The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood

ABSTRACTS

June 10-14, 2024 | Kathmandu, Nepal

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Table of Contents

The 30th Annual International Conference of ISDRS on Sustainable Development Research

A Global Platform Bringing Knowledge, Insights and Experience to Enrich Scholarship from Natural and Social Sciences

INTRODUCTION

Nepal is hosting the 30th Annual International Conference of ISDRS on Sustainable Development Research in Kathmandu from June 10 to 14, 2024. ISDRS (International Sustainable Development Research Society) is a global scientific community committed to global peace and sustainable development. The conference is a multidisciplinary platform of scholars engaged in natural as well as social sciences. Nepal's newly established public universities, the Mid-West University and Nepal Open University are coordinating with various national and international organizations to convene the conference.

For millennia, humans lived as a member of nature securing life and continuing their existence albeit endured calamities. Modern humanity; however, destroyed this relationship by treating nature merely as a means of prosperity rather than a fabric of livelihood. Today's environmental crisis is but a choice of human short-sightedness of abusing natural resources. Lately, the Earth Summit 1992 concluded that sustainable development should be a global goal focusing on economic, social, and environmental concerns. Giving further impetus to the Millennium Development Goals (MDGs) (2001-2015), the governments adopted the Sustainable Development Goals (SDGs) to protect the planet in ensuring their existence. Research as answers to inquiries and solutions to issues have a pivotal role in catalyzing the procedures of SDGs and achieving them.

Sustainability is a way of living. It is a model being practiced by indigenous communities since millennia. While prioritizing the sustainable future for mountain communities and safeguarding the invaluable natural resources found in these regions, their linkages with waters of ocean can never be ignored. All rivers originating in the mountains flow to the ocean. This connectivity is more than a physical bridge; it connects people's livelihood and their culture, completes life cycles of fishes,

nourishes plant and animal life, and fertilizes agriculture farms.

The 30th ISDRS annual conference will be an important international milieu of scientists (natural and social), economists, development professionals and graduate students, entrepreneurs and innovative minds. Nepal, a breathtaking country renowned for its stunning natural landscapes and rich cultural heritage, offers an ideal venue for this prestigious event. The SDGs implementation reached its half-way point in 2023. Accordingly, the conference will offer a global platform for bringing together efforts undertaken towards the 2030 pathways, exchanging the accomplishments that different countries have achieved in reaching the SDGs thus far, and providing recommendations for solutions on how to achieve SDGs by 2030.

CONFERENCE THEME

The theme of the 30th ISDRS annual international conference is *Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood*.

CONFERENCE TRACKS and SUB-TRACKS

The conference will feature ten tracks. In each tracks there will be two to six sub-tracks depending upon the scope of the discipline. The tracks and sub-tracks of the conference are listed below:

1. Sustainability and Science
   1a. Theoretical Approaches
   1b. Research Methods and Methodologies
   1c. Assessing Sustainability
2. Education for Sustainability
   2a. Provision, Quality of and Access to Education
   2b. Educating for Sustainability
3. Biodiversity Conservation and Ecosystem Services
   3a. Life on Land
   3b. Life below Water
   3c. Ecosystem Services
4. Climate Change and Energy
   4a. Climate Change: Effective Response for Energy, Water and Land Use
   4b. Affordable and Clean Energy
   4c. Climate, Tourism and Sustainable Development
5. Sustainable Production, Consumption, and Innovation
   5a. Corporate Sustainability and Corporate Social Responsibility

5b. Design for Sustainability
5c. Circular Economy
5d. Value Chains and Trade
5e. Sustainable Consumption and Consumer
5f. Food System Transformation

6. Sustainable Cities and Communities
   6a. Urban and Regional Transformations
   6b. Urban and Regional Resilience
   6c. The Power of Art and Culture in Sustainable Cities and Communities
7. Socio-economic Aspects of Sustainable Development
   7a. Global Inequality and Poverty
   7b. The Future of Employment and Good Work
   7c. Economic and Financial Innovations for Sustainability Transitions
8. Social Foundations for Sustainability
   8a. Gender, Inclusivity and Human Rights
   8b. Communication for Sustainability
   8c. Just Transition
9. Governance and Institutional Frameworks
   9a. Peace and Sustainable Development
   9b. Collaboration and Co-creation for Sustainability, SDGs Initiative and Scale of Governance
   9c. Public Participation and the Role of Stakeholders
   9d. Legal Aspects of Sustainable Development
10. Special Themes
    10a. ICT and Sustainable Transformation: Navigating SDGs
    10b. Sustainability in the Himalayan Region
    10c. Religious Philosophies and Sustainable Development
    10d. Indigenous System and Sustainability
    10e. One Health, SDGs and Ethical Conflicts

MAIN ACTIVITIES

The conference will create a dynamic and engaging platform featuring keynote speeches by renowned scholars, panel discussions, interactive workshops, and paper presentations, covering a wide range of sustainable development topics. Participants can look forward to networking opportunities and post-conference excursions to explore Nepal's sustainable initiatives.

Table 1: Main Activities of the 30th ISDRS Annual International Conference

Main Activities	Date
PhD Workshop	June 10, 2024
Main Conference Events • Inaugural Programme • Keynote Presentations • Panel Discussions • Oral and Poster Presentations • Networking Session • Valedictory Programme	June 11-13, 2024
Sustainability Field Trips	June 14, 2024

EXPECTED OUTCOMES

The following will be the expected outcomes of the 30th ISDRS annual international conference:

1. **Enhanced Collaboration and Networking**: The conference will facilitate collaboration and networking among researchers, policymakers, and practitioners from around the world, fostering partnerships that can advance sustainable development initiatives.

2. **Innovative Research Presentations**: Over 200 abstracts from various universities and research organizations will be presented, showcasing the latest research findings, innovative methodologies, and best practices in sustainable development.

3. **Policy Recommendations**: The conference will produce the "Kathmandu Communique," a document summarizing key outcomes and providing actionable policy recommendations aimed at national and international organizations to help achieve sustainable development goals (SDGs).

4. **Proceedings Publication**: A comprehensive proceedings document will be published post-conference, disseminating the research and discussions to a broad audience via electronic media. This will ensure that the knowledge shared at the conference reaches a wide range of development organizations, research institutions, and universities.

5. **Youth and Community Engagement**: Engaging young researchers, students, and local communities in sustainable development discourse, inspiring the next generation of leaders and practitioners in the field.

6. **Advocacy and Awareness raising:** The conference will be helpful to raise awareness about critical sustainable development issues and advocate for effective solutions and strategies, enhance capacity to address sustainable development challenges and identify emerging trends and gaps in sustainable development research.

THE 30th CONFERENCE

International Sustainable Development Research Society (ISDRS)

CONFERENCE HOSTS

Mid-West University, Surkhet, Nepal

Nepal Open University, Kathmandu, Nepal

CONFERENCE PATRONS

Ministry of Education, Science and Technology, Nepal

University Grant Commissions, Nepal

ORGANIZING PARTNERS

Agriculture and Forestry University, Chitwan, Nepal

Far-Western University, Kanchanpur, Nepal

Madhesh University, Parsa, Nepal

Purbanchal University, Morang, Nepal

Rajarshi Janak University, Janakpur, Nepal

Global College International, Kathmandu, Nepal

KIST College and Secondary School, Kathmandu, Nepal

Higher Institutions and Secondary School's Association Nepal (HISSAN), Kathmandu, Nepal

National Trust for Nature Conservation, Lalitpur, Nepal

Nepal Tourism Board, Kathmandu, Nepal

Asia Network for Sustainable Agriculture and Bioresources, Kathmandu, Nepal

Himalayan Research Expedition (P), LTD., Kathmandu, Nepal
MiTRA Samaj, Kathmandu, Nepal
Nepal Development Research Institute, Lalitpur, Nepal
Sustainability Prosperity Initiative Nepal, Kathmandu, Nepal
Jawalakhel Group of Industries, Lalitpur, Nepal
UNESCO Kathmandu, Nepal
UNDP Nepal

CONFERENCE SECRETARIAT

Resources Himalaya Foundation, Lalitpur, Nepal

Track One

Sustainability & Science

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 1a - Sustainability and Science – Theoretical Approaches

Submission ID: 72

Assessing Wet Deposition of Microplastics in Agricultural System of Poland with Implications for Agricultural Soil Contamination and Sustainable Livelihood

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Abstract

Concerns regarding the adverse impacts of microplastics on livelihoods have arisen worldwide. Rainwater and clouds could also be a possible source of microplastics in terrestrial and aquatic environments, including mountains and agricultural systems, which can impact the livelihoods of people who rely on these systems for their survival, such as farmers, fishermen, and tourism operators. Microplastics in rainwater can also accumulate in agricultural soil. This can lead to soil contamination and increase the chance of microplastics being absorbed into plant roots and affecting plant growth. Microplastics in the food chain have a direct impact on human health, and different species on land. Sustainable development goals 3 “good health & well-being” and 15 “life on land” could be achieved by food production in a clean environment. The aim of this study was to assess the wet deposition of microplastics in agricultural areas of Poland as a possible source of contamination in the food chain. The methodology used in this research was protected both nationally and internationally, and PCT/IB 2019 /051,838 of March 7, 2019, is the code of the submitted request granted an international patent extension in several countries worldwide, together with the accepted Italian patent number 102,018,000,003,337 on March 7, 2018. The sampling duration was three months from 10th-Oct-2023 to 10th-Jan-2024. Results showed a high concentration of microplastics in rainwater samples from agricultural areas. The results were categorized according to the identified particle sizes, colors, and shapes. The data was presented using FTIR Spectrometry. This study provides valuable

information on the extent and sources of microplastic pollution in Poland's agricultural system, which will help to design policies and strategies to reduce microplastic pollution, promote sustainable development, and protect public health. This research study have linkage with SDG 15 and 3. The methodology and findings of this research can be used to assess microplastic impacts on livelihood, ocean and mountains worldwide and will help to plan strategy to achieve sustainable development goals.

Submission ID: 100

Need of accounting sustainable development goal interactions: insights for a systematic review.

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Abstract

Implementing the 2030 Agenda, with its 17 goals and 169 targets, presents a multifaceted challenge in terms of context-specific prioritization and understanding the interconnections among Sustainable Development Goals (SDGs). It is widely acknowledged that focusing efforts on achieving a single goal or target may result in trade-offs with other objectives, while also creating opportunities for synergies to emerge. If the nature of interdependence between the goals is not considered, there is a risk of producing conflicting results that could hinder progress toward sustainability. For this, an interdisciplinary yet systemic approach is required to maximize the synergies at different scales and sectors. As understanding the interactions demands an interdisciplinary approach, different ontological assumptions regarding each SDG become imperative. As there is a broad acceptance of the critical role of interactions within the SDG agenda, scholarly attention has been shifting towards investigating interactions as a separate field of scientific inquiry. Despite the target of policy coherence being realized through multiple studies, a critical knowledge gap remains in understanding how these complex interlinkages are addressed for policy designs and implementations across various sectors and associated social, economic, and earth systems. We aim to bridge this gap by conducting a systematic synthesis of the current

literature on SDG interactions. The review involves comprehensive keyword search strategies across multiple databases, including but not limited to Scopus, and Web of Science. Furthermore, manual searching of key journals and reference lists complements the electronic search. The inclusion criteria prioritize peer-reviewed articles and policy documents published between 2015 and 2024. Focus is set on various empirical studies, theoretical frameworks, and methodological tools accounting SDG interactions. Relevant data from the selected studies are extracted and synthesized to identify key findings, themes, and trends. This investigation highlights the significance of comprehending SDG interactions, offering valuable insights into present approaches for policy design and implementation. Along with discussing the opportunities created, the synthesis also notes the challenges associated with it both direct and indirect interactions. The findings from the review yet again establish the complex dynamics at play in sustainability science and promote recognition for interconnectedness. Serving as a reference for researchers and practitioners in governance and policymaking, it will provide a crucial perspective on addressing synergies and trade-offs to enhance effectiveness in achieving SDG targets across disciplines.

Submission ID: 279

Organizing the planetary boundaries for novel entities: A proposal for the systematization of knowledge

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Abstract

Initially referred to as the planetary boundary (PB) for chemical pollution[1], this PB was expanded and called “novel entities” (NovEnt), now including all “*new substances, new forms of existing substances, and modified life forms that have potential to* [produce] *undesirable geophysical and/or biological effects*”[2(p. 7)]. The myriad of entities that fall under this definition and the scale of the problem pose scientific and

governance challenges.

NovEnt encompasses more than one boundary[3], and we have probably already exceeded the safe threshold for it[4]. However, there is the challenge of overcoming ignorance about the threats while the disruptive effects of NovEnt are not discovered until they become a potentially irreversible problem on a planetary scale[3]. There are also potential additive and transgenerational effects for which current investigative methods are inadequate[5].

Furthermore, the different types of NovEnt also require a diversity of study strategies and methodologies. Understanding the dynamics and effects of these entities on nature and humans depends on field studies and laboratory representation of the complex interactions involved, which is particularly challenging. As a result, it was not initially possible to establish the status for NovEnt[1,2], which was only formally proposed in 2023[6]. However, the current definition has a logical and qualitative character, and it is currently virtually impossible to quantify this boundary or parts of it.

These conditions encourage a proactive and preventive attitude towards NovEnt[3,7]. To move forward, efforts are needed to organize knowledge on this PB. We propose (i) to systematize the available knowledge and establish a classification of the different types of substances. It will also be necessary to develop strategies and methods to measure and evaluate different types of NovEnt as much as possible, track their fluxes and identify their interactions in nature. To this end, we propose (ii) adopting ecological approaches based on biogeochemistry.

We also propose (iii) the inclusion of invasive alien species (IAS) in the NovEnt list, based on three criteria: *Firstly*, like genetically modified organisms, they are new to the ecosystems where they are introduced. The former's success depends on human intervention[8], while IAS are successful on their own merit, but regulated by human factors[9]. *Second*, like heavy metals and radioactive elements, exotic species exist in nature but are transferred from their contexts to others in which they are new and can produce adverse and unpredictable impacts, cause species extinction and impact human health[10]. *Finally*, IAS are considered a global threat to biodiversity[11–13], despite not being part of any PB.

In conclusion, the complexity of NovEnt poses scientific and governance challenges. It is necessary to systematize knowledge about NovEnt and focus studies on their behaviours and dynamics in ecological and human systems. To contribute to these tasks, we propose: (i) the identification and classification of NovEnt; (ii) the study of the biogeochemistry of NovEnt; and (iii) the inclusion of IASs in the list of NovEnt.

SDGs related to the study topic: 2, 3, 9, 11, 12, 14, 15.

Track 1b: Sustainability and Science – Research Methods and Methodologies

Submission ID: 14

Mutual enforcement between fundamental values and conceptions of sustainability

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Abstract

Since it was introduced in the Brundland Report in 1987, the term *sustainability* gradually increased its presence and exploded into popularity after the Sustainable Development Goals (SDGs) were adopted in 2015. The term is now sprinkled everywhere, from product advertisements by private companies to tabloid shows on TV, as if it were a fashion icon to demonstrate the sensitivity to global issues. However, there is no clear consensus on what the term *sustainability* actually refers to, nor is it clear what values are held and acted upon by those who use it.

On the other hand, regardless of how the term *sustainability* is used, fundamental principles and values that people rely on in judging the correctness of their and other people's behavior regarding the symbiotic existence of humans and nature are rooted in the societies in which individuals live.

Fundamental values, recognition of issues in front, their perceived solutions, and actions to solve such perceived problems are all related but different layers of the cognitive process. Based on this understanding, in this study, the author tries to capture the relationship between people's conceptions of *sustainability* and fundamental values based on which people make ethical judgments and decide their acts on various issues, including those for *sustainability.*

In her earlier study, which conducted a quantitative topic modeling using large-scale web-based texts as data, the author identified diverse connotations attached to the concept of *sustainability* depending on the backgrounds of the people who use it and their motivations. This past study came up with a list of phrases and words that appeared frequently in close connection with sustainability. The current study uses this list of issues and themes identified through the quantitative topic modeling as questionnaire items.

The questionnaire survey was conducted in February 2023 and distributed online to 206 participants in the Philippines and Kenya. These two countries were selected as the samples for the trial survey for being English-proficient societies in two different regions – Asia and Africa. The questions asked respondents to rate different themes and issues related to sustainability, together with their core values, ideological tendencies, and personality.

The data from this questionnaire is then linked to the items from the large dataset from the World Value Survey (WVS) 2023, in which the Philippines and Kenya also took part. The WVS is a global research project that explores people's values and beliefs, how they change over time, and what social and political impact they have. There are also question items about people's values about development, co-existence with others, and utilization of limited resources.

The author will combine the data from her own questionnaire based on the *sustainability*-related topic models and items adopted from the WVS and examine the relationships among people's fundamental values, their conceptions of sustainability issues, and perceived solutions.

Submission ID: 20

Sustainability, development and *différance*

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Abstract

Deconstruction is a critical reading technique proposed by Jacques Derrida (1930-2004). This technique analyses the internal tensions of a discourse, exposes its inherent complexity and, as a result, casts new light into the addressed issue. In this presentation, I propose a deconstructive reading of the concepts of 'sustainability' and 'development', as used by the United Nations in the 2030 Agenda for Sustainable Development, and explain them in terms of identity.

The term *différance*, coined by Derrida, combines the terms *différer* (differ in French) and *différence* (difference in French). Derrida uses it to highlight the contingent and elusive character of the meaning of words: every word finds its meaning by differentiating itself from others (*différence*) and by indefinitely postponing the fullness of its meaning (*différer*). These characteristics are noticeable in the case of the terms 'sustainability' and 'development'.

In UN documents, sustainability refers to the idea of making use of resources in the present in a way that allows future generations to meet their needs as well. The very definition of sustainability subsumes the meaning of the concept to a future (*différer*) which, by definition, is unknown (we will never reach it, otherwise it would cease to be future). At the same time, the UN constructed the meaning of sustainability as a counterpoint to the concept of unsustainability (*différence*): first, we know what unsustainability is (a central characteristic of modern societies); then, sustainability is conceptualised as the opposite to unsustainability. The same logic works within the concept of development in UN documents. On the one hand, it is a concept that always points to a future where the present problems are solved (*différer*). On the other hand, the concept of development was born as a counterpoint to that

of underdevelopment (*différence*): in the 1950s and 1960s, the United Nations first focused on underdevelopment, then theoretically defined development.

My presentation analyses the context where these concepts were articulated into UN discourse and shows them as symptoms of the transitions that the world is going through. In brief, development played a key political role during the 1950s, when the capitalist West aimed to take a centre position in world politics – as opposed to the underdeveloped and/or communist 'other' (*difference*) – and to show capitalism (democracy, freedom) as the way to a better future (*différer*); whereas sustainability emerged in the 1980s and 1990s, and gained momentum in the 2000s and 2010s, when the capitalist West assumed that it was not the centre anymore – the West is unsustainable: one 'other' among many unsustainable others (*difference*) – and that capitalism was an endless scape forward, looking for an unreachable promised future (*différer*).

The presentation does not focus on any SDG in particular. Rather, it offers a general reflection about the inherent complexity of global sustainable development strategies. 'Development' and 'sustainability' are presented, not as the solution to our global problems, but as (identity) discursive tools intended to make sense of (grasp, hold, control) an ever changing and incommensurable reality – our world.

Submission ID: 44

The evolution of sustainability discourses: a deconstructed reading

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Abstract

Sustainability has become a widely accepted and adopted discourse, taking on multiple meanings and uses over the years. This has enriched the discursive scenario but has also resulted in sustainability's characterization as a vague, ambiguous, empty, and contested term, which poses challenges to its representation and understanding (Salas

Zapata & Ortiz Muñoz, 2018; Farley & Smith, 2020, Billi, Mascareño, & Edwards, 2021; Thompson & Norris, 2021).

To gain insight into how sustainability is represented and constructed within the societal discourses, (Michaud, 2018; Khan Malik, 2021), this research employs Jacques Derrida's deconstruction double reading strategy. By applying the double reading strategy, this research looked at eight documents from 1987 to 2021 that have influenced the discursive landscape across multiple dimensions, including environment, economy, society, culture, religion, and politics.

The double reading strategy enables to capture of the discursive scenario of texts and involves two 'gestures' or moves (Derrida, *Limited Inc*., 1988, p. 21). The first, known as 'double commentary', consists of the abstraction of the authorial and textual intentions of the texts (*vouloir dire*) (Derrida, *Of Grammatology*, 1969, p. 158), which was carried out using qualitative content analysis as an auxiliary method. This gesture was followed by a second reading, known as 'deconstructive reading,' which examined the binary oppositions, *differánces*, aporias, and omissions within the texts (Derrida, *Writing and differánce*, 1967, pp. 229-230). The use of deconstruction provided a reading strategy for understanding sustainability discourses.

The double reading strategy has revealed the evolution of sustainability, progressing from the initial Brundtland report which defined sustainability from a global perspective in 1987 to diverse contextual interpretations shaped by dimensions, goals, and authorial intentions. Most of the texts maintained a normative, scientific, and anthropocentric approach over time, except for the religious document *Laudato Si.* This research also found prevalent economic and political structures based on capitalist foundations and a democratic model, along with a strong political inclination beyond governance and regulatory frameworks. An increasing trend toward adopting a broader social, cultural, and ethical agenda was also observed, as well as a shift from apocalyptic narratives to less radical discourses that still emphasized the urgency, immediacy, and challenging nature of sustainability. Despite the adoption of a more inclusive and equitable perspective, the misrepresentation of certain actors, such as indigenous groups, continued in all discourses.

Overall, applying the deconstructive double reading strategy confirmed that sustainability is a multidisciplinary and multidimensional discourse that has, however, transcended to a transdisciplinary one, where practices and behaviors play an important role. The results also indicate that sustainability is influenced by the dimension in which it is rooted and is dependent on spatial and temporal contexts, as well as the authorial intentions that interpret it. As a result, it can be concluded that sustainability is a polysemic, *iterable*, flexible, multifaceted, and adaptable discourse.

Submission ID: 82

The current state of models covering the sustainable development goals and planetary boundaries

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Abstract

The sustainable development goals (SDGs), adopted by the United Nations, are widely used as a framework to transform our world towards sustainability. However, countries are not on track to achieve them by 2030. The SDGs are important in themselves, but achieving them might be insufficient for long-term sustainability. To achieve long-term sustainability, we need to stay within the planetary boundaries (PBs) and avoid dangerous environmental tipping points. Therefore, we need to know the consequences of underachieving the SDGs on the PBs. So far, there are no models, that include all SDGs and PBs. Such holistic models are necessary for the scenario analysis of sustainable development. Therefore, we have the following questions to answer. How are the SDGs linked to the PBs? What is the state of art of models including SDGs and/or PBs?

We will answer these questions by doing a systematic literature review on the current state of system models, covering at least some of the SDGs and PBs. In this review, we search for papers that include terms on SDGs or PBs and terms on modelling or simulating in two databases:

Web of Science and Scopus. For example, for Web of Science we use the following search: *Sustainab* AND (SDG* OR "sustainable development goal*" OR "planetary boundar*") NEAR/10 (~model* OR ~simulat*).* For this search, Web of Science provides a list of 813 articles. We do a similar search in Scopus. Next, we select the relevant papers from this list by reading the titles and abstracts.

With the outcome of the systematic literature review, we write a report on the relations between SDGs and PBs and we make a clear overview of the current state of models about sustainable development which are used for simulating SDGs and/or PBs. Also, we tell which models are most promising to cover all SDGs and PBs. We expect to find an integrated assessment model to be the most suited candidate to expand. We expect that there is already a wide range of models relating SDGs to planetary boundaries covering climate change, but that the other PBs are related to SDGs less.

In this systematic literature review, all SDGs are included. The research contributes to the conference as we investigate the relation between SDGs and PBs. This result is useful for the relation between the achievement of the SDGs by 2030 and sustainability afterwards.

Submission ID: 111

A Survey Experiment Towards Localization of Sustainable Development Goals in Eleven Districts of Rajasthan, India

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Abstract

This article elaborates on the exploration performed using a survey experiment to design strategies for the localization of Sustainable Development Goals [SDGs] at the village level. The experiment is set to impact 11 districts in Rajasthan, India. The study was conducted among 73 random participants belonging to 11 districts of Western Rajasthan,

located in the remote Thar Desert region of India. These participants came from varied domains, including academia, central government, state government, village heads, and UN organizations, respectively. Each study participant was provided with three questions to think through the lens of their district to identify a local development problem, provide a local solution, and propose an approach to attaining the solution. Data from the experiment was labeled, grouped, categorized, and thematically arranged as required under the Kawakita Jiro approach to provide insights into challenges in the localization of SDGs. Qualitative data obtained was taken through multiple generative correlations to identify patterns. At the village panchayat level, the study identifies multi-dimensional issues in governance, lack of technological availability, inertia in its adoption, and illiteracy among villagers as key issues. 60% of the total participants highlighted problems in local governance. Within the governance issues, 28% of responses pointed to illiteracy, and 22% suggested a lack of information on development schemes among villagers as the critical problem. Multiple structural inequalities faced by women in the villages were a concerning challenge. 40% of the responses focused on inequities in access to education, 26% discussed the lack of secured public spaces and transport for women, and 20% focused on the lack of participation of women in local governance as challenges to be tackled under targets 4.1, 5.1, 5.2, and 5.5 of Goals 4 and 5, respectively. District-specific concerns like solid waste management, water pollution, and issues in village settlements concerned with targets 6.3 and 11.a of Goals 6 and 11 were also revealed through the study. Besides, participants provided feasible solutions like proper information dissemination, employment generation, and multistakeholder integration to address these challenges. 71% of study participants emphasized the need for bringing together NGOs, SHGs, government institutions, development agencies, and villagers to achieve the targets of the SDGs at ground level on par with the multi-stakeholder partnership targets of 17.6 and 17.7 of Goal 17. The results of this study conducted in a spatially marginalized location of the Global South, bringing multiple stakeholders together, stand relevant to the conference as it has emerged as an effective methodology that can be adopted in different regions to bring nuanced ground-level perspectives to channelize data-based policymaking to achieve SDG goals. The implications of this bottom-up study also unveil a

feasible methodology to set the direction for the localization of SDGs at the village level in low- and middle-income countries.

Submission ID: 180

Critical realism as a methodology for sustainability research: reflections on circular economy-related applications

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Abstract

Sustainability research is fundamentally driven by an interest in learning from experience to identify and implement change, as well as to identify new areas of research out of academic interest. Critical realism has been identified as a useful research methodology in sustainability, proposed both as an approach to reflexivity (Nastar, 2023) and as a driver for change (Schoppek, 2021). Presently, critical realism is undervalued and under-utilised in a field more given to objectivist approaches which comprises compromise between research approaches driven by objectivity and those explicitly pursuing constructionist approaches. The former, typically quantitative, can be overly swayed by a search for representativeness (missing the lessons from detailed case studies, for example). Whilst constructionist approaches (qualitative methods, emphasizing subjectivity) draw out individuality and particularities at the expense of underlying influences. However, the latter can be critical in hindering the implementation of sustainability initiatives. This paper seeks to increase awareness of critical realism, by reflecting on learnings from its application to research on the circular economy, as an example of sustainability research. The research has investigated a number of distinct but inter-related issues (uptake of eco-design, collaborative resource-efficiency measures as economic development, working in a circular economy) with case studies predominantly in the UK. Research methods, which are not proscribed by critical realism, have included semi-structured interviews, questionnaire surveys and document analysis. Findings illustrate the usefulness of critical realism to address the underlying causal mechanisms relevant to a situation, e.g., that

whilst circular economy (or other sustainability) initiatives might offer environmental gains, social/economic gains are more elusive these and contingent on circumstances. The reflections herein are useful both as a guide to lessons learned from the research as well as to benefits from the approach.

This paper is relevant to all the SDGs as critical realism could be applied to research into any of them. The examples presented here for illustration are relevant primarily to SDGs 8 (decent work), 11 (sustainable cities and communities) and 12 (sustainable production and consumption).

Submission ID: 311

To Grow or to Decelerate? Deconstructing the Pervasive Rhetoric of Green Capitalism

Keith Moser

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Abstract

This presentation takes aim at any form of green capitalism that is predicated upon the simplistic, reductive notion that unfettered economic growth and expansion should be the ultimate goal of every society. Moreover, this transdisciplinary discussion also undermines the progress-regression binary behind the unsustainable idea of continual growth that reinforces free market solutions to the anthropogenic crisis instead of imposing limits to curb our *ecocidal* aggression against the remainder of the biosphere in the Anthropocene-Technocene. Drawing inspiration from Jacques Derrida's concept of *limitrophy*, Edgar Morin's complex theory, the deconstruction of dominant, *ecocidal* metanarratives by the ecolinguist Arran Stibbe, and the promulgation of degrowth by the philosophers Pierre Rabhi and Anne Frémaux, this thought experiment problematizes the viewpoint that it is *always* possible and preferable to find a way to grow the economy without destroying the planet that enables greenwashers to reinforce global, late-stage capitalism. Although Derrida's neologism "limitrophy" is primarily an attempt to dislodge the dichotomous thinking pitting humans against

other animals in his posthumous ecological thought, the philosopher's efforts to "break down the traditional conceptual boundaries" through the philosophical exercise of limitrophy also implore us to reflect upon a "safe operating space for humanity" outside of the progress-regression duality lurking beneath the surface of the discourse of economic growth (Taylor 177; Rockström et al. 472). In a similar vein, Morin's complex thought contests the oppositional thinking linked to "the euphoric image of Infinite progress" by wondering if it is time to "decelerate" (Morin 352, 332). The problem of "boundlessness" to which Morin refers is why the late philosopher-farmer Rabhi identifies "economic growth as a problem and not as a solution" (Pons 74). Building upon and expanding Rabhi's theories about degrowth, Frémaux beckons us to imagine a post-capitalist world in her seminal essays *La nécessité d'une écologie radicale* and *After the Anthropocene: Green Republicanism in a Post-Capitalist World*. Even if technological advances are certainly part of the solution, proponents of degrowth compellingly posit that only a radical paradigm shift regarding our impoverished concepts of development and progress can help us to avoid the impending ecological apocalypse.

Submission ID: 317

Identifying gaps in landslides studies to expedite sustainable development in Nepal

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Abstract

Nepal is susceptible to various hazards because of its geographical location within plate collision zone, complex hydro-meteorological condition and varied socio-economic dynamics. Every year, the country experiences over 7,000 hazardous events, leading to estimated annual losses of approximately 5 billion dollars. Among these hazards, landslides have a particularly severe impact, accounting for about 4% of Nepal's Gross Domestic Product (GDP). More than 500 landslides occur yearly, resulting in 36% of recorded fatalities in the country from these incidents. Despite the ongoing threat of landslides and other hazards,

Nepal is in the midst of rapid development giving due consideration to linear infrastructures. The country is witnessing an increasing trend in constructing new roads, bridges, and irrigation canals even in remote areas, as well as the expansion of urban centers driven by growing population and internal migration. The construction of hundreds of roads without a systematic plan, involving slope cutting without sound geo-technical considerations, has made the slopes vulnerable, contributing recurring landslide. Additionally, climate change impact such as localized intense rainfall in earthquake-affected zones and rising temperatures leading to rapid ice melting contribute to the increased likelihood of mass movement hazards and flooding in glacially fed rivers. Given these risks, it is critical to identify and categorize landslide-prone areas to implement effective mitigation measures. Various government bodies, universities and international NGOs are engaged in mapping and analyzing landslide risks, yet their efforts often focus on limited areas or specific projects. Similarly, academic research by graduate students on hazards in Nepal often remains unpublished, contained within university departments or libraries as thesis work. Even though research and development in Nepal have advanced considerably, the country's development approach has yet to reach a point of sustainability. Several factors are causing this gap, such as inadequate hazard risk assessments, limited use of scientific data in decision-making and a general disregard for the actual ground condition. This study highlights the importance of collecting hazards data and analyzing their impact comprehensively to foster sustainable development in Nepal. It further emphasizes that bridging these gaps requires the promotion of sustainable development practices based on ground reality and governed by scientific insights. This requires a multi-pronged approach, including improved data collection, robust risk assessments, and cooperative socio-technological decision-making among various stakeholders including key decision makers. By implementing these measures, Nepal can progress toward a more resilient and sustainable future, reducing the adverse impact of landslides and other disasters on the nation's economy and its people.

Track 1c: Sustainability and Science: Assessing Sustainability

Submission ID: 4

Mapping SDGs Priorities: Localising SDGs, Analysing Interactions, and Crafting Sustainability Solutions

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Abstract

The United Nations 2030 Agenda offers a comprehensive framework for global sustainability through its Sustainable Development Goals (SDGs), encompassing a wide array of societal, economic, and environmental aspirations. Yet, the successful localisation and implementation of these goals demand an intricate understanding of their multifaceted interactions, recognising both synergies and trade-offs that manifest at local levels. In our in-depth study situated within the Goulburn-Murray region of Victoria, Australia, we embarked on a rigorous exploration to align global SDGs with local imperatives. We conducted a detailed analysis to identify the most important SDGs and their targets that are relevant to the specific challenges and opportunities in the region. Through meticulous research, we pinpointed five overarching SDGs of heightened relevance: clean water and sanitation (SDG 6), agricultural activities (SDG 2), economic growth (SDG 8), climate action (SDG 13), and life on land (SDG 15). Within this localised framework, our investigation revealed a complex tapestry of 307 potential interactions among these prioritised SDGs and their associated 45 targets. Fascinatingly, a significant 41% of these interactions exhibited synergistic relationships, amplifying the potential benefits when pursuing multiple goals simultaneously. However, a discerning 6% revealed trade-offs, signalling areas where concerted efforts might inadvertently hinder progress in other domains. Notably, our findings underscored the intricate balance required, particularly emphasising the repercussions of unsustainable agricultural practices on crucial facets like water resources, environmental integrity, and the foundation of sustainable economic growth. Moreover,

the Goulburn-Murray region isn't immune to global uncertainties and evolving dynamics. Factors such as climate change, fluctuating agricultural commodity markets, evolving international trade landscapes, and progressive water policy reforms introduce layers of complexity for agriculture and the local economy. These uncertainties could potentially thwart the region's strides toward SDG attainment, necessitating adaptive strategies and robust policy frameworks. Drawing from our comprehensive analysis, we accentuated actionable policy solutions designed to harness synergies effectively while mitigating identified trade-offs. For instance, initiatives targeting SDG 13 (climate action) and SDG 15 (life on land) showcased predominantly synergistic co-benefits, presenting avenues for integrated planning and execution. Conversely, our insights illuminated areas of caution, particularly around SDG 2 (agricultural activities) and SDG 8 (economic growth), where proactive measures are imperative to circumvent adverse outcomes stemming from unsustainable agricultural practices. In conclusion, our research underscores the paramount importance of holistic, context-specific analyses when navigating the intricate landscape of SDG localisation. By unravelling the intricate web of SDG interactions within the Goulburn-Murray region, we offer beneficial insights for policymakers, stakeholders, and communities. While our findings are deeply rooted in this specific context, the methodological approach we've pioneered holds promise for broader applicability. It furnishes stakeholders across diverse locales with a replicable blueprint for dissecting SDG interactions, fostering policy coherence, and advancing sustainable development agendas tailored to unique regional nuances.

Submission ID: 32

Integrating Stakeholder Perspectives in Assessing Sustainability of Agriculture Water Management Practices

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Abstract

One of the biggest challenges faced by agriculture is meeting the growing demand for food while managing limited water resources. This challenge

is not only on a global scale but also at the farm level, which is triggered by limited water availability and declining water quality, fragmented governance structures, insufficient collaboration between stakeholders, cultural values, and diverse economic conditions. Different solutions have been developed to encourage a shift towards sustainable land and water management, including the appropriate construction policies, user- and environment-friendly designs, and smart and innovative water technologies. Among these, Smart and innovative technologies are increasingly used as they assist in efficient monitoring, optimization, and forecasting, thus enabling environmental sustainability. They have made jobs more attractive, enabling economic sustainability, and have also helped contribute to the digital literacy of society, thus helping social sustainability. However, there are concerns that the innovative technologies are technically complicated, economically expensive, and limited to certain groups of farmers and may not consider passive stakeholders. Hence, it is crucial to analyze these technologies in terms of sustainability, innovation, operational capacity, customer-centricity, and their impact on the transformation of agricultural activities both now and in the future.

A rapid ethnographic field visit and semi-structured key informant interview were conducted with different groups of stakeholders from Canale Emiliano Romagnolo (CER) in Italy and Seeland, Switzerland. The aim was to study the status of current water management practices in farms and obtain the stakeholder's perspective regarding the sustainability of innovative water management technologies like 'remote sensing pipelines and integrated physically based terrestrial system models'. Our study found that current water management practices were 'environmentally' sustainable with technically advanced water management systems, but there is a need to reconsider social sustainability by creating room for involvement and collaboration of diverse groups of stakeholders and economic sustainability by enhancing market mechanisms. We also observed positive attitudes toward using innovative technology; however, concerns were raised about its use in terms of technical complexity, reliability, and prices. Our study highlights the importance of creating management systems that enable decision-makers to engage with a diverse group of stakeholders to achieve the sustainable transformation of agricultural water management activities. Such systems can streamline policy formulation and implementation, considering the concerns of stakeholders at the farm level.

