three factors have a dominant role, namely (1) eradicating poverty, (2) creating a healthy and prosperous life, and (3) ensuring the availability of clean and affordable energy. It is hoped that implementing SDGs-based environmental management strategies on small islands can maintain the sustainability of island ecosystems, improve community welfare, and protect the environment for future generations.

Keywords: small islands, SDGs, environmental management

ID : AIC 2024 A 004

RESIDENTS' WASTE SEPARATION BEHAVIORS AFTER THE ABOLITION OF ZERO-COVID POLICY: CASE OF SHANGHAI CITY, CHINA

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ABSTRACT

Shanghai, which is China's largest and most urbanized city, has made significant efforts to set a good example in overcoming the challenge of managing municipal solid waste (MSW). In mid-2019, Shanghai introduced the "Shanghai Model," which achieved significant results in waste management. However, due to the arrival of the COVID-19 pandemic, the implementation of this policy experienced three years of "semi-stagnation." In December 2022, the Chinese government finally abolished the "zero-COVID policy" and released the Shanghai "zero-waste city" construction work plan. Against this backdrop, this research primarily explores how people's attitudes toward waste classification have changed in the post-pandemic era and which factors have had the most significant impact. Specifically, drawing from theories like the Theory of Planned Behavior (TPB) and pro-environmental behavior models, a new theoretical model is developed, incorporating the influence of the pandemic. This model is used as the basis for designing and collecting questionnaire data for analysis. Structural Equation Model (SEM) and Repeated measures analysis of variance (ANOVA) will be used for analysis. Results show that while the increase in residents' separation behavior provides a good foundation for achieving the 2025 plan to build a zero-waste city in Shanghai, the government needs to address the inefficiency of related regulations and incentives and make adjustments to relevant policies.

Keywords: Waste Separation Policy; Covid-19 Pandemic; Post-Pandemic era; Zero-Waste City Construction Plan; Repeated Measures Analysis of Variables(ANOVA); Structural Equation Model（SEM）

ID : AIC 2024 A 005

DEVELOPMENT OF FRAMEWORK FOR DECISION SUPPORT INTEGRATED IMPACT ASSESSMENT PLATFORM AND APPLICATION TECHNOLOGY FOR CLIMATE CHANGE ADAPTATION (DIRECTION)

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ABSTRACT

In South Korea, climate change is advancing faster than the global average, leading to more frequent natural disasters such as heatwaves, intense colds, floods, and droughts. Since 2010, South Korea has implemented national adaptation plans addressing various sectors individually. Climate change impacts multiple sectors, including health, ecosystems, and agriculture, with the IPCC highlighting the interconnected effects across all sectors. This underscores the need for an integrated climate change assessment model to inform environmental policy by considering sectoral interactions during adaptation planning. There is a growing necessity to aid policymakers in evaluating climate change policies and developing resilient strategies. Consequently, creating climate change impact assessment models for sectors like health, water management, agriculture, forestry, ecosystems, and industry, and developing integrated models based on intersectoral linkages, is crucial. Policymakers should receive information quantifying the risk reduction effects of adaptation plans, alongside the co-benefits of mitigation plans. To address these needs, the "Development of a framework for decision support integrated impact assessment platform and application technology for climate change adaptation (DIRECTION)" project has been underway since 2022. The project aims to: 1) develop intra- and inter-sector linkage scenarios, 2) assess climate change impacts based on these scenarios, 3) create an evaluation module for the risk reduction effects of adaptation measures, and 4) develop a decision support platform with scientific data. Key steps include developing high-resolution climate scenarios for the Korean Peninsula, building sectoral models, assessing impacts, and creating a user-friendly platform for various stakeholders. The platform will help establish effective national adaptation policies, create jobs in the climate adaptation sector, and provide a scientific basis for integrated climate risk management.

Keywords: climate impact assessment, integrated modeling, MOTIVE, decision support system

This paper is based on the findings of the research project “Development of framework for decision support integrated impact assessment platform and application technology for climate change adaptation (2024-012(R))” which was conducted by the Korea Environment Institute (KEI) and funded by the Climate Change R&D Project for New Climate Regime (Project No. 2022003570007) of the Korea Ministry of Environment.

ID : AIC 2024 A 006

DEVELOPMENT OF METHODOLOGIES FOR ANALYZING THE CLIMATE RISK REDUCTION EFFECTS OF CLIMATE CHANGE ADAPTATION MEASURES: DROUGHT ADAPTATION PLANS IN WATER MANAGEMENT SECTOR

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ABSTRACT

Climate change exacerbates the frequency and intensity of extreme weather events, significantly impacting human societies and ecosystems. Increasing the odds of droughts, in particular, deteriorates water supply and quality, as evidenced by one of the most severe droughts in South Korea in 2022, which notably affected Jeolla Province. This underscores the urgent need for effective adaptive responses. While systematic efforts have been made to develop and implement adaptation policies, there is a lack of established methodologies for evaluating the effectiveness of individual policy implementations. This study aims to develop a methodology for assessing the climate risk reduction effects based on "The Third National Climate Change Adaptation Plan" and detailed implementation plans of local governments, with a focus on drought in South Korea. Our methodology involves selecting adaptation measures, collecting relevant data, and conducting regression analysis to estimate parameters. To utilize statistical techniques effectively, we prioritize measures with accessible data. We then derive parameters corresponding to adaptation options, which serve as proxies for the adaptation policies, to evaluate the risk reduction effects. In cases where data availability is limited, we adopt a literature review approach to evaluate the effects. This integrated methodology, we have established a framework to verify the risk reduction effects applicable to various adaptation options.

Keywords: climate change, climate change adaptation, climate risk reduction effect

Acknowledgement: This paper is based on the findings of the research project "Development of framework for decision support integrated impact assessment platform and application technology for climate change adaptation (2024-012(R))" which was conducted by the Korea Environment Institute (KEI) and supported by Korea Environment Industry &Technology Institute(KEITI) through "Climate Change R&D Project for New Climate Regime.", funded by Korea Ministry of Environment(MOE) (Project No. RS-2022-KE002152).

ID : AIC 2024 A 007

THREE FUNCTIONS OF "NATURE'S CONTRIBUTION TO PEOPLE" AND FORMING CONSERVATION BEHAVIORAL INTENTIONS FOR LOCAL WATER ENVIRONMENT

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ABSTRACT

This study aims to clarify how the three functions of water environments: regulating NCP, material NCP, and non-material NCP, constructed based on the concept of "nature's contribution to people" (Diaz et al., 2018) proposed in the IPBES, contribute to the formation of local residents' behavioral intention to conserve water environments, using Lake Kasumigaura as the survey area. Specifically, data from a questionnaire survey of residents in the Kasumigaura district of Kasumigaura City, Ibaraki Prefecture, a coastal area of Lake Kasumigaura, were analyzed using factor analysis, multiple regression analysis, and structural covariance analysis to examine the formation process of conservation behavioral intentions, including the three functions. As a result, two types of conservation behavioral intentions were obtained, one at the individual level and the other at the group level. In addition, the formation of these two conservation behavioral intentions were related to conservation awareness and attachment to Lake Kasumigaura, conservation awareness of the water environment, and favorable perception of the living community. Furthermore, the regulating NCP directly influenced the conservation awareness and attachment to Lake Kasumigaura, while the non-material NCP directly influenced the conservation awareness to Lake Kasumigaura and the water environment. Each of the three values interacted with each other, and the structure was maintained by the interaction among the three values. Thus, the three values are considered to be important in process of forming conservation behavioral intentions. Therefore, it is suggested that in promoting residents' conservation behavioral intentions, attention should be paid not only to conservation awareness, attachment, and favorable perception, but also to environmental functions such as “nature’s contribution to people.”

Keywords: NCP, Water Environment Conservation, Behavioral Intention

ID : AIC 2024 A 008

ANALYSIS OF PHYSICAL ENVIRONMENTAL FACTORS ON $PM_{2.5}$ CONCENTRATION AT STREET LEVEL IN URBAN AREAS

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ABSTRACT

Fine particulate matter ($PM_{2.5}$), one of the major air pollutants in urban areas, significantly impacts the health of city residents. The spatial distribution and dispersion of $PM_{2.5}$ are closely related to urban landscape patterns. Pedestrian paths along major streets are fundamental public spaces in cities, but exposure to $PM_{2.5}$ from traffic is most frequent at the pedestrian level. This study aims to analyze the physical urban factors that influence $PM_{2.5}$ concentrations along these roads and to determine which factors have the greatest impact. The study focuses on Woni streets in Changwon, South Korea, which features various types of land cover. Using the ENVI-met microclimate modeling program, we extracted meteorological data such as $PM_{2.5}$ concentration, wind speed, and temperature. Field measurements were conducted at the site to validate the model outputs. We also identified physical factors using ArcGIS Pro. Correlation analysis was conducted on the extracted data. The results showed that areas with small streams had relatively lower $PM_{2.5}$ concentrations, even in similar physical environments. Additionally, higher amounts of vegetation along pedestrian paths were associated with lower $PM_{2.5}$ concentrations. These findings can serve as valuable data for urban planning, helping to identify the key physical elements that should be managed to minimize the impact of $PM_{2.5}$ on the health of city residents.

Keywords: fine particulate matter, urban landscape patterns, urban planning, envi-met

ID : AIC 2024 A 009

ASSESSMENT METHOD FOR SMALL GREEN SPACES IN URBAN AREAS USING SATELLITE DATA AND LINEAR COMBINATION MODEL

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ABSTRACT

In recent years, following the adoption of the "Kunming-Montreal Global Framework for Biodiversity" (The Conference of the Parties, 2022), the importance of urban green space has been pointed out in many countries. In Japan, the "Biodiversity Strategy 2023-2030" (Ministry of the Environment, 2023) was approved by the Cabinet, and the importance urban green space is mentioned in the first basic strategy. Different from forests and farmlands, which are typical green spaces, residential planting and street trees are difficult to identify because of their small size. Meanwhile satellite data is one of effective tools in assessing micro urban green. Based on this, the optimal mesh size for evaluating green space for each land use zoning was derived using the normalized difference vegetation index (NDVI), which can be calculated from satellite data, and the green cover ratio was calculated from the regression equation between the amount of green space by visual decipherment and the NDVI (Miyazaki, 2022). In this study, the urban green cover ratio was calculated using a linear combination model as another method of calculated the green cover ratio. The optimal mesh size obtained in this study was applied. As a final part of our conclusions, we have conducted a validation of the green space assessment results.

Keywords: urban green, NDVI, satellite image,

ID : AIC 2024 A 010

COMPARATIVE ANALYSIS OF SUSTAINABILITY-RELATED DOCUMENTS FOR LARGE-SCALE EVENTS: CASE OF TOKYO 2020 OLYMPICS AND EXPO 2020 DUBAI

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ABSTRACT

In the realm of large-scale international events, the concept of sustainability has emerged as a critical focus in recent years. This study examines sustainability-related documentation for the Tokyo 2020 Olympics and EXPO 2020 Dubai. These events were chosen due to their recent occurrence, and both utilized the same Global Reporting Initiative (GRI) framework in their sustainability reports. Relevant official and academic documents were collected and analyzed using a systematic review, followed by text mining and correspondence analysis. The findings fill the literature gap concerning the comparability of different event types under a unified sustainability framework, aiming to provide insights into the pre- and post-event focus on sustainability indicators in large-scale events. The analysis revealed a significant shift in the focus of academic documents from socioeconomic issues to health and ethics, while the official documents exhibited a more modest increase in attention to health and ethics. This shift is partly attributed to the outbreak of COVID-19. Additionally, this research outlined the underrepresentation of specific sustainability indicators in both official and academic documents, suggesting areas for future research.

Keywords: Sustainability Focus, Large-scale Events, Tokyo 2020 Olympics, EXPO 2020 Dubai.

ID : AIC 2024 A 011

ANALYSIS OF THE BIODIVERSITY OFFSET PLAN FOR THE SARULLA GEOTHERMAL DEVELOPMENT PROJECT

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ABSTRACT

The Sarulla Geothermal Development Project in North Sumatra, Indonesia, represents a significant advancement in the country's renewable energy strategy, focusing on geothermal energy to reduce greenhouse gas emissions and enhance energy security. However, large-scale infrastructure projects pose potential risks to local biodiversity, including habitat loss and ecosystem disruption. This research critically analyzes the biodiversity offset plan implemented for the Sarulla project by reviewing the project documents and other relevant literature to draw a comparison. Utilizing the Habitat Hectares method based on the Business and Biodiversity Offsets Programme (BBOP) guidelines, a third-party consultant named ERM conducted a comprehensive habitat assessment using habitat hectares as a reference. The result of their calculation was that around 60.1 ha of biodiversity was lost in the project's development phase, but after the offset project, around 105.67 ha of biodiversity was recovered. Due to the results, this offset was declared a success in achieving no net biodiversity loss. However, while the Sarulla project's offset plan achieved its immediate objectives, some critique can be made regarding the habitat assessment method. Compared to other existing methods, the chosen process can be considered too simplistic for analysis. Adopting more sophisticated and detailed methodologies is essential for more robust conservation outcomes. Advanced assessment techniques provide a nuanced understanding of ecosystems and biodiversity, ensuring offset activities are effectively tailored to specific ecological needs. Refining these assessment methods will enhance the effectiveness of biodiversity offsets in Indonesia, leading to better preservation of the country's rich and diverse natural heritage. This study provides insights for future large-scale development projects, emphasizing Indonesia's need for rigorous and science-based conservation strategies.

Keywords: Biodiversity Offset, Habitat hectare, No Net-Loss

TECHNICAL SESSION 3

ID : AIC 2024 A 014

CONTENT ANALYSIS ON PUBLIC COMMENTS FOR EIA IN JAPAN

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ABSTRACT

Public participation plays an important role in EIA in terms of better decision-making and building meaningful consensus with the public, including residents and governments. Moreover, one of the major methods for public participation is the comments submitted from the public to the project developers. The focus of this paper is to clarify the contents of comments in Japan and their temporal change within 43 years. Therefore, this paper aims to contribute to a better understanding of public interests which leads to effective and practical public participation. The data of the past comments submitted to national-scale EIA projects implemented between 1980 and 2022, which were recorded by the Japanese Ministry of the Environment, were deeply looked into in this paper. Latent Dirichlet Allocation, one of the unsupervised machine learning algorithms for topic modeling, was used to classify the contents of comments into topics.

The contents of the classified topics were observed, by applying various textual mining methods. Moreover, the changes in the topic distribution of comments over time were examined. The results observed show that there were several topics mainly discussed by the public through comments, and the proportion of topics in

comments has shifted in years due to contextual backgrounds in different periods of Japanese EIA deployment.

Keywords: public participation, comments, topic modeling, textual mining

ID : AIC 2024 A 015

CONTENT ANALYSIS ON CUMULATIVE IMPACT ASSESSMENT IN THE US

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ABSTRACT

The implementation of environmental impact assessment is important to avoid significant environmental impacts from projects and plans and to ensure that appropriate environmental considerations are made.
There are two types of impacts to be assessed in environmental assessment: direct impacts caused by individual projects and cumulative impacts caused by the combined effects of multiple projects. While some countries have been started to assess cumulative impact in their EIA systems, methods for assessing cumulative impacts is still unclear. For Environmental Impact statements for wind and photovoltaic projects in the US, we analyze the content of assessment results, such as evaluation items, temporal and geographical boundaries, other actions which should be considered.

Keywords: cumulative impact, wind farm, photovoltaic project, United States

ID : AIC 2024 A 016

DISTRIBUTION CHARACTERISTICS OF HEAT RISK INDEX ACCORDING TO LOCAL CLIMATE ZONES

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ABSTRACT

The UN has warned that we are now entering an era of global tropicalization rather than global warming. Currently, the damages caused by rising temperatures are increasing worldwide, and in Republic of Korea, abnormal high-temperature phenomena such as heatwaves, tropical nights, and urban heat islands are occurring frequently. While detailed information is necessary to identify and mitigate heat risks, most studies have been analyzed at the administrative district level. Analyzing at the administrative district level is advantageous for expressing the status of the region in numerical terms to grasp the quantitative scale, but it has limitations in identifying the distribution pattems or characteristics of heat-related risks within the region. Therefore, this study analyzed the characteristics of heat risk within regions using the Local Climate Zone (LCZ), a spatial classification system that systematically classified regional climate characteristics considering building density and height, and land cover. The LCZ was applied in the study at a resolution of 100m following the WUDAPT procedure, and the Heat Risk Index was created using the Crichton Risk Triangle framework. The study results confirmed that heat risk indices vary by LCZ type, and detailed results within administrative districts could be derived. It is expected that the findings of this study can be used as important data to reduce heat-related risks in future urban environmental planning stages.