Our research primarily focuses on the sustainability of water management in agriculture, with an emphasis on innovative technologies for efficient water management and incorporating input from stakeholders. This research primarily addresses SDG 6 - Clean Water and Sanitation (Target 6.3, 6.4, and 6. b), as well as SDG 2-Zero Hunger (Target 2.3 and 2.4). The impact of this research extends beyond agriculture to food, water availability, and climate change, making it relevant to the conference's theme of "…sustainable livelihood." Additionally, the research addresses the concerns of "... stakeholders to assess and report sustainability issues," aligning with the theme of" Sustainability and Science".

Submission ID: 56

Statistical variability of LCA results using regionalized and representative inventory data: the case of olive production in Italy

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Abstract

Life Cycle Assessment (LCA) is one of the most adopted methods for assessing the potential environmental impacts associated with the life cycle of agrifood products and related agricultural practices. Despite this, there is a common consensus among scholars on the need for site-specific Life Cycle Inventories (LCIs) that should be as much as possible representative of the investigated agrifood system. This is because agricultural processes greatly vary depending on environmental, biological and technological conditions that change among different geographical contexts. In this regard, the Research Projects of National Interest (PRIN) 2017 "Promoting Agri-Food Sustainability: Development of an Italian LCI Database of Agri-Food Products (ILCIDAF)" aims at developing Italian regionalized databases including representative LCIs for four agrifood products, to be used in LCA studies, i.e., cereal and pasta, wine, citrus and olive oil. The aim of this study is to analyse the statistical variability, among 19 Italian regions, in terms of Life Cycle Impact Assessment (LCIA) results that may occur using inventories that are representative of each region. The analysis is carried out considering

1 kg of harvested olive as reference unit, and including all the processes related to agricultural practices, i.e., soil management, use of fertilizers and pesticides, irrigation, harvesting, as well as the related emissions to air, water and soil. The environmental impacts are evaluated by means of the EF 3.0 impact assessment method and analyzing 16 different impact categories. The variability of the LCIA results is investigated through a statistical descriptive analysis. Results show high variability among the 19 Italian regions in all the impact categories investigated. In particular, the coefficient of variability ranges from 176% for Human toxicity, non-cancer to 44% for Ecotoxicity, freshwater. The highest variability, in all the analysed impact categories, emerges for the irrigation processes, in which electricity and water consumption are accounted for. This is because inventory data on irrigation has been considered only for those regions located in areas with a low rainfall distribution.

This study may help in the achievement of SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action), considering most of their related targets. Furthermore, the development of regionalized and representative LCA databases for agrifood products is fundamental when potential strategies for the mitigation of environmental impacts are proposed to reach a sustainable livelihood.

This study is part of the research project “Promoting Agri-Food Sustainability: Development of an Italian LCI Database of Agri-Food Products (ILCIDAF)” PRIN2017 (Progetti di Ricerca di Interesse Nazionale) – Prot. 2017EC9WF2, sector ERC SH2, Line C – funded by the Ministero dell’Università e della Ricerca (MUR).

Submission ID: 92

Beyond sustainable development goals for building societal prosperity and foundation: insights for a systematic review

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Abstract

A key question in achieving global sustainable development is how to build social foundation within planetary boundaries. Among the three pillars of sustainability, the social dimensions have gained relatively limited attention than other pillars. The Sustainable Development Goals (SDGs) and other frameworks (e.g. safe and just space frameworks) have conceptualised multiple social dimensions of sustainability. Recent studies have focused on whether indicators or thresholds are being met in countries and regions. However, there remains substantial inconsistency across frameworks in terms of definitions, indicators and thresholds. An holistic analysis of related frameworks is still lacking. This study therefore undertakes a systematic review of the existing literature on socio-economic aspects of sustainable development. It starts with about 21,777 article records for an initial screening based on a broad keyword search in the Scopus and Web of Science databases. We use a machine learning tool to further screen the searched literature and finally develop indicators that comprehensively represent the social foundations. Due to the large sample size, this review also captures the dilemmas and conflicts of sustaining social livelihoods and planetary boundaries. Our study analyses the interactions between social and environmental dimensions in different contexts. It provides insights to assess the alignment and potential extension of current sustainability frameworks. Our findings aim to make the concepts of social foundations more comprehensive and inclusive within the planetary boundaries.

This abstract relates to the SDG1: End poverty in all its form everywhere, in particular targets 1.1, 1.2, 1.3, and the SDG8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. This study explores the essential indicators that measure the social foundations for long-term sustainability, providing insights to support the SDGs 2030 agenda. It echoes with the theme of this conference on sustainable livelihoods from mountain to ocean, and highlights the connectivity between people's livelihoods and environmental resources.

Submission ID: 208

Discourse workshop on proposed ground rules for full cost accounting methods for product sustainability assessment: how can we ensure valid estimation of hidden costs of products?

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Abstract

Many environmental and social impacts in product's value chains are currently unaccounted for in the price of products. Several methods exist to calculate both the pressures of such impacts, as well as their monetization. These approaches are named Trueprice, TruCosts, Sustainable Value, True Value, Oiconomy Pricing, hidden price etc. In the context of live cycle assessment (LCA), expressing environmental and social impacts in monetary terms allows for aggregation and easier communication. Many methods for monetization exist, with fundamental differences in their underlying monetization approach, accuracy, availability and application. Several scientific and consultancy initiatives have contributed to this development by introducing monetization methods that also use different methodologies. In a recently published article, we reflect on the differences between such existing methods. The scope of these methods is very diverse, while underlying theoretical and methodological choices are not always transparent. This creastes risks of greenwashing. Based on our review, we have proposed four exploratory ground rules for full cost accounting methods. These are:

1. Be consistent, explicit and comprehensive in the selection and framing of the sustainability domains and the impact pathways for each.

2. Be consistent and explicit in justifying the choice for monetary valuation methods and respect the time dimension distinction (costs related to either before or after the activity of production)

3. Be consistent and explicit in justifying the inclusion of positive

externalities and refrain from summing negative externalities and positive externalities.

4. Be fully transparent about which monetary valuation coefficients and data sources are used.

After publishing the article, we have started an online discourse with scholars in this field. We will share the preliminary results and continue this discourse during the workshop in Nepal with the attendants. The results of this discourse will be published after the conference.

Submission ID: 218

Invitation to the open science agenda on full cost accounting with the Oiconomy Pricing approach

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Abstract

The recently implemented European legislation on sustainability and value chain transparency (CSRD, CDD) leaves companies with the need for monetization of environmental, social and economic impacts of their processes and products. Several scientific and consultancy initiatives have responded to this need by developing monetization methods. These methodological approaches aimed at determining the 'hidden price' have names like Trueprice, TruCosts, Sustainable Value, True Value, Oiconomy Pricing, etc. A recent review showed fundamental differences in their underlying monetization approach, accuracy, availability and application (Roos Lindgreen and Vermeulen 2023).

In this paper, we focus on recent experiences with piloting Oiconomy Pricing. The methodology is aiming at a valid, fair, inclusive, and up-to-date representation of the real price of products. It addresses all sustainability aspects (Planet, People and Prosperity) and visualizes these aspects for the entire value chain of products or services. It

assesses these aspects based on the actual actions of the parties in the value chain and it translates the data on the actual actions of these parties in the value chain into the costs necessary for the prevention of the negative consequences for nature and society, as described in the United Nation's Sustainable Development Goals. Eight different case studies have been conducted with the pilot version of the method. In these cases, end-producers of various types of products and their suppliers, together with academic researchers applied the Oiconomy Pricing method at the company level. Based on this, we analyse the need for further improvement and implementation of this form of full-cost accounting and opportunities for value-chain collaboration.

Based on these experiences, the Oiconomy Pricing Foundation has elaborated an Open Science agenda for further improvement of this methodology. During the presentation of this paper, we will discuss how scholars around the globe can contribute to the further development and application of the Oiconomy pricing approach.

Submission ID: 219

Just transition and stakeholder perspective: A focus on South African employees within coal indusrty

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Abstract

As global efforts to mitigate climate change intensify, the coal industry faces unprecedented challenges, necessitating a transition towards sustainable alternatives. Despite its significant contribution to greenhouse gas (GHG) emissions, coal has contributed to job creation for many people across the globe. Meanwhile the South African coal sector transitions to a net-zero carbon economy, massive effects on jobs are anticipated. The alternative jobs from the green economy may provide lower wages and lower levels of responsibility, resulting in employees losing their professional pride, socioeconomic status, and personal identity. Taking into consideration that, if the implementation process of

the coal phase-out is not carefully executed through robust and context-based policies, programmes, and plans, it could result in increased social and economic commotions. Which is why this study is assessing the readiness and preparedness of important stakeholders (coal sector employees) in South Africa. This was achieved through investigating their awareness of the concept of just transition, understanding the perceived impacts, and response mechanism in place for a smooth and equitable transition. Employing a non-parametric quantitative approach, data was collected through surveys targeted to key employees within the coal value chain. Such included coal company employees, transport employees and major coal consumers employees. The preliminary findings reveal that just over a half of total respondents (53%) are aware of just transition, however with very little level of familiarity with the concept. Suggesting that they have heard of just transition, yet with little understanding of its complexities. Nevertheless, most respondents indicated that instead of leaving their jobs in mining coal they would rather transition to mining other minerals. Notably, very few respondents (6%) indicated that they have been exposed to reskilling and upskilling programs. According to employees among many identified impacts job losses were the most prevalent impact of transition, followed by economic restructuring, increased poverty, and inequality, respectively. The study therefore recommends the following: 1) promoting and supporting upskilling and reskilling programs tailored to the needs of the affected. 2) More research on comprehensive impact assessment associated with transition that includes, income stability, potential changes in living standards, and migration issues. 3)More targeted awareness programs and training sessions to educate employees about the concept of just transition, its benefits, and challenges.

Submission ID: 278

Methodological approaches for developing inter-scale participatory sustainability indicator systems

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Abstract

Sustainability indicator systems (SIS) are playing a central role in assessing and reporting sustainability performance at different levels. They are a key topic of discussion in both academic and practical circles, as their development presents a significant challenge. Given the multifaceted nature of sustainability and the complexity of the SIS, methodologies for its measurement are crucial. In this regard, diverse approaches and methodologies are being used to integrate the various dimensions of sustainability within a framework built upon a set of indicators.

This study aims to evaluate the development of inter-scale participatory sustainability indicator systems (SIS) through a literature review. This includes analyzing the methodologies employed and identifying areas for future research.

Inter-scale participatory SIS offer a more comprehensive picture of sustainability, empower stakeholders because their participation is crucial for defining SIS, reflecting a variety of needs and priorities and it considers different levels, like families, communities, cities, regions and countries allowing not just the understanding of the interconnection between scales but also fostering collaboration for better sustainability outcomes.

The emphasis here lies on identifying innovative methodologies that incorporate participatory processes within SIS development.

The preliminary results show that inter-scale participatory SIS are a relatively under-addressed area of research. Furthermore, the inter-scale dimension often only considers two levels, such as, regional and local or national and regional.

Participatory methodologies tend to follow a similar pattern: starting with existing indicators (e.g., UN Sustainable Development Goals) and then engaging stakeholders through surveys, online platforms, workshops, focus groups, or expert panels to refine the indicators.

Future research will face some challenges:

- Develop innovative methodologies that move beyond existing indicator sets and incorporate novel data sources;

- Explore the relationships between different levels to improve the effectiveness of collaborative sustainability efforts;
- Ensure fair representation of stakeholders across scales;
- Build capacity for meaningful participation by developing skills and knowledge among stakeholders;
- Address the challenges of data collection and normalization, which require expertise and time.

Overall, this is a promising area of research. The methodological approaches used in SIS based on participatory approaches are fundamental for an appropriate development of these systems and have the potential to significantly improve sustainability assessment and action.

Submission ID: 303

Global Actions Towards Climate Action Goal (SDG 13): A Bibliometric Review

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Abstract

Climate change is a pressing challenge the world is facing currently(Glaser, J. et al., 2016). It is rising, and mitigation efforts at all scales are not sufficient(Creutzig et al., 2018; Grubb et al., 2022). Therefore, climate action is imperative in tackling the urgent and unavoidable challenges posed by climate change on the environment, economy, and society and securing a sustainable future for our planet and future generations(Markowitz & Shariff, 2012). This study aims to study the global climate action goal of SDGs, i.e., SDG 13 by doing a bibliometric review of the scientific research documents produced on SDG 13. This study uses the pre-generated query string related to SDG 13 to fetch bibliographic data from Scopus. Pre-generated query strings for all the SDGs are provided by Scopus itself(Maxime et al., 2023). VOSviewer and Biblioshiny (R-Studio) software tools are used for data analysis. These

tools are apt, user-friendly, and free from coding(Aria & Cuccurullo, 2017; Markscheffel & Schröter, 2021). This study uses performance analysis and relationship analysis techniques, which are very common in bibliometric studies. Performance analysis uses publication count, citation count, CiteScore, h-index, SJR, SNIP, NIR, QS ranking, and number of fundings as metrics. Bibliographic coupling, three-field plot, and keyword co-occurrence are used for productivity and relationship analysis of different research elements (e.g. journals, authors, affiliations, and countries)(Donthu et al., 2021). This study presents an idea to researchers and policymakers about the current state of research related to SDG 13 (climate action) and about future research scope. Policymakers can get insights from this study for policymaking. Researchers can also take up similar bibliometric studies for other SDGs. Along with performance and relationship analysis, other enrichment techniques, such as exploratory factor analysis (EFA), hierarchical clustering, island algorithm, etc., can be used for similar kinds of studies(Donthu et al., 2021). Artificial intelligence (AI) and machine learning (ML) can be used for more comprehensive results. Like other studies, this study, too, has limitations. Data and outcomes related to Scopus database are dynamic due to the continuous addition of research documents.

Track Two

Education for Sustainability

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 2a: Education for Sustainability – Provision, quality of and access to education

Submission ID: 11

Education on sustainability, circularity, and responsibility: A case study from EIT Raw Materials courses

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Abstract

The rational management of raw materials including metals, energy, chemicals and industrial raw materials as well as water and biomass is a key element of a circular economy, and an important issue reflected in sustainable development goals. In the policies of many countries and organizations, there is an expectation that the environmental impact throughout the life cycle of raw material use will be reduced. Material flows and resource productivity indicators play a central role in monitoring the changing patterns of resource use. Companies, including those in the mining sector, have already published information regarding their sustainability performance. Furthermore, in 2024, the EU Corporate Sustainability Reporting Directive (CSRD) will mandate more comprehensive sustainability and environmental, social, and governance (ESG) reporting by large companies. European Sustainability Reporting Standards (ESRS) will lay out the disclosure obligations of companies including mining, processing and recycling. Therefore, new practical knowledge and case studies are needed to understand and learn these requirements and procedures, which are now being implemented also in many mining countries outside the EU All these rapid changes and new requirements necessitate acquiring new knowledge for staff in existing companies, administration and universities. The new and updated education programme for different types of courses and lectures, i.e. EIT-Labelled Master Programme: lifelong learning, PhD school, etc. courses can be supported by EIT Raw Materials within The Raw Materials Academy. Various conventional, non-conventional, and digital tools have already been proposed for individuals already working in the raw

materials sector, as well as students and PhD students, not only from Europe. In most of them, the goal was not only to enhance practical and theoretical knowledge but also to raise awareness regarding corporate social responsibility, sustainable development, and responsible mining. Additionally, there was a focus on promoting the greater adoption of clean and environmentally friendly technologies and industrial processes. The paper aims to analyse and review both good practices in teaching methods and the scope and educational content of proposed courses and lectures, taking into account the issues of circularity and sustainability. Drawing from my own experience and students' evaluations, the paper includes a SWOT analysis and recommendations for further educational activities.

Submission ID: 74

Attributes of Educational Partnerships Designed to Create Global Changemakers, a Literature Review

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Abstract

The purpose of this paper is to conduct a literature review on the attributes in educational partnerships designed to create global changemakers. Individuals who are changemakers focus on creating a positive impact on the world through innovation, practicing empathy, collaborating in groups, striving to make positive changes in society, becoming in tune with the world around them, and advocating for change in their communities. The research from this literature review shows common attributes in educational partnerships designed to create global changemakers. Some attributes that emerged in the literature review are trust, collaboration, innovation, understanding, transparency, perspective, and opportunities. Understanding which attributes are common in educational partnerships designed to create global changemakers could provide insight into the systems that are implemented to support the sustainability of the partnerships. Gaining insight into how educational partnerships to create global changemakers are sustained is important in that these partnerships provide a quality

education. Sustained educational partnerships also contribute to the partners' mutual value of their goal of educating students with an innovative curriculum that provides tools for the students' future as global changemakers. In communities where parents are given the opportunity to choose which school their students attend, the opportunity to enroll their child in a school that offers a curriculum that prepares their students as future global changemakers may contribute to attractive quality for enrolment at the school. This research follows United Nations Sustainable Development Goal Quality Education Target 4.7, which states that providing a quality education promotes "a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development."

Submission ID: 268

Empowering Narratives: A Storytelling Approach to Sustainable Menstrual Hygiene in Rural India

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Abstract

The sustainability of our planet depends on minimizing environmental harm, with improper sanitary pad disposal in rural India being a pressing issue. This study is focused on addressing the issue of natural resource depletion and pollution resulting from this problem, specifically for girls aged 12-15 at the Government Higher Primary School in Mandihal village, Dharwad Taluka, Dharwad district, Karnataka state, India.

The project aims to introduce reusable sanitary pads as a sustainable solution and foster community participation and stakeholder engagement through group discussions and targeted awareness sessions. It will also emphasize the importance of collaborative learning, with student experiences crucial in facilitating knowledge transfer and partnerships.

Aligned with Sustainable Development Goal (SDG) 3 (Good Health and Well-being), the project signifies a broader commitment to education for

all and lifelong learning. By integrating storytelling and lived experiences into discussions about hygiene and care, the initiative educates and addresses social and cultural issues embedded in sustainable practices. The storytelling approach creates a dynamic space for shared experiences, contributing to a holistic understanding of menstrual hygiene.

This initiative is an inclusive and innovative approach to addressing a specific challenge, emphasizing the power of storytelling in shaping attitudes and behaviours. If successful, it could be a scalable model for other communities, aligning with principles of community participation, stakeholder engagement, and sustainable alternatives. The project aims to establish a replicable solution, fostering collaborative learning and contributing to the health of adolescent girls and the broader environmental sustainability landscape.

Track 2b Education for Sustainability: Educating for Sustainability

Submission ID: 59

Mapping the Progress of Circular Economy Integration in Portuguese Higher Education Curricula

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Abstract

The Organization for Economic Co-operation and Development recognizes the importance of incorporating circular economy (CE) principles in Higher Education Institutions (HEI) to address global challenges, equip individuals with relevant skills, promote innovation, and contribute to sustainability. By introducing CE principles into their curricula, educational institutions can encourage students to think creatively and develop solutions that to support the shift from the linear model of "take-make-use-dispose" to a circular model of resource management, that replaces the 'end-of-life' concept. Numerous studies on the integration of the circular economy have focused on the Portuguese higher education

system; yet there is still a dearth of information regarding the areas in which the system needs to be improved. This research explores the HEI's current approach to CE using the Portuguese case. Specifically, it will assess the extent to which circular economy principals, approaches, models, or frameworks are presently included in the curricula second-degree cycle public HEI. Portugal was chosen as the case study because of its noteworthy advancements in sustainability-related activities for higher education and its potential to provide insightful information about how to apply circular economy principles in higher education. Thus, content analysis will be conducted using the curricular courses of each study programme previously approved and assessed by the Portuguese National Agency for Assessment and Accreditation of Higher Education. The study's major conclusions will offer relevant insights into the current integration of the circular economy into the national higher education system. Furthermore, the main research outcomes may also be used to identify areas in which the system needs improvement and to better educate students about the opportunities and challenges presented by the circular economy. A more comprehensive analysis of the research findings on the development of CE education and its role in assisting public policies in fostering thinking for a transition towards sustainability.

Submission ID: 99

Educating on sustainable product design for a circular use of water. Reflections on the results of university design studios for this new scenario.

Chiara Battistoni

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Abstract

This paper wants to reflect on the education of designers for sustainable development, which can be the evolution of the design discipline in general. Sanders and Stappers (2014) claim an evolution from 'how to design' in 1984 to 'what to design' in 2014 and to 'design to help ensure that what is designed makes sense in the future lives of people' predicted for 2044. Today, instead, design products should not only care about the interaction of the user-object - the human-centered design (Norman, 2002) -, but also the user-object-environment to ensure that what is designed makes sense without compromising more the critical

environmental situation. Design for sustainability, a field in the design discipline, indeed not only means designing more sustainable products following the ecodesign principles, but has evolved over the years from ecodesign to design products, services, and systems for system innovations and transitions (Ceschin & Gaziulusoy, 2016; 2020).

This paper reflects on the education of design students for this new design scenario, taking as a case study the design of sustainable products for a circular use of water in the Food Service (FS). Master design students indirectly explored this topic in two different educational experiences, working on a wider brief of designing products for the circularity in FS. Some students recognized water saving as an essential point on where to work and where they, as designers, can intervene in FS. The reflection is done through a retrospective inquiry over the concepts designed and the educational model used, which was a merge of: a specific methodology to follow (Battistoni et. al., 2023), not always declared, merging human-center with ecodesign - the consideration of environmental requirements in the design process (Vezzoli & Manzini, 2007; Lanzavecchia, 2004) - and Systemic Design (Bistagnino, 2011; Battistoni et al. 2019); the use of different pedagogical approaches as learning-by-doing with continuous open discussions teacher-students and visualization of system maps. The process and the results can give insights on educating on 'design for a sustainable use of water' and more broadly on 'design for water'. Water, a fundamental resource to preserve, that is not a usual topic for designers, was taken by students as a new agent to consider in the design process, a step that comes from the posthumanism design approach (Forlano, 2017). Moreover, the understanding of how water flows inside the product and in the professional kitchen helped identify the points where to intervene, to reduce its use, or to create a circular use. The design journey was also a moment to increase the ecological awareness of students about current ecological crisis, skills such as problem framing, systems thinking and future literacy - key competences (Bianchi et al., 2022) -, and to understand the responsibility of design in the current environmental scenario.

Link with the conference topic: the diffusion of this education model can help future product designers work more on innovation for freshwater saving, especially in locations affected by water scarcity. SDGs involved: 6.3, 6.4, 12.2, 12.8, 11.6, 13.3, 14.1.

Submission ID: 106

Enhancing Undergraduate Learning and Community Engagement in Sustainable Development Through Place-Based Education and Lab-Scale Engineering Models

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Abstract

This abstract presents an innovative approach to reinforce undergraduate understanding of sustainable development via place-based education and lab-scale engineered models. As a faculty member in a newly established environmental engineering program, my focus has been on providing practical learning opportunities for students to tackle local sustainability issues.

Project 1 concentrates on the development of lab-scale models for Green Stormwater Infrastructures (GSIs). Urbanization has led to more impervious surfaces and therefore increased peak flows, flooding events, pollution, and sewer overflows. GSI is a management strategy that is most beneficial in developed/urbanized areas where stormwater quantity and quality are an issue. Constructing demonstration units like rain gardens and wetlands in the college's engineering lab provides hands-on experience and raises community awareness of sustainable stormwater management. These projects enhance courses such as Water Quality, Environmental Sustainability, and Water Treatment, enriching the educational experience for Juniata's environmental engineering and science students.

Project 2 examines urban runoff management at Juniata College using GSIs. Juniata College spans 110 acres, constituting a significant developed area. Most importantly, a local creek, named Muddy Run passes through the college and carries runoff from residence halls and parking lots. Through site assessments, flood mapping, and the application of EPA Stormwater Calculator, the project identifies areas prone to runoff issues and proposes GSI solutions. A combination of green roof and rain barrels is suggested for the campus's largest building, potentially reducing over 31,000 gallons of runoff for a 1-inch design storm while also offering economic benefits via the reuse of harvested rainwater.

Similarly, a bioswale is proposed for a campus parking lot to mitigate runoff discharge into the local creek, thereby safeguarding water quality in the streams. These GSI implementations not only yield direct benefits but also serve as experiential learning opportunities for students through hands-on research and project involvement.

Project 3 focuses on the water quality assessment of Muddy Run, a local stream in Huntingdon, Pennsylvania. Through comprehensive sampling and analysis, the study identifies sources of pollution and evaluates the stream's health. Significantly higher nutrient concentrations and lower DO levels ($p<0.05$) were observed as the stream emerged from underground indicating a point source discharge of nutrients in the creek. TDS and conductivity values were observed to be higher at locations near impervious surfaces with an indication of runoff from streets and parking areas. Findings indicate the impact of urbanization on water quality, emphasizing the importance of continuous monitoring and informed decision-making for watershed management.

By integrating these projects into the undergraduate curriculum, students not only acquire technical skills but also develop a deeper understanding of the interconnectedness between environmental issues and sustainable development. Furthermore, the involvement of students in local projects fosters community engagement and empowers future environmental leaders to tackle pressing sustainability challenges.

This proposed abstract relates to SDG 4.7 and 13.3 as this approach helps raise awareness among youth regarding climate change issues and sustainable mitigation strategies. It aligns closely with the conference theme, offering multifaceted approaches to educating societies and communities on addressing localized challenges.

Submission ID: 118

Advancing Sustainability Practice through Digital Learning: A Comprehensive Approach

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Abstract

The urgency to achieve Sustainable Development Goals (SDGs) by 2030, particularly in vulnerable regions like the Hindu Kush Himalayan (HKH) area, heightened by the COVID-19 pandemic, necessitates innovative strategies. This abstract outlines a comprehensive digital learning approach, focusing on two initiatives: ForHimSDG and In Our Hands.

ForHimSDG employs a hybrid learning ecosystem, combining online and in-person modalities, to enhance accessibility, flexibility, and engagement. Primarily targeting sustainability practices, including SDGs and evidence-based planning, the initiative utilizes blended learning models incorporating synchronous and asynchronous activities. Interactive content delivery mechanisms, like virtual simulations and gamification elements, augment the learning experience, fostering enhanced engagement and retention among learners.

Conversely, In Our Hands, a youth entrepreneurship program in Nepal, endeavors to cultivate a creative green economy to advance climate goals. It offers workshops, mentoring sessions, networking events, grants, and showcases. Central to this initiative are craft toolkits, providing hands-on learning experiences tailored to sustainability practices. These toolkits, offering essential materials and instructional resources, facilitate creativity and skill development among participants.

While both initiatives aim to empower individuals and communities in addressing sustainability challenges, it's notable that craft toolkits, despite their physical nature, complement digital learning methodologies within the broader program framework. Though primarily focusing on experiential learning, craft toolkits may also integrate digital elements, such as instructional videos or online resources, enhancing their alignment with the digital learning approach.

Together, through the integration of digital learning methodologies and hands-on experiences facilitated by craft toolkits, these initiatives strive to contribute significantly to the achievement of SDGs and the establishment of a sustainable future for the HKH region and beyond.

Submission ID: 134

Empowering Sustainability: The Impact of Urban Toilet Design on Environmental Education

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Abstract

Public toilets are an integral part of urban infrastructure, supporting the well-being and comfort of individuals in their daily lives. The absence of on-street toilets contributes to instances of open urination and defecation, giving rise to public health. Addressing this issue is crucial not only for maintaining hygiene but also for mitigating the associated health risks and improving the overall quality of public spaces. Providing accessible on-street toilets can play a vital role in curbing such practices and fostering a cleaner, healthier urban environment. Public toilets serve as essential infrastructure in cities, ensuring the specific needs of various demographic groups, such as women, transgenders, individuals, homeless populations, the elderly, and people with disabilities fundamental right to sanitation and enhancing their comfort while navigating public spaces.

Indeed, education plays a pivotal role in promoting the responsible use of public toilets for the sustainable environment. By raising awareness about the importance of proper toilet usage, individuals can be encouraged to maintain cleanliness, conserve resources, contribute to sustainability and a healthier public environment. Public awareness campaigns can highlight the significance of using public toilets responsibly, reducing instances of misuse, and fostering a collective sense of responsibility for communal spaces. Education becomes a powerful tool in cultivating a mindset that values and actively participates in maintaining the hygiene and sustainability of public toilet facilities.

With the rapid sprawl and urbanization of cities, the scarcity of available public toilets has become a common challenge. Balancing accessibility, convenience, and strategic placement is essential in addressing the challenges associated with the expansion of public toilet infrastructure in evolving urban landscapes. The study is been conducted in Bengaluru, leveraging secondary data analysis and focused primary surveys in

specific areas. The evolution of public toilets is been analyzed from 1862 to present from Bengaluru City Corporation toilets to Swachh Bharat Mission Urban Public Toilets. By doing so, the study aims to shed light on potential gaps in current knowledge and seeks to contribute to the development of effective and well-designed public toilet facilities that cater to the specific needs of urban environments, promoting better sanitation and enhancing the overall quality of urban spaces. Certainly, overcoming challenges in public sanitation can be addressed through innovative toilet design and through educating people. By focusing on creating better designed toilets, we can enhance functionality, accessibility, ease of maintenance and sustainability. The study aims to provide design solutions and education to improve sanitation infrastructure, making it more efficient, user-friendly and sustainable.

Submission ID: 137

Investigating factors to improve education in rural public schools in Nepal through the use of computer technologies

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Abstract

Computer technologies continue to evolve, and new learning methodologies are emerging in developed countries. They are directly impacting the methods by which students in advanced countries learn in their educational institutions. However, there is almost no impact on how students are learning in rural areas of developing countries such as Nepal as these technologies are not being used. Significant numbers of schools in rural areas of Nepal have very limited access, or have no access, to any computers for student's learning within their classrooms.

In advanced countries educators are developing the teaching methodologies that embrace the use of computer technologies into their classrooms. In most cases this is not seen in the rural areas of Nepal, where computer teaching is mainly focused on the basics of word processing.

This study aims to investigate the important factors that affect how

computer technologies have (or have not) been used in rural areas of Nepal. In our visits to three different rural areas of Nepal in the last four years, we have observed various factors that affect how this lack of adoption affects the learning and teaching of children in these rural areas. The introduction and use of computer technology has not been adopted well by schools in these rural areas. Data collected during our field trips show poor results with almost a non-existent use of computing technology. However, in the case of one school only, there was a fully-fledged attempt to integrate computer technology as a tool into the student's learning environment. The results in this school compared favourably to those in all other schools visited.

Submission ID: 144

Trainers' Knowingness, Attitude, and Practice of Design for Sustainability: Perspectives from Special Technical and Vocational Education and Training Institutions, Kenya

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Abstract

Issues on disability are increasingly gaining attention in public and policy documents. Persons living with disabilities (PLWDs) constitute 15% of the world population and 80% of them reside in low-income countries, such as Kenya. Technical and Vocational Education and Training (TVET) is key to expanding opportunities for adolescents and youth living with disabilities by empowering them with skills, attitude, and knowledge to be self-reliant, and for social integration and self-esteem. There is a dearth of research on TVET in Africa, especially the special TVET. TVET institutions have limitations: some special TVET institutions' trainers are not professionally trained in the courses that they teach, such as clothing/dressmaking technology thus may be unaware of the global Design for sustainability discourse, and; the courses offered labour market-oriented, but the trainees exit without the skills due to an outdated curriculum and lack of industrial attachment. Sustainability: environmental, social, economic, and cultural, concepts include upcycling, zero-waste design, and disassembly. Sustainable/eco/green fashion

addresses fashion's unsustainable production and consumption. The study aimed to: evaluate special TVET institutions' clothing/dressmaking technology and leather work technology curricula and; assess trainers' knowingness, attitude, and practice of Design for sustainability utilizing a descriptive survey. The study was conducted in Kenya's four special TVET institutions. Data were collected from twenty trainers, employing a semi-structured questionnaire, and analysed using quantitative and qualitative techniques. The curricula were analysed thematically. The four special TVET institutions offer fashion design and clothing technology/garment making and tannery and leather work technology courses from artisan to diploma level, encompassing apparel, fashion accessories, fabric colouration, and beadwork. Most of the trainers are diploma holders. The majority of the trainees are physically challenged/ handicapped. Both the trainers and the curricular analysis reveal sustainability is incorporated in eight and four certificate and artisan courses respectively. For instance, fabric colouration, garment cutting and making, workshop organizationa and management, material knowledge, and safety and hygiene. The incorporation is mostly implied rather than explicit. The respondents demonstrate an in-depth understanding of design for sustainability and its benefits, mostly obtained from social media. Incorporating sustainability occasions to the Departments both benefits (trainees, trainers, community, environment) and challenges (institutional, consumer, and financial). The trainers mainly encourage and guide the trainees to adopt sustainability in the course projects. Consequently, the trainees have wholly embraced sustainability that is embodied in sustainable fashion products, soft furnishings, and coloured/decorated fabrics. The authors recommend the introduction of a theory-cum-studio unit explicitly titled 'Design for sustainability', so that the graduates are ready for an ever-changing fashion and leather industry, that is practically shifting toward sustainability. In conclusion, a sustainability-oriented trainer shall impart the same ethos to the special TVET institutions' trainees, concerning projects and theory, thereby contributing to Kenya's fashion and leather industry's substantive engagement with sustainability. A capacity building workshop should be conducted for the trainers to enhance their skillsets, knowingness, and attitude toward design for sustainability. This study is aligned with the United Nations *Sustainable Development Goals,* 1, 2, 3, 4, 8, 9, 12, 15, and 16.

Submission ID: 161

Strengthening Teaching and Research on Sustainable Development by co-developing and joint-offering Courses

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Abstract

Currently, countries are not on track to meet Sustainable Development Goals (SDGs) by 2030, further exacerbated by the negative impacts of the COVID-19 pandemic. Thus, accelerated efforts and increased support are needed to achieve SDGs. The Hindu Kush Himalayan (HKH) region has eight countries, including Nepal, with such needs. Strengthening these countries' teaching and research on SDGs and evidence-based planning, policies, and practices will contribute to their sustainable transformation. Against this background, we aim to strengthen teaching and research on SDGs in the HKH region by fostering North-South and South-South cooperation. We achieve this vision by developing and realizing higher education partnerships between institutions in Germany, Thailand, and Nepal. Further, we extend this partnership with other institutions in the HKH regions, building a ForHimSDG network.

We co-developed a course on sustainability in a workshop in 2022 in Nepal. The workshop has the objective of sharing knowledge and experiences on sustainability-related curriculums among higher educational institutes in the HKH regions. During the workshop, we co-developed introductory and advanced courses on global sustainability goals and approaches to sustainability, considering the local context. The co-developed course was offered to students in Thailand and Nepal in 2023 in a hybrid mode. We shared our experiences implementing the co-developed course in a workshop in 2023. During the workshop, we also explored the possibility of transferring and adapting the co-developed course at other HKH institutions/universities. We also developed a Massive Open Online Course using the materials while offering the course.

We conducted these activities under the ForHimSDG project, funded by DAAD (German Academic Exchange Service) under the call SDG Partnerships, which is financially supported by the Federal Ministry for Economic Cooperation and Development of Germany.

Submission ID: 190

ARTE PROJET: Reflective Learning through Theater for Socio-Ecological Transformation

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Abstract

Over the last 70 years, the acceleration of human impact on the planet has been so rapid, abrupt and intense that it has not given nature the time to react and absorb the impact. The paradox of today's life is that humanity is destroying what keeps it safe, demolishing the foundations of a stable climate, living in ecological debt, close to a point of "no return". Education for socio-ecological transformation is a fundamental pillar for Higher Education Institutions' role in avoiding climate collapse. The use of pedagogical strategies based on arts, particularly theatre techniques, has the potential to act as a transformative learning approach, fostering the development of different social, cognitive and personal competences in students. Theatre is expected to offer a platform to explore different perspectives and promote empathy and social awareness, through a multi and inter-disciplinary approach.

This study intends to present and discuss the implementation of an innovative pedagogical project named "ARTE project: Reflective Learning through Theater for Socio-Ecological Transformation" and its preliminary results. The project aims to promote Master students' transversal competences, the understanding and the ability to solve complex problems in sustainability transformation and climate change impact through theatrical techniques. The ARTE project was implemented in the first semester of 2023/2024 in four courses of three Master's degrees: Political Science, Administration and Public Policy and Regional and Urban Planning, in collaboration with the GrETUA

(the theatre group of the UA). The partnership with this group provides theoretical and practical knowledge to the project, connecting students and teachers with national artists, and promoting cohesion within the university. It involved 27 students and 8 staff members. To gauge the project's impact, pre- and post-surveys and three final focus groups were applied to students. The preliminary findings suggest that using theatre as a learning tool can improve students' transversal skills and increase their social awareness and involvement regarding sustainability and climate change impact. This interactive approach can lead to a more engaging and participatory educational experience. Nevertheless, the use of innovative pedagogical approaches demands additional support and articulation to be felt comfortable by the students. The overall results support the argument for incorporating creative and artistic methodologies in Higher Education pedagogical strategies. The ARTE project has the potential to be replicated in other academic settings and applied to different disciplines. Overall, theatre-based pedagogy has the potential to foster transformative learning, creativity and collaboration among Master's students, providing new ways to "Link (challenging) Futures" and contributing to SDG4.a Effective learning environments and SDG13.3.Build Knowledge and Capacity to meet Climate Change.