Keywords: heat risk index, local climate zone, urban environmental planning

ID : AIC 2024 A 018

INTERNALIZATION OF THE PRIORITY OF EXTERNALITIES DUE TO THE PRESENCE OF KEK JIIPE IN THE COMMUNITY OF MANYAR SUB-DISTRICT, GRESIK DISTRICT

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ABSTRACT

Externalities are costs or benefits that arise but are not covered by market prices. Externalities often occur in an economic context, one of which is in industrial activities. As in the JIIPE Special Economic Zone, where this area raises costs that should be obtained by the surrounding community. In overcoming the externalities that arise due to the presence of KEK JIIPE, it is necessary to explore externalities in the community and weighting externalities through academics. By conducting Delphi Analysis in determining existing externalities. And Analytical Network Process in weighting externality variables along with alternatives. All analyses were conducted using primary data obtained from questionnaires to the community and stakeholders. After the exploration, it was found that the sixteen externality variables proposed to the community were reduced to fourteen externality variables. After the weighting process, it was concluded that economic externalities are more prioritized to be addressed than social externalities. And the most prioritized externalities to be addressed are Labor, Price Level, and Population Density followed by eleven other externality variables. And in handling priority externalities, enforcing or adjusting regulations is the most appropriate way according to the exploration. Followed by a social approach, subsidizing the affected party, and imposing a pigouvian tax on the impactor

Keywords: *Externality, Internalization, Impact-Assesment, Socio-Economics, Special Economic Zone*

Industrial Area

ID : AIC 2024 A 019

POTENTIAL USE OF DOMESTIC WASTEWATER FOR AGRICULTURAL IRRIGATION IN DEVELOPING COUNTRIES

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ABSTRACT

The level of water pollution that occurs in developing countries tends to increase. The source of this pollution is caused by human activities that dispose of wastewater without treatment, especially domestic wastewater in developing countries. The existence of domestic wastewater treatment methods can be a solution for utilizing wastewater so that is can be reused, one of this as agricultural irrigation. Irrigation water is a source of agricultural water that usually comes from rivers. However, currently the quality of river water is decreasing due to pollution and its quantity is decreasing due to climate change. Therefore, reusing domestic wastewater through appropriate methods will be able to provide a source of irrigation that the quality standards are appropriate so that it is safe to use. This article has been prepared aims to examine the technologies and methods that have the potential to treat domestic wastewater, that have been implemented in several developing countries and in the form of technological ideas that can be used. The method is a literature review with a qualitative approach and the data comes from books and indexed articles. The results show that there is potential utilizing domestic wastewater for agricultural irrigation in developing countries, which includes physical, chemical, and biological treatment. Developing countries that have implemented domestic wastewater treatment into irrigation include India, Indonesia, and Libya. Based on the results and conclusion show recommendations use of domestic wastewater for agricultural irrigation begin with processing it through a combination of physical, chemical, biological wastewater treatment plants, checking for compliance with quality standard, distribution using pipes to agricultural land, storage in reservoirs, and use as irrigation water.

Keywords: wastewater, domestic, irrigation, agriculture, developing countries

ID : AIC 2024 A 020

PLASTIC WASTE MANAGEMENT AND ITS ENVIRONMENTAL IMPACTS IN DEVELOPING CITIES

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ABSTRACT

This study examines plastic waste management and its environmental impacts in cities of developing countries. The methodology used is a systematic literature review, consisting of three stages: planning, execution, and reporting. The planning stage includes determining the topic, formulating the problem, and setting the criteria for reference articles. The execution stage involves conducting the systematic literature review, while the reporting stage includes writing the systematic literature review article. A total of 25 articles were used in this research. Our analysis identified the impacts of various plastic waste management strategies, such as recycling, waste-to-energy conversion, alternative products, and extended producer responsibility. The research findings indicate that out of the total 25 measurable impacts, 1 was negative, 15 were positive, 5 were neutral, and 4 depended on the context of implementation. Consideration of the impacts of plastic materials and management strategies is necessary to avoid adverse outcomes from efforts to mitigate plastic pollution. This study emphasizes the importance of a holistic approach to plastic waste management to achieve long-term sustainability and reduce environmental impacts in cities of developing countries.

Keywords: plastic waste management, sustainability, waste management strategies, policy changes, and developing cities

ID : AIC 2024 A 044

SOLID WASTE MANAGEMENT ASIAN URBAN AREAS

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ABSTRACT

Solid waste management in Asian urban areas poses challenges that are relevant to rapidly increasing urbanization. Solid waste management in Asian urban areas is very urgent, related to the quality of drinking water, sanitation and human health, especially impacting poor communities in urban areas. The aim of this research is to examine various obstacles and solutions in solid waste management in urban Asia. This research uses a literature review approach from journal articles, research reports, books and official publications from institutions/organizations within the last 5 years (2019-2024).). The results of this research show that challenges in waste management include rapid population growth and urbanization, inadequate infrastructure, lack of public awareness and education, limited regulations and law enforcement and environmental impacts. The solution implemented is through incentive community involvement, learning from practice, legal and policy reform, the use of modern technology, as well as cooperation and cooperative governance.

Keywords: solid waste, challenges, solutions

ID : AIC 2024 A 024

WASTEWATER MANAGEMENT IN CITIES OF DEVELOPING COUNTRIES: RISK ANALYSIS AND SOLUTIONS

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ABSTRACT

Wastewater is water resulting from human activities which, if not managed properly, can cause serious problems, both for health and the environment. Wastewater management in cities in developing countries is a major challenge that has significant implications for public health and the environment. The article contains risk analysis and solutions in wastewater management in cities in developing countries. The purpose of this article is to provide an overview of the challenges and solutions in wastewater management, with a focus on how technology and best practices can be implemented to improve wastewater quality and protect human health and the environment. The method used is a qualitative method with a literature review or literature review approach. This research uses 20-40 articles as secondary data. This study presents the risks facing several cities in developing countries and outlines solutions that can be implemented to address these problems. The forms of solutions applied are in the form of biological, chemical, physical approaches, as well as other approaches such as improving infrastructure, implementing efficient waste water treatment technology, as well as strengthening government regulations and policies. Through an analytical approach and case studies in several cities, this article concludes that effective wastewater management requires collaboration between government, the private sector and society. It is hoped that the results of this research can provide insight and practical recommendations to improve the quality of wastewater management in developing countries, in order to achieve environmental sustainability and better health and support the Sustainable Development Goals program.

Keywords: Wastewater, Wastewater Management, Risks, Solutions, Cities, Developing Countries

TECHNICAL SESSION 4

ID : AIC 2024 A 025

DOMESTIC WASTE PROCESSING USING INCINERATOR AT TEMPORARY PROCESSING PLACE REDUCE, REUSE, RECYCLE (TPS 3R) CIPAKU VILLAGE, SOUTH BOGOR DISTRICT, BOGOR CITY

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ABSTRACT

Waste is the result of the remnants of daily activities from humans and/or natural processes in solid form. One of the wastes that continues to be a concern and is rapidly increasing is household waste. Until now, the waste problem has not been handled properly. Cipaku Village manages waste by implementing the Temporary Processing Place Reduce, Reuse, Recycle (TPS 3R) system, in order to reduce the quantity and improve the characteristics of waste that will be further processed in the landfill. The TPS 3R process applies the concepts of Reduce, Reuse and Recycle to run well. How efficient, effective and effective is the processing of household waste with the Incinerator tool in handling household waste in Cipaku Village. In analyzing the existing problems, the qualitative analysis method is used, so that the expected purpose of the data is produced. From the results of the research of TPS 3R Cipaku which uses incinerators can process waste up to 90% to 94%, meaning that the processed residues are residues from both organic and inorganic waste such as plastic waste residues, plastic bottles, plastic jerry cans, plastic toys (organic), and cardboard, wood, paper, leaf etc. (organic) waste, with the final residue result of 8% to 10% is ash from incineration, while TPS 3R that does not use Incenerator processes waste only 27% to 41%, so the average waste reduced is ±33% with a final residue result of 59% to 73% and forwarded to the landfill (Final Processing Site). In terms of efficiency, there are several factors that affect such as operational cost factors, residual volume factors produced. Processed products in the form of ash can be used as a mixture of building materials (bricks, concrete). The basic principles of 3R (reduce, reuse and recycle) in accordance with the mandate of Law No. 18 of 2008 concerning waste management can be immediately applied through local government apparatus, both through socialization to the community and providing supporting facilities such as those found in TPS 3R Cipaku Village and TPS 3R Ciparigi Village.

Keywords: domestic, waste, incinerator, tmporary processing place, recycle

ID : AIC 2024 A 048

SYSTEM DYNAMICS MODEL FOR AGRICULTURAL LAND CARRYING CAPACITY IN KAPUAS HULU REGENCY

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ABSTRACT

This study uses a system dynamics model to project the agricultural land carrying capacity in Kapuas Hulu Regency for the next thirty years. The primary objective is to evaluate the sustainability of food resources in the region and to predict future scenarios based on current data and trends. The model integrates factors such as population growth, agricultural productivity, land use, and environmental constraints to comprehensively analyze the region's ability to meet its food needs over the next three decades.

The results indicate that the current agricultural land is insufficient to meet the food requirements of the population in Kapuas Hulu Regency. Several scenarios are proposed to address this challenge: expanding agricultural land, enhancing the productivity of existing agricultural land, and selecting high-value crops for development. The simulation of these different scenarios is crucial for increasing the understanding of the complexity of the food security system in Kapuas Hulu Regency to support local policymakers and stakeholders in the development of strategies that ensure long-term food security and environmental sustainability.

Keywords: agriculture, land carrying capacity, system dynamics

ID : AIC 2024 A 027

DEVELOPMENT OF A TOOL FOR PRE-ANALYSIS OF THE ENVIRONMENTAL ISUUES OF WIND POWER PROJECTS / POSTER

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ABSTRACT

As a key means of carbon neutrality and energy security, great efforts have been made worldwide to expand renewable energy. In Korea, the installed capacity of renewable energy will increase by more than four times (7.1 GW → 30.0 GW) by 2023 compared to 2017, but the supply is still behind the government's target, and it is time for a full-scale expansion and leap forward of renewable energy. The main reasons for the delay in the supply of renewable energy are the complex licensing of offshore wind power, depletion of solar power sites, insufficient power grid, and low public acceptance. Excluding the insufficient power grid, environmental issues and public acceptance are very important matters. Therefore, in order to expand the supply of new and renewable energy, it is urgently necessary to achieve carbon neutrality and energy security by preemptively establishing an environmental assessment plan. This study aims to expand and enhance existing spatial information data on onshore and offshore wind power and provide appropriate environmental regulation spatial information. It also focuses on enabling business operators and various stakeholders to use this platform to compare and analyze development sites and evaluate them.

Keywords: Renewable energy, Environmental issuss, Wind power, Spatial analysis, Platform

ID : AIC 2024 A 046

GEOSPATIAL INFORMATION DATABASE FOR ENVIRONMENTAL IMPACT ASSESSMENT OF ONSHORE WIND POWER / POSTER

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ABSTRACT

Onshore wind power is gaining attention as a sustainable energy source; however, selecting suitable sites for wind farms is a complex process that must consider environmental, social, and economic factors. This study aims to establish a geospatial information database(DB) necessary for analyzing site feasibility in environmental impact assessments(EIAs) for onshore wind farms. To achieve this, we will analyze relevant guidelines used in onshore wind planning and EIAs, as well as review opinions from previous EIA cases to identify key geospatial information elements. Based on this analysis, we will collect and refine geospatial data encompassing various environmental and social factors, including wind resources, ecological environment elements, and living environment elements, and integrate them into the DB. This study will provide policymakers and developers with crucial information and tools, supporting decision-making processes in site selection for onshore wind farms while minimizing impacts on key areas for biodiversity conservation.

Keywords: onshore wind power, site feasibility, geospatial information, GIS, database, Impact Assessment

ID : AIC 2024 A 028

STRATEGY TO HARMONIZE THE IMPACT OF CLIMATE CHANGE FOR COFFEE SMALLHOLDER IN JEMBER REGENCY

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ABSTRACT

The impact of climate change on coffee is starting to appear in fifteen countries that produce 90% of the world's coffee, including Indonesia, America and Africa. Long dry seasons or continuous rain or unpredictable weather can have an impact on coffee farming. Long dry conditions as a result of El-Nino in 2023 will cause coffee plantation productivity to decline drastically in Jember, East Java. The death rate of coffee trees due to long drought can be up to 30% and the decline in production can reach 27%. This article aims to analyze the sustainability of coffee smallholder management and conservation strategies to harmonize with the impacts of climate change. The research location was in three coffee villages in Panti sub-district which is part of the Argopuro mountain area, with a sampling of 47 farmers. This research is a mix method using multidimensional scaling data analysis with rapfish analysis and miles and huberman qualitative analysis. The research show that the sustainability level of the coffee smallholder is quite sustain in ecological dimensions. The dimensions of less sustainable in coffee smallholder are status are economics, social dimensions, technological and institutional dimensions. This indicates that farmers have taken mitigation actions and adapted to the threat of climate change. Several strategies used by coffee smallholders to harmonize with climate change threats include the use of organic fertilizer, choosing an appropriate shadow plant, creating a natural terrace and utilization of coffee waste.

Keywords: coffee smallholder, climate change, sustainability.

ID : AIC 2024 A 034

ANALYSIS OF PHYSICAL ENVIRONMENTAL FACTORS ON $PM_{2.5}$ CONCENTRATION AT STREET LEVEL IN URBAN AREAS

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ABSTRACT

Fine particulate matter ($PM_{2.5}$), one of the major air pollutants in urban areas, significantly impacts the health of city residents. The spatial distribution and dispersion of $PM_{2.5}$ are closely related to urban landscape patterns. Pedestrian paths along major streets are fundamental public spaces in cities, but exposure to $PM_{2.5}$ from traffic is most frequent at the pedestrian level. This study aims to analyze the physical urban factors that influence $PM_{2.5}$ concentrations along these roads and to determine which factors have the greatest impact. The study focuses on Woni streets in Changwon, South Korea, which features various types of land cover. Using the ENVI-met microclimate modeling program, we extracted meteorological data such as $PM_{2.5}$ concentration, wind speed, and temperature. Field measurements were conducted at the site to validate the model outputs. We also identified physical factors using ArcGIS Pro. Correlation analysis was conducted on the extracted data. The results showed that areas with small streams had relatively lower $PM_{2.5}$ concentrations, even in similar physical environments. Additionally, higher amounts of vegetation along pedestrian paths were associated with lower $PM_{2.5}$ concentrations. These findings can serve as valuable data for urban planning, helping to identify the key physical elements that should be managed to minimize the impact of $PM_{2.5}$ on the health of city residents.

Keywords: fine particulate matter, urban landscape patterns, urban planning, envi-met

ID : AIC 2024 A 035

PLANT HEALTH: SHOULD IT BE A MANDATORY PARAMETER FOR ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT STUDIES?

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Abstract

No doubt, environmental exploitation has posed significant risks in various ways to, not just social community, but also plant health. It is known that plants play a fundamental role in providing ecosystem services that support human well-being, young generation and biodiversity. They help regulate the climate, purify air and water, control erosion, and cycle nutrients, among other functions. Healthy plants contribute to the stability and resilience of ecosystems, which in turn benefit communities by providing essential resources and services. However, of many advantages and consequences to environment and community, plant health has not fulfilled unequivocally in fundamental environmental regulations. In this paper we present scientific evidences of plant health risks due to human actors behind environmental exploitation such as habitat destruction, pollution, climate change, invasive species, overharvesting, and soil erosion. In habitat destruction, the operators threat clearing forests and other natural habitats for industrial purposes which destroys the homes of many plant species. This loss of habitat can lead to the extinction of plant species or disrupt the ecological balance, affecting the health of remaining plant populations. Pollution from industrial activities, including the release of chemicals and toxins into the environment and agriculture, can directly harm plant health by contaminating soil, water, and air. In short, we conclude that vulnerable risk of plant health from environmental exploited actors is real. To address with on-going and future negative consequences, we therefore propose plant health as mandatory parameter in environmental and social risk assessment studies. No plant health, no life!