Submission ID: 212

Teachers' Mindsets: is it relevant for Sustainability?

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Abstract

The current sustainability outlook indicates that we are still far from achieving the objectives set out in the Agenda 2030, requiring global collective and individual efforts that include a mindset shift for behavior changes. As a key element in promoting sustainability, many authors emphasize the importance of changing mindsets to reach social transformation. This approach argues that sustainability can be achieved if peoples' worldviews and mindsets concerning different spheres of life, especially regarding self-perception, connection with others, and with nature, alter to a more ecologic way of living. In other words, sustainability

depends on behavior, which depends on peoples' worldviews and mindsets as deep leverage points for the necessary behavioral change. In this context, education, particularly at higher education level, can contribute to the mindset shift, through processes in which teachers play a decisive role as transformation agents. However, despite many authors have studied the subject field of the role of education on sustainability, regarding sustainability competencies development or mindset changes in student's education, fewer have done research regarding teachers' worldviews, mindsets, and related constructs.

The literature review suggests different worldviews on sustainability, including among teachers, which may affect education for sustainability and social transformation. This review aims to present an integrated literature review on the potential impact of teachers' worldviews, mindsets, and related constructs on behaviors and teaching practices while exploring their relationship with social transformation for sustainability.

Submission ID: 265

Enhancing Sustainability Learning and Curricula in Portuguese Higher Education: A Comprehensive Approach through Key Performance Indicators

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Abstract

Integrating sustainability into Higher Education Institutions (HEIs) requires a multifaceted approach across different dimensions of education, governance, research, operations, and outreach. Education plays a pivotal role in achieving Sustainable Development Goal (SDG) 4 for quality education to ensure all learners acquire the knowledge and skills needed for sustainable development. By aligning learning and curricula practices to integrate sustainability with relevant Key Performance Indicators (KPIs), HEIs can create a holistic system that not only meets educational goals but also contributes to broader sustainability objectives. In Portugal, the Sustainable Campus Network (http://www.redecampussustentavel.pt) aims to establish an Observatory to systematically assess and monitor the implementation of sustainability practices at Portuguese HEIs. While existing sustainability assessment tools at HEIs cover a wide range of KPIs, there is still a lack of understanding of the specific KPIs related to learning and curricula, particularly in exploring how these indicators could be adapted and applied to the Portuguese HEIs. The primary aim of this study is to propose a set of KPIs focusing on learning and curricula for sustainability, to support the innovative Observatory's mission in Portuguese HEIs. This Observatory represents a pioneering effort of its kind in Portugal, helping to shape governmental policies and institutional strategies for the long-term growth of Portuguese HEIs. To do so, a comprehensive literature review is in progress to extract the KPIs incorporated into existing sustainability assessment tools. Following this, the KPIs will be systematically categorised based on their associated metrics. Lastly, a methodological approach for organising and structuring data on learning and curricula in the Portuguese context will be proposed. The justification for the literature review lies in its role in informing the development of the proposed KPIs and shaping the research approach. Accordingly, the foundation for defining the KPIs rests on the importance of reliable sources and comparable data, essential for developing a meaningful and effective Portuguese set of KPIs, representative of the national landscape. This will involve establishing criteria for categorization, such as thematic areas or dimensions of sustainability, and applying these criteria consistently across a range of indicators. This approach has the potential to create a standardised framework for assessing sustainability practices across Portuguese HEIs. By systematically organising and categorising KPIs, the research aims to identify strengths and weaknesses in the

context of Portuguese HEIs' current curricula and learning approaches, offering a foundation for targeted improvements. These outcomes will contribute not only to the educational experience of students but also to their understanding of the opportunities and challenges associated with sustainability in the context of the assessed HEIs. Recommendations for refining learning and curricula, based on the research outcomes, will be pivotal in guiding HEIs toward a more comprehensive and effective approach to sustainability education in Portugal. The anticipated impact extends beyond the local context, fostering a culture of education for sustainability implementation in HEIs worldwide, thus contributing to SDG4, target 4.7.

Submission ID: 272

Eco-Conscious Education: Exploring Sustainable Alternatives for Paper-Based Practices in Architecture and Design Schools.

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Abstract

The world produces over 400 million tons of paper yearly, creating a paper waste crisis that needs urgent attention. This research aims to tackle environmental challenges by proposing sustainable alternatives to paper-based practices in architecture and design education. The primary goal is to reduce deforestation, habitat destruction, and ocean pollution while promoting environmentally friendly practices in academic settings.

The study identifies viable alternatives to paper-based practices within architecture and design schools, quantifies the environmental impact of paper production, and highlights the consequences of mismanaged paper waste. The research focuses on Tier-II cities like Hubballi in India and examines the implications of adopting alternatives to paper-based submissions in architectural education. It analyses courses from the fourth and sixth semesters at the School of Architecture, KLE Technological University.

The research applies quantitative and qualitative methods, combining faculty opinions and student feedback. Faculty insights and student perspectives provide qualitative understanding, while quantitative methods measure paper usage's environmental and economic sustainability in architectural submissions. The study's context in Hubballi, India, is a microcosm for global applicability to architectural education.

The target audience includes educators, students, and policymakers within architecture and design schools, emphasising the study's relevance in diverse academic and geographical contexts. The research is significant because it advocates for transitioning from prints to participatory methods, offering a three-fold approach (elimination, alteration, and management) to sustainable practices in architectural design studios.

The research aligns with Sustainable Development Goal (SDG) 4: Quality Education, promoting inclusive, equitable, and quality education through digital practices. It also supports SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) by reducing the carbon footprint and addressing environmental degradation associated with paper production.

In conclusion, this research advocates for a shift in architecture and design education towards sustainable alternatives. By aligning with specific SDGs, the study offers a comprehensive framework for promoting ecological responsibility, technological advancement, and pedagogical innovation in pursuing environmentally conscious architectural and design practices.

Submission ID: 289

The impact of business-university collaboration on students' knowledge exchange for sustainability: evidence from the UK

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Abstract

Knowledge exchange in higher education in an emerging area delivered through business-university collaboration, combining academic knowledge and businesses needs. Knowledge exchange can act as a vehicle for embedding sustainability in the curriculum and help address the major challenges we face as a society. Student knowledge exchange is two-way learning, i.e., for both students and businesses involved in a project. There is a need to assess the impact of student knowledge exchange on students to inform curriculum design and development for better student experience and employability in line with business needs. This research aims to measure the impact of student knowledge exchange for sustainability delivered through the business-university collaboration on students from business and built environment disciplines. The study uses two schools at Nottingham Trent University that embedded project-based learning in four courses to support student knowledge exchange for sustainability. Data was collected using surveys before and after the project took place. Surveys were based on frameworks on the sustainability competencies of students, students' skill development, students' perceptions of sustainability, students' attitudes and behaviours, and students' career readiness. Data was analysed using statistical analysis. It is found that there is a positive and significant impact on students from the knowledge exchange for sustainability in the different disciplines. The benefits and disadvantages of distinctive approaches adopted, including activities integrated into the curriculum versus extracurricular activities, bespoken versus ad-hoc projects for different organisations and the duration of students' exposure to sustainability-related topics are discussed. This study contributes to the field of higher education teaching and learning and its impact on sustainable society. Project-based learning in higher education teaching and learning sustainability can enhance student knowledge exchange.

Submission ID: 293

Improving Rural Primary School Education with Classroom Design: A Sustainable Method

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Abstract

The 90% of India's population lives in rural area, it is more critical to address sustainability education in these areas. Due to various factors such as lack of quality education, insufficient resources, and lack of exposure to environmental issues. These areas can have a big impact on the nation's overall sustainability efforts. While there are currently a few successful sustainability educational programs around the rural areas in India, they are by no means widespread. Programs in the rural schools of India are particularly sparse. The aim of the study is to investigate awareness and understanding of sustainability education in rural primary schools of Jabalpur, central India. A total of 72 participants (school children) were selected, out of which 29 were males and 43 were females. Through the interviews, and observational studies the findings of this research study showed no knowledge of sustainability. From interviews, teachers reveal that they face challenges in teaching sustainability topics and strategies used to engage children. Children responses showed no knowledge of sustainability. From observational studies, we could conclude there is no classroom activity related to sustainability education, no environmental topics, no integration of sustainable practices into daily routines. Also, there are no eco-friendly facilities and no outdoor learning spaces. Thus, there is a great need for sustainability education in rural primary schools. Thus, sustainability education in everyday learning was incorporated through physically sustainable classroom design by using corrugated sheets/ papers/ charts to create interactive learning aids for teaching and learning. Based on this, activity based test were conducted to children while using the tools (teaching learning methods). Children were able to feel learning is real and tangible. Thus improves the educational process and gives children valuable lessons in creativity, sustainability, and resourcefulness. Thus, children can be inspired to become environmentally conscious citizens and practices more sustainable future.

Submission ID: 299

Sustainable Geoeducation Framework: Bridging Insights from Tokachi-Shikaoi Geopark, Japan

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Abstract

Geoeducation in geoparks serves as a cornerstone for promoting sustainable development through geological and geomorphological relic protection, geo-knowledge dissemination and economic growth. This study examined the educational sustainability of geoparks, focusing primarily on the Tokachi-Shikaoi Geopark in northern Japan. Prior to 2018, geoeducation initiatives at schools in Shikaoi demonstrated effectiveness. However, discontinuation there after necessitated efforts to revive and enhance educational outcomes. Therefore, a partnership framework was proposed by engaging stakeholders including the Tokachi-Shikaoi Geopark, universities, and local elementary/junior high/high schools. Leveraging university resources and integrating geopark-related content into e-textbooks can ensure sustainability of educational initiatives.

Moreover, this study assessed the educational model implemented at the Cuihuashan National Geopark in China, employing questionnaire and interview surveys with students and relevant informants to identify areas for improvement in the educational approach. Leveraging insights gained from the case of Tokachi-Shikaoi Geopark, recommendations are proposed for the Cuihuashan National Geopark, including the implementation of interactive learning activities, capacity building for educators, and the development of tailored educational resources to optimize its educational impact.

The findings highlight the effectiveness of geoeducation initiatives at the Tokachi-Shikaoi Geopark before 2018, followed by the need for revitalization and enhancement alongside a proposed new partnership framework. Similarly, the educational model at Cuihuashan National Geopark demonstrates efficacy, yet it requires enhancements to fully realize its potential. Consequently, this study underscores the importance

of geoeducation in driving sustainable development and proposes a partnership framework to elevate educational outcomes with geoparks.

Drawing upon the experiences and insights of the Tokachi-Shikaoi Geopark, this study presents valuable recommendations for enhancing geoeducation practices at the Cuihuashan National Geopark. Furthermore, it underscores the importance of the continuous assessment and improvement of geoeducation initiatives within geoparks. Through collaborative efforts and innovative approaches, geoparks can realize their potential as educational hubs, fostering environmental protection and sustainable development worldwide.

Submission ID: 312

21st century understanding of sustainability: how teaching system thinking can ease the transition.

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Abstract

This note is to consider some of the key challenges of transition towards strong sustainability, based on the economic paradigm shift as a driving force. Despite the development in understanding and practice of sustainability globally, the economy based on an obsolete fragmented and mechanistic worldviews and mindsets lag significantly behind and remains mainstream, still following the “business as usual”, “doom and gloom”, and “less bad” track.

The demonstration workshop at the conference offers participants to trail system games and discuss the best practices of education and training to develop system thinking and design skills.

In the presentation author stresses the importance of promoting the understanding of the system thinking, the circular economy, ‘strong sustainability’ through advanced interactive student-cantered approach to education. This work is based on the author’s experience and involvement into hundreds of educational projects in various countries.

Widely spread and accepted concept of sustainable development goals

helps us to focus on essential aspects and elements of sustainability. Governments, local authorities, and corporate sector have a chance to structure and prioritise their SD programs and activities.

The very idea and the theme of this conference correlates with the core principles of the contemporary thinking and the mindsets which are required to understand and ensure transition towards stronger sustainability.

Two seemingly departed and remoted natural areas have strong connections unseen, if the systemic and wider view is missing.

The concept of SDG, although valuable, lacks a vision of the real-world natural complex nesting systems, where the larger systems sets the boundaries and defines the rules, of subsystems and their elements. These systems are full of feedbacks, resilience, and self-regulation.

Thus, mimicking nature gives us prompts and teaches towards stronger and real sustainability and long-term resilience of economic and social systems. In this concept, there is no point in having a non-effective system, and an effective system is one that is able to maintain itself. Using the analogy from the living systems approach, it should be able to adapt to changing circumstances, and to maintain homeostasis.

Contemporary economic systems are linear and open-ended, being created with thinking and mindsets which are obsolete in 21st Century. They do not fit into the limits of the biosphere. Thus there is an urge of transition towards the circular economy as “an industrial economy that is restorative or regenerative by intention and design” (has been framed by the Ellen MacArthur Foundation 2013).

System thinkers with understanding of the importance and vital features of nested nature-like systems’ principles and skills to design such systems are to be trained and educated in a new manner. Future leaders and system designers have their mission to drive transition to the circular economy which is restorative by design, and which aims to keep products, components and materials at their highest utility and value.

Track Three

Biodiversity and Ecosystem Services

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 3a: Biodiversity and Ecosystem Services: Life on Land

Submission ID: 21

Coexistence amidst Modernisation: More-than-Human design for Sustainable Futures

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Abstract

Across the ages, humans and animals have contended for natural resources, sharing the role of Earth's stewards, equitably. This initial equilibrium facilitated harmonious coexistence, bringing mutual benefits to both entities. Yet, with the progression of modernization and unregulated urban expansion, anthropocentric spaces emerged, disregarding crucial non-human stakeholders' integral to the ecosystem. This transition from a once harmonious and balanced ecosystem to a human-centric, greed-infested one has created a vicious circle, deemed wicked problems (Irwin, 2018). Earlier design principles, despite numerous efforts, prove inadequate as they neglected the intricate interdependencies between human and non-human stakeholders. This research aims to investigate: a. how the potential connection between unregulated human-centric design and global human-animal conflicts can be analysed? b. how can community engagement and co-creation strategies be optimally utilized to incorporate a wide range of stakeholders' participation? c. how effectively does the More-than-Human design framework translate diverse stakeholder values into tangible aspects in the development of educational and sustainable design solutions? This research is inspired by the work of Berilsu Tarcan (2022) and Kande Kazadi (2016). Present research holds significant implications for UN Sustainable Development Goals (SDGs), particularly aligning with the SDG 15, "Life on Land" subset 15.5 "Protect Biodiversity and Natural Habitats." The focus is on preserving biodiversity in and around mountain and hilly regions within this research, where issues like deforestation, excessive land use, and resulting land degradation contribute to the extinction and migration of species, leading to ecosystem collapse. This collapse, in turn, poses

a threat to the health and wellbeing of both human and non-human inhabitants in these spaces, emphasizing the interconnectedness of environmental and community well-being. To cater to the aforesaid objectives, Anegundi (heritage village surrounded by hills) and Kodagu (famous hill station), two landscapes in the Deccan Plateau of Southern India, have been chosen as case studies. Their historically harmonious coexistence is now under strain due to conflicts with non-human stakeholders, exacerbated by rapid and unchecked urbanization. This research seeks expert opinions from designers, ecologists, and specialists in pertinent fields along with exploring community participation and various stakeholders' roles through the lens of co-creation. Case study analysis shows that preservation of these ecosystems not only benefits communities and livelihoods by providing food, shelter, health, and occupation but also contributes to the sustainability of these vital aspects of human as well as nonhuman well-being. Further, the research examines the complexities of human-centric development, offering a global blueprint for fostering sustainable and harmonious relationships between humans and non-human stakeholders within a larger regional setting. This research culminates to an interactive educational game to broaden awareness among diverse audiences, emphasizing their pivotal role in sustaining ecosystem functionality. Along with its findings, it holds significance for researchers interested in investigating the interplay between human-centric design and the global issue of human-animal conflict.

Submission ID: 149

Biodiversity and Conservation of Limestone Areas in southern Thailand

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Abstract

In southern Thailand, the limestone terrain collects rainfall to form limestone outpourings and wetland forests in the lowlands. These forest floors, filled with clear water, are essential to the region's ecosystem. However, recently, oil palm plantations have been established on the few remaining wetland forests into oil palm plantations, which were

previously preserved in southern Thailand.

We will focus on the conservation of caves and their biodiversity data in southern Thailand, but we would like to discuss the conservation of these limestone areas.

Submission ID: 209

Habitat quality of farmland for Sarus Crane in the Greater Lumbini Area, Nepal

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Abstract

Urbanization and fragmentation decrease habitat availability and connectivity in the farmland, which tends to shrink the provision of ecosystem functions and taxonomic diversity. To understand the cumulative effects of road network and urban area on the large wading birds in the Greater Lumbini Area, this study assesses the responses of Sarus crane to spatial habitat quality generated by Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) Habitat Quality Module based on land use and land cover including experts' knowledge on habitat suitability, accessibility and threats to the birds. The results indicated that the habitat quality of 358.9 sq. km has changed from 2017 to 2023, of which 72.5 sq. km of the area changed from very high to very low, and 80.5 sq. km changed from very high to low habitat quality. The habitat quality of the southern part is higher than the northern part of the study area. The distribution of Sarus cranes in pre-monsoon, monsoon, and post-monsoon were significant to habitat quality, preferring very high-quality habitats for nesting and foraging. This study is crucial for conserving the quality of farmlands and can contribute to developing conservation policies for the large wading birds in the farmlands of lowland Nepal.

Submission ID: 227

Control and management of invasive and alien plant species essential to achieving Sustainable Development Goals: A Comprehensive Assessment

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Abstract

Invasive and alien plant species (IAPs) present a significant threat to global ecosystems, impacting water quality, agricultural productivity, flooding, and biodiversity. This literature review explores the extensive ecological and socioeconomic consequences of IAPs, with a particular focus on South Africa, where over 10 million hectares are currently affected. The introduction of approximately 9,000 IAPs to the country has led to 198 being classified as invasive, posing serious challenges to local ecosystems. Beyond ecological concerns, the study emphasizes the broader implications for achieving Sustainable Development Goals (SDGs). IAPs can exacerbate food insecurity, diminish water resources, and increase the risk of vector-borne diseases, hindering progress towards SDGs 2 (Zero Hunger), 3 (Good Health and Well-being), 6 (Clean Water and Sanitation), and more. Despite the pervasive impact of IAPs on multiple SDGs, there is a notable gap in the literature assessing the contribution of IAP eradication to sustainable development. The study aims to fill this gap by investigating how IAP control aligns with the SDGs, analyzing successful case studies, examining potential trade-offs, and assessing policy frameworks. Methodologically, the research will utilize existing evidence on the socioeconomic impacts of IAPs, focusing on case studies such as the effects of Eichhornia crassipes in Ethiopia and the spread of Mesquite in South Africa. The evaluation of successful management projects, like the control of *Opuntia monacantha* using biological agents in South Africa, highlights positive impacts on SDGs 2, 3, and 15. Furthermore, the study proposes a mixed-methods approach involving surveys and interviews with experts, policymakers, and local communities to understand their perspectives on the link between IAP management and SDGs. The online surveys will explore the connections between specific SDGs and the impact of IAPs, engaging with various stakeholders to gather comprehensive insights. The anticipated

outcomes include a comprehensive assessment of current knowledge on IAP control, identification of effective methods and challenges, and actionable policy recommendations aligned with SDGs. Ultimately, this research aims to provide scientific evidence supporting the development and implementation of effective IAP control programs while raising awareness of the critical need for action in achieving sustainable development objectives.

Submission ID: 228

Balancing the goals of sustainable community wellbeing and habitat restoration in managed retreat proposals: a perspective from the Indian Sundarbans

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Abstract

Coastal biodiversity is under significant threat from rising sea levels, ocean acidification, and over-exploitation of marine resources. Additionally, the increased pressure from human populations in coastal areas further jeopardizes biodiversity. Managed retreat has been proposed by environmental conservationists as a means of maintaining coastal biodiversity while looking for the wellbeing of populations living in vulnerable areas. Any managed retreat model evaluates the regional multi-hazard setting that would ideally consider regional influences such as the combined effects of cyclones, riverine and oceanic floods, etc. Related simulations of these hazards can help to estimate the nature, extent and patterns of submergence of, for example, delta regions. Managed retreat solutions embrace the spirit of SDG 14, which seeks to conserve water resources in sustainable way.

Several studies have addressed the multifaceted challenges faced by governments and stakeholders at different levels while promoting strategic managed retreat models. Present-day research is seeking to investigate the social, cultural, and economic challenges of implementing

managed retreat for achieving climate resilience, biodiversity conservation, sustainable community development, and informed policy advocacy. Against this backdrop and in seeking to assess the present situation of areas under threat, this paper identifies the Sundarbans delta region of India as a case study. In 1989, UNESCO declared this region as the "Sundarbans Biosphere Reserve" because of its unique biodiversity, which is spread across the world's largest mangrove forest. Research suggests this area could stand to lose between 42% to 80% of its pristine area due to the decline of the mangrove forests, rise in sea level and frequent cyclones. The Indian government drew up plans for a Delta Vision: 2050 which seeks not only to conserve the biodiversity through retreat management but also to improve overall wellbeing of affected communities. Nevertheless, experts and various stakeholders have expressed concerns regarding the advocacy of 'phased and systematic outmigration' of local people who have lived in tandem with this deltaic landscape for generations.

We explore how local populations are apprehensive about the loss of their culture, traditions, and livelihood because of forced migration. In this context, we seek a solution that is at the intersection of design for locals and for the environment, and is one that can ensure that affected communities do not succumb to changes to their original habitat and loss of their cultural heritage and livelihood. We argue that instead of a top-down approach, what we need are co-design solutions at the indigenous community level (through collective, shared, and lived experiences) that foster greater social integrity. Solutions embracing indigenous traditions and culture not only act as catalysts to build a sense of belonging within the community but also help sustainable livelihoods thrive in the face of uncertainty. They also ensure justice and equity among and for displaced communities and help toward the development of new policies for the preservation of indigenous heritage. We hope such an innovative alternative prototype can serve as a guide in making policy directions while even considering strategic retreat with the goal of long-term and holistic sustainable development.

Submission ID: 309

Interaction networks between fig-fig wasp system and birds: A case study on *Ficus tinctoria* in Xishuangbanna, Southwestern China

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Abstract

The evaluation of spatial utilization patterns at the community level is essential for comprehending the segregation of species across various habitats and the extent of species overlap, which encompasses complementarity and redundancy. The vertical stratification of fig resources within the canopy layers offers additional ecological niches for frugivorous, thereby facilitating species coexistence and augmenting the diversity of frugivorous within forest ecosystems. Nonetheless, a comprehensive investigation into the interplay between frugivorous and figs within the vertical spatial dimensions of *Ficus* at the community level remains a relatively unexplored avenue of research. *Ficus tinctoria* indigenous to the Xishuangbanna region, exhibits a distinct phenological pattern compared to other *Ficus* in its climatic adaptation and timing of fig production, notably yielding a substantial quantity of fig wasps during the winter months. Prior scholarly work has postulated that the *F. tinctoria* has evolved this unique phenological adaptation to optimize the reproductive capabilities of female trees, a strategy that is highly advantageous for seed dispersal. In order to elucidate the interrelationships between *F. tinctoria* and avian species across various forest canopy strata, as well as to identify the factors that influence avian foraging preferences for male and female figs of *F. tinctoria*, the application of network analysis to examine the community-scale interactions between avian species and *F. tinctoria* can delineate the architecture of the frugivory network. Such insights are pivotal for forecasting the dynamics of ecological communities and the functional attributes of the ecosystem. Through our study, we found that *F. tinctoria* provides food resources for 58 bird species during the dry season (November to April), making it an important foundation species. Birds show a preference for consuming female figs of *F. tinctoria* compared to male figs, and they

exhibit different spatial ecological niches, complementing each other between the upper and lower canopy networks. The vertical structure of the fruiting network promotes coexistence of frugivores and seed dispersal. When birds feed on female figs, they have a positive impact on the fig-wasp mutualism system. However, when birds consume male figs or fig wasps, it has a negative impact on the fig-wasp mutualism system. The intensity of avian consumption of ripe *Ficus* figs leads to a decrease in 55-89% of seeds and 85-93% of fig wasps. The size, nutritional content, and color of female and male figs can influence bird selection. Female figs of *F. tinctoria* are more attractive to birds, and the phenological period of *F. tinctoria* effectively facilitates seed dispersal through bird feeding. The study suggests that the *F. tinctoria* offers an ecological niche to avians inhabiting various vertical strata and the unique phenology maximises the function of female trees as females, which is beneficial for seed dispersal and the stability of the community.

Track 3b: Biodiversity and Ecosystem Services: Life Below Water

Submission ID: 33

Navigating sustainability: A Transboundary Socio-Ecological Study of the Brahmaputra River Basin.

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Abstract

A river ecosystem, home to diverse biotic and abiotic resources, provides highly valued services benefiting both people and the planet. The transboundary Brahmaputra river originating from the Chemayungdung mountain glacier in Tibet and draining down to the Bay of Bengal sea in Bangladesh is no different. The river not only sustains livelihood and shared culture along its riparian countries but also nurtures an array of flora and fauna, including the endangered Ganges river dolphin- an indicator of the river's overall health. Cetaceans like dolphins are universally renowned as ecosystem engineers as they play a key role

in modifying and maintaining the health and stability of their resident habitats.

Climate-conscious global countries aiming for sustainable development and carbon neutrality are on a constant lookout for low-carbon emission strategies. The transportation sector is one such carbon-heavy industry that is moving towards investments in waterways as they have relatively lower carbon emissions and are cost-effective. Economies with indefinite waterways potential such as the Brahmaputra river basin are experiencing a surge in utilization of their inland waterways. At present, the governments of India and Bangladesh have bilateral ties for trade and transportation over the Brahmaputra river. However, this shift in industry towards sustainability must be considerate of the ecological impacts that it imposes on the river's health and biodiversity. Activities related to inland water transport are evident sources of pollution, habitat loss, degradation, and overexploitation of biodiversity. Besides, the consequences of inland water transport on the dolphins and associated species are avowed.

To assess the existing population of dolphins in the Brahmaputra river, the scope of the study extends from Majuli of Assam to Sirajganj of Bangladesh with three objectives. First, to trace the socio-political-economic dynamics of the inland water transport in India and Bangladesh by enquiring about the inclusivity in decision-making for environmental consideration; second, identifying vulnerable areas in Assam and Bangladesh imposed by inland water transport on the river biodiversity by using modern technological tools; third, suggesting evidence-based mitigation recommendations for policymakers. The objectives will be fulfilled by document analysis supported by qualitative interviews, spatiotemporal mapping and meta-analysis, respectively.

The study is dedicated towards SDG+target 6.6 for restoring the Brahmaputra river and its biodiversity from the impacts of inland water transport and promoting the industry towards strong sustainability. The research contribution of the study is analogous to the conference theme, "Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood", as it supports the sustainable future of inland water transport as an established livelihood provision along the Brahmaputra river while prioritizing safeguards of the future for invaluable biodiversity and associated communities of the region.

Submission ID: 302

Long-term monitoring of trail degradation in Daisetsuzan National Park, Japan

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Abstract

Trails are essential infrastructure for trekkers/hikers to reach mountain summits and mountain lodges, and trails also play a role in protecting the natural environment from use. However, the location and design of trails are focused on the convenience of walking, and not necessarily on the vulnerability of the natural environment. As a result, trail degradation such as trail erosion have become a problem in many national parks and nature reserves. However, the personnel and budget required for maintenance and management of national parks in Japan are not necessarily sufficient. As a result of the lack of proper management of degraded trails, leading to further degradation caused by heavy rains that have occurred in recent years.

Daisetsuzan National Park has started repairing trails with the help of volunteer trekkers/hikers in 2017. However, due to the limited frequency of trail monitoring in Daisetsuzan National Park, the prioritization of trails for repair and the scientific basis for this prioritization are not adequate.

In this study, long-term monitoring using three-dimensional measurement methods such as UAVs and pole photography was conducted from 2014 to 2022 in order to clarify changes and trends in trail degradation. The survey was conducted by dividing the trail into ten sections that pass through flat landform formed by lava flows and pyroclastic deposits called *Hokkai-daira* at an elevation of around 2,060 meters.

The first survey was conducted in 2014. In the first survey in 2014, a large amount of degradation (>200 m^3) was already observed in survey sections on the southeast-facing slope where clayey soil was developed. On the other hand, during the eight years of long-term monitoring from 2014 to 2022, erosion of more than 10 m^3 was observed in study sections covered by pyroclastic flow deposits on the northwest-facing slope, showing a larger amount of erosion than in study sections located on the

southeast-facing slope. This indicates that each study section responded differently to heavy rainfall events with daily precipitation exceeding 80 mm that occurred in 2016, 2018 and 2022. The results indicate that identifying changes in erosion rates is important in determining which trails should be repaired.

In the sensitive environment of Daisetsuzan National Park, repair work needs to be conducted carefully, and long-term monitoring is essential. However, it is not practical to cover the entire 300 km of trails due to the lack of specialized staff and budget. Therefore, as in the case of repair work, the participation of volunteer trekkers/hikers may play a significant role in acquiring basic data that is essential for decision-making in trail maintenance and management.

This study employed UAVs and pole photos, but iPhone is equipped with Lidar, which makes it relatively easy to acquire three-dimensional data. The establishment of a data collection platform and feedback system will provide value in the contribution to the conservation of the natural environment. Long-term monitoring using three-dimensional data and the cooperation of volunteer trekkers/hikers are essential to enhance the value of national parks and the sustainable use of mountain trails.

Track 3c Biodiversity and Ecosystem Services – Ecosystem Services

Submission ID: 110

Bridging the Gap: Community-Centric Approach to Nature-Based Solutions for Urban Flood Management and Sustainable Development.

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Abstract

In urban contexts, nature-based solutions (NbS) are crucial for stormwater management systems, achieved through integrating green infrastructure, such as constructed/natural wetlands. These solutions

mimic natural hydrological processes, reducing urban flooding and improving water quality, offering recreational opportunities and economic savings. A study was conducted on Deepor Beel, a Ramsar site and prominent wetland located in the urban landscape of Guwahati city in the Eastern Himalayan Region (EHR). City authorities are actively pursuing the utilization of this wetland as NbS to enhance urban stormwater management. Leveraging the wetland's natural capacity to buffer against flooding while promoting biodiversity conservation and sustainable land management practices concurrently. This approach is perceived as cost-effective, sustainable, and multifunctional, aligning with climate change mitigation and adaptation goals and the broader objectives of sustainable development.

While acknowledging the commendable efforts of city authorities, our consultation meeting with them unveiled a top-down approach lacking input from the local community residing near the wetland. Several research studies on NbS underscore the potential impacts of implementing nature-based solutions (NbS) on local communities and livelihoods, including changes in water availability/quality, land use, and regulatory constraints. Robust stakeholder engagement and adaptive management strategies are essential in addressing these concerns. Against this backdrop, our study aims to assess the feasibility of utilizing the wetland as an NbS to address urban floods in the city, considering the local context.

To achieve this goal, the study employed a mixed-method approach. Firstly, hydrological modelling was utilized to simulate flood events and assess the wetlands' impact on flood attenuation. This was followed by stakeholder engagement involving local communities, government agencies, NGOs, and other stakeholders. This engagement aimed to gather insights, assess perceptions, and integrate local knowledge into the research process.

Our study revealed that the wetland is already facing threats from untreated stormwater flowing from the city through natural streams into the wetland. This has adversely affected the livelihoods of the local community, pushing them towards low-skill industrial or commercial work from their traditional agrarian occupations. The fishing community, in particular, has encountered significant challenges due to declining water quality, resulting in reduced fish catch.

Proposals for further interventions to protect against flooding without considering the existing local context raise concerns about exacerbating water quality degradation, leading to livelihood loss and biodiversity. Our research underscores the critical importance of involving local communities in flood management decisions to ensure the effectiveness of Nature-based Solutions (NbS) initiatives. While communities acknowledge wetlands as sustainable flood management tools, they stress the necessity of inclusive decision-making processes. The lack of consultation has fueled distrust and conflicts between communities and authorities, resulting in feelings of marginalization among local residents. To promote NbS, especially in mountainous areas, our study advocates for building trust, fostering dialogue with local stakeholders, and considering social and cultural aspects in decision-making. This approach can contribute to achieving various Sustainable Development Goals (SDGs), including poverty reduction, food security, sustainable city, climate resilience, and biodiversity conservation.

Submission ID: 128

Integrating Environmental Impact Assessment and Protected Area management through Ecosystem Services: possibilities for application in buffer zones

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Abstract

Protected Areas (PA) are among the main nature conservation strategies available, although anthropic pressure on these areas is a globally identified problem. The way in which the surroundings of PA are used is critical to ensure their protection. Environmental Impact Assessment (EIA) is a useful instrument for anticipating and preventing the impacts of human activities that may result in significant environmental quality degradation. Incorporating Ecosystem Services (ES) into decision-making processes can help improve EIA practices, while addressing issues related to biodiversity loss. Despite the potential of ES approaches to enhance

EIA practice and PA management, it is still necessary to study how to integrate them particularly concerning projects located in PA buffer zones (BZ), due to their role in conservation. This research aims to analyze how the concept of ecosystem services can be used to integrate conservation objectives and EIA in BZ of Protected Areas. Semi-structured interviews were carried out with experts and practitioners dealing with analysis of ES within environmental assessments and/ or PA, in order to understand the current frameworks and implementation of this approach across different geographic contexts. Results of a content analysis showed a consensus among participants regarding the importance of ES approach for decision-making processes in BZ, because it can make it easier to communicate impacts and to compare possible land use and land cover alternatives. The majority of participants utilizes software tools to assess ES (e.g. i-Tree, Nature Value Explorer, among others), while others prefer social and participatory approaches for this kind of evaluation. Almost all respondents involved stakeholders in the different phases of their work. Even though some interviewees are aware of the InVEST software, its use is not a common practice. The most relevant ES for the interviewees were water supply and habitat quality. Although ES monitoring is an important aspect for integrating EIA and PA management, few respondents reported the use of this approach over time. While no projects employing the ES approach were reported in the follow-up stage of EIA practice, a more integrated and practical use was observed in PA management. The integration of the ES approach into environmental policies, particularly those concerning PA management and financial incentives like Payment for Ecosystem Services, was noted across several countries, regardless of the continent or economic status. It was concluded that although the ES concept is still rarely applied in integration of both instruments, it holds potential for enhancing conservation efforts in PA surroundings through EIA. This research provides insights into how the ES approach can support and guide EIA in PA buffer zones, that way contributing to protect, restore and promote sustainable use of ecosystems, halt and reverse land degradation and halt biodiversity loss (SDG 15, especially targets 15.1 and 15.9). An ES approach can also be instrumental to reconcile biodiversity protection and sustainable livelihoods, promoting connections between SDG 15 and other SDGs, for example SDG 3 (Good health and well-being) or SDG 6 (Clean water and sanitation).

Submission ID: 237

Ecosystems first: restoring ecosystems for meeting future demands for ecosystem services

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Abstract

Healthy functioning ecosystems are a prerequisite for creating the potential for flows of ecosystem services (ES) as natures benefits obtained from ecosystems. Meeting future demands for ES, as intergenerational equity, is fundamental to sustainable development. So too is the ecological restoration (ER) of degraded and destroyed natural ecosystems (SDG 15), now presented as a law in the EU. ER, in this respect, supports employment (livelihood) opportunities.

In Portugal there are limits and challenges to restoring natural ecosystems. Affecting the ER potential for recovering degraded, destroyed natural ecosystems on private land. Despite this, an opportunity exists to assist private landowners with abandoned eucalyptus plantations (AEP) to recover this land naturally, creating the future potential to meet demands for ES. As such, a privately funded project on private land in eastern-central Portugal has undertaken this challenge over an area of approximately 16 hectares.

The methodology, a praxis (practitioner based), heuristic (traditional and low-tech methods), and technology (using cost-effective technologies such as drones) approach The goal of the project is to allow the potential for the endemic (natural) species observed within the AEP to recover without removing (killing) the eucalyptus stumps. A method referred to as 'transitioning', which is part of a PhD study currently being completed by the main author. Transitioning requires the 'thinning' (reduction) of the dominant eucalyptus, opening space and light for the existing natural species.

Based on site analyses, this AEP has numerous oak trees. Primarily holm oaks (*Quercus rotundifolia*) with a lower presence of cork oaks (*Q. suber*).