ID : AIC 2024 A 036

TRAINING OF DEVELOPMENT INNOVATIVE TEACHING MODULES INTEGRATING ECOLITERACY AND PANCASILA LESSON PROFIL FROM MERDEKA CURRICULUM PERSPECTIVE

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Abstract

This research aims to develop innovative teaching modules integrating ecoliteracy and Pancasila lessons from the perspective of the Merdeka Curriculum. The study employs a module development approach involving data collection from various sources, including previous research, needs analysis, and insights from experts in the fields of education and environment. The developed modules are designed to provide a holistic and integrative understanding of ecoliteracy and Pancasila values, taking into account the context of the newly introduced curriculum. The module development method encompasses planning, design, development, implementation, and evaluation stages. Additionally, the research also involves profiling teaching from the perspective of the Merdeka Curriculum to ensure alignment with the goals of the new curriculum. Data obtained from the evaluation and testing of the modules are utilized to refine and enhance the modules iteratively. This research is expected to make a significant contribution to the development of more innovative and integrated curriculum and teaching practices, as well as to enhance students' understanding of ecoliteracy and Pancasila values in the context of relevant environmental and social challenges.

Keywords: *Teaching Module, Innovativ, Ecoliteracy, Pancasila, Merdeka Curriculum, and Integrative*

TECHNICAL SESSION 5

ID : AIC 2024 A 037

SPATIAL DISTRIBUTION OF COASTLINE CHANGES IN THE COASTAL AREAS OF BALI ISLAND

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ABSTRACT

The impact of climate change in coastal areas which has become a global issue is sea level rise. This research is aimed at analyzing changes in coastlines due to sea level rise in the coastal areas of Bali Island. The method used in this research is analysis of Landsat Satellite data for the period 2010 to 2023 using the Normalized Difference Water Index method. The results of this research show that there are very significant variations between South Bali and North Bali. The coast of southern Bali, which is directly adjacent to the ocean, is the dominant region experiencing abrasion, while in northern Bali it tends to be less. The physical condition of the area is the main factor that causes coastal areas to be vulnerable to abrasion. Apart from abrasion in several coastal areas, accretion was also found, which was influenced by physical development in coastal areas. Especially in areas experiencing abrasion, settlements that were previously not affected by threats, eventually become vulnerable areas. This results in many coastal areas having high vulnerability.

Key words: coastal areas, climate change, coastline changes

ID : AIC 2024 A 039

ESTIMATING CHANGE POINTS OF THE INFLUENCE OF AGRICULTURAL LAND AND FOREST AREA RATIOS ON RIVER WATER QUALITY

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ABSTRACT

The abstract analysed the influence of agricultural land and forest area ratios on river water quality in the Yeongsan and Seomjin River basins in Korea, estimating key change points. Monthly water quality samples were collected from March to December 2019 at 45 river points (18 in the Yeongsan River and 27 in the Seomjin River). The water quality was assessed using BOD, TOC, and T-P parameters, and change points were estimated using the Buishand range test. Results showed that TOC concentrations sharply increased when agricultural land area ratios exceeded 30%, and BOD and T-P concentrations rose significantly when agricultural land area ratios exceeded 46%. Conversely, BOD, TOC, and T-P concentrations showed a sharp increase when forest area ratios fell below 50%. These findings indicate that maintaining agricultural land ratios below 30% and forest ratios above 50% is crucial for effective river water quality management.

Keywords: Water quality management, Yeongsan River, Seomjin River, Agricultural land and Forest area ratios, BOD, T-P

ID : AIC 2024 A 040

A STUDY ON THE IMPORTANCE OF ESTABLISHING AND MANAGING STANDARDS FOR PESTICIDE APPLICATION USING DRONES

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ABSTRACT

This paper analyzes the current status of pesticide application using drones worldwide, examines its side effects and cases of environmental pollution, and presents standards for drone operation and pesticide use suitable for the environment of South Korea. Pesticide application using drones is gaining attention as an innovative technology that provides higher efficiency and precision compared to traditional methods, thereby enhancing agricultural productivity while reducing labor. However, cases of environmental pollution and adverse effects on human health through the use of high-concentration pesticides exclusively for UAVs in pesticide application have been reported. To address these issues, the global status of drone pesticide application is thoroughly investigated, and improvement measures for drone operation are explored through the analysis of side effect cases. Particularly, strategies for drone operation considering the unique terrain and climate conditions of South Korea are proposed, and specific standards for pesticide use for environmental protection are established. The aim is to promote innovative approaches to drone utilization in the agricultural sector.

Keywords: Drone spraying, Pesticide application, Environmental pollution, Sustainable agriculture, Drone operation standards

ID : AIC 2024 A 041

KOREA-CONVERGENCE DIGITAL TRANSFORMATION(K-CDX) PLATFORM

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ABSTRACT

Post-environmental management, a crucial component of the Environmental Impact Assessment (EIA) system in South Korea, is primarily conducted through on-site inspections. However, for EIA-targeted project sites, which typically cover large areas, conducting field surveys on foot poses several challenges. These include increased time requirements, inability to access information in restricted areas, and limitations in detecting non-visible environmental changes. Consequently, there are inherent limitations in the precision monitoring and analysis methods.

There is a need to enhance post-environmental management techniques to enable detailed multi-faceted analysis of environmental changes in large-scale development sites. This study focuses on integrating digital transformation technologies—such as unmanned aerial vehicles, spatial mapping, multispectral imaging, and 3D modeling—to develop the Korean Environmental Impact Assessment Digital Transformation Platform (K-CDX). This platform aims to enable detailed analysis of illegal development activities, vegetation health, and preemptive prediction of collapse risks for socially significant development projects, potentially faulty projects, and projects anticipated to have significant environmental impacts.

Through the establishment of the K-CDX platform, several effects have been confirmed: achieving carbon neutrality by identifying illegal development activities and conserving green spaces, creating social value through the preservation of forest resources' public benefits, expanding public information support and fulfilling the right to know, and mitigating conflicts between the public and businesses by enhancing scientific decision-making and collaborative acceptance. Future plans include systematic research to ensure the platform's content can be utilized freely once the system is fully established.

Keywords: Post-environmental management, Digital Transformation

ID : AIC 2024 A 042

THE CHARACTERISTICS OF LOW-FREQUENCY NOISE GENERATED FROM INVERTERS AND CONVERTERS IN SOLAR POWER FACILITIES

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ABSTRACT

In recent years, there has been a rapid increase in environmental impact assessment projects in South Korea, particularly focusing on solar power facilities. Solar power facilities harness solar energy to generate electricity, and they have gained attention as one of the projects promoting the introduction of renewable energy for greenhouse gas reduction.Solar power facilities utilize solar panels to collect energy from the sun and convert it into electrical energy through inverters and converters. While this is an eco-friendly method, the installation of solar power facilities can lead to various environmental issues such as land degradation. Among these issues, we have investigated the impact of low-frequency noise generated by inverters and converters

The low-frequency noise measurement data were directly obtained from the operation of inverters and converters in the Sinan Solar Power Plant in South Korea(mW). The measurements were conducted according to the standards for noise and vibration testing, specifically focusing on the standards for measuring environmental noise in residential areas. The investigation covered a range of inverters from small to large sizes. Moreover, since converters, the primary source of low-frequency noise, often generate significant noise during nighttime, data were collected through 24-hour measurements. The NX-62RT sound level meter was utilized for the measurements.

The measurement results revealed that low-frequency noise exceeded the standards in the range of 12.5 to 80Hz at close distances from the inverter. Additionally, at certain distances beyond a certain threshold, some frequency bands also exceeded the standards. Furthermore, for converters, low-frequency noise was within the standards below 40Hz, but exceeded the standards above 40Hz, particularly showing higher levels during nighttime.

Keywords: Low-frequency noise, Solar power facilities

ID : AIC 2024 A 043

ANALYSIS OF CLIMATE RISK REDUCTION EFFECTS OF CLIMATE CHANGE ADAPTATION MEASURES: FOCUSING ON ADAPTATION MEASURES RELATED TO FLOOD DAMAGE

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ABSTRACT

The purpose of this study is to analyze the effectiveness of climate change adaptation measures being implemented in Korea in relation to flood damage caused by extreme weather. The Republic of Korea is increasingly affected by the frequency and intensity of extreme weather due to climate change, including the longest-ever drought in 2022 and the highest accumulated rainy season rainfall in 2023. To respond to these challenges, climate change adaptation measures are being established and implemented at national and local government levels. Within the water management sector, efforts are divided into three main areas: floods, water quality and ecosystems, and drought. Various measures are being implemented to diversify prevention projects and modify land use. This study focuses on adaptation measures that impact the impervious area ratio, maintained area ratio, and ditch area ratio in regions affected by flooding from heavy rain between 1998 and 2021. Precipitation data from the same period were also collected to consider changes in precipitation due to climate change. A damage function was constructed through multivariate regression analysis of the collected data. The results indicate that a 1% reduction in the impervious area due to water circulation improvements and low-impact development reduces the flood damage area by approximately 6%. Additionally, a 1% increase in the maintained area ratio through measures to expand storage and pumping facilities resulted in a 14% reduction in flood damage. Increasing the ditch area ratio by 1% through drainage facility expansion led to a 25% reduction in flood damage. This study is significant as it provides an objective basis for establishing and implementing adaptation measures through quantitative analysis. By upgrading the methodology, it is possible to construct a damage function at the local government level and apply it to other sectors, which we plan to review.

Keywords: climate change, climate change adaptation, flooding damage

Acknowledgement: This paper is based on the findings of the research project “Development of framework for decision support integrated impact assessment platform and application technology for climate change adaptation (2024-012(R))” which was conducted by the Korea Environment Institute (KEI) and supported by Korea Environment Industry &Technology Institute(KEITI) through "Climate Change R&D Project for New Climate Regime.", funded by Korea Ministry of Environment(MOE) (Project No. RS-2022-KE002152).

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DEVELOPMENT OF A METHODOLOGY TO EVALUATE THE RISK REDUCTION EFFECT OF CLIMATE ADAPTATION : INSIGHTS FROM KOREA'S WILDFIRE ADAPTATION MEASURES

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ABSTRACT

Korea has actively engaged in climate change adaptation by establishing 'National Climate Change Adaptation Plans' across various sectors, including water management, agriculture, and ecosystems. To effectively implement adaptation policies, it is crucial to develop a methodology that can evaluate the risk reduction effects of these plans in the future. However, a standardized methodology for assessing the risk reduction effect of adaptation policies has not yet been established. This study aims to fill this gap by developing a methodological foundation for quantitatively assessing the effects of climate risk reduction. We focused on the ecosystem sector as outlined in 'The 3rd National Climate Change Adaptation Plan,' specifically targeting the risk of 'increasing and enlarging wildfires due to climate change-induced drought.' Our approach involved a detailed review of the adaptation measures related to wildfires, the identification of relevant proxy variables, data collection, and conducting a non-linear regression analysis to derive the wildfire damage function under the influence of adaptation measures. The findings indicate that the implementation of adaptation measures can lead to an average risk reduction of 3.33% per 10% decrease in wildfire fuel load per hectare, based on the national average for Korea. This methodology can be adapted to other sectors, providing a valuable tool for policymakers to develop and implement effective adaptation strategies that can mitigate future climate change risks.

Keywords: Climate Change Adaptation, Risk Reduction Effect, Wildfire Risk, Adaptation Measure, Quantitative Assessment

Acknowledgment

This paper is based on the findings of the research project "Development of framework for decision support integrated impact assessment platform and application technology for climate change adaptation (2024-012(R))" which was conducted by the Korea Environment Institute (KEI) and supported by Korea Environment Industry &Technology Institute(KEITI) through "Climate Change R&D Project for New Climate Regime.", funded by Korea Ministry of Environment(MOE) (Project No. RS-2022-KE002152).

ID : AIC 2024 A 047

PRIORITIZATION OF EXTERNALITY MANAGEMENT DUE TO THE PRESENCE OF THE SPECIAL ECONOMIC ZONE JAVA INTEGRATED INDUSTRIAL ESTATE (JIIPE) IN THE COMMUNITY OF MANYAR SUB-DISTRICT GRESIK DISTRICT

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ABSTRACT

Externalities are costs or benefits that arise but are not covered by market prices. Externalities often occur in an economic context, one of which is in industrial activities. As in the JIIPE Special Economic Zone, where this area raises costs that should be obtained by the surrounding community. In overcoming the externalities arising from the existence of KEK JIIPE, it is necessary to explore externalities in the community and weight externalities through academics. By conducting Delphi Analysis in determining existing externalities. And Analytical Network Process followed by Quantitative Descriptive Analysis in weighting priority externalities and their alternatives. All analyses were conducted using primary data obtained from questionnaires to the community and stakeholders. After exploration, it was found that the sixteen externality variables proposed to the community were narrowed down to fourteen externality variables. After a weighting process, it was concluded that economic externalities were prioritized to be addressed compared to social externalities. And the most prioritized externalities to be addressed are Labor, Price Level, Population Density, Land Acquisition, Level of Service, and Social Life. And in addressing the prioritized externalities, regulatory enforcement or adjustment is the most appropriate way according to the exploration. Followed by social approaches and subsidizing affected parties will be used as the basis for formulating directions for handling priority externalities through Qualitative Descriptive Analysis.

Keywords: *Externality, Impact Management, Impact-Assesment, Socio-Economics, Special Economic Zone Industrial Area*

TECHNICAL SESSION 6

ID : AIC 2024 A 045

BEST PRACTICES AND SUBOPTIMAL CASES IN THE ENVIRONMENTAL IMPACT ASSESSMENT FOLLOW-UP MANAGEMENT

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ABSTRACT

Based on the「Environmental Impact Assessment Act」established in 1993, South Korea's environmental impact assessments are divided into four types: Strategic Environmental Assessment, Environmental Impact Assessment, Small-scale Environmental Impact Assessment, and Post-Environmental Impact Investigation. Among these, the Post-Environmental Impact Investigation is conducted to prevent damage to the surrounding environment from the potential impacts of projects after their commencement. It involves investigating the impacts caused by the project through the implementation of mitigation measures and monitoring the environmental status as outlined in the Environmental Impact Assessment report and the consultation contents.

Given the increasing importance of post-management of environmental impact assessments to preemptively respond to unexpected environmental damage, such as abnormal weather events caused by climate change, the Ministry of Environment aims to promote awareness of the significance of the consultation system and post-management of environmental impact assessments. This is achieved by identifying and disseminating best practices and suboptimal cases in post-management.

This study examines the post-management best practices and suboptimal cases in various fields (natural and ecological environment, atmospheric environment, water environment, land environment, and living environment) of projects subject to Post-Environmental Impact Investigation reviewed by the Korea Environment Corporation, including urban development projects, construction of industrial sites and complexes, energy development projects, and installation of waste disposal and other facilities.

Keywords: Post-environmental impact investigation, Best practices and suboptimal cases

ID : AIC 2024 A 048

GREEN BUILDING IMPLEMENTATION AND EVALUATION IN THE GOVERNOR'S OFFICE BUILDING OF WEST PAPUA PROVINCE: A STUDY ON SUSTAINABLE DEVELOPMENT PRACTICES AND ENVIRONMENTAL IMPACT

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ABSTRACT

Global warming is a significant problem facing society, partly caused by construction activities such as building construction, which can harm the environment. One solution to this problem is the application of the Green Building concept. The establishment of the Green Building Council (GBCI) in Indonesia as an internationally recognized certification body reflects the government's effort to promote the concept of green buildings. This study aims to assess and evaluate whether the West Papua Province Governor's Office building meets Green Building standards and to what extent the Green Building concept is implemented in the building, based on the guidelines for Environmentally Friendly Buildings version 1.1 from 2016. According to the data and calculations from the building applications at the Governor's Office of West Papua Province, a total of 67 points were obtained out of a maximum of 117 points across 37 Green Building criteria. Therefore, the building meets the criteria for applying the Green Building concept according to the GBCI assessment tool, with a compliance score of 67 points or 67.52%, earning a Gold rating.