The oak trees noted in the AEP were mostly stunted, many presenting a bushy growth form. Showing definite impacts from the faster growing eucalyptus as the canopies of these trees dominate the aerial spaces and access to light.

The process decided was for an intervention to reduce (treat) the dominance of the eucalyptus, and a 'wait and see' process to the reaction (recovery) of the oak trees and other natural vegetation noted during the site analysis. 'Wait and see' is an active process involving: 1. The monitoring and evaluation (M&E) of the site using a drone; 2. The random selection of both treated and untreated (control) trees for M&E; 3. Returning to the site to maintain the treatment of the eucalyptus stumps until the site shows clear signs of a recovery trajectory.

As far as possible, assessments are done to understand the effects of the changing regional climate, to understand the recovery of natural species, to understand the impacts of the intervention on the local water cycle, soil conditions, and spatial return of biodiversity, a holistic view of the food/energy network that is slowly recovering in this site, as well as the influence of this ER intervention of bordering ecosystems within this location.

The results so far show a positive trend toward the restoration of a novel ecosystem or ecosystems, supporting SDG 15. Furthermore, local employment enhances the sustainability and economic value of local livelihoods.

Submission ID: 291

Climate regulates the effect of abrupt vegetation shifts on soil moisture on the Loess Plateau, China

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Abstract

To alleviate the social and environmental impacts of soil erosion and land degradation on the Loess Plateau, China has launched many ecological

restoration projects. These projects have achieved the goals of increasing carbon stocks and conserving biodiversity, whereas their impacts on soil moisture is ambiguous. Previous studies have focused on the effects of linear greening of vegetation on soil moisture, and they generally hold the contradictory views that revegetation may either increase or decrease soil moisture, because vegetation has the intertwined and opposing effects of increased evapotranspiration causing drying and decreased runoff causing wetting. However, the effects of abrupt vegetation shifts (i.e., the productivity of ecosystem changes dramatically over a short time) on soil moisture remain relatively unclear, and this may result in some threats to soil moisture from extreme restoration measures being overlooked. Furthermore, what exactly determines which effect vegetation has on soil moisture remains to be elucidated. Here, we used the multi-period difference-in-differences method to find that positive abrupt vegetation shifts prevailed (29% for grasslands and 25% for forests) on the Chinese Loess Plateau from 2000 to 2020. To find out the regulators that determining these whether these effects are positive or negative, we used climatic zones to distinguishing the regulatory role of climate. We found that most of the positive abrupt grassland shifts (89%) favored soil moisture accumulation, whereas positive abrupt forest shifts had positive (51%) impacts on soil moisture in “hot zones” (characterized by higher temperatures and higher solar radiation) but negative impacts (47%) in “wet zones” (characterized as cloudy and rainy). The results show that a full understanding of how abrupt vegetation shifts affect soil moisture is critical for managing ecosystem sustainability. Our findings can inform sustainable ecological restoration and water resource management strategies, and reveal areas where revegetation should be prioritised under the background of climate change.

Track Four

Climate Change and Energy

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 4a Climate Change and Energy – Effective Response for Energy, Water, and Land Use

Submission ID: 42

Examining the primary drivers of carbon costs in the Chinese economy

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Abstract

Carbon costs and constraints increasingly impact economic sectors. Carbon costs on the input side are associated with the sector's reliance on fossil fuels. Output-side costs primarily relate to the emissions generated by economic sectors appearing as emission rights and costs related to carbon emission trading systems (Rudnik, 2023).

It is often observed that policies such as fuel and carbon taxes, affecting the input side, are commonly treated separately from climate policies. Insufficient integration in policy efforts may lead to a behavior-impact gap problem at the policy level.

Our research proposes a model to quantify the costs of embodied fossil inputs on the input side and the costs of embodied carbon on the output side. The model is based on an environmentally-extended input-output analysis. Carbon inputs encompass the use of fossil fuels for both energy and non-energy purposes. We illustrate our model with the example of China, as it is heavily reliant on fossil fuels, particularly coal, which constitutes a significant portion of its energy supply. China stands as the world's largest energy consumption deficit economy while ranking as the largest emitter of greenhouse gases (Yang et al., 2023).

Results show that embodied carbon-related inputs within downstream sectors are as much as two or three times greater than direct carbon inputs. The costs of embodied carbon-related inputs exceed the costs of CO_2 emissions across all sectors. The total carbon cost may exert a greater influence on downstream sectors, who are not directly subjected to carbon regulations, than on upstream industries.

Recent climate policy initiatives have primarily focused on addressing carbon emissions (the output side), despite empirical evidence highlighting the substantial impact of the input side. A successful transition towards a low-carbon economy hinges on the existence of high total carbon costs for sectors, which encompasses the sum of both input and output-related costs. For this, the present research offers an integrated carbon accounting approach.

The research is closely related to SDG 7: Affordable and clean energy, sub-target **7.a. and SDG 13: Climate action,** sub-target **13.2.** Results are closely linked to the topic of the ISDRS conference, as by integrated carbon input-carbon output analyses, policymakers can formulate more effective strategies to address the challenges posed by climate change, to contribute to the realizations of SDGs related to climate change and energy policy.

Submission ID: 64

Analysis of tradeoffs and co-benefits of hydro-led energy transition in Nepal for Sustainability and Development

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Abstract

With the rapid hydroelectric expansion, Nepal is transitioning from biomass and fossil fuels to renewable energy. The country is eager to pursue its dream of producing abundant hydroelectricity that is often assumed to make it prosperous. However, the rapid hydropower development across Nepal has sparked debate over its implications for society, the economy, and the environment. With the overarching framework of Sustainable Development Goals, this study analyzes tradeoffs and co-benefits of the hydro-led energy transition with other global goals. We employ a review of the secondary literature and key informant interviews to understand how the renewable energy transition in Nepal can contribute to a just and equitable energy transition that aligns with national development and climate goals. Our preliminary analysis suggests that it is crucial to view the energy transition in Nepal as a sociotechnical system as the generation of more electrons may not

automatically translate to prosperity. It is crucial to ask critical questions regarding the long-term sustainability of hydroelectric production, transmission, and distribution. While the government has initiated several initiatives to increase internal demand and export surplus energy, the pace has been slow. The larger question is whether the country can manage the surplus energy and who the alternative energy economy is serving. Lessons learned from Nepal regarding concerns about energy access, availability, affordability, and sustainability apply to other countries undergoing similar energy transitions.

Submission ID: 105

Water Sustainability using Pond-In-Pond (PIP) wastewater treatment system for reuse

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Abstract

The world's freshwater resources are continuously being depleted and water scarcity is already a global issue. The current understanding of our water resources shows that the sustainable limit will be reached by the year 2030 for food production and 2040 for potable water. Several attempts have been made to address this problem, yet few have considered integrating wastewater treatment sites with reuse sites and converting those water resources into a safe alternative to fresh water for agricultural purposes. Wastewater is an easily accessible and abundantly available resource that could meet irrigation needs while conserving freshwater for future generations; yet is highly underutilized, mainly for two reasons – 1) the perceived difficulty of reusing wastewater for agricultural purposes and 2) lack of specific guidelines for designing natural pond systems that adequately predict continuous performance. Also, there exist strong contradictory viewpoints regarding optimal pond dimensions and performance. The best next step thus is to take a different approach in the configuration of the ponds for reuse.

This research provides us with an alternative pond treatment system known as the Pond-In-Pond (PIP) that can be used to treat wastewater sufficiently for reuse. The PIP is a treatment technology where two types

of ponds -- anaerobic and aerobic -- are combined into a single pond and consist of a deeper inner pond entirely submerged within the outer pond. The inner deeper section provides anaerobic conditions for more complete degradation of organic matter while the outer pond provides additional treatment through the aerobic process and controls odor. The PIP showed promising performance with an average BOD removal of over 80% throughout the year within a single pond for both municipal and industrial wastes while requiring up to 40% less land area compared to traditional single-process ponds. Results from 2-D models further confirmed that the PIP configuration offers improved flow diversion and higher retention of solids, thus allowing for better and a more consistent level of treatment. The savings in capital costs due to reduced land requirements, savings in operations and maintenance, and consistently higher performance, thus make the PIP a potentially viable and sustainable technology for wastewater treatment, especially for reuse purposes. Further, its simple design and easy operation with revenues from the reclamation of effluent, make it well suited for rural and small communities. Effective pond design and appropriate implementation of the PIP will thus help address the major societal concern of water scarcity with low-cost and effective wastewater treatment for reuse.

This proposed abstract relates to multiple targets within SDG 6 (primarily 6.3, 6.4, and 6.a.), and SDG 2 (mainly 2.3 and 2.4). This abstract is relevant to the topic of the conference as it offers a viable technology for rural and small communities that are widely prevalent in mountainous countries like Nepal where access to centralized treatment systems is limited. This proposed technology also contributes to creating a self-sustained livelihood for such communities as they will be able to manage their waste back into the farms producing foods and generating economic revenues.

Submission ID: 113

Achieving high integrity voluntary climate action: an interdisciplinary review of principles, criteria, and indicators

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Abstract

Non-state actors are increasingly recognized for their pivotal role alongside nation-states in addressing climate change and its impacts. Voluntary climate actions of non-state actors encompass a spectrum of strategies, ranging from mitigating greenhouse gas emissions to enhancing adaptive capacity and fostering climate resilience. Amidst a surge in voluntary climate actions like net-zero pledges and other climate commitments from diverse actors such as businesses, financial institutions, civil societies, and cities, there emerges a pressing need for enhanced scrutiny regarding the integrity of these commitments. Scientific studies, as well as non-scientific reports, indicate that the lack of transparency, accountability, demonstrable permanent impact, and commitment to justice and equity of these voluntary pledges could impede effective and legitimate voluntary climate action.

While voluntary climate actions of non-state actors are integral to achieving the objectives of the Paris Agreement, their proliferation without integrity creates severe challenges, including slowing down and undermining high-integrity commitments by other actors, greenwashing, and creating undue expectations among policy-makers, investors and other stakeholders. Meanwhile, climate action is becoming more urgent everyday. Against this backdrop, the ACHIEVE project endeavours to formulate a comprehensive framework of high-integrity principles for voluntary climate action. Grounded in current climate science, existing research on high-integrity and aligned with the objectives of the Paris Agreement, these principles aim to garner social legitimacy and trust. Here, we present the inter-and transdisciplinary methodology employed in the ACHIEVE project, insights from an interdisciplinary review of relevant principles, criteria and indicators for assessing high integrity and outline the trajectory for future research on high-integrity principles for voluntary climate action.

Submission ID: 140

Dilemma between Solar Panels and Wetland Protection in the Taiwan Energy Transition - A Case Study of Chiayi Budai

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Abstract

This article discusses the the conflict between installing solar panels and protecting wetlands faced in Taiwan's energy transition. It highlights the importance of ecological conservation and ethical considerations in the decision-making process by exploring the government's renewable energy policy, the need to reduce carbon dioxide emissions and the challenges posed by the "demand gap" in renewable energy production. This article uses the DPSIR framework, stakeholder analysis and different perspectives of environmental ethics to discuss the case of Chiayi Budai. The preliminary results emphasize the importance of wetland preservation for maintaining the integrity and beauty of the land. It also argues that installing solar panels on wetlands is not an appropriate solution without considering the ecological impact. Furthermore, it highlights the need for stakeholder analysis and public participation in decision-making processes related to energy development and land use. Various stakeholders, including environmental advocacy groups and energy associations, provide insights on balancing renewable energy development and ecological protection. The conclusion discusses the concept of "no net loss" in wetland conservation and the importance of changing people's values to achieve sustainable development.

The proposed abstract and its discussion on the dilemma between solar panel installation and wetland protection in Taiwan particularly relate to the following Sustainable Development Goals (SDGs) and their specific targets:

- SDG 7: Affordable and Clean Energy
    - Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.
- SDG 13: Climate Action
    - Target 13.2: Integrate climate change measures into national policies, strategies, and planning.
- SDG 15: Life on Land
    - Target 15.1: By 2020, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, particularly

forests, wetlands, mountains, and drylands, in line with obligations under international agreements.

- Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity, and by 2020, protect and prevent the extinction of threatened species.

The proposed contribution directly relates to the topic of the Conference "Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood" by showcasing a real-world dilemma that encapsulates the intricate balance required between advancing renewable energy (solar power) and preserving natural ecosystems (wetlands). It highlights the challenges and opportunities in achieving SDG targets related to clean energy, climate action, and biodiversity conservation within Taiwan's energy transition context.

This case study exemplifies the interconnectedness of mountainous regions (as sources of rivers feeding into wetlands) and oceanic ecosystems (as destinations of migratory birds relying on wetlands), emphasizing the need for holistic approaches to energy policy that consider ecological impacts. Through stakeholder engagement and ethical considerations, it offers insights into reconciling economic development with environmental preservation, a core theme of the conference aimed at fostering sustainable livelihoods while advancing towards the SDGs by 2030.

Submission ID: 182

The impact of the Covid-19 pandemic on the energy use and carbon footprint in Hungary

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Abstract

The present research presents the impacts of the Covid-19 pandemic in Hungary in terms of energy use and the evolution of the sectoral carbon footprint.

After a short literature review on the characteristics, significance and socio-economic consequences of the Covid-19 pandemic, we first present the impacts on energy use. For these analyses, annual data on energy use collected by the Hungarian Energy and Utility Regulatory Office were used as the main source.

The results of the analysis show that the indicators in the areas under study mostly show a significant impact only during the period of the pandemic restrictions (or even not there due to various extinguishing effects), but after the lifting of lockdowns, the levels of traffic, consumption and energy consumption have returned to or even exceeded the original levels. For these reasons, the positive impact of the Covid-19 outbreak on energy use can be considered to be at most short term.

To examine the development of the sectoral carbon footprint, I used national greenhouse gas inventory data collected and controlled by the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat, while I used the gross value added of the production sectors as a basis for projections.

The results of the sectoral carbon footprint analysis show that there are sectors with positive specific emissions trends (e.g. construction-related sectors), but also sectors with diverging or even reverse trends.

The reasons for these changes can be mainly attributed to pandemic prevention measures, economic policies measures, or even simply to weather effects, which may (or may not) have a strengthening effect.

Although the results of the research identify overall short-term pandemic effects on energy use and sectoral carbon footprint trends, the lessons learned from the pandemic through the analyses carried out can be used to shape a more environmentally and economically sustainable future for many sectors.

Submission ID: 238

PURE a Digital Platform: Unveiling Nepal's Potential Renewable Energy Demand in Irrigation for informed decision support

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Abstract

In Nepal, 60 % of the agricultural land do not have access to year-round irrigation. This makes it hard to grow food, affecting both having enough to eat and making a living. This underscores the urgent need for effective climate adaptation solutions to safeguard both food security and farmers' livelihoods. Energy access stands out as a pivotal factor in meeting these irrigation requirements. With the abundance of renewable energy sources and the establishment of a 100% renewable energy grid, renewable energy emerges as a crucial player in addressing the pressing need for reliable energy to support irrigation.

However, to effectively address these challenges, a comprehensive understanding of the geographical landscape and potential market opportunities for integrating renewable energy is imperative. The PURE (Productive use of Renewable Energy) platform emerges as a transformative solution, bridging data gaps by utilizing satellite imagery and advanced modeling. This novel web-based platform enables user-guided inputs, allowing to select various dataset layers encompassing administration boundary, physiographic zones, transmission lines, river networks, canals, road access, and more. PURE facilitates the integration of these various datasets, enabling the presenting of prospective renewable energy demand and cost predictions at the national, provincial, and district levels through the utilization of both tabular and graphic representations.

The PURE platform employs a methodical approach. The process commences with a comprehensive suitability analysis, wherein several factors including land cover, terrain, availability of surface water, slope, soil type, and surface water supply are assessed in order to find regions that are conducive to irrigation. Afterwards, the platform calculates Crop

Water Requirements by evaluating the demands of the most commonly cultivated crops, offering an approximation for irrigation water needs. Power requirement estimation follows, calculating the power demand for lifting water based on the identified potential unirrigated areas and crop water requirements. This comprehensive methodology ensures a thorough analysis of suitable irrigable areas, megawatts of required power demands, and associated costs, facilitating decision support for effectively planning RE powered irrigation in Nepal. According to the platform's assessment, there is a renewable energy demand potential between 800 and 1300 MW necessary to address Nepal's irrigation requirements through the utilization of surface water. The results of platform were also validate through expert consultations and validation workshop.

PURE serves as a decision-support tool for government officials, practitioners, researchers, and academics. By offering detailed insights into renewable energy demand planning, the platform facilitates informed decision-making to address the immediate energy needs of Nepalese farmers. In conclusion, the integration of renewable energy, facilitated by platforms like PURE, is the key to unlocking investments to sustainable solutions for irrigation challenges in Nepal's demanding agricultural landscape.

Submission ID: 243

Techno-economic feasiblity of a solar-bio-pwered waste and wastewater utilization system for small rural communities

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Abstract

More than 140 billion tons of organic wastes including agricultural and municipal waste streams are produced annually in the world representing an untapped biomass resource. Utilizing these traditional wastes as biomass resources can significantly contribute towards meeting the ever-growing demand for energy while alleviating the negative impact on the environment by reducing greenhouse gas emissions and protecting

water resources. However, less than 10% of the waste streams are currently utilized for energy production and other uses. Diverse waste streams, relatively small amounts of individual wastes, logistics and cost of collection, and transportation, and lack of public awareness are the main factors that lead to low utilization of waste streams. Addressing these issues provides a great opportunity for both scientific and industrial communities to make significant contributions to global sustainable development. Due to the complexity of these issues, systems approach is needed to develop new solutions.

The purpose of this study was to implement and evaluate a pilot-scale and closed-loop system that synergistically combines solar thermal collector, anaerobic digester, and post-treatment to simultaneously treat and utilize organic wastes and wastewater. The system utilizes 863 kg of mixed animal and food wastes to generate 263 MJ of renewable energy, produces 28 kg of nitrogen and phosphorus fertilizer, and reclaimed 550 kg of water per day. The net revenue considering electricity and fertilizer was $2,436 annually. The payback period for the system is estimated to be 17.8 years. The implemented system has successfully demonstrated a self-efficient and flexible waste utilization and treatment system. It creates a win-win solution to satisfy the energy needs of rural communities and address environmental concerns of organic waste and wastewater disposal.

Submission ID: 255

Integrated Assessment Modeling and Determinating with SDGs for Linking Future Resilience to an Optimized Climate Risk-, Water- and Drought Management – Comparative Analysis in Lusatia, Spree Forest and Ahr Valley Region, Germany

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Abstract

This research deals with the combined viewpoint of strengthening resilience throughout sustainable development, Sustainable Development Goals (SDGs), and an integrated assessment modeling and spatially determinating. Linking future resilience to an optimized climate risk-, water- and drought management means to stress integrative assessment and modeling with the help of comparative analysis in Lusatia, Spree Forest (state of Brandenburg), and Ahr Valley Region (state of Rhineland-Palatinate and North Rhine-Westphalia), Germany, effectively respond for water and land use challenges and can help overcoming the climate crisis and rescuing the SDGs 2030 for sustainable livelihood.

Linking sustainable, resilient futures of terrestrial land and ocean further means to bring sectoral aspects of land and water responses into effective instruments, which is observed throughout the self-developed CA(LU)²WA framework for sustainable climate risk- (CRM), disaster risk- (DRM) and crisis management (CM) and applied instrumentations such as the landscape units.

Two groundworks advect this research: firstly the by the author for Lusatia, implied Spree Forest Region, possibly for worldwide regions developed, applied innovative theoretical approach, and verbal-argumentative model called „Climate Adaptive Land Use within Landscape Units and Drought and Water Management" (CA(LU)²WA) proactive landscape meta-model; secondly the approval for operationalizing CA(LU)²WA into the flood-destroyed Ahr Valley Region after flood disaster in mid-July 2021 and simultaneously threatening COVID-19 pandemics.

Sustainable development through spatially determining and, therefore, operationally implanting SDGs, climate, land, and water resilience, and general planning combined with an integrated land- and environmental systems processing lead to constructive solution transferors against challenges in times of climate change. Diverse sustainable and resilient aspects through integrated assessments within landscape scale, regional planning level, and by the help of SDGs should guide into a chance for climate, land, and water resilient futures for our Planet Earth, the ONE.

Compiling findings, the research being based on past, long-term theoretical combined applied research pillars show that the framework, with its applied instrumentations, such as landscape units and transboundary river basin areas, can synthesize sectoral and integrated

aspects of assessment and decision-making into the ideal „prototype region“ of Lusatia and inhabited Spree Forest and to override risks and needs parallel in diverse regions, such as Ahr Valley region.

The CA(LU)²WA assessment framework combined with innovative and well-known assessment methodologies can stepwise – as one of several pillars – strengthen overcoming the climate crisis and rescuing the global SDGs 2030 for sustainable livelihood. It is a high-ranged, sustainable, resilient future-saving, capacity-building flagship initiative, which gains regional climate, land, and water resilience not only in the flood disaster-, COVID-19-impacted Ahr valley region but in the same way in highly industrialized regions, such as Lusatia region. Specific SDGs such as SDG 11, 13 with a combined Climate Smart Planning or SDG 17, 15 with a combined Integrated Drought and Water Management enhance the effective applicability of diverse regions and assessment fields to gain regional resilience. This research supports interdisciplinary sustainability science and sustainable future processes around multivarious landforms, flat or mountainous land, the same as terrestrial land or ocean.

Submission ID: 274

Risk of Disaster and Riverbank Erosion Linking Vulnerable Community Livelihoods Sustainability in the Ganges - Brahmaputra-Meghna Deltaic Floodplain Region in Bangladesh

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Abstract

The geographic location and the monsoon climate render deltaic floodplains highly vulnerable to natural disasters. Floods and riverbank erosion is a common natural phenomenon in the Ganges-Brahmaputra deltaic region. The climatic change impact is a new threat to food security and livelihoods of the riverine community in the Ganges basin. The Ganges-Brahmaputra-Meghna (GBM) river carries 2.4 billion tons of sediments annually and these sediments settle on the bed of the major rivers and build Char-lands (river bar). the land that has newly emerged in the river channel is called Char-land, there are over 12 million people are living in the islands in Bangladesh. Purba Khas Bandarkhola Mouza

of Char-Janajat of Madaripur district in Bangladesh is a unique Char-land located in the Ganges basin area which is an active delta. The community livelihoods and the settlements of char-lands are under threat due to massive floods and riverbank erosion, as a result, the people have to move and relocate their settlements from one place to another within the char-land or outside the char-lands. the climate change impacts are the root cause of massive floods and erosion that extended its negative impacts on rural sustainable development and settlements sustainability issues. the objective of this study is to understand the risks of floods and riverbank erosion impacts on char-land livelihoods and the vulnerability of inhabitants in the Ganges active delta. To develop a comprehensive integrated poverty, livelihoods, and ecosystem management plan for settlement and agricultural stability and livelihood sustainability in the Ganges-Brahmaputra river channels. The study was carried out based on primary and secondary data sources. The results show that the average interval of displacement is every 5 years at the Purba Khas Bandarlhola mouza. The cyclic displacement range is 121 km2 and pull and push factors are influencing the settlement relocation processes. Considering the MDGs, the study also seeks the achievements and success of MDGs of the United Nations at the micro-scale level which is moving to SDGs in the rural areas in Bangladesh. The study found 2 agendas of MDGs which have a meetup and reached the goals before 2030; these are eradicated extreme poverty and hunger, and ensure environmental sustainability. Findings show that the 2 goals are sustainability. gradually to meet SDGs before 2030 and through future implementation, the process will achieve and meet the 17 SDGs. Therefore, an integrated climate risk and disaster management planning approach and policy framework are urgently needed for the Char-lans' livelihoods and ensure environmental sustainability for the vulnerable communities in the Ganges deltaic fcatchment region in Bangladesh.

Submission ID: 320

Climate Change impacts on Future Extreme Rainfall: A Study in Nepal, Palestine and Bangladesh.

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Abstract

Frequent occurrence of extreme rainfall events leading to catastrophic floods has been quite evident in the recent years. The IPCC sixth Assessment Report states that the human caused climate change is causing more frequent and extreme events that have led to adverse and irreversible impacts, and will continue to rise in the future. Understanding the risks imposed by the future extreme events is imperative to build resilience and to minimize human and socio-economic losses in the future. Through Tomorrow's Cities project aiming to catalyze a transition from crisis management to multi-hazard risk-informed planning and decision-making for cities in low-and middle-income countries, this study analyzes the changes in future rainfall extremes, and spatial and temporal patterns of extreme rainfall events in Kathmandu Valley(KV) and West Rapti(WR) in Nepal, Nablus in Palestine, and Chittagong and Cox's Bazaar(CB) in Bangladesh.

We present a methodology integrating historical extreme rainfall patterns and future projections from Global Climate Models (GCMs) to overcome the limitations of temporal and spatial resolutions of GCMs. It starts with the analysis of historical extreme precipitation, focusing on maximum one-day rainfall (RX1day), and spatial pattern of extreme rainfall events. Future precipitation is obtained from CMIP5 and CMIP6 GCMs for Representative Concentration Pathways-RCP4.5 and RCP8.5, and Shared Socio-economic Pathways-SSP2-4.5 and SSP5-8.5. The GCMs are selected from an envelope type analysis to determine best performing GCMs in the study area or as per the recommendations from literatures. GCM data are bias corrected and statistically downscaled to required spatial and temporal scale. Rainfall frequency analysis, stationary or non-stationary, is performed depending on the Mann Kendall trend test on future RX1day values. The spatial and temporal disaggregation of the rainfall values is done on the basis of historical extreme rainfall event. Satellite based rainfall data is used for the sub-daily precipitation measurements.

From our studies, we observe up to 50% and 69% increase in RX1day in KV and WR in the future. Maximum RX1day increase of 8% is observed in CB, 18% in Chittagong and 24% in Nablus. Extreme rainfall is expected to be more frequent and intense in the future. For example, 1 in 100 year return period rainfall will be equivalent to 1 in 20 or 25 year and 1

in 25 year return period rainfall for KV and WR, respectively. Up to 60% increase in 1 in 100 year return period rainfall is projected in Nablus. Negative change in future rainfall is also observed in CB, with -6% change in 1 in 100 year return period rainfall.

This study allows us to quantify frequency and intensity of future rainfall extremes with respect to historical observations, providing crucial information for future urban planning and climate change adaptation strategies. The future rainfall values are valuable inputs for hydrological and hydraulic models to understand the discharge and flood levels in future urban environment, thereby helping in risk informed planning of future cities. This study aligns with SDG#13, target#13.1:strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

Track 4b Climate Change and Energy – Affordable and Clean Energy

Submission ID: 49

Encouraging biogas plant construction in Nepal: should carbon revenues be spent as interest rate subsidies, environmental income payments or purchase subsidies?

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Abstract

Governments and project developers in developing countries can obtain substantial income from carbon revenues as households make the transition to clean energy technologies and reduce their greenhouse gas emissions. These revenues can be used in various ways to encourage further investments in clean energy. This paper examines the effectiveness of three alternative policy instruments for supporting this clean energy transition in relation to cooking with biogas plants in Nepal – 1) carbon revenues as purchase subsidies on biogas plants, 2)

distribution of environmental income to households for continuing use of biogas plants, or 3) interest rate subsidies related to purchases of biogas plants on credit. Thus far the sectoral focus has been on purchase subsidies, but these are increasingly declining in their effectiveness. Our results identify the effectiveness relative to government cost from these three types of potential government policy. We find that compared with purchase subsidies, credit subsidies on shorter-term loans, preferably 3 years or less, have the lowest government cost to achieve a given increase in purchases of biogas plants. Moreover, combining credit subsidies with distributing modest amounts as environmental income to biogas purchasers, can further increase the rate of uptake of biogas plants. These results support the policy recommendations to (1) mainstream larger interest rate subsidies for biogas credit and (2) channel some carbon revenues to those who generate carbon credits. These findings have relevance for both the Nepali and international organisations concerned with improving energy access, generating carbon credits, improving environmental and health outcomes, and improving community welfare.

Submission ID: 67

Identifying clusters for municipal solid waste management facilities and investigating different quantity-based approaches for waste-to-energy generation in Nepal

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Abstract

Nepal has three administrative divisions, and local levels are responsible for managing municipal solid waste (MSW). Due to the lack of proper facilities, most municipalities are collecting, dumping, and burning solid waste, which is hazardous. There are few waste-based industries in Nepal, but due to insufficient raw materials, most are starving and have faced sustainability challenges. Clustering could create a better environment by increasing the availability of waste quantity not only for waste-based industries but also to add hands in the process of

proper waste management. No literature on clustering techniques in the country has been found, and the study has filled the gap. The study has identified a suitable location for MSW management facilities using QGIS for waste collection and management all over Nepal, focusing on metropolitan and sub-metropolitan areas. Further, the study has quantified the waste generation potential based on the population and the availability in clusters based on 10, 25, and 50 km diameter coverage area. In addition, based on the quantity of waste generation and available literature, various possible valorization approaches for waste-to-energy were discussed. The study has identified ten different clusters covering six metropolitan and 11 sub-metropolitan cities and surrounding municipalities. Out of the total 6,963 tonnes/day, metropolitan and sub-metropolitan cities account for about one-fourth of the waste. Based on the quantity of waste available, the study has identified three different approaches for waste valorization: fractionation for syngas and methane production, gasification for electricity and heat production, and gasification for hydrogen and liquid fuel production. The study's findings could help policymakers promote clustering techniques, and entrepreneurs establish waste-based industries.

Submission ID: 68

Environmental Evaluation of Innovative Thermochemical Energy Storage Materials: A Preliminary Life Cycle Assessment

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Abstract

In the ongoing transition toward sustainable energy systems, thermal energy storage stands out as a pivotal technology, providing the capability to store and release heat or cold based on inherent physical and chemical properties. Within the context of the EU-funded 'Innovation Ecosystem - Sicilian MicronanoTech Research And Innovation Center' (SAMOTHRACE) project, a dedicated team of researchers is committed to advancing sustainable energy storage technologies.

One of the tasks of the project involves the development of innovative

materials for thermochemical energy storage. Envisioned to be low-cost, non-toxic, and non-flammable, these materials should also represent an environmentally friendly alternative. Considering that most studies on these innovative materials generally focus only on their thermodynamic properties and costs, the primary objective of this study is to assess their potential environmental impacts, with a specific focus on the investigated organic thermochemical compounds, including di-sodium succinate and lactate salts. These compounds are explored as substitutes for traditional inorganic counterparts like halide hydrates, nitrate hydrates, sulfate di-hydrates, etc.

Adopting a Life Cycle Assessment (LCA) approach, the study evaluates the potential environmental impacts of these materials across their entire life cycle, encompassing production, use, dismantling, and disposal phases. This preliminary investigation focuses solely on material properties, excluding considerations about other components typically included in thermal storage systems and infrastructure.

Thermochemical properties, including specific storage capacity per kg of material, evaporation enthalpy of water at the adsorption temperature, integrated adsorption potential, and sensible heat capacity, are investigated for comparison purposes. Inventory data sources include both primary and secondary data. In particular, literature reviews and responses from a questionnaire sent to the project-involved laboratories are collected. Background processes are estimated using the Ecoinvent 3.8 database, supplemented by a stoichiometric approach for candidate materials lacking data.

The findings provide valuable insights into the environmental impacts of these innovative materials, identifying hot spots and potential trade-offs. This preliminary life cycle analysis provides critical information to guide the development of sustainable energy storage solutions. Furthermore, the findings will support future LCA studies by offering critical discussions on data uncertainty and limits, thereby enhancing the robustness of environmental assessments in the realm of thermochemical energy storage.

This research aims to contribute to the achievement of SDGs 7 and 12 by evaluating the potential environmental impacts of alternative chemical materials that can be used in thermal energy storage. The new technological design not only increases the share of renewable energy

in the global energy mix allowing a long-term storage of renewable or wasted thermal energy. in addition, it offers an environmentally sound management of chemicals and waste, substantially minimizing their adverse impacts on human health and the environment through the use of organic compounds.

Submission ID: 87

The use of smart apps to promote energy-saving: Householders' response and behavioural change in Hong Kong (A Case Study of Sai Kung & Sheung Shui Community)

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Abstract

To foster the smart energy transition, the Hong Kong government has published the Climate Action Plan (2017) and Smart City Blueprint (2020), alongside the introduction of the Carbon Neutrality Goal by 2050 (ENB, 2017; HKSAR, 2020). Two monopolised power companies have implemented the smart meter rollout plan from 2020 to 2025 (CLP, 2018; HEC, 2020). The Department of Geography (GEOG) of Hong Kong Baptist University (HKBU) has started the smart low-carbon transition project, which aims to motivate energy behavioural change via bottom-up approaches. The interdisciplinary researcher teams formed by academic expertise in geography, physics, computer sciences and visual arts have developed the Smart Energy Envisioning (SEE) apps. The smart apps can provide Real-Time data visualisation, Energy-Saving Coins and Rewards, and AI-conversational chatbot for householders. It also acts as a communicative agent to generate, collect and interpret large-scale datasets. We aim to achieve an annual average of 10% electricity consumption reduction, as well as knowledge, attitude and behavioural change after 3-month app-based intervention (HKBU, 2021).

The research would address the following question: (i) How do householders' response and interact (e.g. using percentage, using frequency, which and when) with 6 app-based energy behavioural change interventions? (ii) What are the impacts (e.g. total electricity consumption change, energy behavioural change, knowledge and attitude change) of

6 app-based energy behavioural change interventions? (iii) What are the factors (e.g. socio-demographic features, dwelling characteristics, type of electricity consumers, and other factors) explaining the differences on app-based interaction and energy behavioural change? This study is a case study of Hong Kong with Two Comparative Communities. Hong Kong is a significant case for studying the role of households in smart energy transitions due to the dense urban environment and smart city transformation (HKSAR, 2020). Sai Kung and Sheung Shui are two significant communities due to its climate resilience capability, diversity of housing types and strong community bonding. During the 3-month app-based interventions (Sai Kung: 09Aug-08Nov2023; Sheung Shui: 18Aug-17Nov2023), 120 households were selected to interact with 6 app-based energy behavioural change interventions. 80 households and 40 households were served as intervention and control group respectively.

Interdisciplinary multi-methods with 2 main types of data, including (i) quantitative and (ii) qualitative data collection. The former one includes Questionnaire T1&T2, collection of electricity bills and real-time electricity consumption. The later one comprises focus group sharing and in-depth household interviews. This study is novel in several aspects. Firstly, we develop a holistic app-based energy behavioural change interventions for a smart low-carbon community. We develop 6 app-based interventions, such as real-time data visualisation, financial rewards and AI-conversational chatbot, derived from 6 motivational factors of energy-saving behavioural changes. Secondly, we interpret the progression of energy-saving behavioural change via comprehensive indicators (e.g. total electricity consumption change, energy behavioural change, knowledge and attitude change). Therefore, the research outcomes would result in a positive impact on a wide range of stakeholders, as well as provide useful policy implications for smart city transformation and decarbonisation measures.

Submission ID: 304

Waste to Energy - Refuse Derived Fuel Briquettes (RDF) from MSW as Fuel for Small Scale Industries and Partial Solution to Waste Management

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Abstract

Energy recovery from municipal solid waste (MSW) has been gaining attention as one of the world's alternative and environmentally friendly methods for waste management. MSW management is one of the major issues in developing nation like Nepal, causing environmental pollution from poor management and open burning. Open burning of waste in the mountainous areas even cause even more pollution. On the other hand, traditional sources of energy such as fuelwood, coal, etc. are getting expensive and also cause pollution from their use in industrial kilns and furnaces. This research work is based on the research work conducted by Centre for Energy and Environment Nepal (CEEN) to explore the possibilities of producing refuse derived fuel (RDF) briquettes using some combustible portions of the (MSW), namely plastic waste/ wrappers, paper, rubber, cloth, etc. and testing them as alternative fuel to traditional fuelwood being used in the clay craft kilns for baking clay pots in Thimi and Thermax boiler in Pashmina factory in Bhaktapur District.

The combustible waste (paper, plastic, rubber, clothe and biomass) was collected and processed (sorting, drying, shredding) for production of refused derived fuel (RDF) using screw extruder technology. First RDF-1 was produced using 50:50 paper and noddle wrappers, then RDF-2 was produced using 57.25 % plastics, 21.54% cloth, 13.57 paper, 7.60% rubber. The fuel characteristics (proximate analysis, calorific value) of RDF briquettes were determined and then tested in clay craft pottery kilns and boiler in Bhaktapur. The emissions from the combustion of the wood fuel and RDF in the kilns were monitored during firing of the kilns.

Refuse derived fuel briquettes were found to be more efficient than fuelwood, both in terms of resource consumption and emission control. Where 80kgs of wood was required for firing, 31 kgs of RDF-1 could complete the firing process of 7 hours in baking clay pots. In case of using as boiler fuel for steam generation for treatment of pashmina yarns and fabrics for a time period of 5-6 hours, 95kgs of RDF-2 was used instead of 200kgs of wood fuel. Flue gas emission (CO, CO_2, SO_2) can be minimized by using limestone or slaked lime during RDF production.