Keywords: green building; the governor's office building; west papua province; sustainable development practices; environmental impact

ID : AIC 2024 A 049

TOURISTS' PERCEPTIONS REGARDING THE IMPORTANCE OF INCLUSIVE WATER, SANITATION AND HYGIENE (WASH) ASPECTS IN CHOOSING ACCOMMODATION IN SANUR

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ABSTRACT

The COVID-19 pandemic has led tourism stakeholders to implement WASH aspects to enhance tourist confidence. This study aims to understand tourists' perceptions of the importance of inclusive WASH aspects in their hotel selection in Sanur compared to other attributes. The research employed Q-methodology with a sample of 40 tourists who have stayed in accommodations in Sanur in the last 1-6 months, using convenient sampling. Variables studied include perceptions of WASH and other hotel attributes, along with socio-demographic characteristics. Data were analyzed and presented in tabulation tables and correlation matrices using SPSS and KenQ. The findings indicate that there are five main types of tourists when choosing accommodations. The first group of tourists prioritizes clean rooms and contribution to local communities, the second group prioritizes staffs' cleanliness & benefits to communities, the third group prioritizes self-comfort, the fourth group prioritizes local and vulnerable communities, and the fifth group prioritizes location of culture and entertainment as crucial aspects. Interestingly, all tourist types put water saving and sound wastewater treatment as not an important consideration in choosing hotel. Additionally, all tourist groups consider fair and equal treatment of female employees important. These indicate that even though most of tourists aware the hygiene and health association for themselves, and also the importance of gender equity and social inclusion to ensure benefit for local people, they have less awareness on the environmental issues exist in Sanur area such as water resource management and water pollution that can affect local environment and community. It is important for government and tourism industries to improve tourist awareness regarding water and sanitation related issues in tourist destination to encourage supporting behavior from tourist.

Keywords: Inclusive WASH, Hotel Attributes, Accommodation, Sanur, Q-Methodology

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CHALLENGES AND IMPLICATIONS OF NON-PROCEDURAL WASTE MANAGEMENT IN PAGEDANGAN, TANGERANG: A CASE STUDY OF TPST-3R RTH PBPA

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ABSTRACT

The management of waste facilities is a critical issue in urban planning and environmental protection. This study investigates the non-procedural operations of the TPST-3R RTH PBPA, a waste processing facility managed by the Paguyuban Bumi Puspita Asri in Pagedangan, Tangerang. This facility, located within a designated green open space, faces significant challenges due to its substandard incineration practices, improper waste burial causing odor problems, and its non-compliance with zoning and permit regulations. Despite enforcement actions by the Tangerang Environmental Agency, including demolition orders, the facility has resumed operations, highlighting the complexities of regulatory compliance and enforcement. This study aims to explore the environmental and legal implications of these practices, providing insights into the systemic issues and proposing recommendations for improved waste management and regulatory adherence.

Keywords: Non-Procedural Waste Management, TPST-3R, Incineration Standards, Environmental, Compliance, Regulatory Enforcement, Green Open Space, Tangerang.

ID : AIC 2024 A 051

SCIENTIFIC VALUES SINGKARAK TECTONIK LAKE AS GEOSITE FOR GEOTOURISM DEVELOPMENT OF WEST SUMATERA

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Abstract: Singkarak Tectonic Lake is a landscape formation of the Sumatra Great Fault (GSF) along 1900 km which is an active and segmented horizontal fault, consisting of Sumani and Sianok segments in West Sumatra province both segments pass through a relatively densely populated area. The purpose of this study is to identify scientific values as the opposite of the development of tourism. The method used is qualitative method with an explorative approach. Factors that determine the assessment used are four (4) scientific assessment criteria, 1) namely
geological sites can represent Geological topics, processes, and geological frameworks 2) the relationship of the conservation status of a geological heritage site location 3) scarcity or geological elements that cannot be found in other locations 4) the availability of scientific data that has been published about the location of the geological heritage site. The results of this study managed to identify the scientific values with good value. The results showed that the geological site of Singkarak Tectonic Lake is well-developed for ecotourism.

Keywords: Scientific Values, Geosite, Geotourism, Singkarak.

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HYDROMETEOROLOGICAL DISASTER MITIGATION IN THE TARUSAN WATERSHED, WEST SUMATRA PROVINCE

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Abstract: Floods are the most common natural disasters in Indonesia and have enormous potential. This study aims to determine the flood hazard zone and regional arrangement in the Tarusan Watershed, South Pesisir Regency. To determine the flood hazard zone using the GIS approach. The indicators used to determine flood hazard are slope, rainfall, soil type, landform, geology, and land use. Determining disaster mitigation strategies using the Analytical Hierarchy Process (AHP) approach. The results showed that the high flood hazard zone in the Tarusan watershed is about 22% of the total area, the medium index is around 58%, and the low flood hazard index is 20%. The high-hazard zone of flood disasters in the study area is caused by high rainfall and topographic conditions of the Tarusan Watershed. The main priority in the management of flood-hazard areas in the Tarusan Watershed is to find economic alternatives to reduce forest destruction. Increasing the economic value of the community can lead to reduced community activities in carrying out land conversion, especially in forest areas.

Keywords: AHP approach, Flood, GIS approach, Mitigation, and Strategy

ID : AIC 2024 A 053

OPTIMIZING THE ROLE OF USER AND MAINTAINER GROUPS(KPP) IN THE SETTLEMENT QUALITY IMPROVEMENT PROGRAM

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ABSTRACT

The purpose of this research is to optimize the role of the user and maintainergroup (KPP) in the Klasabi slum quality improvement program of Sorong City. In this case, the environmental conditions in this settlement are reviewed, the role of KPP is evaluated, and optimization strategies are also formulated that can be used for the environmental management of Klasabi slums in Sorong City. This research is quantitative with the method used in this research, namely the descriptive method with a case study technique through data collection from the results of distributing questionnaires, interview results, direct observation, and using other official documentsanalyzed using validity test analysis and reliability tests. Based on the results of the datavalidity test and the data reliability test, it was found that the research data or questionnaire data used in the study was valid and reliable. research data or questionnaire data used in this study is valid or reliable. The results showed that environmental conditions, seen from several perspectives, including ecological, economic, social, and cultural, can be considered good. However, when viewed in ecological conditions, especially in road and drainage conditions, it is still considered adequate by the community because there is no equal distribution of facility development. Also, the role of the user and maintainer group (KPP) is assessed as not optimal in carrying out its duties and responsibilities; this is supported by the results ofthe conducted interviews and observations made by researchers. In addition, optimization strategies can be carried out, such as structuring the Klasabi area around Deo Airport in Sorong City, handling slum houses by the government to support the development of water tourism, optimizing the use of water hyacinth plants that can be developed by community members using SIKIM and BLK facilities, and providing capital loans to support the business of making traditional snacks, traditional Papuan handicrafts, and Papuan craftsmen certification training in Sorong City.
Keywords: role of KPP, optimization strategy, Klasabi slum area.

Keywords: role of KPP, optimization strategy, Klasabi slum area.

ID : AIC 2024 A 054

STRATEGIES FOR SUSTAINABLE DEVELOPMENT BASED ON CHURCH PERCEPTION AND PARTICIPATION IN MANOKWARI DISTRICT, WEST PAPUA PROVINCE, INDONESIA

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Abstract

Sustainable development aims to improve well-being without harming the environment. The sustainable development needs to be underpinned by perspective and attitudes that support sustainability in the program of activity carried out systematically and planned in the framework of welfare improvement, quality of life and the environment of humanity without reducing access and opportunities for future generations to enjoy and utilize it. The research objectives were: (1) to understand the church's perception of sustainable development; (2). to describe the church's participation in sustainable development, and (3) to design a sustainable management strategy based on the church's perspective and participation in Manokwari Regency, West Papua Province. The study was conducted in West Manokwari District and East Manokwari District of Manokwari Regency, West Papua Province from April to May 2024. It involved interviews and questionnaires with 110 church members, including pastors, council members, and congregation members of all denominations under the Fellowship of Churches in West Papua. The collected data were analyzed using figures, graphs, and tables. The research results revealed that the church's perception of sustainable development in Manokwari Regency is very strong (87%). The church's level of understanding, sermons, work programs, and budgets all showed very strong scores. Additionally, the church's level of participation in sustainable development was deemed strong (77%), with work programs, concrete actions, and engagement all scoring well. Sustainable management strategy based upon this perspective of the church in the Manokwari District, West Papua Province, by way of using the internal external make use of the opportunities, increase the community participation, collaboration and partnership with external sides, and the utilization of technology.