About 20 kg of RDF briquettes were sent to conduct some simple

tests as space heating fuel in the Solokhumbu area. The observations received suggested them as better fuel in comparison to yak dung.

Track 4c Climate Change and Energy – Climate, Tourism, and Sustainable Development

Submission ID: 109

How sustainable tourism empowers community and conservation: Perspectives from Rural India

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Abstract

Over the past 20 years, agrotourism as a part of ecotourism has been on the rise, and people have been gladly accepting it to get away from the hustle and bustle of city life (Xu et al., 2023). To foster rural community and optimize local natural resources, agrotourism acts as a powerful tool. Case studies present that agrotourism and sustainable tourism are inherently intertwined because of the philosophical similarities between both concepts. UN (2017) rightly addressed that (SDGs target 8.9): *"by 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products".* Presently, agrotourism has gained support from many regional and local governments as a means of bringing new finances into rural regions, promoting economic growth, and creating empl0yments. It further helps to identify problems caused by lost economic opportunities and population decline which associated with agricultural collapse. It is important to acknowledge the significance of science related to tourism climatology, as it helps practitioners and policy makers to navigate and unpack unique experiences of any tourist destinations while fostering environmental stewardship. However, it is also crucial to address the multitude of challenges faced by the practitioners and policymakers from implementing the principles of sustainable tourism to leveraging economic realities and ensuring community wellbeing. This research

paper tries to explore: i) how can agrotourism contribute to the development, diversification, and opportunities of rural economies; ii) how to develop a flexible and adaptable framework to implement sustainable agrotourism initiatives by considering diverse local contexts and requirements. To get a holistic understanding of agrotourism at local level, this research has selected a village Anegundi, located deccan plateau of South India – surrounded by river in one side and hills in other three sides. Due to its unique geographical location, it presents huge potential for agrotourism as it has innumerable farmlands, skilled farmers, and rich cultural heritage of Vijayanagara Empire (17th Century). Primary research evolves through observations and semi-structured interviews with the experts, several stakeholders, and the farmers. Data analyses reveal there needs a climate responsive plan as tourism climatology plays a crucial role in identifying tourists' season, promoting sustainable practices, attracting eco-conscious tourists, and above all fostering biodiversity. By factoring in tourism climatology insights, this paper proposes a framework which would guide to i) bridge the gap by connecting tourists and information of the agrotourism destination; ii) unearth opportunities through jobs, skills, and community benefits; and iii) promote sustainable practices within the community. This framework would contribute towards responsible practices and optimize visitor experiences aligned with the climatic realities. Based on the inferences it further proposes an agrotourism-based design intervention (viz. a website and a brief spatial plan of the destination) which provides an in-depth itinerary for stakeholders to unpack the importance of social and environmental significance of the tourist destination. The framework and the design intervention would be useful for researchers, practitioners, and policy implementors from the pertinent field of interests who wants to become a game changer within the sustainable tourism ecosystem.

Submission ID: 123

Managing Tourism Sustainably: Overtourism in the Ozark Mountains, USA

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Abstract

This study examines the impacts of tourism and overtourism in four destinations in the Ozark Mountain region of the United States: Branson, Missouri, Lake Ozark, Missouri, Eureka Springs, Arkansas, and Mountain Home, Arkansas. It utilizes maps, literature, and stakeholder interviews to evaluate the current state and future risks of overtourism in the Ozark region and examines best practices to mitigate identified problems.

Defined by the United Nations World Tourism Organization (UNWTO) as "the impact of tourism on a destination, or parts thereof, that excessively influences perceived quality of life of citizens and/or quality of visitor experiences in a negative way," overtourism can impact tourist-oriented communities in a variety of ways. Some common issues caused by overtourism are decreased quality of life for local community residents, increased housing costs and/or shortages of long-term housing, transportation infrastructure deficits, ecological destruction, and pollution. Such detriments which can all contribute to the destabilization of critical infrastructure such as in education or emergency services, as full-time residents begin to move away.

For the towns in this study, tourism is a critical component of these communities' economic health; however, it has also contributed to economic instability in some of these destinations. While leaders from these communities who were interviewed often did not directly identify a struggle with managing overtourism, there were several indications that overtourism has been an issue for at least three out of the four locations. The primary indicator of overtourism that three destinations (Branson, Lake Ozark, and Eureka Springs) share is the need for transportation infrastructure upgrades as automobile traffic related to tourism negatively impacted resident quality of life and the tourist experience. For example, Eureka Springs passed city-wide ordinances to relieve the long-term housing problems it experienced due to a growing popularity of vacation rentals. Mountain Home, nestled between three lakes, has struggled with the seasonality of tourism, creating periods of untenable demand for local residents and businesses. Prevention and mitigation of overtourism requires employment of innovative planning, involvement of all stakeholders in the planning process, and carefully structured development where new attractions continue to arise.

Submission ID: 157

International, National and Local Linkages for Sustainable Tourism: Case Studies of Sherpas in Nepal and Touristic Activity Groups of Tunceli, Turkiye.

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Abstract

Touristic activities can be arranged and organized in different frames. The touristic activities of normal times and COVID times have shown recent differences. However, they may differ in the purpose of the activities as well. Some of them leisure time activities, some other scientific activities. Sustainability activities in touristic activities require interconnectivity of local, national, and international relations. This paper derives findings through the literature on Sherpas in Nepal in the environs of Everest and touristic leisure time activity groups of Tunceli, Munzur mountain, and Munzur National Park areas, Turkiye.

As we know Sherpa people played an important role in the achievements of Everest-related activities. The locals' physical conditions to climb higher altitudes are better than the coming climbers and scientists have placed them differently in the area. But then, their self-organization in time transferred them to touristic company owners and action organizers. However, the situation in Tunceli was slightly different. The locals started to prepare trekking and walking groups around Munzur National Park. These local activities evolved organizations' national and international activities. Their context is useful for religious, environmentalist leisure time activities. The activities and their organizations are taking place in actual life and the cyber World.

Although both groups' activities are on a touristic base, their presence is vital for the control and sustainability of their local environments in normal and chaotic situations. This paper will reveal the importance of locals' actions for their environment's sustainability whatever the origins or awareness levels of tourists arriving in their areas.

Submission ID: 167

Empowering communities and promoting Sustainable Development through Tourism: The Case of Hornbill Festival of Nagaland in India

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Abstract

Sustainable development through tourism plays a pivotal role in empowering communities and achieving their aspirations for well-being, encompassing economic, social, and environmental sustainability. In the same context, UN Sustainable Development Goals (SDGs) 11.4 and 13.2, address the significance of cultural and natural heritage preservation as well as impact of climate change on local ecosystems. Existing research reveals because of the vulnerability of mountainous destinations, collaborative efforts are crucial for responsible and comprehensive development of the community. Although researchers have rightly pointed out that sustainable tourism is the key concern for community's development, however, responsible tourism gets inadequate attention in the present context. Against this background this research tries to explore a) how to promote sustainable development through tourism within an indigenous community and b) what are the potential threats for practising the same. To attain these objectives present research particularly selects the Hornbill Festival of Nagaland due to its uniqueness of cultural and natural heritage. Nestled in India's Northeastern part, Nagaland is known for its adventurous mountainous terrain and typical harsh climate. The Hornbill Festival started in 2000 to celebrate indigenous people's rich traditional culture through vibrant costumes, rhythmic beats, and musical narratives. Data for this research were gathered from fieldwork conducted between 2013 and 2019, through observations and in-depth interviews with domain experts, different stakeholders. Investigation shows the Hornbill Festival has experienced substantial growth, attracting increasing numbers of tourists and driving economic, political, social, and infrastructural changes within the indigenous community, viz. Naga community. International and domestic tourists have played a significant role in this transformation towards

holistic well-being and fostering cultural exposure. Despite positive outcomes, the research identifies internal and external challenges, including political conflicts, environmental hazards due to overcrowded tourists, unplanned infrastructures, and socioeconomic imperatives – which are threatening towards sustainability at present. Hence, the research underscores the importance of responsible tourism initiatives in fostering indigenous community empowerment and sustainable development. It further proposes a flexible framework for stakeholders to evaluate existing policies and addresses sustainability risks and emphasizes the need for ongoing collaboration and adaptation among different stakeholders. By embracing responsible tourism practices and leveraging flexible and collaborative frameworks, stakeholders would able to navigate challenges, reflect on the mistakes and eventually would able to promote holistic development for the community. This paper serves as a resource for community leaders, tourism entrepreneurs, policymakers, and researchers, offering insights into the complexities of sustainable tourism development and strategies for long-term success.

Submission ID: 179

Navigating the Climate-Tourism-Sustainability Nexus from Crisis to Opportunity: A Case Study of Shimla

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Abstract

Abstract: The intersection of climate, tourism, and sustainability has garnered significant attention in recent years, particularly in regions heavily reliant on tourism for economic sustenance. This paper divulges into the intricate dynamics between the economy, climatic calamity and sustainable development goals eleven and thirteen that are sustainable cities and communities and climatic action respectively in context to a hilly region, Shimla, nestled in the Himalayas. The aim is to focus on understanding the urgency to deal with climate change and to identify challenges faced by Shimla's tourism and agriculture dependent local communities to ascertain the shortcomings in the current existing policies to provide solutions to combat effects on the main revenue-generating avenues like agriculture and tourism for Shimla region. Empirical analysis and theoretical inquiry are employed through on-

site visits, surveys, experiments, interviews, focus groups, participant observations, and statistical analysis to collect and analyze primary and secondary sources data to distinguish and resolve the multi-faceted environmental factors emerging as a threat to sustainable development of communities and to document analysis to gather rich, detailed insights into the phenomena under study. The paper views sustainability from different perspectives by laying emphasis on some aspects like sustainable infrastructure, tourism planning, tourism management and ecotourism by examining how present and future climate scenarios impact weather patterns, climate change, and tourism and agriculture sustainability particularly in regions like Shimla, where livelihoods are intricately intertwined with environmental conditions. Ultimately, this paper underscores the imperative of addressing loss of life and property incurred by locals due to recent landslides impacting the entire connectivity and livelihood matrix. This study examines international cases with comparable geographical and climate conditions, aiming to propose enhancements in policies and strategies for adaptation. The insights gained from this research endeavour are anticipated to address the challenges posed by climate change, fostering the development of human settlements that are secure, adaptable, and environmentally sustainable. Furthermore, the outcomes of this investigation aspire to contribute towards the realization of a global vision wherein all individuals have access to affordable, dependable, and sustainable energy sources. The overall study will help overcome the existing challenges by identifying limitations of current policies and will contribute to a broader discussion on the future direction of policy and urban planning in tourism and agriculture-focused regions such as Shimla.

Submission ID: 201

The impact of policy and entrepreneurship in promoting sustainable tourism: The case of Yuwan Village in Shaanxi Province of China

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Abstract

The sustainable development of tourism needs contribution from stakeholders including government agencies, private sectors, various institutions and local communities, etc. This paper is to show how policy and entrepreneurship play critical roles in promoting sustainable

tourism.

Field study is used to analyze the case of Yuwan Village ecotourism. Located in southern Shaanxi Province, Yuwan Village is a rural area in the lower mountains Qingling Mountains, with a good natural endowment, but poor development conditions. Ecotourism has been developed jointly to realize . We visited the village, reviewed the various stakeholders, including farmers in the village, local communities, banks, government agency clerk, mangers of the involved company.

Based on our field review towards them, we have identified that there are some general problems in promoting ecotourism. First of all, developers are lack of comprehensive ecotourism thinking. The reasons may be neglecting the critical role of ecological factors, and short of institutional support which hinders the execution of even formerly-designed ecotourism. Secondly, the ecotourism needs financial support, which is often in a shortage. For ecotourism specific investment targeting ecological goals generates an overall higher capital demand. Thirdly, ecotourism require infrastructure more nature-based, which arouse problems of understanding local nature conditions and making good used of them.

In terms of Yuwan Village ecotourism case, the joint effort has turned out contributing the success of its business model. The leading private sector designed the ecotourism-based strategy, which is “restoring rice paddies to attract Nipponia nippon before developing accommodation in the village”. Government policies have been made good use of developing the ecotourism, such as Western Development, East-West Collaboration, Rural revitalization. Nature-based infrastructure has been designed and constructed, such as abandoned hydropower stations renovated into Yuwan Village Complex, camps constructed above the rice fields.

This paper focus on the business model of Yuwan ecotourism benefiting the various stakeholders, aims to demonstrate that strategies of sustainability and sustainable innovations depend on both private and public supports and initiatives. On the public side, the government policy in China has offered fundamental policy framework. On the private side, the case study of Yuwan Village shows that individual contribution of an entrepreneur has been key to initiate a ecological and social innovation in this rural area.

This research is especially related to SDG+Target: 8.9 (to promote sustainable tourism that create jobs and promotes local culture and products); 10.4 (Adopting policies and progressively achieve greater equality); and 15.1 (to ensure the conservation, restoration and sustainable use of terrestrial ecosystems, in particular mountains.) This paper focus on a case developing ecotourism in mountain area in central China, which will contribute to the general topic of the conference linking the future of mountain and ocean.

Track Five

Sustainable Production, Consumption, and Innovation

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 5a Sustainable Production, Consumption, and Innovation – Corporate Sustainability and Corporate Social Responsibility

Submission ID: 26

Reportings of sustainable mining activities and possibilities for financial support from EU fund

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Abstract

In 2023, the European Commission adopted the European Sustainability Reporting Standards (ESRS). Therefore many reports, publications, and policies underlined the need to improve the management and transparency of their environmental and social impacts to meet the expectations of interested stakeholders, notably communities affected by mining operations and investors. Moreover, the EU Corporate Sustainability Reporting Directive (CSRD) will require more in-depth sustainability and environmental, social, and governance (ESG) reporting by large companies in 2024. European Sustainability Reporting Standards (ESRS) will lay out the disclosure obligations of companies including mining, processing, and recycling. The mining industry is one of those facing the most difficult challenges in the context of transformation resulting from spreading the idea of sustainable development. It is impossible to demand that companies engaged in the extraction of raw materials, which are so important from the point of view of many, sectors, suddenly cease their activities or conduct them in a way that deprives them of profits. However, they can introduce changes to your production processes, making them more environmentally friendly, undertake various pro-environmental initiatives, and take into account the welfare and needs of local communities in many ways. Awareness of the need to take into account the assumptions of sustainable development in business has increased over the last two decades around the world, also among companies mining. Observing the change in attitudes among enterprises, it should be recognized that they are

becoming The activities of the mining sectors will not suddenly become completely environmentally neutral, but will gradually become more friendly and compensate for the negative impact of the environment. more and more aware that running a business today is not only about concentration on profit. Moreover, the mining sector began to see what sustainable development could bring benefits and become a field for creating competitive advantage. Therefore, there are more and more programs and tools supporting the financing of sustainable mining. The work aims to present and identify tools supporting sustainable mining in connection with the new non-financial reporting. EU funds are extremely important for activities aimed at sustainable mining, in particular, due to the scale of funds involved. In recent years, there has been a noticeable increase in EU funds for the side and social effects of the mining sector. As part of this program, the innovative ValorWaste project is implemented, the aim of which is the Valorization and Integration of Extractive Waste Towards the Sustainability of Raw Materials Industry.

Submission ID: 154

Has the environmental information disclosure policy in China promoted green innovation among heavily polluting listed companies?

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Abstract

According to Stakeholder Theory and Signaling Theory, environmental information disclosure policy can transmit a positive signal to stakeholders that companies are actively fulfilling their environmental responsibilities. This further mitigates information asymmetry and agency problems, enhances social reputation of the companies, and enables them to better access the economic resources needed for green innovation. Based on this, this paper investigates the impact of environmental information disclosure on green innovation in heavily polluting companies, which carries practical significance for promoting the green transformation of such enterprises.

China introduced the Measures for Environmental Information Disclosure (Trial) in 2007, which clearly stipulated that companies should proactively disclose 17 categories of environmental information

to the public. Additionally, the Guidelines for Environmental Information Disclosure of Listed Companies (draft for comments) issued in 2010, as well as the Measures for the Management of Legal Disclosure of Enterprises Environmental Information introduced in 2021, further clarified the primary responsibility of heavily polluting companies in disclosing environmental information and mandated them to regularly disclose such information. This paper takes all A-share listed companies in heavily polluting industries from 2008 to 2022 as research samples to examine the relationship between environmental information disclosure and green innovation of heavily polluting enterprises. The total sample size of this study is 7 113.

The study found, firstly, that environmental information disclosure can significantly promotes green innovation in heavily polluting companies. Results of mechanism testing confirm that environmental information disclosure promotes green innovation of enterprises through alleviating financing constraints. Secondly, environmental backgrounds of executives, analyst coverage, and media scrutiny demonstrate moderating effect on the relationship between the two. Executives with environmental backgrounds, along with analyst coverage and media attention, enhance the beneficial effects of environmental information disclosure on green innovation of companies. Finally, there are significant property and regional differences in the impact of environmental information disclosure on green innovation of companies. The positive effect of environmental information disclosure on green innovation is more pronounced for state-owned enterprises and heavily polluting enterprises located in the central and western regions.

The potential limitations of this study may lie in the use of empirical data from A-share listed companies in China, and variations in data, variable assignment, analytical methods, and other factors could potentially constrain the research findings.

Submission ID: 158

Exploring Sustainable Transformation Strategies and Barriers in Taiwan's AEC Industry

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Abstract

The architecture, engineering, and construction (AEC) industry in Taiwan is at a pivotal juncture where the adoption of sustainable practices is not just an ethical imperative but also a strategic necessity. This abstract delineates the multifaceted approach toward sustainability management and leadership within the sector, emphasizing the critical role of organizational culture in fostering a conducive environment for sustainability initiatives. It is posited that the integration of Corporate Social Responsibility (CSR) within business operations is paramount to achieving long-term resilience and sustainability. The experiences and developments in sustainability management reveal a complex interplay of strategies, barriers, and actors that shape the trajectory of the industry's sustainable transformation. Furthermore, the discourse extends to strategic sustainability management as a driver for sustainable innovations, which are integral to redefining the value proposition of businesses in the AEC industry. Sustainable business models and entrepreneurship are highlighted as essential components that underpin the industry's ability to adapt and thrive in a rapidly evolving economic and environmental landscape. This abstract synthesizes the collective insights into a coherent narrative that underscores the exigencies and opportunities of sustainability in Taiwan's AEC industry.

This abstract directly aligns with the conference's focus on Corporate Sustainability and Corporate Social Responsibility by examining how sustainable practices can be integrated into the AEC industry's operations. It contributes to the discourse on sustainability management, leadership, organizational culture, and sustainable business models—key themes of interest for the conference. Furthermore, this research connects with several Sustainable Development Goals (SDGs), particularly:

- SDG 9 (Industry, Innovation, and Infrastructure): By exploring sustainable innovations and business models within the AEC industry, this study contributes to building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation.
- SDG 11 (Sustainable Cities and Communities): The findings have implications for making cities and human settlements inclusive, safe, resilient, and sustainable through sustainable construction practices.

- SDG 12 (Responsible Consumption and Production): The research addresses how the AEC industry can adopt sustainable practices to ensure sustainable consumption and production patterns.

By examining the barriers to and strategies for sustainable transformation in Taiwan's AEC industry, this abstract offers insights that are crucial for rescuing the SDGs 2030 for Sustainable Livelihood, linking directly to the conference's overarching theme.

Submission ID: 239

Impact of cybersecurity management on sustainability in the waste management sector with a focus on the NIS 2 Directive: experiences, developments, barriers and actors

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Abstract

Cybersecurity management links to sustainability in several aspects such as:

- protection of waste management data: Goal 16 (Strong institutions);
- resilience of critical infrastructure: Goal 9;
- urban safety: Goal 11;
- support of life below water: Goal 14 and life on land: Goal 15, by securing systems to monitor and control illegal dumping and contributing to the protection of marine and terrestrial ecosystems from pollution;
- using resources more efficiently - Goal 12.

The new NIS2 Directive on measures for a high common level of cybersecurity within the European Union, which EU countries must implement by 17 October 2024, confirms the recognition that the waste management sector is important and must be protected. It was pointed out that in cities, public services are increasingly connecting to digital networks to improve waste disposal. These digital utilities are vulnerable to cyberattacks. As part of their national cybersecurity strategies, Member States should develop policies that consider the development of such networks and their potential impact on society. As a result of this, waste management companies will also need to be more concerned with sustainability, in line with the SDGs Goals.

Waste managers, according to the NIS2 directive, must ensure the security of the information systems used in their operations, put in place appropriate technical, operational and organizational measures, and their employees are required to undergo regular training.

The purpose of this article is to analyze the barriers and challenges in waste management companies in implementing cybersecurity management solutions. This is a very specific sector that is only at the stage of digitization, especially in municipal companies. From the interviews conducted with managers of these companies, it appears that there are several challenges that they need to address to ensure sustainability through the implementation of the NIS2 Directive. Some of these barriers are:

- the recently introduced automation of waste and transport information reporting - companies are not fully familiar with this, they already have to implement new regulations;
- access of too many external actors to manage the system;
- outdated machinery that doesn't meet safety requirements (mainly in municipal companies);
- fear of too high costs of implementing changes (cybersecurity investments are overlooked by companies as an unnecessary cost);
- legal documentation doesn't reflect actual problems;
- very low employee awareness related to cybersecurity.

The research shows that the need to implement NIS Directive 2 solutions will mean that companies will need to invest in new solutions that will need to enable rapid incident reporting and due care of the digitized infrastructure. They will also have to train their employees to raise their awareness of risks. Consequently, this will contribute to the development of cybersecurity as such in companies and, as a result, will fundamentally affect sustainability in the form of reducing waste, supporting communities, protecting data, protecting ecosystems or increasing the resilience of critical infrastructure.

Track 5b Sustainable Production, Consumption, and Innovation – Design for Sustainability

Submission ID: 16

Circular and Sustainable Product Design. Rethinking the modularity as a strategy to increase the durability of industrial products

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Abstract

In recent years, the current industrial production system has been strongly challenged, especially in light of growing environmental awareness and the recent debate on the transition towards more sustainable and circular business models. In this scenario, the Circular Economy (CE) represents a virtuous closed-loop production model capable of optimising the environmental impacts of goods through the reuse of outputs in technical and biological cycles and by extending product life as much as possible. In order for these processes to take place, the CE model places the design phase at the centre, orienting the project around the concept of 'modularity' and Design for Modularity (DfM) (Ellen MacArthur, 2013; Charter, 2018). A DfM approach is therefore instrumental in both reducing life-cycle generated environmental impacts and extending the durability of products through their repairability, upgradeability and remanufacturability (Hollander et al., 2017). Promoting reparability, allows for the replacement of damaged or obsolete parts, thus extending the usefulness of the product and reducing waste generation (Ulrich, 1995). Increasing upgradability, allows users to integrate new features or adapt the product to new needs without replacing the entire product, thus extending its life and reducing the overall environmental impact (Hielscher & Jaeger-Erben, 2021). Finally, modularity allows for a remanufacturing process of product parts and components contributing to responsible resource management and reducing ecological impacts associated with the extraction and production of materials (Sheng et al., 2015). Several studies confirm the importance of modularity in the design phase, both as a concrete contribution to the development of more sustainable and durable industrial products and as a strategic lever for companies in the manufacturing sector to move from a linear model to a truly circular and sustainable one (Ethiraj & Levinthal, 2003; Lacy &

Rutqvist, 2015; Berg & Bakker, 2015).Through the analysis of case studies of products designed according to a DfM approach and in line with UN SDG 12 and Target 12.5, the article aims to discuss the importance of the concept of modularity as a key design strategy to increase circularity and sustainability of industrial products in the Circular Economy scenario. Indeed, Design for Modularity is crucial today for extending the useful life of products, facilitating their reparability, upgradeability and remanufacturing, i.e. extending their durability.

Submission ID: 27

Materials Research in Design: A Bibliometric Analysis

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Abstract

Over the years, numerous advancements in materials science have provided the foundation needed to develop technologies that address sustainability goals. However, the implementation of these technologies and the application of materials often result in undesirable impacts on human society and the environment. In recent years, a new phenomenon has emerged and thrived in the design field—materials research in design (MRID), where designers take the lead in material research. In contrast to scientists, designers often aim to address sustainability issues, approaching the development and application of new materials from a humanistic perspective such as culture and experience. This phenomenon differs significantly from traditional material development in materials science, warranting comprehensive examination to analyze its causes, current status, and future trends. This study uses bibliometric analysis methods and the visualization software CiteSpace to comprehensively evaluate the literature on MRID in the core citation database of the Web of Science (WOS). This study first used bibliometric analysis to obtain data samples. After many attempts, it was determined to use TI=(“material design” OR “design material” OR “material” OR “material creative”) as the search strategy. The WOS core database indexes SSCI, SCI-Expanded, A&HCI, CPCI-S, and ESCI are employed as retrieval sources, and the period from 2003 to 2023 (the first paper retrieved was published in 2003) was used as the time range. More than three design scholars were invited to review the deduplicated data, and 212 pieces of literature were

extracted to form a data sample. Subsequently, the CiteSpace software is used for visual analysis of author keywords, publications, authors, countries or regions, institutions, and annual publication volumes within the data sample. The main results indicate that: (1) Although the overall research volume of MRID is relatively small, several specific research directions have been established, and preliminary collaborative networks exist among authors, institutions, and countries within these directions. (2) MRID has undergone an important shift influenced by the concept of sustainable development, especially since the introduction of the Sustainable Development Goals (SDGs) in 2015, where the research hotspot has shifted from a focus on material selection and the application of new materials to a focus on the development and application of non-standardized materials and coupled with an emphasis on humanistic values such as materials experience.

The article supports SDG 12, especially SDG 12.5. Multiple papers within the sample confirm that people have expanded their understanding of materials. Designers often can perceive unique aesthetics and cultural connotations in materials typically considered waste. They draw inspiration from these materials and use them as a basis for design practices. This study conducts a comprehensive examination of MRID, combining quantitative and qualitative approaches. The findings from this review can guide future theoretical research and design practices in MRID, enriching our understanding of materials and the human living environment.

Submission ID: 41

Revitalizing Craftsmanship in the Digital Age: A Study on Skill Enhancement and Sustainable Development of Indian Crafts in the North-East

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Abstract

The definition and contextualisation of crafts emphasise the characteristic human skill, aesthetic, and cultural values imbued in crafts, setting them apart from mechanically produced goods. It is the second largest employment generator and has a notable impact on

exports, with significant contributions to the Indian economy. Despite the global demand for handicraft products, the influx of manpower is an issue. The transition to mass-produced goods, globalisation, and lack of modern market acumen among artisans has led to a decline in traditional craft practice and its transmission across generations. We focused our research on North-east of India which is located in the foothills of the Himalayas and is home to more than 50% of Indian weavers.

With modernization, it has been observed that skills in crafts, traditionally passed down from one generation to the next, are experiencing a decline. This situation underscores the necessity for a structured upgrade in skills and knowledge within the handicraft sector. Various initiatives implemented under the National Handicraft Development Program (NHDP) are designed to promote, preserve, and enhance the craft sector. These initiatives focus on providing marketing support, skill development, infrastructure enhancement, and technological assistance.

This study was designed to investigate the underlying needs for skill enhancement among artisans, aiming for the sustainable development of crafts in India. Utilizing a mixed-methods approach, we conducted a thorough review of existing academic literature, policy documents, and reports focused on the sustainability of crafts, artisanal skills, and pertinent government initiatives within India. Following this, we analysed key policies and programs enacted by the Government of India that pertain to craft development, skill training, and the promotion of livelihoods. Subsequently, we carried out a field study, during which we engaged in qualitative interviews with trainees, trainers, and administrative personnel. This comprehensive approach enabled us to acquire insights into the current state of craft training and identify contemporary learning needs essential for the sustainable development of Indian crafts.

While numerous government schemes and policies prioritize entrepreneurship and skill building within the crafts sector, our findings reveal that the existing craft training programs lay a strong emphasis on preserving traditional methods and cultural significance and impart only a robust focus on practical skill acquisition through hands-on experiences. There exists a notable disconnect in the training programs when it comes to imparting knowledge of modern market dynamics, consumer engagement, and the adoption of new technologies that

could enhance craft marketability and sustainability. Additionally, the study identifies significant gaps in design skills, new product development, marketing strategies, and digital literacy within these programs. Despite the use of social media and web browsing for exposure, digital tools are not fully integrated into educational frameworks, limiting artisans' market reach in a digital age.

The field research amongst the different kinds of craftspeople shows that we can classify the craftspeople broadly as traditionalists or potential modernists, and Artisan Associates or Artisan Entrepreneurs. Concluding, this study offers a broad vision on how to effectively train craftspeople, thereby contributing to the achievement of Sustainable Development Goal (SDG) 4.4, which focuses on substantially increasing the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.

Submission ID: 45

Empowering Artisanal Entrepreneurs: A Gamified Approach to Inventory Management Education

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Abstract

Most of the crafts entrepreneurs in India are not well educated. 22.5% of the handloom artisans haven't received any form of education whereas only 10.9% have above high school education. However, in order for the artisans to manage their business, they face lot of challenges. Learning management skills to better manage their business is a challenge because of the jargons in place. Also, the management schools teach way more in detail than what is necessary for the artisans in the cottage industry. The unavailability of accessible educational resources compounds this struggle, limiting the potential for growth and hindering the realization of entrepreneurial dreams. Inspired by the Antaran, a Tata Trust initiative, during my field studies, which empowers artisans through entrepreneurship programs, this project identified the lack of accessible educational resources on inventory management for artisans.

Equipping artisans with the knowledge and skills to manage inventory effectively is expected to lead to a confluence of positive

outcomes. Effective inventory management empowers artisans to optimize production and minimize waste, leading to increased profitability and financial independence, ultimately contributing to their self-sufficiency. So, in order to meet their cognitive and small-scale business requirements and field research data collected, we designed a simplified, gamified, yet knowledge rich way of teaching them inventory management with better knowledge retention compared to traditional methods, while simultaneously addressing the issue of educational limitations.

"Loom Inv," a board game simulating market demands and trends, was developed. Engaging four players, the game mirrors real-life scenarios by incorporating customer orders, raw materials, and currency as well as important entities like player shops and bank. Strategically designed game modifiers, like 'special events', also encourage the players to explore various possibilities to reach the optimum result, thus developing a sense of excitement. This enhanced understanding translates to improved decision-making in real-world scenarios. By participating in "Loom Inv" together, artisans foster a supportive community where they can share their knowledge and experiences, contributing to collective growth and empowerment within the artisan community.

This project aligns with Sustainable Development Goals (SDGs) 4.4, 4.5, 4.7, and 4.c by providing quality education in the form of the "Loom Inv" curriculum, promoting lifelong learning opportunities through engaging game-based learning, fostering entrepreneurial skills by equipping artisans with inventory management knowledge, and promoting global citizenship within the artisan community by encouraging knowledge sharing and collaboration.

"Loom Inv" offers a promising solution to bridge the knowledge gap for handloom artisans, empowering them to thrive in the dynamic marketplace. By leveraging gamification and aligning with SDGs, this intervention contributes to sustainable and inclusive economic development within the artisan community.

This research has been done on the foothills of the Himalayas. The end goal of this project being the creation of artisan entrepreneurs equipped with the appropriate knowledge to efficiently management their inventory so as to reduce wastage of precious raw materials that are indigenous to the local environment, aims to foster a community of artisans who respect and nurture the nature for the resources it provides.

Submission ID: 46

Balance: A Gamified Toolkit for Sustainability-oriented Design Thinking

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Abstract

Integrating Design for sustainability (DfS) strategies into the innovation process is challenging and presents a complex learning curve. Tools like the Cambridge sustainable design strategy cards, sustainable design toolkit by shift, and ICS toolkit have been designed to guide the ideation process. These tools are made to improve and guide product development toward environmentally responsible solutions. However, mastering the application of the tools can be challenging, especially for individuals or teams lacking prior experience in sustainability-focused ideation frameworks or the ideation part of the design process. Despite the SDO toolkit's attempt at the gap, the precautionary approach hinders creativity amongst the designers. Additionally, at the PSS level employing DfS strategies becomes a complex and wicked design problem for design students, demanding cross-disciplinary and trans-disciplinary knowledge. A significant difference has been observed between student (novice) designers and expert designers in defining the wicked design problem. The difference arises because of higher information needs, assistance in problem structuring, and presentation along with process selection. Students, therefore, need pedagogy that can aid them in perceiving the relevance of various factors involved in locating interconnections.

Taking inspiration from the prior research presenting creative DfS pedagogy, this paper addresses the issue by introducing a card-based team game called 'Balance', designed to teach sustainable design strategies based on the SDO toolkit. The game uses the SDO toolkit's framework and uses its content to design an engaging game. This enables novice designers to consider sustainability as a criterion within the context of design. Players throughout the game collaborate to apply sustainable design strategies to identify appropriate solutions to design challenges and then compete to analyse the final proposed solution to obtain the final score. This paper describes the game's design, development, and evaluation, and discusses its potential to broaden

accessibility to sustainable design principles.

The game caters to both educational settings by engaging students in simulated design challenges that apply sustainability principles, and professional settings within design firms by fostering collaborative exploration and integration of sustainable solutions through a holistic approach. Thus, targeting multiple sustainability development goals: 9 for sustainable innovation,11 for creating sustainable solutions, 12 responsible consumption and production, 13 to mitigate climate actions, 14 help us in pollution reduction, 15 on sustainable materials, land use, and reducing deforestation, and 17 helps in collaboration to achieve sustainable development and hence also link to the theme of the conference. This intervention aims to bridge the gap between existing sustainable design tools and user-friendly learning methods, potentially broadening accessibility and promoting sustainable design practices.

Submission ID: 50

Product Innovations based on Water Hyacinth for a Cleaner and Greener Planet

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Abstract

Microplastic fibers from sources such as synthetic clothing can be harmful because they have a negative impact on marine life. According to the IUCN report, the majority of primary microplastics in the ocean come from the process of washing synthetic textiles, which then end up in marine life and enter the food chain and ecosystem. Not only synthetic materials but sometimes even natural entities can be responsible for having negative impact on the ecosystem of water bodies. Eichhornia crassipes Mart. (Pontederiaceae) also known as Water hyacinth, introduced in India during British colonial rule, is a free-floating aquatic plant that originated in the Amazon Basin, then spread to other parts of the world and has been considered as global waste. Its uncontrolled rapid growth causes many problems in water bodies, such as water logging, reduction in oxygen and nutrition, loss of aquatic life, and increase in mosquito breeding. However, now the dried water hyacinth stems are utilized as raw material to create a wide range of innovative products in various parts of the world as it is easily available and free of cost. A sizable

population of Northeast India relies on handicrafts for both employment and income. Rural craftsmen have benefited extensively from several initiatives taken by NEDFi, NEC, and ASRLM to promote water hyacinth (*panimeteka in Assamese*) based handicrafts.

This study highlights the information that focuses on the problem and existing solutions related to water hyacinth. It also demonstrates the scope of water hyacinth application in the textile sector, as an abundance of fiber is found in its stem, which makes it a promising plant for the textile industry. The process of making organic water hyacinth clothing includes extraction of fiber from plant stems through the mechanical and retting methods, then converting fiber into yarn by spinning method, and finally, yarn to fabric by using a handloom.

Northeast India is home to over half of the nation's weavers, making it an ideal spot to implement water hyacinth in the handloom sector. The challenges that water hyacinth is expected to meet when making a sustainable substitute for natural fiber are also covered in this research. The study constitutes a conceptual model for sustainable water hyacinth design in the handloom sector. It creates a roadmap that illustrates how to promote the rural economy and transform a problem into a solution. Along with this, it also contributes to several Sustainable Development Goals created by the United Nations. By utilizing water hyacinth sustainably, it supports, Clean water and sanitation (SDG + Target: 6.6); Responsible consumption and production (SDG + Target: 12.2); and life below water (SDG + Target: 14.1). In addition to cleaning up waterways, water hyacinth offers an alternative to synthetic fiber and serves as an excellent waste management example. The current data-driven analysis will address the state-of-the-art in the field of utilization of water hyacinth as a potential raw material in innovative product design and development.

Submission ID: 51

Environmental and bio-inspired re-design of Sebach's TopSan NoTouch 2.0 portable toilet. Quantitative assessment of the environmental benefits obtained from the biomimetic approach to product design.

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Abstract

The bio-inspired approach to sustainable design, a topic of international relevance in recent scientific literature, appears to be a driver of innovation in product design in order to expand and improve its performance and environmental qualities. Today we speak of biomimicry, a term coined by Janine Benyus in 1997 to denote the approach to design based on the conscious emulation of nature's genius. After more than two decades since the term has been associated with the practice of bio-inspiration, biomimicry has established a design methodology focused on observing biology as a source of knowledge to learn about natural phenomena and extract principles from them in order to find sustainable solutions to design and technological problems. However, despite the assumptions of biomimicry in providing ecological solutions through imitation of optimized natural processes over time, quantifying the environmental benefits of this approach has so far been rarely explored.