Key Words: sustainable development, perception, participation, church community, manokwari regency, west papua

ID : AIC 2024 A 055

POTENTIAL LOSS OF CARBON STOCKS DUE TO LAND USE CHANGE IN FOREST AREA IN MANDAILING NATAL DISTRIC

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ABSTRACT

Land use change that occurs from forest to non-forest has an impact on significantly reducing the carbon content stored in forest areas. This study aims to calculate the potential carbon loss due to land use change in forest areas in Mandailing Natal District. The calculation of carbon stocks was carried out in other use areas that have been granted Business Use Rights (HGU) or Timber Utilisation Permits (IPK) but have not been converted into oil palm plantation areas and in oil palm plantation areas with an age of 1 - 5 years. Based on the comparison between the 1982 Forest Use Plan (TGHK) and the Decree of the Minister of Forestry No. 44/Menhut-II/2005, forests in Mandailing Natal Regency have experienced changes in the area of function of the area where there was an increase in the area of Other Use Areas by 152,503.85 ha and a reduction in the area of production forest by 121,390.80 ha. The carbon stock value of trees ranged from 110.16 - 195.56 tonnes/ha, while the carbon stock of oil palm stands at the age of 1 - 5 years ranged from 2.42 - 9.54 tonnes/ha. The potential loss of carbon stocks due to changes in forest area functions based on the granting of Timber Utilisation Permits and map interpretation is 7,458,214.48 tonnes and 6,489,729.00 tonnes, respectively.

Keywords: *Carbon stock, land use change, oil palm plantation, production forest, timber utilisation permit*

ID : AIC 2024 A 056

MITIGATION AND ADAPTATION OF NATURAL DISASTERS BASED ON LOCAL WISDOM IN THE COMMUNITIES OF THE MENTAWAI ISLANDS DISTRICT

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ABSTRACT

This study aims to describe and analysis mitigation and adaptation model of natural disasters that have been doing by people in Mentawai Islands. The type of research in this study is qualitative research. Determination of informants in this research were used a purposive sampling method, where samples were selected based on certain criteria that relevant to the study objectives. Data collection techniques include direct observation, interviews, documentation, and literature review. Data analysis was carried out through the stages of data collection, data reduction, data presentation, and generating conclusions. The results of this study is expected to provide an understanding of existing local wisdom and how it is applied to maintain, preserve and build mitigation efforts against natural disasters in the Mentawai Islands. In addition, this research can reveal the values of local wisdom of local communities so that they can be paid more attention and maintained, so that local wisdom can become part of natural disaster mitigation strategies. This research is also expected to explain the influence of local community wisdom in mitigating natural disasters, both in terms of cultural and structural aspects in the Mentawai Islands. In addition, this research is expected to be able to analyze active and passive adaptation strategies, social adaptation, and community cultural adaptation in facing natural disasters in the region.

Keywords: Mitigation, Adaptation, Disasters, Mentawai

ID : AIC 2024 A 057

SUSTAINABILITY OF WATERSHED MANAGEMENT: MULTIDIMENSIONAL SCALING (MDS) ANALYSIS OF ECOLOGICAL, ECONOMIC, SOCIAL, AND INSTITUTIONAL DIMENSIONS IN THE PAGUYAMAN WATERSHED, GORONTALO PROVINCE, INDONESIA

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Abstract

This research aims to analyze the sustainability status of the Paguyaman Watershed management in Gorontalo Province based on ecological, economic, social, and institutional dimensions, as well as to identify the attributes influencing this sustainability status. The method used is Multidimensional Scaling (MDS) analysis to comprehensively assess the sustainability of watershed management.

The analysis results show that the sustainability status of Paguyaman Watershed management varies across dimensions. The ecological dimension has a sustainability index value of 50.13 (moderately sustainable), the economic dimension 53.63 (moderately sustainable), the social dimension 63.57 (moderately sustainable), and the institutional dimension 42.33 (less sustainable). These findings indicate that while there are some positive aspects, significant challenges remain in the management of the Paguyaman Watershed, particularly in the institutional aspect.

Further analysis reveals various key attributes influencing sustainability in each dimension. In the ecological dimension, water quality, vegetation cover, and erosion levels are important factors. The economic dimension is influenced by land productivity, livelihood diversity, and water management investments. The social dimension highlights the importance of gender equality, food security, and migration rates. Meanwhile, the institutional dimension emphasizes inter-agency coordination, clarity of authority distribution, and effectiveness of program implementation.

The study concludes that an integrated and holistic approach is needed in the management of the Paguyaman Watershed to enhance its sustainability. Recommendations include improving land management practices, economic diversification, strengthening community participation, and enhancing institutional capacity and coordination. These efforts are expected to promote more effective and sustainable watershed management, ensuring the availability of healthy water resources for future generations and supporting sustainable development in the region.

Keyword: Paguyaman Watershed; Sustainability assessment; watershed management

ID : AIC 2024 A 058

GREENHOUSE GAS EMISSIONS IN CORN PLANTATIONS IN BOALEMO REGENCY, GORONTALO PROVINCE

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ABSTRACT

Corn is one of the leading commodities in Boalemo Regency. Extensive land clearing for corn cultivation occurs on a large scale. This land management has environmental impacts. One of the impacts of corn agricultural land management is the emission it produces. This study aims to assess greenhouse gas emissions in corn plantations in Boalemo Regency. The research location covers the entire Boalemo Regency. This research uses a quantitative method with a Life Cycle Assessment (LCA) approach. Corn plantation management activities were obtained through interviews with farmer groups. The research population consisted of all corn farmer groups in Boalemo Regency. The sampling method is simple random sampling, with a total sample of 385 individuals. The LCA system analysis is limited to Cradle to gate. Emission data analysis was conducted by combining Tier 1 and Tier 2 methods. Greenhouse gas emissions calculations were based on IPCC 2006 guidelines. The study results show that the total emissions generated from the corn plantation process amounted to 3279 Gg GHG. Based on slope gradient, the highest emissions were produced on slopes of 5 – 15%. Emissions on corn agricultural land with a slope of 5 – 15% amounted to 1,379,856.78 kg CO_2, 268 kg CH_4, and 103,237 kg N_2O.

Keywords: Greenhouse Gas Emissions, Corn Plantation, Boalemo Regency

ID : AIC 2024 A 059

PERAN PENGETAHUAN TRADISIONAL DAN NILAI LOKAL DALAM OPTIMALISASI PRAKTIK PENGELOLAAN SAMPAH BERBASIS MASYARAKAT DI PULAU-PULAU KECIL : STUDI KASUS PULAU PENYENGAT

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ABSTRACT

Coastal and small islands are areas with unique and complex dynamics of ecological, social, and cultural challenges. An urgent issue is waste management, considering the rapid development of tourism while land and resources are minimal. This study aims to determine the influence of local knowledge and values on the effectiveness of community-based waste management on Penyengat Island. This study uses quantitative and qualitative approaches. Sampling points were divided into four clusters representing the four sides of the island by interviewing 97 respondents. Quantitative data were analyzed using regression analysis, and qualitative data were analyzed descriptively and qualitatively. The results showed that knowledge and local values significantly influenced the effectiveness of waste management. The coefficient indicates that local values have a slightly more substantial impact than the knowledge factor. The statistical significance confirmed by the t-statistic is 4.198697071 with a p-value of 0.0000609514 local value variables, and the t-statistic is 4.614113432 with a p-value of 0.0000124656 local knowledge variables. This shows that both variables underline the reliability of this finding. However, qualitative data shows that optimizing waste management on Penyengat Island requires strong support from the government to provide supporting facilities for waste processing at the Penyengat Island 3R TPA.

Keywords: community-based waste management, local knowledge, and values, Penyengat Island


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