This paper focuses on the quantitative evaluation of the environmental benefits that the biomimetic approach brings to the sustainable design of industrial products. In fact, the paper describes the results of an experimental research conducted on the TopSan NoTouch 2.0 portable toilet from Sebach S.r.l. The product was subjected to a redesign based on biomimetic criteria, and then, through the use of Life Cycle Assessment (LCA), the environmental benefits of bio-inspired design solutions were evaluated compared with the environmental profile of the original product. Specifically, the paper summarizes the results obtained from the experimentation, from the implementation of the bio-inspired solutions to improve the environmental impacts of the product to the quantitative evaluation of the environmental benefits from the biomimetic re-design.

Finally, the positive results obtained from comparing the environmental impacts of the starting case study and those of the related bio-inspired re-design are discussed, which emphasizes that the biomimetic approach contributes significantly to increasing product sustainability by integrating biomimetic criteria with those of Design for Sustainability.

Submission ID: 62

Ecodesign-based modelling of decarbonisation

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Abstract

Decarbonization, as the reduction or elimination of greenhouse gas emissions, is a vital goal in mitigating climate change. Decarbonisation aims to reduce emissions of carbon dioxide and other greenhouse gases resulted in education, business, industrial and other activities, e.g. conferences. This requires the application of eco-design models and practices. In our research, we studied the impact of going online in decarbonization in various areas, but in this article, we only examined a research institute with 300 employees. The modelling began with a status quo analysis of the same period of 2 different years. We collected data of office working (2020) and remote working (2021) when 90% of employees were at home due to the Covid19 pandemic, and in both cases, we determined the organization's carbon footprint based on the MSZ ISO 14064 standard. The formula used in the calculation is as follows:

$CF_{wp} = \sum(i=1)^n CF_i$, where:

CF_{wp}: workplace carbon footprint; CF_i: factors involved in the formation of the carbon footprint.

The embodied carbon content was neglected. The functional unit was the carbon footprint created by one person in 1 hour.

The comparison of the two cases highlighted critical elements from carbon footprint point of view (commuting, travelling abroad) and also that the direct and indirect carbon dioxide emissions from the energy consumption of the office building showed only a minimal difference in the two cases. Therefore, among the aims, we have defined the monitoring of energy consumption, as well as the sensory tracking of heating and lighting, the improvement of efficiency in the use of electrical equipment, smart automation and IoT (Internet of Things) and the reduction of commuting-related impacts by remote working in order to reduce per capita emissions. We also set up scenarios for these proposals, examining the effects of carbon dioxide savings, globally and only from the perspective of the workplace. The result showed that 20-55% savings can be achieved, and the biggest can be mainly achieved by increasing flexibility of working hours and promoting remote work, but energy consumption at home has clearly increased.

This research was realized based on research agreement No. NKE/9939/2023 -between NKE and the LCA Center Association and it was financed by the National Media and Communications Authority (NMHH).

Submission ID: 79

Optimization of Powertrain Of Hybrid Electric Vehicle Using Power Split Device

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Abstract

Hybrid Electric Vehicles (HEVs) represent a significant development in the automotive industry integrating Internal Combustion Engines (ICE) with electric propulsion systems to reduce carbon footprints. A power split device (PSD) consists of a set of planetary gears that efficiently split power between the ICE and the electric motor based on different driving conditions, allowing seamless transitions and optimizing energy utilization. Through its dynamic control of power allocation and its ability to capture and store energy during deceleration, the PSD not only enhances overall system efficiency but also enables effective recuperation of energy, extending the operational range of HEV while minimizing emissions. The objective of this paper is to optimize the powertrain of an HEV using PSD, and create an Energy Management Strategy (EMS). Urban Dynamometer Driving Schedule (UDDS) is used as input driving cycle in coordination with efficiency maps of engine and motor to determine optimal gear ratio (between k =2.8 to 3.6) to fulfill flexible torque request of the vehicle, traffic efficiency and reduced fuel consumption. A mathematical model is built incorporating engine, motor, battery, transmission system and vehicle dynamics. The optimal gear ratio of the planetary gear set is obtained which resulted in a 12% improvement in overall system efficiency compared to conventional settings. Additionally, the analysis revealed a peak torque output of 265 Nm at 1,500 - 4,500 RPM, affirming that the optimized powertrain effectively fulfills dynamic torque requirements. Speed, torque and efficiency are plotted to determine the maximum performance point of the powertrain considered. The methodology used in this research can be used for future design of HEV powertrains to increase energy efficiency.

Submission ID: 108

Reimagining Design for Sustainability: Biophilic design as a framework for documenting human-nature transitions in vernacular dwellings

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Abstract

Ancient civilizations evolved in coexistence with nature. Throughout history, humans have attempted to understand their place in and relationship with nature through popular wisdom, philosophy, and practices (Vatsyayan & Baidyanath 1995). However, modern technologies today promote the notion that humans can transcend and dominate nature, resulting in an era of rapid and profound unsustainable transformations. The disconnect between humans and nature has been identified as the primary cause of current environmental crises, and reconnecting humans with nature is a proposed approach for tackling current ecological and sustainability challenges (Ives et al. 2018). This context also resonates with the United Nations Sustainable Development Goals (SDGs), notably SDG11+Target:11.4 and SDG12+Target:12.8. Biophilic design is an innovative, sustainable design concept that aims to reconnect people with nature by incorporating and retaining natural characteristics and experiences in the built environment. Although presented as a modern paradigm, biophilic design has been the way of architectural design throughout the majority of human history (Kellert et al. 2013). The diverse traditional architecture of rural India, shaped by regular human exposure to and engagement with nature, perceives dwellings as living entity that respond to their inhabitants and environment, exhibiting a distinct biophilic principle. Vernacular dwellings, as a community-designed traditional architectural form, presents a fundamental connection of human with nature. These vernacular architectural practices are transforming today due to modernization. Within this larger context of transition, the connection of biophilic design and vernacular architecture in India is yet to be investigated and this research attempts to fill this gap. It investigates how analysing transitions of vernacular architecture using a biophilic lens reveals significant changes in human relationship with nature.

There are three models of Biophilic Design proposed in the literature: Biophilic Elements (Kellert et al. 2013), Biophilic Patterns (Browning et al. 2014) and Biophilic Experiences (Kellert 2018). This research contextualizes the biophilic experiences model with transitions in vernacular architecture, developing and presenting it as a tool for documenting transformations and understanding sustainability in the human-nature relationship within vernacular dwellings. This framework is further evaluated through a pilot case study of a vernacular dwelling in the semi-arid region of Bhal, Gujarat, India. The context of Bhal is chosen for its extreme hot and dry climatic conditions, as well as its geological formation data, which indicates it emerged from the sea as a result of sedimentation caused by eustatic sea-level changes, maybe aided by tectonic movements. Because of its oceanic origins, this region's culture and traditional architectural practices are a response to the unique natural flat landscape at sea level, irregular temperatures, and salty soil conditions. The findings suggest that biophilic model helps in understanding vernacular architectural transitions and taps into wisdom gained from long-standing human connection with nature, providing a new framework for observing transitions in the human-nature-architecture relationship. This research enables sustainability practitioners to move beyond the objective of low environmental impact in sustainability design by establishing biophilic design as traditional wisdom for understanding and reviving long-term human-nature relationships in architecture for timeless sustainability.

Submission ID: 151

Investigation into the Impact of Featured Park pavement Design Materials on Microclimate

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Abstract

This study is devoted to unveiling the microclimatic characteristics of featured parks in Yongkang District, Tainan City, Taiwan. Through detailed monitoring of four distinctively styled featured parks, the aim is to deeply explore the unique microclimate phenomena of these parks situated in a hot and humid climate zone. These parks not only exhibit local cultural characteristics through their playground facilities but also

display a rich diversity in design, from the densely shaded Kai-Der Park and Shang-her Park to the innovatively designed Ding-Mea Featured Park and Reading Forest Park, each with its unique features. To accurately capture microclimate data, the monitoring equipment in this study was positioned 80 centimeters above the ground, a setup intended to closely match the heart height of the parks' main users—children. The monitoring period was from August to November 2023, with an average of one survey conducted per park per month, totaling 742 questionnaires from both adults and children over 30 actual measurement days. Besides choosing weekends for surveys, weekday survey times were aligned with periods of higher park usage, from 3 pm to 6 pm.

The focus of this study includes: 1. The difference between the microclimate of the featured parks and the information provided by surrounding weather stations. Through detailed comparative analysis, we not only expanded our understanding of park microclimatic characteristics but also provided the public with practical information for estimating the actual microclimate conditions of parks (such as differences in temperature, humidity, and wind speed) when consulting weather station information. 2. Further exploration into the relationship between different park features and temperature changes, including whether ground surface temperatures vary with different pavement materials, providing valuable reference information for park design. 3. The conduct of visitor satisfaction surveys, collecting feedback on the public's park usage experience to provide directional suggestions for future park design improvements. These survey results not only point the way for the future design of featured parks but also help the public understand the differences between weather station information and actual microclimates, enhancing public awareness and understanding of microclimate information.

Submission ID: 166

Revisiting the method of Service System Map: Operational Logic and Rules of Use

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Abstract

Service System Map, as an important tool for service design, can help describe system relationships and thus assist subsequent service design planning. However, existing studies have problems such as vague conceptual definitions, unstructured operational processes, and unclear instructions for use. The motivation of this study is to sort out and optimize the conceptual definition, operation process logic, and usage rule description of the service system map. This paper clarifies the connotation of the service system map through literature review and theoretical investigation, tightens the logic of procedure steps, provides the instructions for usage rules, and verifies the optimized method through the case study of "Shenzhou Pregnant Mothers' Special Car". The optimized Service System Map concepts, and helps service designers to improve the clarity, definition, and rigor of the system's operational processes and elemental relationships.

Submission ID: 225

The unsustainability of 'sustainable' Architecture: externalization of socio-environmental impacts

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Abstract

This work presents some reflections from doctoral research, which has investigated the relationship between Society and Nature, especially conflictual in the field of Civil Construction – the one in which Architecture is practiced. Observing the environmental inadequacy of hegemonic architectural production, this article seeks to understand the reasons that could explain why our category has distanced itself from the accumulated knowledge in 'sustainable' construction practices. As a rule, vernacular and traditional constructions are deeply connected to the socio-environmental and cultural context of the territories in which they are built. By reconstructing the historical path that led us to the environmental incompatibility of buildings in the present, we conclude

that the 'modern architecture of oil' that has prevailed to date easily conforms to the unsustainable hegemonic mode of production, especially because it favors the logic of expropriation of labor, associated with the overexploitation of natural resources. Contrary to what the ecological modernization of sustainability presupposes, the production processes of building materials and components generate countless environmental impacts, while the 'concrete-steel-glass' buildings that we continue to build make abusive use of artificial lighting and conditioning systems to maintain minimum conditions of occupancy (consuming a large amount of fossil fuels in their operation). As a consequence, civil construction emits more than a third of the gases responsible for global warming. The standard response from our particular area, regarding the socio-environmental problems, has been a kind of 'technical correction' – aided and legitimized by different environmental performance standards. Hence, what it is generally considered as 'sustainable' architectural production involves the use of accessory elements added to buildings, such as special glass and filters, solar collectors and photovoltaic panels, wind turbines and automated shutters. The architectural typologies of these buildings are rarely questioned, nor the means and processes used in their creation. However, these 'green' buildings also consume significant amounts of energy and material resources – such as steel, cobalt, lithium and rare-earth elements. In this context, one aspect that hides the alleged eco-efficiency of 'sustainable' buildings refers to the production stages that require the most material and energy, in precarious work situations, being transferred to other parts of the planet: nothing more than the externalization of socio-environmental damages. As a consequence, the so-called 'sustainable' architectural strategies only produce a palliative effect, since their production processes depend on exploiting natural elements and workers (on and off construction sites) and are insufficient to contain the dangerous changes we have promoted in the world's climate system. In short, constructing more buildings, even in the case of those considered to have high environmental performance, implies generating more damage and more GHG emissions. This work is related to SDG+Target: 11.4, 11.5 and 11.6. It defends the need to re-establish the links between buildings and the territories in which they are inserted, in any biomes (from oceans to mountains), in order to reduce the socio-environmental impacts of architectural production.

Submission ID: 263

The intersection between MDD and DIY aimed at promoting Growing Materials within established markets

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Abstract

The continuous extraction of resources poses a challenge to the sustainability of our planet, one that product designers and other professionals must address to promote a more sustainable and biocentric future. The options provided by regenerative materials, such as Growing Materials, are garnering increasing interest due to their circularity and advantageous performance.

To promote and formalize effective collaboration between designers and innovative materials, a design methodology known as Material Driven Design (MDD) has been developed, which helps identify suitable and favorable markets. At the same time, many emerging regenerative materials are gaining popularity outside the industrial sector, thanks to their adaptability to the Do It Yourself (DIY) approach. This means that they can be easily worked with using common tools and do not require specialized environments or equipment.

Considering the premises, this contribution suggests integrating the MDD methodology with the DIY approach, aiming to blend theoretical research with experimental verification. The goal of this intersection is to test the acquired evidence on these materials and ensure an effective application proposal within plausible markets. The outlined process, consisting of the four steps of MDD integrated with three experimental design phases defined by the authors, will be employed to analyze the performance of Bacterial Cellulose (BC) in upholstered furniture. This will be done with the aim of clearly illustrating the structure of the resulting methodology and identifying the key steps of the process.

The conclusions regarding the emerging evidence will focus on the opportunities arising from this new integration, while also analyzing its applicative limitations. This will outline a new role for the designer

within the emerging design landscape focused on Growing Materials, expanding the possibilities of intervention from product realization to the design of the related production system.

The proposal presented relates to SDG+Target 12.2, which addresses sustainable management and efficient use of natural resources. The contribution aligns with the theme of the conference as, as highlighted in the conclusions, new sustainable design methodologies actively contribute to the promotion of ethical design, proving essential for a transition towards a circular production system. A thorough study of regenerative materials would also bring about changes on the production level, as these materials lie at the intersection of semi-industrial and artisanal production, representing a potential circularity for both the global society and local development.

Submission ID: 275

Exploring Design Strategies in Upholstered Furniture: An In-Depth Exploration Through Case Studies

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Abstract

In the context of contemporary design innovation, the paradigm shift towards sustainable and systemic approaches, encapsulated by Design for Sustainability, necessitates an in-depth exploration of circularity within Product-Service Systems and manufacturing, specifically in fashion-textile and furniture sectors. This paper extensively examines circular design strategies by collecting, selecting, and analyzing case studies that unveil the evolutionary pathways of upholstered furniture.

The fundamental objective is to chart the implementation of circularity

strategies, focusing on design approaches within the upholstered furniture category. This sector poses distinctive challenges due to the inherent nature of the final product, which typically incorporates diverse, non-recyclable materials, features non-reversible assembly systems, and lacks a specific disposal chain (in 2017, the environmental impact of furniture waste in the European Union was 10,78 million tonnes, and about 2,5 tons are composed by mattresses and upholstered furniture). The ecological repercussions of materials like expanded polyurethane underscore the urgency of integrating circular practices into the sector's design ethos.

The paper initiates a concise literature review, categorizing potential drivers for sustainable design and setting the stage for the ensuing case study analysis.

Building on desk research, the paper introduces a thoughtfully selected array of products, constituting the foundational dataset for the subsequent case studies. These products undergo a meticulous analysis to unravel the ongoing interventions in design, production, service, life extension, and disposal phases specific to upholstered furniture. The outcome is a curated collection of design approaches strategically positioned to facilitate sustainability, laying the groundwork for attaining circularity goals within the upholstered wood furniture sector. The paper underscores the potential of these design approaches to instigate a paradigm shift, fostering the adoption of circular business models firmly rooted in circular economy principles.

In the concluding sections, the paper synthesizes critical inferences from the collected data, elucidating recurrent trajectories and synergistic design approaches that hold transformative potential within the upholstered furniture sector. The investigation contributes to the ongoing discourse on sustainable and circular design practices, providing nuanced insights into the dynamic landscape of the upholstered furniture sector. This comprehensive exploration not only sheds light on the challenges but also identifies strategic opportunities for designers, businesses, and policymakers to navigate the evolving landscape of circular design in upholstered furniture.

The proposal aligns with Sustainable Development Goal 12, "Responsible Consumption and Production." Specifically, the work aims to target 12.5

and 12.6: the former focuses on substantially reducing waste generation through prevention, recycling, and reuse, while the latter encourages businesses to adopt sustainable practices.

Moreover, the contribution aligns with the theme addressed within the conference, as highlighted in the conclusions. The design strategies described and outlined can be adopted in other production sectors, even beyond upholstered furniture, to facilitate the transition to systemic sustainability and circularity.

Track 5c Sustainable Production, Consumption, and Innovation – Circular Economy

Submission ID: 7

Transitioning Towards a Circular Household: Exploring Drivers and Barriers

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Abstract

The adoption of household circular economy practices is fundamental in the transition towards sustainability, but still underexplored, with individuals not fully realising the pivotal role they could play in society's progress. Despite the arguments inherent to these practices, such as financial benefits, lower environmental pressures, and well-being – in an intergenerational context –, circular practices and initiatives remain concentrated on environmental silos, focusing on isolated topics, such as waste recycling, energy efficiency and water savings, rather than exploring the factors for change through integrated circular thinking. Multiple studies have documented the drivers and barriers linked with the implementation of circular strategies and practices in private or public organizations, eco-industrial parks, and cities. Nevertheless, there is still

a lack of knowledge regarding the motivational factors and inhibitors associated with household circular economy activities. Thus, the present work aims at comprehending what drives and inhibits individuals from fostering circular economic progress at the household level. This study is supported by a triangulation approach, combining an integrative literature review with the results derived from semi-structured interviews with householders. The integrative literature review enabled the categorization of the data obtained through the interviews, while outlining the theory present in the scientific body of literature. The findings of the semi-structured interviews indicate that the drivers and barriers could vary between consumer stages. The householders can be negatively influenced by the lack of awareness of the existing benefits, an inadequate structural context (i.e., unaligned legislative framework or physical infrastructures), and a market offer with insufficient quality (i.e., low accessibility, availability or quality of circular products and services). On the other hand, the adoption process of circular economy-related practices significantly depends on the attitude of each individual and can be driven by the possibility to reduce the cost of living, the lifestyle of each householder, such as localism, and minimalism, and the ability of the product to include digestible information, regarding its sustainability performance. Additionally, key recommendations, supported on the householders' insights, for the development of public policies and market strategies were proposed, including public subsidies with reduced bureaucracy tailored to minimize the financial pressure of circular practices with a high initial investment, and transparency and disclosure of the sustainability performance of the retailed products (e.g., a sustainability score). This research contributes to the ongoing debate regarding the role of householders in circular economic progress.

Submission ID: 8

Towards a Circular Lifestyle: An Integrative Review on Household Circular Economy Assessment and Disclosure

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Abstract

As a key driver for the Sustainable Development Goals, the circular economy model has been increasingly gaining attention from academics, companies, policymakers, and individuals. On the one hand, this concept helps define a roadmap towards sustainable development, and, on the other hand, it presents tangible solutions that can be implemented at different levels, including consumers, companies, eco-industrial parks, and cities. Householders, in the form of consumers or citizens, hold a pivotal role in society's progress towards a sustainability, representing a core component in the adoption of circular economy strategies. The assessment and communication of these actions has been highlighted as a tool, to foster the efficacy and dissemination of these practices. Several research studies have been conducted to provide insights on the state-of-art of circular economy assessment and reporting in products, organizations, eco-industrial parks, and cities. However, the scientific body of literature on circular economy assessment and disclosure at the household level is still at an embryonic stage, showing various gaps of knowledge and possible research avenues. Thus, the present work aims at exploring the current state of knowledge on the circular economy assessment and disclosure models at the household level. This research study is supported by a systematic literature review of the existing body of scientific and grey literature. It leverages topics associated with approaches, concepts, methods, and frameworks, as well as case study applications. The study covers three subtopics: (i) household circular economy assessment; (ii) circular economy disclosures; and (iii) political landscape enabling circular economy progress at the household level. The systematic literature review will provide an overview of the present trends in research related to these areas, recognize the key limitations, assessment, and communication methods, and identify research gaps. Building on this foundation, it will provide a theoretical framework for the subsequent studies, underlining possible areas of contribution. This research contributes to the debate on the role of the household in the transition towards a circular economy, and its inherent assessment and communication.

Submission ID: 19

Factors affecting the sustainability assessment of circular bio-based building materials: A literature review

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Abstract

Circular bio-based building material adoption is a potential approach to addressing climate change and other negative impacts on the natural environment, economy, and society of the construction industry. Using these materials can also contribute to the transition of the current linear construction sector to circular construction, a core sector to achieve a circular economy, which is the target of many countries worldwide. To provide a solid basis for selecting these materials, sustainability assessments (SA) associated with their use, especially at the building scale, are vital. These assessments are needed to better understand the impact of circular bio-based materials on buildings' sustainable performance, especially during the use, maintenance, and end-of-life phases. However, literature shows that there is still a lack of SAs for circular bio-based materials used in buildings. Therefore, to promote the widespread implementation of SAs regarding the use of circular bio-based building materials at the building scale, identifying the factors that affect this practice is vital. However, the literature shows that most existing studies focus on examining factors affecting the sustainability or circularity of traditional buildings. Otherwise, there is still a lack of studies that identify potential influencing factors for the SAs of buildings using circular bio-based materials. This study goes beyond existing literature by addressing this gap. To this end, this study employs systematic and bibliometric literature review approaches with the aim of identifying factors affecting the practice of assessing sustainability regarding the use of circular bio-based building materials at the building

scale. Firstly, search queries are used to identify relevant publications on Scopus. The identified papers are then screened using inclusion and exclusion criteria to select the most appropriate to be included in the final sample. The Microsoft Excel, VOSviewer, and Biblioshiny R application are adopted to synthesise, analyse, and visualise metadata extracted from Scopus in order to identify the evolution, source-based, and geographical distributions of the research topic, as well as network analysis of keywords, co-authorship, etc. Finally, the content analysis is adopted to identify a list of 24 barriers and 26 drivers for the sustainability assessment of buildings using circular bio-based building materials. These factors provide a concrete basis for further investigations on their influence on sustainability assessment practice, which can assist policymakers, practitioners, and scholars in taking appropriate measures to boost SA practice and also the use of circular bio-based building materials. With these improvements, the greenhouse gas emissions and environmental impacts of the construction industry can be significantly mitigated. Additionally, this also can boost the reuse, reduction, recycling and valorising of waste from other sectors, such as agriculture and forestry. Therefore, this study can contribute to achieving Sustainable Development Goals 12 (indicators 12.2, 12.5, 12.6, and 12.8) and 13 (indicator 13.3).

Submission ID: 25

Assessing the Adoption of Circular Economy strategies and practices in the third sector: Survey Investigation of Portuguese Catholic Organisations

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Abstract

Circular economy (CE) is a concept that could allow organisations to become more sustainable. In addition to businesses and public entities, one significant sector of our society is the third sector which provides services in various areas with great impact globally. The organisations in this sector can facilitate the adoption of CE practices through advocacy, education, and internal practices. Therefore, their transition from a linear to a circular model is desirable. However, there is a scarcity of empirical

studies researching on CE at the organisational level of third sector organisations. Through a literature search, several factors were found to influence the implementation of CE activities in third sector organisations such as technology, technical support, training, capital requirements or transaction costs. CE in organisations therefore includes a diverse group of practices that demand detailed examination to understand the implementation process. Hence, this study aims to outline the present state of incorporating circular practices and strategies using Portuguese catholic organisations as our case study. Catholicism in Portugal plays a significant role culturally and traditionally. According to the 2021 Census, about 80% of the Portuguese population identifies as Catholic and the influence of the catholic church and its organisations is undeniable as they account for 30% of the national social third sector. The study will also cover the barriers and motivations inherent to CE implementation. For this purpose, an online questionnaire survey will be distributed to Portuguese organisations affiliated with the Catholic Church (around 1,500 organisations). This article will address the preliminary findings. This research can potentially assist practitioners and researchers in the transition towards circular practices in the third sector, particularly within religious organizations. It can play a pivotal role in the identification of circular opportunities within these organisations and contribute to the development of a future approach for the gradual implementation of circularity, with a particular focus on its application within Catholic organisations.

Submission ID: 28

Exploring Circular Economy awareness in the cosmetic sector: evidence from Italian firms.

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Abstract

Circular Economy (CE) represents a model that can guide the design of potential sustainable solutions in many business and manufacturing activities. The cosmetic industry is one important sector in the global economy and is increasingly involved in the search of sustainable practices aimed to mitigate its economic, environmental and social

impacts, also including CE solutions.

As highlighted in a previous literature review carried out by the authors of this paper, despite the cosmetic sector's experience in practices that could be classified as circular is rooted in time, studies focused on this industry which explicitly refer to the CE paradigms emerge in literature only after the 2015. After this date (when the European Commission published the Circular Economy Package), the academia showed an increasing interest in the field, but further research is needed to better characterize the practical implementation of CE paradigm in cosmetic firms.

It is of basic importance to analyze the level of awareness and implementation of CE in the cosmetic sector. Following this aim, the present study collected evidences through survey from a sample of Italian cosmetic companies regarding their experiences of CE. Italy was chosen as reference for this study because, in the above-mentioned literature review, it emerged as the most active country in the investigated field. Targeted companies were the members of the "Cosmetica Italia" Association. This association was chosen due to its commitment to sustainability issues and membership of companies operating in diverse parts of the cosmetic supply chain.

The survey was distributed to 530 member companies in the period between October 2023 and January 2024. The questionnaires' structure includes five sections: i) general information, ii) awareness of CE and sustainability, iii) awareness of CE in the cosmetic industry, iv) implementation of CE, v) communication and assessment of CE.

Preliminary results showed in this study derive from the analysis of the answers of 46 respondents. A qualitative analysis of the answers was carried out using the NVivo software.

Findings highlight that a greater percentage of positive responses was recorded for partial or ongoing implementation levels of CE practices, while a much smaller percentage was recorded for full implementation, for which we mean that at least one circular practice was designed, implemented and fully completed.

In addition, only less than half of respondents communicate CE initiatives, while even less than a third measure them. Among the companies that

communicate CE, the most used channels appear to be certifications and labels; while, among the companies that measure CE, the most used method is Life Cycle Assessment (LCA).

This study also showed insights on the perception of respondents regarding CE and sustainability, which are perceived as very similar and interconnected concepts. Indeed, the implementation of CE in the cosmetic industry could support the achievement of sustainable development and SDGs, especially the No. 12 "Responsible Consumption and Production" (target 12.1, 12.2, 12.5, 12.6).

Finally, this study aims to provide insights on how circular practices could contribute to the overall achievement of the SDGs 2030 for Sustainable Livelihood.

Submission ID: 43

How aquaculture addresses environmental challenges through circular economy adoption: evidence from the Italian sector.

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Abstract

Aquaculture is a growing industry in Europe, where people consume a lot of fish but have limited wild fish stocks. To meet the demand, Europe relies on both local aquaculture and imports from other countries. Local aquaculture involves raising aquatic species in controlled or semi-controlled environments, both in seawater and freshwater. The EU's aquaculture output has risen by 11% since 1990 but has fallen by 8% since 2018 (FAO, 2022). In 2020, European aquaculture supplied about 21% of the domestic demand for fish and shellfish.

Italy is a leading producer of aquaculture food, both marine and freshwater, as the third European producer with around 120 thousand tons. Italian aquaculture is known for the quality and variety of its products, however, some environmental challenges affect it, such as: a) fish feed impacts connected to the use of wild fish as feed; b) pollution from fecal matter and unused feed; c) escapes of farmed fish that may interbreed with

wild populations; d) loss of materials due to production by-products that often remain completely unused and destined for landfill, rather than being reintroduced for producing valuable compounds (such as protein, omega-3, chitin). In this context, the circular economy (CE) model may offer opportunities and challenges for aquafarmers. On one hand, it can help to reduce the environmental impact of aquaculture, improve the efficiency and quality of the products, and make the sector more self-reliant and resilient. On the other hand, it can require significant changes in the management of resources, production, and market, which can entail costs, risks, and barriers. Aquaculture entrepreneurs must therefore be ready, innovative, and flexible to seize the benefits and face the challenges of the CE. This paper builds on a previous comprehensive literature review that examined the CE in the aquaculture and found that Italy is one of the leading countries in the world for circular options in aquaculture. Therefore, in the present study Italian aquaculture farmers' attitudes and practices are examined by highlighting: a) the CE awareness and interest; b) the CE practices for environmental sustainability; c) the barriers to the CE transition; d) the opportunities emerging from the CE model. Data are collected through a online survey distributed to a sample of 230 farms that belong to the main Italian trade association, (Associazione Piscicoltori Italiani) producing more than 90% of the Italian aquaculture supply. The results show how farm types, company size, species bred, and CE awareness affect the adoption of CE practices. Therefore, some common challenges among the farms emerged, such as regulatory fragmentation, new production patterns and lack of training on environmental issues. Future research activities will add a validation phase with key-informants entrepreneurs through dedicated interviews. Therefore, the findings highlight CE criteria as drivers. In addition, the scrutinised practices may stimulate entrepreneurs to analyse their hot-spots and move towards circular practices based on the 4Rs for valorising waste and by-products. Furthermore, this will achieve the protection of underwater life, according to SDG 14 (indicators 14.1-4.2), as well as Goals 12 and 8.

Submission ID: 52

The circular and transdisciplinary approach for sustainable cacao postharvest production in Arauca, Colombia

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Abstract

Agri-food systems are a key sector for a sustainable society. In fact, sustainable agri-food systems contribute to income generation for rural populations and small farmers. Conventional agri-food systems lack technological innovation, particularly in the first mile of the value chain, and regularly small farmers operate without standardized processes, resource efficiency in production systems, or considering the knowledge transfer between the system stakeholders. The use of analytical models in the design of the value chain, innovative circular business models and the co-creation between different actors in the agri-food systems could enable the transformation from conventional towards sustainable systems. This research focuses on the design of circular business models for agri-food systems incorporating operations research tools into farmer´s decision-making processes. This allows them to enhance their agri-food systems and facilitate their transformation into more sustainable systems. We aim to develop a collective and sustainable postharvest model production for the cocoa agri-food system in Arauca, Colombia, including Circular Economy-CE practices in the transformation, improving technological innovation, creating cooperative structures, and improving profits for cocoa farmers.

In cocoa transformation, as with many other agricultural sectors, numerous residues or byproducts often go unused (the main byproducts of the cocoa transformation are cocoa pod husk, mucilage, and bean shell). Creating a business model for agricultural products that integrates CE practices will secure a significant enhancement in farmers´ productivity, environmental sustainability, and particularly, their profits, contrary to the limitations of the traditional business model approach in agri-food chains.

Also, by taking a transdisciplinary approach, the researcher engages with system practitioners in the capacity building and co-creation of circular business models using data validation tools, participative modeling, capabilities transfer, and validation of the analytical models. This is highly relevant since these practices facilitate a shared understanding of

the agri-food system and will provide training to the primary users, who will afterward employ them to assess the feasibility of the model.

The learnings on the design of agricultural business model integrating CE practices and the contribution of collaborative working and analytical tools for decision-making processes in transforming the cocoa agri-food system in Arauca from conventional to sustainable can be used in other regions or even other agri-food systems.

This research focuses mainly on Sustainable Development Goal 12 (Ensure sustainable consumption and production patterns), mostly in target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources. Furthermore, developing sustainable management in agri-food chains can improve sustainable livelihoods for farmers, particularly in rural areas from developing countries.

Submission ID: 57

Circularity and sustainability indicators for the agrifood sector: the case of olive oil supply chain

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Abstract

During the last year, the Circular Economy (CE) paradigm gained increasing attention from the scientific community, organisations and policymakers due to the need to identify models and strategies to ensure the reduction of resource use and waste production as well as to increase process efficiency. Focusing on the agrifood sector, the achievement of CE concepts may be considered challenging. Indeed, agrifood-based processes, being part of the so-called biological cycles, are responsible for a high demand for resources as input and produce different types of waste and by-products. This is particularly true for olive oil which is one of the most impactful agrifood supply chains in terms of resource depletion (e.g., chemicals, energy sources, etc.) and production of waste (e.g., olive pomace, olive stones, olive mill wastewater, etc.), considering its whole life cycle. The international scientific literature reports various studies

in which potential circular strategies for the agrifood sector, specifically for olive oil, are proposed, also considering an environmental, economic and social sustainability perspective. Despite this, there is a common consensus among scholars regarding the need for appropriate and dedicated indicators to measure the circularity and sustainability indexes of such strategies. In this regard, the Research Projects of National Interest (PRIN) 2022 "Towards circular and sustainable agri-food systems: metrics for assessment (CIRCULAGRIS)", has the scope of developing circularity and sustainability metrics suitable for the agrifood sectors considering three main supply chains, i.e. olive oil, wine and bread/pasta, and understanding the interrelation between these metrics. Within the goal of the CIRCULAGRIS project, this preliminary study aims to provide a first explorative overview, among the international scientific literature, of circularity and sustainability indicators to be applied for assessing the olive oil supply chain. The results report a detailed discussion of the identified indicators. In particular, regarding the circularity indicators, the results underscore that different metrics have been proposed to be applied for assessing circular strategies in the agrifood sector in general. Despite this, no specific and dedicated indicators emerged for the olive oil supply chain. Focusing on the sustainability metrics, results point out that the methods based on the Life Cycle Thinking (LCT) approach are the most adopted when both circularity and sustainability indexes are evaluated. In addition, among the LCT methods, the Life Cycle Assessment (LCA) is considered a useful method to evaluate the degree of environmental sustainability associated with CE strategies implemented in the agrifood sector. This preliminary research highlights the need to develop dedicated and integrated circularity and sustainability indicators to be applied to assess the olive oil supply chain.

This study is in line with most of the targets included in SDG 12 (Responsible Consumption and Production). In addition, it is fundamental for identifying metrics to measure circular, sustainable and resilient agrifood productions.

This study is part of the research project entitled "Towards circular and sustainable agri-food systems: metrics for assessment (CIRCULAGRIS)" PRIN2022 (Progetti di Ricerca di Interesse Nazionale) – Prot. 2022JNNJJX, sector ERC SH7, founded by Ministero dell'Università e della Ricerca (MUR).

Submission ID: 66

An Empirical Study on the Industrial Hemp Potential in Nepal: Production and Valorization Perspectives

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Abstract

Hemp, a versatile and sustainable crop, has multiple economic and environmental benefits. Although hemp biomass is used to produce fiber and the seed is available in the market, it's cultivation is illegal in Nepal. The government of Nepal has shown interest in legalizing cultivation, yet no study has been reported that has assessed the industrial hemp potential and investigated its benefits. And still, there is confusion regarding psychoactive and non-psychoactive hemp varieties. The study has filled the gap by identifying areas with potential hemp cultivation and estimating its annual production potential with the valorization possibilities. Considering the thematic maps of various parameters, such as land use practices, soil properties, and climate, and using ArcGIS, suitable land for hemp cultivation (> 1 ha) has been identified. The identified areas were further categorized into low, medium, and high potentials, and considering medium and high potential lands, the hemp biomass and seed production potential were estimated. The study identified a total of 1,849,481 ha of land suitable for industrial hemp cultivation, and excluding low potential area, about 5.6 million metric tonnes (Mt) of biomass and 3.4 Mt of seed is estimated to be produced annually. Construction materials, textiles, and bioenergy (such as pellets and biodiesel) can be produced from hemp biomass and seed. The study's findings could be used to advocate for the government to legalize hemp cultivation in Nepal and attract entrepreneurs to establish hemp-based industries.

Submission ID: 69

Metabolism practice for National Strategies of Circular Economy

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Abstract

Metabolism study is one of the essential methodological approaches of the industrial ecology field. Since decades, this academic field studies the types and volumes of physical resource flows at diverse system levels including national economies. Outcomes of metabolism study generate knowledge on composition, sources, volume, destination, and efficiency of resource use.

Physical resources are also at the heart of circular economy models, as a language that aims to transform the link between economic growth, natural resource depletion and environmental impacts. Public policy making for circular economy transition requires multi-disciplinary governance structure for negotiations of targets. As such, the public policy-making process implies decision-making about scenario analysis, and priority setting for scaling innovative circular production and consumption systems.

Traditional governance structures for environmental policy-making focus resource flows from a disciplinary perspective in diverse institutional settings. For example, water as a resource is regulated by specialized water institutions, biomass by agricultural related policy, energy and waste by specialized ministries. These public institutions operate independent information systems, and have singular priority settings. Moreover, the diverse public institutions often lack capacity for holistic interpretation of physical resource use on the scale of the national economy. The foregoing, makes the priority setting for decision-making in public policy process on circular economy, challenging. Metabolism study of national economies offers a governance structure for integration of the diverse disciplinary institutional perspectives on physical resource flows, by classifying input, output of all flows and stocks of a national economy including the integration of fragmented databases.

This research, studies the case of the National Strategy of Circular Economy of Uruguay, to understand how the practice of metabolism practice contributes to priority setting in the public policy making process. The action research methodology followed a transdisciplinary approach including capacity building of representatives of diverse public institutions, integration of diverse databases on a variety of resource flows, and iterative interactions among academic researchers and representatives of ministries and public institutions, for advancing metabolism study and decision-making on policy priorities. The outcomes of the transdisciplinary process include the formal adoption by the government of Uruguay of the National Strategy of Circular Economy. The contributions of this research highlight the importance of resource flow analysis as a baseline for national strategies circular economy and propose best practices for metabolism study as part of a transdisciplinary public policy-making process.

Submission ID: 88

Social innovations for a circular built environment: case studies on solutions proposed by users and practitioners

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Abstract

The built environment (BE) as a central part and environment of our everyday life is facing pressing issues such as high CO_2 emissions driving climate change, and resource scarcity, with construction activities being a major contributor to both. It is responsible for a significant share of CO_2 emissions (WEF, 2016), the consumption of a large portion of available resources (De Wit et al., 2018; Schiller, 2020), and the generation of construction and demolition waste that again make up the bigger share of global waste. So, shifting "traditional", linear production and consumption practices and patterns towards innovative, circular ones by *slowing, closing, or narrowing resource flows* (Bocken et al., 2016) is a substantial part of the solution to these problems.

As a contribution to the debate on transitions in practice and everyday

life, this research focuses on the role of social innovations in facilitating this transition. It adopts a case study design and presents projects that promote change in the BE by introducing *new ways of doing, thinking, organizing, or framing* (Pel et al., 2020). To that end, it dives into three different types of social innovations:

- Adaptive reuse of existing buildings through cooperative buying: an innovative ownership model (new ways of decision making) slowing resource flows.

- The (commercial) reuse of building materials and building parts represents new practices within the construction value chain, providing knowledge about reusable building materials, representing new ways of knowing, and both slowing and closing resource flows

- Using new technologies like 3D printing of buildings and building parts represents new practices and narrows resource flows

Semi-structured expert interviews were conducted to gain initiators' and practitioners' insights, and evaluated using a qualitative approach.

The main findings differ between contexts: the initiating group: the cooperative buying groups included as well as one building parts reuse provider have an activist character. Their biggest barriers are access to financing of their projects as well as lack of support from governance structures, while they cite support from their network their biggest enabler. Business actors such as initiators of 3D printing in construction or building material platforms have more stable financing options, but lack the public awareness and trust in their ventures. However, they benefit from their technologies' innovativeness and the interest among their peers and target groups.

The study highlights the potential of social innovation in solving problems related to the built environment. By thoroughly looking into exemplary social innovations, this study underscores their significance in shaping a sustainable future through challenging traditional construction practices and offering new approaches to address the issues facing the built environment. Finally, it aims to outline possibilities for society and governance to enable and support such social innovations.

Submission ID: 93

Measuring circular economy for organisations from resource decoupling perspective

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Abstract

Sustainable raw materials production and consumption is a key element of industrial and circular economy (CE), social welfare and justice. With digitalization, decarbonization and growing standards of living worldwide, the demand for mineral raw materials has been increasing. The recent global energy crises and Russia's war on Ukraine have exposed vulnerabilities to the security of the supply of raw materials, which is one that must be considered and addressed, issues in global policy and monitored within SDG 12. Target 12.2 is measured by two indicators; raw material consumption and domestic material consumption. They are close correlated with resource decupling, which can be important indicator for raw materials policy and security for many countries and regions. Decoupling has been put forward as a policy goal by the International Resource Panel that distinguishes two types of decoupling (UNEP 2011): resource decoupling (economic growth and the level of primary resource use); and impact decoupling (economic activity and its environmental impacts), as measured by impact and state indicators.

Nowadays decoupling might be widely recognized as the overarching goal of the CE, but has not been operationalised and rarely features as an integrated part of the transition process. For example OECD in report (2020) collected 474 CE-related indicators, between 2018 and 2020 from 29 CE studies. Indicators on resources and materials represent only 9% of the framework, measuring material flows (exports and imports), the self-sufficiency of materials and the recovery of materials whereas decoupling has not been identified in the whole report. Moreover, as indicated by Lindgreen et all. the field of CE assessment has a low level of

maturity, and the level of implementation of CE assessment approaches by organizations appears to be limited.

The aim of this paper is to identify and validate CE indicators applicable to companies across various sectors, with a focus on the concept of resource decoupling. Additionally, the paper examines limitations associated with the implementation, knowledge, and acceptance of these indicators among projects in Poland and UEA. This analysis is based on a comprehensive literature review, survey, and questionnaires. Our previous research (oto-GOZ) conducted in Poland showed that there is high potential for increasing decoupling through the application of CE business models.. It was revealed that most companies, especially SMEs, are not prepared for indicators based on life cycle assessment methodology and monitoring of raw materials resource consumption, including critical resources. Based on these results, it was proposed to utilize tools such as the Complex Circular-Economy Quality Indicator (Kowalski et al., 2023) and IT models to support decoupling and implement CE models. Moreover, these indicators have been implemented as incentives in policies and applied in Polish research and investment programs to support investments and new technological solutions." A case study based on the use of geothermal energy in the Carpathian mountain area has been also presented.

Submission ID: 107

Environmental sustainability in cement industry: An integrated approach for green and economical cement production

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Abstract

Cement industry is one of the leading contributors of greenhouse gases after power plant industries. Approximately 4.1 billion metric tons of cement are currently produced globally every year, accounting for about 8 to 10 percent of global anthropogenic CO_2 emissions, and is expected to continually increase in the future adding more CO_2 into the atmosphere. The cement and concrete industry searches for ways to meet increasing

demand while reducing the carbon footprint of the concrete produced. Techniques such as carbon capture and storage (CCS), material substitution, alternative fuels, and energy-efficient technologies have been identified as some of the approaches to producing more sustainable cement. Regardless of extensive research on novel techniques for reducing the environmental impacts of cement production, commercial implementation has yet been a concern and will occur only if there is a real synergy between sustainability and profitability. Most of the current studies, however, prioritize environmental aspects and lack exploring the socio-economic aspects. The commercial rollout of technology is impossible without public acceptance and until the plant owners and stakeholders see the economic values.

This paper proposes an integrated approach for environmental sustainability in cement industries where the traditional approach of cement production is combined with modern and emerging technologies. The CO_2 captured from the cement plant will be utilized within the plant for producing nano calcium carbonate ($CaCO_3$) for use in cement manufacturing process. This technology incorporates all the existing approaches and helps cement industries produce sustainable, durable, and economical cement while reducing CO_2 emissions into the atmosphere: thus, leading towards green infrastructure and global environmental sustainability. Additionally, the adoption of this technology ensures proper dispersion of nanomaterials thereby improving the performance of concrete. Further, this technology is economically attractive to cement industries as they will have a new product (nano $CaCO_3$) with a much higher cost than cement with the potential of additional economic revenues.

This proposed abstract relates to SDG 9.4, SDG 12.4, and SDG 12.5. This is relevant to the conference topic as cement is the second most used resource in the world and has a larger footprint in every region of the world. Appropriate technology for sustainable production will help protect the atmosphere, mountains, and oceans.

Submission ID: 116

The CIRCULAGRIS project for developing metrics for circularity and sustainability in Italian agri-food systems

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Abstract

The agricultural sector, a leading sector in Italy, is crucial for various EU sustainability initiatives and Circular Economy (CE) integration. However, evaluating the sustainability of specific CE practices is essential beyond mere circularity. Scholars stress the need for assessing sustainability impacts at both company and inter-firm levels, often using life cycle-based assessment methodologies, although further development is necessary for CE practices assessment. The CIRCULAGRIS project aims to understand the relationship between circularity and sustainability in the agricultural sector, thus identifying metrics and exploring the impact of circular practices.

Methodologically, the project encompasses several key approaches: identifying circularity assessment methods and indicators through systematic literature review, modelling circular systems within three key supply chains in Italy (wine, olive oil, bread/pasta), applying and testing assessment methods to these models, developing a comprehensive life cycle-based assessment framework for all sustainability dimensions, and assessing individual sustainability aspects using life cycle assessment, life cycle costing, and social life cycle assessment. Comparative and scenario analyses will be used to understand how circularity affects sustainability.

Expected results include the development of a framework for assessing the sustainability implications of the three identified supply chains, creating knowledge about applying life cycle-based methodologies within circular supply chains, identifying circularity assessment methodologies tailored

to the agri-food sector, establishing an approach linking circularity and sustainability assessment to guide decision-makers, and identifying best practices for structuring supply chains considering sustainability impacts.

In conclusion, whilst CE is a priority for EU sustainability initiatives, its implementation may not always guarantee enhanced sustainability, especially in sectors like agri-food, which is vital for meeting human needs. This research seeks to fill existing gaps by providing methodological tools to assess circularity and sustainability in agri-food supply chains, thus allowing stakeholders to determine if their circular practices indeed lead to greater sustainability compared to linear approaches.

Contribution to SDGs and related targets: SDGs 2 and 12 + targets: 12.3, 12.4, 12.5. Relation to the topic of the Conference: ***Offering methodological instruments for evaluating circularity and sustainability within agri-food supply chains***.

Submission ID: 122

Harmonising Sustainability: Steering Bioeconomy-Sustainable Development Goal Interactions and Influences in Europe

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Abstract

Despite facing unprecedented challenges, countries around the world are leveraging the 2030 Agenda and its 17 Sustainable Development Goals (SDGs) as a framework for navigating poly-crisis and building a more resilient and sustainable future. One promising solution to push for progress in this endeavour is transitioning towards a bioeconomy that utilises renewable resources and low-carbon value chains to meet rising food, energy, and materials demands. Recognising the bioeconomy's potential to catalyse a greener, fairer, and more prosperous future, the United Nations Food and Agriculture Organization (FAO) developed a comprehensive blueprint for a sustainable bioeconomy aligned with the SDGs. This indicator framework, comprised of ten principles and twenty-four criteria, provides a monitoring tool for countries to track and guide their transition towards a more sustainable

bioeconomy. As a result, a growing number of countries have pledged to endorse this transition, committing to bioeconomy strategies.

While not inherently circular nor sustainable, the bioeconomy's interactions with SDGs, and vice versa, are complex. Synthesising insights from recent SDG and bioeconomy research and established frameworks, we employ a holistic approach to navigate this complex nexus. Combining correlation analyses, transfer entropy, and network analyses to reveal interactions, we further draw on literature and content analysis of policy gaps for qualitative insights. Exploring the European context, we updated the unified SDG database, developed a bioeconomy database aligned with the FAO framework, and used relevant bioeconomy policy strategies for the analysis.

While initially intended as mutually supportive, the bioeconomy-SDG nexus is characterised by synergies and trade-offs. The bioeconomy framework incorporates the 2030 Agenda to guarantee a sustainable transition. Nonetheless, our analysis reveals a balanced influence, with both positive and negative interactions of similar magnitude. However, SDGs have a significant influence on the bioeconomy, with the positive influence notably outweighing the negative ones. This influence varies significantly across national contexts, shaping diverse network structures, which dilute at the European scale. Given this variation in the significance of interactions across different countries, tailoring bioeconomy transitions and solutions to each national context becomes crucial. Moving beyond broad principles and goals, a granular analysis of BE-SDG interactions, examining individual criteria and target interactions, reveals an intensified and diversified share of directed synergies and trade-offs. Further contributing to this complexity, we observed an unequal prioritization of certain SDGs over others in policy strategies, neither reflecting actual interaction patterns nor urgencies for progress in the respective goals, e.g. emphasis on environmental SDGs in the European strategy, while national strategies lean towards economic SDGs. This selective focus calls for a more balanced approach, ensuring inclusive progress towards all SDGs and unlocking the full potential of the bioeconomy-SDG nexus by leveraging synergies and minimizing trade-offs to harmonize both sustainability initiatives.

Submission ID: 163

Unraveling the Role of Retailers in Shaping the Circular Economy: Insights from Digital Innovations and Sustainability Initiatives

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Abstract

The retail industry, a major player in the global economy, is undergoing significant innovation driven by digitalization and Industry 4.0. The technological transformation in the market, accelerated during the COVID-19 crisis, underscores the crucial role of retailers in shaping the circular economy. While retailers are adopting digital technologies like virtual reality, artificial intelligence, and data analytics to engage customers, their potential role in enhancing sustainability in emerging economies remains largely unexplored. The present study adopts an explorative inductive design through data from 10 in-depth interviews with retailers involved in circular economy initiatives and 20 circular consumers. In this article, we journeyed to unravel the intricate relationship between retailers' digital technology-based resources and consumers´ circular behavior, delving into the capabilities required by retailers to implement digital technologies successfully, and generating a competitive advantage from circular economy-based business models. The study suggests that circular economy programs, such as buyback programs, reselling through retailer platforms and C2C resell platforms, benefit sustainable brands, and retailers by reducing costs, creating new revenue streams, improving efficiency, and enhancing customer engagement, and at the same time contributes to resource conservation, lower production costs and reduced environmental impact through closing the loops of materials (Euromonitor, 2024). This research provides valuable insights to both scholars and practitioners, particularly in understanding consumer behavior throughout the lifecycle of remanufactured, reused, upcycled, and recycled products.

SDG+Target: 12.5 and 12.A

This contribution relates to the topic of the conference theme of "Linking Futures of Mountain and Ocean," as it addresses sustainability as a way of living through the diffusion and consumer adoption of circular

business models in emerging economies like Colombia. In particular, the proposed contribution relates to track 5c Production, consumption, and innovation – Circular Economy, as it contributes to the areas of circular business models and consumer perspectives and roles in CE.

Submission ID: 185

Assessing circularity in the agri-food sector: a case study.

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Abstract

The circular economy (CE) has gained interest for its potential to establish a regenerative system. By slowing, closing, and narrowing material and energy loops, it offers a pathway to a new balance between environmental and economic systems, promoting sustainable development. However, the implementation of CE by companies still poses significant challenges, first in terms of measurement. Without proper measurement, there is a significant risk of rebound effects or greenwashing. For this reason, it is crucial to find adequate tools for its measurement that allow companies to understand the real impact of their activities and identify room for improvement.

Several measurement tools have been proposed, but no unified approach has yet been achieved, and this abundance of tools increases the complexity and confusion for companies. A key sector in the transition to circularity, where this lack of measurement is particularly felt, is the agri-food sector (AFS). This sector poses additional challenges due to its complexity and inherent characteristics (e.g., perishability), and for these reasons requires an ad hoc measurement approach. Moreover, circularity does not always go hand in hand with sustainability; it remains necessary to identify it on a case-by-case basis.

In this context, the current study aims to assist *Fattoria della Piana*, a company operating in the Italian dairy sector, known for its best practices in circularity, towards a proper measurement of circularity aligned with sustainability. The company has not only implemented circularity strategies by closing the loop on its waste and resources but has also, through its anaerobic digestion and combined heat and power plant (AD-CHP) plant, established a system of symbiotic exchanges with other agri-food businesses for the exchange of residues and by-products such as olive pomace and citrus pulp. In this context, the present study focuses on the evaluation of the AD-CHP plant as the core of the symbiotic system to support the waste management strategies of the company. To do so, it proposes a combined use of circularity indicators literature based on energy balance, nutrient recycling, and waste degradation efficiency with Life Cycle Assessment (LCA).

Preliminary results from the LCA analysis evidenced environmental benefits related to the activity of the AD-CHP plant, especially considering the avoided production of mineral fertilizer and heat from natural gas. The indicators applied confirm the circular nature of the practices analyzed. Nevertheless, an overall evaluation of the level of circularity of the system is complex. The implications of the study are twofold. Firstly, it prompts a reflection on the practical implications of measuring circularity at the company level in the agri-food sector. Secondly, it seeks to disseminate circularity best practices for waste and organic waste management. The study contributes to monitoring a sector significantly contributing to climate change impact and promotes waste valorization practices from other agri-food sectors. In alignment with these goals, the study also aims to contribute to sustainable development by achieving Sustainable Development Goals (SDGs) 12 (Responsible Consumption and Production, targets 12.3, 12.5), 7 (Affordable and Clean Energy, targets 7.2, 7.3), and 13 (Climate Action, target 13.3).

Submission ID: 248

Implementing Extended Producer Responsibility (EPR) for Managing Post-Consumer Textile Waste in India

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Abstract

India, one of the largest textile-producing countries is challenged with the threat of producing 8,200 kilotons of textile waste of which 51% emanates from post-consumer textile waste. There is a surge in textile waste due to the influence of brands and ever-evolving fashion trends, which poses a threat to the environment by significantly increasing land pollution. Research studies indicate that there is a critical imbalance in treating post-consumer textile waste and a lack of awareness of disposal methods. The municipal solid waste management faces challenges in recycling clothes due to the distinctive compositions of the clothes. The impact of brand on consumer behavior is leading to more purchases which leads to a higher rate of disposal. There is a need for a system-level intervention to tackle the post-consumer textile waste in India.

This research proposes an implementation of the Extended Producer Responsibility (EPR) model suiting the Indian context due to its diversity of people and systems which prevails across the country. Inclusion of awareness along with this model emerges as a strategic intervention in textile circularity which offers sustainable and a long-term solution for the environmental repercussions of textile waste. An extensive literature study along with system blueprint and system thinking maps aided in developing a comprehensive understanding of textile waste management. From these insights, primary research was conducted with expert interviews to gather knowledge on industrial practices and questionnaires to understand consumer behaviour on textile disposal. The research findings show that the brands have a significant influence over the consumers' purchasing decisions. Consumers are also unaware of the disposal methods available. The majority of the clothes end up being donated, repurposed, or incinerated. The ambiguity on the garment's end of life is still unknown.

EPR is an environmental policy where the producer is responsible for the entire lifecycle of the clothes which includes disposal and recycling. It is also crucial for the brands to run repetitive awareness campaigns on proper disposal methods which helps the consumers to make informed choices on convenient channels to discard clothes responsibly. This approach not only promotes sustainable practices but also addresses India's specific challenges such as reducing land pollution and minimizing textile waste incineration. EPR encourages producers to adopt recyclable

clothing, reducing the production of lower-quality, affordable garments. Moreover, it brings stability to consumers' purchasing behaviour by fostering conscious buying patterns, which is relevant to India's diverse and dynamic market. In addressing the post-consumer textile waste challenge, the research contributes to the global sustainability with key Sustainable Development Goals (SDGs). The EPR along with awareness initiatives not only offers strategic interventions in textile circularity but also directly supports SDG 12, Responsible Consumption and Production which is tailored to India's socio-economic and environmental landscape.

Submission ID: 296

Waste and by-products of olive oil supply chain: a systematic review of treatment technologies and eco-efficiency assessment tools.

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Abstract

Olive oil production is an important activity in the agri-food sector, especially in Mediterranean countries where it has a significant socio-economic and cultural relevance. However, the olive oil supply chain generates a notable amount of waste and by-products that, if not properly managed, can cause several significant environmental impacts. On the other hand, they constitute a great source of high-added value compounds, which may be used for various. However, the efficiency in the recovery of these compounds is highly dependent on the technologies used for their treatment and extraction. To the authors' knowledge, eco-efficiency indices and approaches are less considered in the olive oil sector and, in particular, in olive oil waste treatment and valorization technologies, than in the agribusiness sector in general. The most of literature's works are focused on finding high-efficiency technology in abating the toxicity of these wastes and their appropriate reuse, but few focus on the eco-efficiency of these treatment and valorization strategies. For this reason, the present study provides a systematic literature review to analyze the state-of-the-art waste and by-product treatment technologies in the olive oil production processes, focusing on their valorization strategies and the evaluation of their eco-efficiency approaches and tools, considering environmental sustainability and

circular economy point of view. Two queries have been defined and processed using Scopus and Web of Science databases. The sample has been defined including articles and reviews published within the 31st of December 2023, considering studies in which olive oil by-product and waste treatment technologies and their valorization were investigated, for query 1, and studies in which the assessment of the eco-efficiency of such technologies was proposed, also focusing on an environmental sustainability and circular economy perspective, for query 2. The results are reported by investigating three macro-areas of interest: i) waste treatment and valorization technologies; ii) identification of eco-efficiency strategies of the technologies addressed; iii) circular economy and environmental sustainability approaches considered separately or together with eco-efficiency. The main findings pointed out that the most investigated treatment technologies for olive oil waste and by-products are represented by anaerobic or aerobic digestion, membrane filtration, and advanced oxidation processes, or by new technologies combining chemical-physical and biological treatment. Along with these treatments also main valorization routes such as biogas or bioethanol production, recovery of polyphenols for pharmaceutical uses or as additives to food, and reuse in agriculture have emerged. Although many circular economy and environmental sustainability strategies were found, this was not the case for eco-efficiency indices. In addition, the analysis highlighted greater attention by the research community on treatment and valorization efficiency strategies to minimize environmental impacts and waste formation, although, the eco-efficiency concept is not directly mentioned. Through this analysis, it is possible to obtain a more comprehensive and integrated view of natural resource recovery to achieve a zero-waste and zero-emission production system that uses the best available sustainable and innovative technologies. For this reason, this work can contribute to achieving the Sustainable Development Goals n. 9 (target 9.4) and 12 (targets 12.2, 12.3, 12.4, and 12.5)

Submission ID: 318

Stocks and flows of the non-negligible toxic polybrominated diphenylethers (BDE-209) in the Chinese automobile industry

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Abstract

BDE-209 is a persistent organic pollutants (POPs) and extensively used in the automotive sector as a legacy brominated flame retardant. Recycling materials from end-of-life vehicles are a crucial component of the circular economy, but it contains high levels of BDE-209, posing significant risks to human health and the environment. This study aims to estimate the stock, flow, emission and associated environmental impact of BDE-209 throughout the life cycle of vehicles in China from 2010 to 2050. A dynamic substance flow model and scenario analysis were applied to estimate the substance flow of BDE-209, and life cycle assessment was adopted for toxicity assessment of human health based on vehicles types, lifespan, BDE-209 contents, and emission factors. Results show that in 2020, 7,370 tons of BDE-209 newly entry into the in-use phase, with 60% flowing up to the scrap stage (4,402 tons) and 29 % re-entering the social system through material recycling. Sedan and Sport Utility Vehicle (SUV) were the main contributors to both in-use and scrap stages, with contributions of 40%-44% and 23%-58%, respectively. The emissions of BDE-209 were projected to rise to 7,854 kg by 2050, an 11-fold increase from 2010. The atmosphere and soil are the primary environmental media for emissions, with distribution rates of 56% and 33%. Human health toxicity mainly comes from the in-use stage, followed by automobile shredder residues treatment (ASR) and reuse stages. Future reduction strategies, such as enhancing the recovery rate of scrapped vehicles and refining ASR treatment could potentially reduce BDE-209 increment by 1,232 kg and 1,793 kg in 2030 and 2050, respectively. Furthermore, soil is projected to replace the atmosphere as the primary medium for emissions. Analyzing human health toxicity excluding the use phase, implementing reduction strategies can effectively mitigate toxic effects, with approximately a 33 % decrease under the medium reduction scenario and an 18 % decrease under the high reduction scenario. The study highlights the necessity of considering toxic substances in the current automotive circular economy from a life cycle perspective and provides a reference for reducing BDE-209 emissions in the automobile industry.

Track 5d Sustainable Production, consumption, and innovation - Value chains and trade

Submission ID: 39

Strategic Sourcing for Enterprises in a Geopolitically Insecure World - Securing the Supply of Critical Raw Materials

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Abstract

The 21st century is characterized by countless technological inventions, innovations, and groundbreaking technologies spanning various domains from personal life to businesses and military applications. Key technologies permeate diverse sectors, and headlines increasingly feature terms such as semiconductors, drones, quantum computers, or artificial intelligence. These key technologies share a commonality—they operate only with sufficient power and the necessary hardware resources. The requisite energy transformation away from fossil fuels towards renewable energies depends on the availability of critical raw materials. Almost all key technologies, including photovoltaic technologies, rely on silicon. However, like many other critical raw materials, silicon is predominantly mined, refined, and exported from China. China also controls many downstream production chains within the photovoltaic industry. In the past, China has leveraged its power position in exporting critical raw materials through production quotas, export quats, and export taxes exerting political pressure on other countries. This not only jeopardizes international security but also the availability of key technologies and the success of energy transformation.

Raw material dependencies and uncertain market conditions result in various sourcing scenarios with associated costs. Using the example of silicon, this study tests the cost implications of dynamic supplier limitations and spot market price fluctuations. Consequently, two research questions arise: What are the impacts on procurement and inventory costs due to critical supplier availabilities and fluctuating spot market prices in strategic silicon sourcing? What sourcing implications

can be derived for the economic sustainability of companies in uncertain market environments? To model the associated decision problem, the Multi-Sourcing Single Item Capacitated Lot Sizing Problem is employed. To incorporate the increasing geopolitical impacts on markets, the model represents order criticality in the form of the Worldwide Governance Indicators (WGI) and the relative quantity share in production demand. To adequately evaluate the results, a scenario analysis is conducted through simulation-based optimization, comparing selected sourcing scenarios against a benchmark. In total, 21 different scenarios are considered.

The results indicate that the higher the spot market fluctuation, the lower the supplier dependency. The sourcing problem is subject to certain limitations, including static supplier contracts, absence of quantity discounts, and a static cost rate ratio. From an economic perspective, for companies, dependencies on suppliers and their limitations decrease with higher spot market price fluctuation. Consequently, there is a future need for robust planning methods in spot market procurement, especially in unpredictably volatile commodity markets. Furthermore, there is a perceived research need to investigate whether spot markets are a reliable source for critical raw materials in geopolitically uncertain markets.

The results obtained through this study could contribute to the achievement of SDGs 7.1 and 8.2. This is manifested in the assurance of expanding renewable energy sources and the associated availability of critical raw materials, while concurrently facilitating an enhancement in industrial productivity. Furthermore, it contributes to a more comprehensive consideration of geopolitical changes in the upcoming years, which can indirectly jeopardize the success of all SDGs.

Submission ID: 181

Sustainability data sharing in supply chains – Empirical insights from a global industry survey

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Abstract

The exchange of sustainability-related information along value chains is a key requirement for a successful transition to more sustainable patterns of production and consumption. It enables companies to gain insights into the sustainability practices of their suppliers, conduct sustainability assessments, and make sustainability and circularity-related decisions during product and service design. However, while new digital technologies such as digital product passports or dataspaces provide possible solutions for a more efficient flow of information that is increasingly also required by regulations, empirical evidence on the state of data exchange along global value chains is limited and mainly available in the form of case studies. Therefore, this study sets out to assess the extent to which companies exchange sustainability-related information along the value chain and explore their motivations and barriers to this exchange.

A quantitative online survey was used to investigate companies from various industries and different sizes around the globe. The data was analyzed using descriptive and inferential statistical methods to assess the answers from 675 companies.

The findings show that 61% of the respondents regarded sustainability as highly important globally, with statistically significant ($p < .001$) differences between regions (i.e., Asia and Europe, Asia and North America, Central/South America and North America and Central/South America and Europe), as measured by a Kruskal-Wallis test. The majority of the survey companies (i.e., 78 %) report that they share data on the sustainability status of their products with customers, with significant differences ($p < .05$) regarding the company size. As expected, large companies share significantly more than medium or small companies. Most often, companies share Environmental Product Declarations (i.e., 48 % of the companies that share data), followed by Product Carbon Footprints (23 %), full Life Cycle Assessments (16 %), and Water Footprints (7 %). Of the 146 companies that do not share sustainability data, 28 % stated that they do not receive requests from customers, 21 % that they do not have sustainability data available, and 20 % that they do not share data with third parties at all. Finally, the survey reveals a growing

trend in regulatory and customer demands related to product data. Almost half of the surveyed companies (i.e., 49%) perceive an increase in regulations enforcing the exchange of sustainability data in the last years. Slightly more than half of the surveyed companies (i.e., 55 %) are facing an increase in customer requests for sustainability data, and 61 % experience an increase in compliance-related data requests.

In summary, while sustainability data sharing was found to be a common global practice that is increasingly driven by regulations and customer pressure, its focus is still limited. Thus, it is crucial that this focus is expanded to enable a more comprehensive management of the sustainability performance of products and organizations. Such enhanced data exchange is not only required for achieving SDG 12 and targets 12.6 and 12.8 but also for achieving sustainable livelihoods, as it facilitates informed decision-making and increases transparency and accountability across industries.

Track 5e Sustainable Production, consumption, and innovation - Sustainable consumption and consumers

Submission ID: 38

Circular value chain blind spot – A scoping review of the 9R framework in consumption

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Abstract

In today's highly digitized age, where advancements in communication and efficiency coincide with increased resource consumption for hardware production, the prevalence of digital media and electronic products contributes to a vast array of diverse products. The rapid influx of new electronic devices fosters market dynamism, driven by consumer incentives to possess the latest products, perpetuating a linear economy in the electronics industry. Unfortunately, this has resulted in a significant surge in Waste of Electrical and Electronic Equipment (WEEE), making it the fastest-growing waste category.

To counter this concerning trend, establishing a circular economy (CE) emerges as a viable solution. Within this framework, consumers play pivotal roles, potentially prolonging device lifespan and conserving resources. However, existing research predominantly focuses on recycling, with the remaining 9R framework strategies receiving limited attention. These strategies collectively constitute a theoretical concept within the CE.

This study aims to provide a detailed overview of current research on consumer behavior regarding e-waste, utilizing the 9R framework. Two research questions guide the investigation: What aspects of the circular and linear economies are systematically investigated concerning consumer behavior in handling WEEE? What strategies are recommended for consumers or consumption to strengthen circular behavior in line with the 9Rs?

To address these questions, a Scoping Review methodology was employed. Using search terms in databases such as Scopus, Web of Science, and ProQuest, 122 articles were reviewed, with a focus on online panels, questionnaires, and interviews with consumers regarding their interactions with WEEE. Additionally, the strategies provided by authors for improving the CE were analyzed.

Results indicate a majority of research concentrating on recycling behaviors and disposal/storage habits, with other 9Rs receiving limited attention. Furthermore, strategies for enhancing the CE primarily target governments and businesses, with consumers recommended only education. This results in blind spots, neglecting crucial aspects of the CE, referred to as the Circular Value Chain Blind Spot.

To address this, an agenda with practical implications has been developed, including directives such as nudging, differentiation, a systematic perspective, waste hierarchy, value chain strategies, and cultural factors. Findings are subject to limitations: not all relevant articles may have been captured, selection criteria may have influenced the number of articles, and generalizability is confined to the WEEE sector.

In conclusion, there is limited knowledge within the CE about consumer behaviors in various subdomains within the electronics industry. The identified Circular Value Chain Blind Spot characterizes this condition and should be addressed through the proposed agenda to conserve

resources and reduce the accumulation of WEEE.

Overcoming Circular Value Chain Blind Spots has the potential to enhance resource efficiency (SDG 8.4) and bolster the protection of labor rights (SDG 8.8). Additionally, it can contribute to the reduction of waste generation (SDG 12.5) by gaining insights into people's behaviors regarding a circular economy within the WEEE sector. Furthermore, by diminishing the WEEE output, it may mitigate the degradation of natural habitats (SDG 15.5), as a reduction in informal recycling could lead to fewer pollutants being released.

Submission ID: 127

Moderating effects of environmental concerns on diet preferences across generational cohorts

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Abstract

Meat is an important and growing part of diet worldwide. Meat consumption and production are widely discussed topics in the wider public forum due to their impacts on nutrition, sustainable food systems and climate change (Sanford, et al. 2021). This study seeks to answer two key questions – 1) how dietary behavior varies across generations? and 2) What role environmental concerns play in dietary choices across generational cohorts? The study is based on data collected in the 2019 LOHAS (Lifestyles of Health and Sustainability) database survey by Natural Marketing Institute (NMI). NMI is a health and wellness marketing research company that works with major industry clients including Nestle, S.C. Johnson, and Walmart among others. The 2019 data was collected online by surveying more than 3,000 out of over 60,000 U.S. consumer panel in September 2019. The data represented U.S. demographics relatively accurately with a 95% confidence level.

Results from the Model that included variables representing environmental concerns show that both high and moderate levels of environmental concerns have significant impact on diet choices compared to low level of environmental concerns. Those with moderate to high levels of environmental concerns were likely to prefer more plant based diet.

Results from the Model that included base variables and generational cohorts show that respondents belonging to generation Z/Millennials and generation X were not significantly different from those belonging to boomer and silent groups. However, when environmental concern variables were added then those who are either generation Z or Millennials were less likely to prefer diets with more meat.

The results in this case are consistent with the research hypothesis (H2) that the relationship between generational cohorts and diet preferences is possibly moderated by environmental concerns. It was expected that the intensity and direction of the relationship between generational cohorts and diet preferences are conditioned by environmental concerns. Following the results, the younger generations, in this case Gen Z and Millennials are likely to have high to moderate environmental concerns and prefer more plant based diet. It is expected that this relation to be more intense when households show highest levels of environmental concerns than those with lowest level of environmental concerns.

Regression results show that differences between men and women on the basis of food choices remained consistent and did not change when variables representing generational cohorts and environmental concerns were added. Men were likely to select diet with higher meat content than women. Results showed regional differences in food choices. Households in the states included in the western region were significantly different from those in the south with regard to food choices. Households in the west were likely to select a more plant-based diet than those living in the south. Households in the Midwest and northeast did not show any such difference compared to households in the south. When generational variables were added the effects remained largely the same.

Submission ID: 171

Citizens' deliberation on solutions to fight urban household food waste

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Abstract

Food waste is currently acknowledged as a major societal challenge, including the food waste at the household level estimated to be responsible for the wastage of one third of the food produced for human consumption. Hence, tackling Household food waste (HFW) has is gaining gained a momentum in societal and policy agendas accompanied by an increasing effort of the scientific community to deliver evidence to address the research gaps on the causes and on the solutions to address this multidimensional societal problem. The proposed solutions by published literature to mitigate HFW can be unfolded into four major types, actions to raise people awareness, participatory actions, economic incentives, and collective actions. However, there is little evidence on the household's assessment on the different types of actions and its combination. This paper contributes to this research gap by adopting an innovative participatory approach, using deliberative focus groups (DFG), and analyzing the collected data through content analysis resorting to the software Maxqda. We had conducted six DGF in the Porto metropolitan area before and during the pandemic COVID-19 crisis. Our results highlight the citizen's selection for more holistic actions in comparison to separate actions to fight effectively fight food waste at household level. Another finding of our study is that citizen's growing urban gardens found it more effective way to reduce own food waste. These results suggest that urban policies and underlying legal frameworks should favour holistic solutions to incentivise fighting HFW and account for the urban gardens. In addition, the study has shown that qualitative deliberative citizen-led approaches show insightful to understand how common people perceive as alternative or complementary different types of actions proposed by the literature review.

Submission ID: 172

Factors influencing environmental behavior: A PLS-SEM-based approach

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Abstract

Environmental behavior has long been studied linked to environmental knowledge and attitudes. Although there are debates related to the causal effect between these topics, most studies agree on a positive relationship between them (Casló & Escarion, 2018; Liu et al., 2020). However, less emphasis has been put so far on how more general attitudes (like simplicity or frugality) influence environmental behavior.

The core hypothesis of this submission is that beyond specific, environmental and sustainability attitude-related factors, more general ones (like frugality) also influence environmental behavior.

A PLS-SEM research model is developed focusing on direct and indirect impacts of factors like environmental activism, frugality and conservation behavior on environmental behavior. For the model building, the review of Milfont & Duckitt (2010) on environmental attitude measures were used as a basis, while environmental behavior was based on the scale of the Eurobarometer survey. For testing the hypotheses, a Hungarian sample (size of 1000 respondents) is used that is representative for age, gender and education.

Results support the main hypothesis in the sense that beyond the sustainability-related attitude factor (environmental activism) the more general one (frugality) also positively influences environmental behavior. Furthermore, the latter applies not only directly, but also indirectly, through conservation behavior, a direction could not be validated for the factor of environmental activism.

These findings imply that environmental and sustainability behavior can not only be fostered through the 'mainstream' track (via promoting and educating environmental awareness and activism), but also through general patterns of a simpler and in general more conscious lifestyle, the impact of which is less often discussed so far.

This submission is related to specific UN SDG targets, such as 12.1., 12.5. and 12.8. on sustainable consumption. Furthermore, the topic of this submission is also directly related to the key theme of the current conference (rescuing the SDGs 2030 for sustainable livelihood), as it touches on the theme of sustainable consumption, a key challenge for higher income countries, as these countries serve in general also a benchmark for the rest of the world.

Submission ID: 186

Motivating behaviour change: Understanding drivers for radical lifestyle shifts and reduced meat consumption

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Abstract

Current food consumption patterns contribute to approximately one-third of total anthropogenic greenhouse gas emissions (Crippa, 2021). Moreover, agriculture utilizes over 80% of arable land, with this figure continuing to rise. Substantial reductions in greenhouse gas emissions and associated environmental impacts of land use could be achieved by reducing meat consumption (Hallstörm et al., 2015; Rancilio et al., 2022).

While behavior change theories traditionally emphasize incremental, there is a growing need to understand high-impact, radical, and transformative lifestyle changes. The adoption of a vegetarian diet and reduction in meat consumption exemplify such radical lifestyle changes. In this research we explore various motivations of consumers and identify triggers which lead to behavioral changes of reduced meat consumption. We analyse feedbacks regarding potential negative aspects of dietary change. Fogg's (2009) behavior model serves as the theoretical framework of the analysis, which was previously employed in persuasive technology contexts.

The research is based on a survey of 566 participants active on social media platforms, with a particular focus on in-depth content analysis of responses to open-ended questions. Large-scale qualitative studies are scarce within the domain of sustainable consumption research.

Findings suggest that social media bubbles can serve as triggers for building capabilities, facilitating the dissemination of new consumption patterns, reinforcing positive impulses, and screening out negative ones. Additionally, personal experiences emerge as influential drivers of radical lifestyle changes.

Results show a reversal in knowledge transfer between generations, with children often influencing their parents' behavioral patterns. Notably,

discouragement and critical feedback predominantly originate from family and close acquaintances. The negative effects of social media are mitigated by the bubble-filtering effect, allowing for the identification and avoidance of adverse influences.

Understanding the motivating factors, triggers, and potential barriers to radical lifestyle changes is essential for designing effective interventions and transforming unsustainable consumption patterns.

The research is closely related to SDG Goal 12: Responsible consumption and production, sub-target 12.3 and 12.8, and SDG 3: Good health and well-being. Results are closely linked to the topic of the ISDRS 2024: Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood conference, as the focus of the research is to understand the behaviour change of consumers for a more sustainable lifestyle and reduced environmental impact.

Track 5f Sustainable Production, consumption, and innovation - Food system transformation

Submission ID: 10

Peak and fall of China's agricultural GHG emissions

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Abstract

Agriculture takes a large proportion of greenhouse gas (GHG) emissions, playing an essential role in achieving global climate goals. However, targeted mitigation opportunities for agricultural GHG are still unclear due to the lack of standalone analyses at sub-national and food-specific scales. Here, we accounted for agricultural GHG emissions in 2000-2020 in mainland China and found that the largest emission sources by region, product group, process, and gas were Hunan province, rice cultivation, enteric fermentation, and CH_4, respectively. Agricultural emissions peaked in 2015 and temporarily declined by 8% by 2020 and possibly

decline by 30-36% by 2060, primarily owing to the reduction potential from meat production in eastern and northern China. The emissions produced and land needed per unit of food product reduced mostly, while emissions per unit of land use increased in many regions and food groups. We conclude that the opportunities and challenges for GHG mitigation lie in a few top emitters in central China where intensities were unexpectedly much larger than the levels of the national average and marginal agriculture in the northeast.

Submission ID: 17

Assessing the environmental impact of strawberries grown in soilless systems: a Life Cycle Assessment case study

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Abstract

Modern agriculture, while essential for feeding an increasing global population, faces pressing challenges that threaten environmental sustainability. Intensive agricultural practices, particularly the reliance on energy-intensive inputs and fertilizers, contribute significantly to greenhouse gas emissions, land use change, and soil degradation. One promising approach to address these challenges lies in the adoption of soilless cultivation systems. These systems replace soil with growing mediums (either liquid or solid) and provide plants with essential nutrients through a nutrient solution, eliminating the need for tillage and minimizing soil degradation. Soilless cultivation systems offer several potential environmental benefits, including reduced soil erosion, improved efficiency in water use, and increased crop yields. However, concerns have been raised regarding their energy intensity, which can vary depending on the technology and infrastructure employed. Additionally, external factors such as crop species, socioeconomic conditions, and climatic conditions can influence the environmental impacts of these systems. Therefore, comprehensive assessments are crucial to fully evaluate their environmental sustainability. In this context, Life Cycle Assessment (LCA) method is widely used for assessing the potential environmental impacts of products and systems, considering all stages of their life cycle, from raw material extraction to end-of-life disposal. In

this article an LCA case study of soilless strawberry cultivation in Maletto (Italy) is proposed to evaluate the environmental burdens connected with this system. The functional unit is 1 kg of strawberries, and the system boundaries are defined as cradle-to-gate. The inventory analysis is carried out using primary data collected through direct interviews and questionnaires submitted to a company operating in Sicily (Italy), and secondary data from scientific literature and dedicated databases. The impact assessment is performed using the CML I-A baseline and IPCC methods. While the study is ongoing, preliminary results focus on the identification of the hot-spots related to processes and materials/energy sources causing the highest contribution to the environmental impacts, and consequently, the definition of potential strategies for their minimization. Further research will be focused on a comparative study between soilless and soil-based strawberry cultivation systems to fully assess their relative environmental impacts and inform sustainable agricultural practices. In addition, soilless systems can offer a range of potential benefits that align with the Sustainable Development Goals (SDGs), such as SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), and SDG 12 (Responsible Consumption and Production), as well as their relative targets. In mountainous regions where arable land is scarce and water resources are precious, soilless systems represent a potential solution, offering several advantages that align with the conference's focus on sustainable livelihoods and environmental protection of mountains and oceans.

Submission ID: 65

Urban agriculture matters for sustainable development

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Abstract

Urban agriculture can contribute to sustainable development. However, a holistic investigation is lacking to comprehend its positive and negative impacts on the Sustainable Development Goals (SDGs). We fill this gap with a systematic analysis of around 1,450 relevant publications on urban agriculture, screened from 76,000 initial records. We map and analyze the text in the literature for each SDG target and associated positive

or negative sentiments. All SDGs are positively and negatively linked to urban agriculture, with 142 and 136 targets having positive and negative sentiments. The mapped texts with positive sentiments are around double the negative ones. We identify six leveraging opportunities urban agriculture provides for sustainable transformation with four hurdles to be resolved. Urban agriculture, in itself, does not inherently contribute to sustainability. Its impacts rely on the adoption of specific practices. Realizing urban agriculture's social, economic, and environmental functions to accelerate SDG progress requires tackling the hurdles.

Submission ID: 89

How can design discipline contribute to the sustainable food system transformation? A review of research projects in the Italian context.

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Abstract

According to Clark et al. (2020), global food system emissions could preclude the targets set to prevent climate change disasters. Indeed, the entire food chain creates 26% of anthropogenic GHG emissions, where food production is the most impactful stage of the chain (Poore & Nemecek, 2018). The road for the food system transformation towards a more sustainable scenario requires consideration of all the stages of the food chain, with great effort and cooperation from all the disciplines, to which the design can also contribute. A general overview of the contribution of design discipline in the food field has been defined food design by some contributions such as Massari (2017) and divided into design with food, for food, and of food by Bassi (2015). This paper is focused on the research in the design field for the agri-food sector, where sometimes the outputs are distant from the design of an object. The goal is to understand how the design field can argue for a more sustainable scenario for the food system, thanks to many diverse project outputs. First, a literature review is conducted to discover these research projects, starting and limited to the Italian context for many reasons: time constraints; agri-food in Italy is the most important economic sector - 580 billion euros in 2022 (Unioncamere, 2023) with 5450 traditional products (Didonna et al., 2023); Italy is the home and work author

country so it is possible to discover more contributions also written in Italian. The results give interesting insights into practices and actions just applied and reveal that most of them integrate reasoning over the food system's sustainability. Examples are: agri-food by-products used as resources for new products; actions to reduce homeless food poverty; new local food system; food system education; digital innovations for sustainable transformations; participatory design in food experience; design for leftovers; circular distributed production system; social eating; communication campaign on food waste.

Afterward, the results of the review help reflect on the contribution of design in a specific research scenario where a group of multidisciplinary researchers is working on the context around the production of two typical Italian products in two different territories of the Veneto region. These territories have been primarily dedicated to these products, overshadowing other activities and also creating environmental impacts. They are the hills at the foot of the mountains Dolomiti prealpi where Prosecco wine is produced, and a part of the big plain Pianura Padana on the banks of river Adige - Lusia municipality - where Lusia salad is cultivated. In the end, this paper gives insights for a reflection on the design for a sustainable food system and a territorial development that respects biophysical thresholds of the planetary boundaries, ecological common goods, and social conditions of citizens.

Link with the conference topic: the location of the two case studies is related to mountain (pre-alps) and river contexts, so they can contribute to the discussion over a more sustainable future for these territories.

SDGs involved: 2.4; 6.3; 12.2, 12.3, 12.5, 12.8; 13.3; 14.1;15.1, 15.3

Submission ID: 95

Do farmland transfers mitigate farmland abandonment? ——A case study of China's mountainous areas

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Abstract

Farmland abandonment is a manifestation of farmland misallocation in mountainous parts of China. Farmland transfers are an important pathway for reallocating farmland, and it is still unclear whether farmland transfer can mitigate abandonment and what factors affect the relationship between the two. Thus, according to the principle of resource market allocation, this study constructed a theoretical model that included labor force, farmland resources endowment, and the land market. Combining unique survey data (539 samples), we used Tobit, IV-Tobitl, the interaction impact, and moderation effect models to analyze the effect of farmland transfers on abandonment at the village level. We found that farmland transfers could mitigate abandonment. The farmland abandonment rate declined by 0.09% when the transfer rate increased by 1%. For areas with fewer full-time agricultural labors, abundant farmland resources, more high-quality farmland, and more transfers with paid rent, the impact of farmland transfers on abandonment was greater. Village cadres also believed farmland transfers could mitigate abandonment, and viewed labor force resources and farmland resource endowment as important factors affecting abandonment. This study helps to deepen the understanding of the relationship between farmland transfers and abandonment, and serves as a basic scientific reference for corresponding policy suggestions on how to enhance the effect of farmland transfers.

Submission ID 96

Extent and food crop production potential of abandoned farmland in China

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Abstract

The impact on food production should be the top concern of China's farmland abandonment. This study took into account both inter-annual and seasonal farmland abandonment in China and assessed their extents and food production potentials by combining land use data, cropping

intensity data, statistical data, and the China-AEZ model. Results showed that the inter-annual and seasonal abandonment rate of farmland in China from 2010 to 2018 were 9.79% and 5.11%, respectively. High values of inter-annual abandonment rates (>20%) mainly located in the agro-pastoral ecotone of northern China and the southern coastal area of China, as well as the TPR; while high values of seasonal abandonment rates (>20%) mainly concentrated in the YRR, the SER, and the HHH. The total FCPP of abandoned farmland amounted to 124.38×10^6 t/year. If 50% of the above FCPP can be achieved, an additional 154.72 $\times10^6$ people could be fed according to FAO's food security standard.

Submission ID: 102

Alternative Food Movements as Contested Vehicles for Climate Justice

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Abstract

The global food security literature focuses on the health, social, and environmental impacts of industrial food systems and portrays alternative food movements (AFMs) as immune to injustices. This study aims to synthesise evidence on an under-researched area of food systems, especially the social and environmental justice implications of the AFMs globally in all possible contexts and dimensions using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The search keywords cover five dimensions of justice – distributive justice, procedural justice, recognitional justice, restorative justice, and cosmopolitan justice - in alternative food movements and involved three databases (Scopus, Web of Science, and Medline). A narrative synthesis was performed to identify the themes. A total of 140 peer-reviewed studies met inclusion criteria and were subjected to topic modeling. Our analysis highlighted the 'triple movement theory' (corporate food movement, alternative food movements, and food justice movements) resulting in nine topics

under two themes (representing technical as institutional aspects) to address multiple, multispecies, and planetary injustices in food systems. The available literature on alternative food movements began to address multiple food injustices primarily in the context of developed countries since the early 1990s indicating that there is a dearth of knowledge in the literature, particularly the more than human approaches to multispecies, cosmopolitan, and planetary justice in global food security.

Submission ID: 126

Effects Of Climate Change and Adaptation Strategies on Food Security - Lessons From Nepal

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Abstract

Globally, a significant proportion of food insecure households are smallholder farmers. This study focused on the role of climate change and adaptation strategies on food security of smallholder households in Nepal. Data were collected in 2021 from 400 farming households from three agro-ecological zones of Nepal, namely Mountain, Hilly and Terai. Indicators of food consumption score and reduced coping strategies index showed that about 12% and 22% of the farming households belonged to the food insecure group. Ordered logit models show that climate change (drought) has a negative impact, while climate change adaptation strategies (irrigation, agroforestry, and temporary migration) have a positive impact on food security status. The results also show that education, access to markets, credit and information affect household food security. We recommend that any adaptation strategies to address food insecurity should be carefully designed to fit the socio-economic, climatic, and institutional structures of each agro-ecological zone.

Submission ID: 216

Spatial differences of specialty agriculture development in the mountainous areas of China - 'one village, one product' as an example

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Abstract

With the rapid development of urbanization, the rate of abandonment of arable land in China's mountainous areas has accelerated. Solving the phenomenon of abandonment of arable land has become an important issue in managing the use of China's arable land, the key to which lies in the development of specialty agriculture using the unique natural environment of mountainous areas. This paper scrutinizes both the horizontal and vertical distribution of specialty agriculture in these areas, drawing upon the "One Village, One Product" dataset provided by the Chinese Ministry of Agriculture and Rural Development. The findings reveal that the horizontal distribution pattern of specialty agriculture exhibits the formation of eight primary clusters. It is intriguing to observe that a majority of these clusters are situated at the intersection of two or three provincial administrative units, with the largest cluster occurring at the border of Chengdu and Chongqing. In terms of the vertical distribution pattern, the specialty agriculture in China's mountainous areas are mainly distributed at low altitudes, i.e., below 500 m, and at gentle slopes of 4°–8°, and with increases in altitude or slope, the overall amount of specialty agriculture declines rapidly.

Submission ID: 308

MAPS: A new model using data fusion to enhance the accuracy of high-resolution mapping for livestock production systems

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Abstract

To meet growing demand for animal-based foods, livestock production has intensified to maximize output with limited resources and space. This has increased the spatial heterogeneity of livestock distribution, which has in turn caused severe nutrient loss and increased risk of antimicrobial resistance, zoonotic disease, and human exposure to disease and pollution. There is an urgent need for spatially explicit impact assessments, but current methods lack the resolution needed to accurately map fine-scale livestock distribution. Here we developed a mapping agricultural production systems (MAPS) model by fusing enterprise registration information (ERI), which can directly represent agricultural activities, with other currently available data to generate high-resolution mapping. Using an example of pig production in China, the global leading pig producer, we show that MAPS improves the accuracy of location/size estimates of livestock production systems by 12%–84%, illustrating a 44% underestimation of pig numbers in dense farming areas (>1,000 pigs/ km2) by existing methods. MAPS also reveals a spatial transfer of pig production from rural to peri-urban areas, implying more decoupled pig-crop systems in China. MAPS enables spatially explicit impact assessments to support sustainable planning of intensive livestock production systems that can alleviate nutrient loss and health risks.

Track Six

Sustainable Cities and Communities

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 6a Sustainable Cities and Communities - Urban and Regional Transformations

Submission ID: 70

Expansion Opportunities of Railway Network of the Lisbon Metropolitan Area: A GIS-Based Methodological Study

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Abstract

At a time when climate action is becoming increasingly important, mobility is proving to be a key factor in reducing greenhouse gas emissions. Metropolitan transport systems can play a fundamental role in moving passengers in a more sustainable way, offering a high-capacity and frequent service in densely populated territory. In the Lisbon Metropolitan Area (AML), the public transport system is hard pressed to meet the needs of the population, resulting in a predominant use of the car (68% of motor transport) and a consequent high level of congestion, air and noise pollution. To counteract this trend, it is important to promote high-performance public transport, particularly rail modes.

The aim of this research is to identify the gaps in the AML public transport network and explore proposals for improving the metropolitan rail network.

Based on the doctrine and best practices reported in the literature, the areas with the greatest shortcomings and potential in mobility were identified using a GIS-based methodology, integrating geo-referenced data such as population density, demand generating points, existing transport networks, origin-destination matrix. The result was a detailed GIS with mobility patterns. Eight major gaps were identified, and 18 rail-based solutions were discussed (13 light rail and 5 heavy rail), including new lines and extensions to existing networks. To assess the performance of the proposals, a range of indicators were used, such as terrain digital modelling, network density, percentage of population served by rail, available routes for new infrastructure, modal share and evolution, factors influencing modal shift to public transportations) and CO_2 savings.

Results suggest that it is possible: to increase the population in the AML within easy reach of rail (<500 m), from 33% to 65%; to increase rail density from 0,11 km/km^2 to 0,17 km/km^2; to promote the modal share of public transport, from the current 16% of motor transport to 43%, reducing the circulation of individual vehicles; and cut CO_2 emissions by about 8%. Based on international case studies, it is hoped that with an integrated, intermodal network it will be possible to improve these indicators even further. This method proved to be a useful decision-making tool, identifying key features and performance indicators of different options. The method may be used in other contexts.

Submission ID: 112

"HACKATHON+" AS A METHOD TO INTEGRATE CIVIC TECH IN URBAN PLANNING:The case of a "HackYourDistrict" workshop in Taipei

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Abstract

In this study, we investigate the recent application of hackathons in urban planning, focusing on their role in data collection and public engagement. Despite their increasing use, hackathons have been criticized for being ephemeral events with limited long-term impact and a tendency to prioritize digital information over social context. The "Hackathon+" model, enriched by site visits, stakeholder reports, feedback, and data collaboration via Commutag, aimed to improve traditional hackathon approaches.

The research was conducted during the "HackYourDistrict" international workshop series, held in Taipei in October 2023. This event gathered over 20 international participants who collaborated with Taiwan's civic tech community. The focus was on the Guandu Plain, Taipei's largest remaining urban agricultural area, strategically located and ecologically significant. However, this area faces challenges from landowner and developer pressures for changes in urban planning zoning, and efforts by

local young farmers to innovate in agriculture and cultural activities to redefine Guandu's identity.

"HackYourDistrict" was designed as a catalyst to introduce new perspectives and opportunities in Guandu's urban planning. Utilizing research methods including participatory observation, focus group discussions, and participant surveys, this paper explores the implementation of the "Hackathon+" case of aiming to expand the scope and potential of civic technology in urban planning and analytics. Through various simulation scenarios, this paper presents the Guandu "Hackathon+" case study, emphasizing the preserved values of urban agriculture and natural spaces. It underscores the potential of civic technology in knowledge production, transfer, and public communication within the realm of urban planning.

The "Hackathon+" study, focusing on the Guandu Plain in Taipei, aligns with the ISDRS conference theme "Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood" by emphasizing sustainable urban agricultural practices, civic engagement, and innovative solutions in urban planning. This approach supports SDGs such as Sustainable Cities and Communities (SDG 11) and Life on Land (SDG 15). The location of Guandu Plain, nestled between mountains and rivers, underscores the importance of preserving natural ecosystems (SDG 13: Climate Action and SDG 14: Life Below Water) and the role of civic tech in enhancing knowledge production and transfer, contributing to Quality Education (SDG 4). Overall, the study presents a multifaceted approach to sustainable urban development, aligning with the conference's theme of fostering sustainable livelihoods through the interconnection of mountain and ocean futures.

Submission ID: 145

Decentralized WASH in Informal Settlements: a step towards Sustainable Development

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Abstract

Nepal is prone to multi-disasters from natural and anthropogenic causes. Flooding and resulting inundation in the Terai areas of Nepal is increasing, partly due to climate change. The low elevation of the informal settlements along the Singhia River in Biratnagar Metropolitan City in the Terai area of Nepal, elevated highways in the downstream areas, and lack of proper drainage and sewerage systems are exacerbating the Water, Sanitation and Hygiene (WASH) problem in Singhia. The extremely low per capita income of the Singhia settlers, local government's low priority to WASH in informal settlements and lack of WASH awareness are some of the root causes of the pathetic hygiene and sanitation level.

The global paradigm shift in the water sector and the demand to focus on local community level for efficient and sustainable water services, promoted decentralized systems. In this study, decentralized WASH in informal settlements is considered as a part of a solution, and a step towards sustainable development. Using freely available maps and GIS software, the spatial extent of the problem was mapped. A field visit to the area was conducted to document the extent of the problem and the willingness of the local settlers to contribute in decentralized WASH at Singhia. Discussions with the local government officials was held to assess the possibility of coordinating the implementation of a techno-social solution to the problem.

Based on the experience of similar situations in other developing countries, a low-cost design to minimize the possibility of cross contamination of the water sources from the latrines with basic facility was prepared, using proven and financially affordable technology. To address the problem in a sustainable manner a demonstration of the solution to the problem, in the form of a piloting project is proposed. Success of this pilot program will initiate similar actions in other parts of the settlements since it will generate social, moral and political pressure to the local government and provincial government agencies.

Submission ID: 150

An Initial Exploration of Circular Urbanism in Taiwan's Construction Sector: Examining the Potential and Limitations of the BIM to CIM Approach

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Abstract

Research by the Ellen MacArthur Foundation indicates that half of the materials mined globally each year are used in the built environment. With urbanization, global material consumption is projected to increase from 40 billion tons in 2010 to 90 billion tons by 2050. This highlights the challenge of resource consumption if the current linear economic model persists. Concurrently, Schiller and Roscher (2023) merged the 'Closing, Slowing, Narrowing (CSN) strategy' with the '9R framework' to advocate for circular urbanization. The CSN strategy includes 'Closing' for increased reuse of artificial resources, 'Slowing' through repair, remanufacturing, upgrading, and remodeling to extend lifespan, and 'Narrowing' for enhanced resource efficiency and reduced product and material consumption.

Examining Taiwan's construction activities from a circular urbanization perspective is valuable. Taiwan is among the most urbanized countries globally, and a recent urbanization wave driven by science parks, spurring new residential and infrastructure construction demands. However, Taiwan's built environment material flow is complex, embedded in dynamic global material economy relations. On the other hand, about two-thirds of Taiwan's mining areas are in the east, reflecting regional resource production and consumption disparities. Under regulatory, environmental, and social conditions, construction activities in Taiwan face higher thresholds in natural resource extraction and waste disposal site operation. In response, Taiwanese government agencies are promoting the transformation of the construction sector through circular economy models.

This research, as a pilot study of a larger project, explores using BIM (Building Information Modeling) and CIM (City Information Modeling) under 9R and CSN principles for simulations and decision-making to promote material circularity and reduce carbon emissions. The study focuses on Shezidao in Taipei, a sand dune area formed by the Keelung and Tamsui Rivers, with low population density and significant urban planning controversies due to recent land use zoning changes. The simulations provide new development perspectives for the government and community.

The study first creates 3D models for Shezidao, comparing current scenarios with alternatives using different designs and recycled materials. It then uses GIS tools to calculate carbon emissions at neighborhood and regional levels, establishing preliminary CIM models. Further steps involve refining these models based on input from government units, community groups, and experts. The case of Shezidao, facing discussions of comprehensive reconstruction or partial preservation, offers scenarios for developing CSN strategies. The transition from BIM to CIM involves conceptualizing circular scenarios at different scales. The research discusses overcoming challenges through technological innovation and policy formulation, focusing on interdisciplinary collaboration and integration for effective circular urbanism strategies. It lays the groundwork for future studies on material flow analysis in different regions of Taiwan's construction activities.

This study explores how Taiwan's construction sector can achieve sustainable development through circular urbanism, applying circular economic principles in design, construction, and use phases, particularly through BIM and CIM for material recycling and carbon emission reduction. It aligns with the conference themeby focusing on technological innovation and policy development to advance Sustainable Development Goals (SDGs), especially SDG9 (Innovation and Infrastructure) and SDG12 (Responsible Consumption and Production).

Submission ID: 177

Urban Mobility in Hill Towns: xTransformation Towards Sustainable Development

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Abstract

Hill towns across the globe face unique urban mobility challenges. Their steep slopes, winding roads, and growing tourism overburden the existing infrastructure, leading to challenges such as congestion, air pollution, and limited accessibility. The traditional solutions often magnify these problems, hindering not only sustainable development but also equitable access for residents and visitors. This research aims to bridge the gap in understanding how hill towns can achieve mobility transformations that align with the Sustainable Development Goals (SDGs), particularly SDG 11. b (sustainable transport systems) and SDG 13.2 (integrating climate action into national strategies). Focusing on Shimla city, India, as a case study, the research investigates how the unique geographical and ecosystem complexities impact mobility transformations. Through diverse data collection methods, including local surveys, and stakeholder interviews, the study sheds light on the distinct needs and challenges faced by various user groups — residents, tourists, and individuals of varying socio-economic backgrounds and abilities. Opinions involved reflect the concerns of residents regarding congestion and pollution, the tourism industries' emphasis on responsible development, and the environmental group's call for reduced carbon emissions and active travel promotion. The research examines successful approaches used in other towns worldwide, focusing on solutions that promote gender equality, inclusiveness, and environmental sustainability. This analysis informs the development of context-specific strategies for Shimla, considering local needs, infrastructure limitations, and budget constraints. These strategies address challenges like integrating active travel options with the challenging terrain, implementing affordable and accessible public transport, and ensuring collaboration between diverse stakeholders for co-creating and managing sustainable mobility systems. Ultimately, this research aims to provide valuable insights for Shimla and other hill towns seeking to navigate the intricate path towards equitable and sustainable mobility transformations. By prioritizing inclusivity, environmental responsibility, and effective management, hill towns can strengthen their transportation systems by ensuring the well-being of their inhabitants and protecting the fragile ecosystems that are vital to their identities and locals. This study contributes to a broader discourse on achieving the SDGs in challenging geographical contexts, paving the way for future research and action towards a more inclusive and sustainable future for all.

Submission ID: 178

Policy Analysis of Urban and Regional Transformation in Indian Temple Towns: A Framework for Sustainable Development

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Abstract

Policies serve as the blueprint for urban and regional development, shaping infrastructure, economy and societal aspects. And aligning policies with SDGs, particularly SDG 11 on Sustainable Cities and Communities, is vital for a strategic and inclusive approach as it ensures lasting impact on the economic, cultural and environmental dimensions. Recognizing the significance of temple towns in India, policy alignment not only preserves the cultural heritage but sustains community identities. The study evaluates government policies related to urban and regional transformation in Indian temple towns, understands how existing policies align with or diverge from the SDGs, and creates a deeper understanding of the dynamics between policies, sustainability and cultural heritage. The research employs qualitative and exploratory methods and will be based on primary and secondary data sources consisting of policy analysis, comparative case study analysis, interviews with policymakers and heritage conservation organizations, on-site visits, and focus group discussions with local communities. Specific temple towns in India will be examined as case studies to understand the practical impact of these policies. The current policies governing the changes in Indian temple towns will be studied and assessed to see the effectiveness of these policies in achieving sustainability goals. Subsequently, a framework will be developed to synthesize findings from policy analysis, and comparative analysis, and propose targeted interventions that can enhance current policies for better alignment with Sustainable Development Goals. Furthermore, a policy gap analysis matrix will be done to offer a clear overview of where policy improvements are needed, supporting policymakers in strategic decision-making. Overall, the framework will systematically address the policy gaps, identify patterns of transformations in the policies, and aim to provide recommendations for policymakers to align with SDGs. The study not only analyzes policies shaping the Indian temple

towns, but provides a systematic framework for policymakers, urban planners, government agencies, heritage organizations, communities, and researchers. As temple towns continue to evolve in India, this paper advocates for policies that incorporate Sustainable Development Goals ensuring economic prosperity, cultural preservation and environmental stability.

Submission ID: 217

Optimizing Investments for the Path to Holistic Sustainable Development Through Achieving Human Satisfaction: A Particular Reference to the Urban Transport Sector in Sri Lanka

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Abstract

In pursuit of sustainable livelihood, the focus on the 2030 Agenda for Sustainable Development has emerged as a significant and compelling topic among stakeholders engaged in global development projects. Concurrently, in today's global landscape, numerous researchers are trying to redefine sustainable development by integrating subjective goals, such as human happiness and satisfaction together with already established objective goals like environmental, economic, and social wellbeing. Sri Lanka, a nation historically entrenched in traditional development approach, has grappled with economic crises stemming from weak investments and unsustainable debt, leading to a surge in migration due to dwindling life satisfaction among its populace. Moreover, Sri Lanka faces a number of environmental challenges, necessitating the adoption of a unique holistic approach to sustainable development that integrates both subjective and objective goals. This approach seeks to optimize returns from developmental initiatives while safeguarding the mental and spiritual wellbeing of its citizens.

This study is particularly focused on the urban transport sector, which not only significantly impacts the economy but also serves as a major contributor to greenhouse gas emissions and other pollutants.

Furthermore, urban transport profoundly affects citizens' daily lives, influencing their time, costs, and overall activities. The research utilizes literature surveys and quantitative analyses from primary and secondary sources. The paper's findings highlight the conditions which impact on the human's mental wellbeing with reference to accepted philosophies related to mental wellbeing and relationship of both subjective & objective goals with the urban transport sector.

The study's findings highlight the inadequacies of current transport and city development strategies in comprehensively addressing both subjective and objective sustainable development goals within the transport sector. Notably, the research underscores the potential efficacy of prioritizing investments in public transport infrastructure, rectifying existing failures, and fostering human-centered approaches to urban development. These strategies are identified as an avenue for achieving a harmonious balance between subjective well-being and overarching environmental, social, economical & cultural sustainability objectives. Moreover, the paper emphasizes the need for further research to delineate specific governance-led actions required to enact these transformative measures effectively.

Submission ID: 226

Potential climate benefits of a bio-based built environment with regionalised supply and demand

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Abstract

The built environment contributes more than a third of global energy-related carbon emissions. This trend is expected to grow with rapid urbanisation and rising demand for fossil-based construction materials (UNEP 2023). In order to meet global climate targets, the sector needs to reverse its emission trajectories. One way of achieving this is to shift construction material input from carbon-intensive materials, such as concrete and steel, to bio-based regenerative products including timber

and bamboo, which have the potential to store significant amounts of carbon in the long term.

The transition towards a net-zero built environment could be further advanced if materials are sourced from regional forests, considering the growing interest in 'regionalising' or 'shortening' supply chains to promote self-sufficiency and reduce climate impacts. We therefore propose a model to systematically quantify and match the supply of and demand for bio-based building materials for all urban agglomerates globally. A key feature of the model is to be spatially explicit, thus exploring the potential for demand to be met by regional supplies.

The model is divided into the following components: on the supply side, it will use a statistical model to map potential timber production. In terms of demand, the model will use high-resolution earth observation datasets to quantify building typologies and thus material demand for urban agglomerates. Future demand will be projected by considering various scenarios of socio-economic development, particularly with regards to future developments of floor area, distribution of building typologies, and the level of adoption of bio-based building materials. To match supply and demand, a spatially explicit supply-demand balance algorithm will be applied to identify regional forest areas needed to theoretically supply future urban construction materials. Finally, the model will quantify carbon sinks and substitution effects of a bio-based built environment using life-cycle assessment (LCA) approaches.

The model's findings could demonstrate how the built environment can play a leading role in mitigating climate change and thus reducing its impacts on climate-sensitive environments. Our model has clear relevance for SDG 9, in particular for Target 9.4 in promoting the use of "clean and environmentally sound technologies and industrial processes" through the widespread adoption of bio-based materials. Through its regionalised approach, our model could also inform national and regional development planning in supporting positive economic, social, and environmental links between urban and rural areas (SDG 11, Target 11.a), as we seek to investigate the potential of bio-based materials being supplied locally. Finally, the model's carbon quantification estimates could inform national policies, strategies, and planning on climate mitigation (SDG 13, Target 13.2).

Submission ID: 271

From Idle to Ideal: Urban Transforming Initiatives through Harnessing Agrivoltaics Symbiosis for Agricultural Revitalization

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Abstract

This study examines the challenges and opportunities presented by the Guandu Plain, situated near the heart of Taipei City, which has long awaited comprehensive development. The area faces significant issues due to the abandonment of agricultural land, prompted by the loss of the local farming population. This has led to the proliferation of urban waste disposal, illegal factories, and parking lots, encroaching on valuable agricultural spaces, and shifting maintenance costs to the remaining farmlands. The Guandu Plain is crucial in regulating the local microclimate and preserving regional ecological diversity. However, its potential is threatened by land pollution and the prospect of development-induced land use changes.

Addressing the complexities of land ownership, conflicting development expectations, and the fragmentation of agricultural land, this paper proposes a novel approach through a small-scale experimental initiative. The initiative focuses on agro-electricity symbiosis and the strategic exchange of public and private lands. This method aims to revitalize unused agricultural areas in alignment with sustainable ecological policies while leveraging solar energy infrastructure. Such infrastructure not only promises a stable supply of clean energy but also offers supplemental income for the agricultural sector. By adopting a compromise model, the initiative seeks to prevent land degradation and abandonment without compromising the landscape or agricultural productivity.

The proposed initiative in the Guandu Plain closely aligns with several SDGs, notably:

- SDG 7 (Affordable and Clean Energy), particularly target 7.2, which aims to increase substantially the share of renewable energy in the global energy mix.

- SDG 11 (Sustainable Cities and Communities), with an emphasis on target 11.3 to enhance inclusive and sustainable urbanization and target 11.7 to provide universal access to safe, inclusive, and accessible green and public spaces.

- SDG 15 (Life on Land) focuses on target 15.3, which seeks to combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation-neutral world.

This article exemplifies how local agricultural revitalization and sustainable energy production can contribute to broader goals of sustainable livelihoods, directly addressing the conference's theme "Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood." By integrating agro-electricity symbiosis, this approach not only mitigates land degradation and supports agricultural communities but also fosters resilience against climate change impacts. It demonstrates a practical model for linking terrestrial (mountain) and aquatic (ocean) ecosystems through sustainable practices that benefit both environments. This case study serves as a microcosm of how localized efforts can contribute to global sustainability objectives, highlighting the importance of innovative land use and energy solutions in rescuing the SDGs by 2030 for a sustainable future.

Track 6b Sustainable Cities and Communities - Urban and regional resilience

Submission ID: 18

Future conscious water policy, governance and usage of local communities in the EU

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Abstract

Water is a paradox: it is a seemingly abundant and renewable resource,

while only a tiny amount of it is accessible and drinkable. Global water resources are unevenly distributed and many of them have been contaminated.

„Water is our most precious resource, a 'blue gold' to which more than 2 billion people do not have direct access. It is not only is essential to survival, but also plays a sanitary, social and cultural role at the heart of human societies." (Audrey Azoulay, UNESCO Director, 2021)

The existence of life is inconceivable without water. Water is an essential pre-requisite for existence and sustenance of life in any form. The natural resources - be it in the form of safe drinking water, targeted both in the UN Millennium Development Goals (MDGs, Goal 7) and in the UN Sustainable Development Goals (SDGs, Goal 6) - are public goods. Water is an international public good and is associated with common pool resources (CPR) and collective action problems whose solution calls for international cooperation and action. The extreme and rapid changes in our climate, have severe environmental consequences, long droughts in one place, and sudden floods in others, with increasing number of water-scarce areas in the world.

It is very important that we should learn lessons from our ancestors and draw important conclusions for our own future. Technology and perfect engineering are not enough: local communities, both urban and rural, need to be careful with their water resources, manage and govern them wisely, in a future-conscious way, paying attention to socio-cultural factors (related to UN SDG 11 and the conference topic) as well. Well-developed ancient civilizations have disappeared because of human environmental degradation, bad resource management and related socio-political problems.

The paper is focusing on the comparative analysis of smart local/ regional water usage, governance models and community initiatives – with special attention to the socio-cultural factors - within the EU water policy framework.

Submission ID: 29

Beyond Borders: A Comparative Exploration of Seismic Design Standards in Germany and Iran

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Abstract

In the face of escalating global ecological crises, sustainability has emerged as a critical imperative to address the substantial environmental impact of various sectors. One significant driver of global resource consumption is the construction industry, with a heightened focus on sustainable building design. However, this commitment to sustainability encounters conflicting goals, particularly in earthquake-prone areas, where the imperative for seismic resilience necessitates a certain material investment that challenges the principles of sustainability and resource efficiency. Different countries, each characterized by unique geographical conditions, impose varying requirements on seismic building design. Against the backdrop of seeking generalizability and/or transferability of methods to determine sustainable material use while ensuring resilience to geotectonic environmental risks like earthquakes, notably prevalent in mountainous regions or regions with tectonic plate boundaries, a crucial aspect is to examine the implementation within region-specific building codes.

In our contribution, we present a comparative analysis of normative seismic design regulations between Germany, located in a region with lower earthquake vulnerability in Europe, and Iran, characterized by mountainous terrain in Asia with numerous faults and a high seismic risk. The building code acts as a bridge between hazard research findings and the impacts or requirements for structures. It involves determining relevant parameters and their effects on the structural design, necessary load-bearing capacity, and usability of individual components, considering the entire building. Our comparative study on the Iranian seismic design standard “Standard 2800” and the “DIN EN 1998 (Eurocode 8 with the National Annex for Germany),” governing seismic design in Germany and the EU, provides a concise overview of key

content and compares pivotal parameters of seismic design. The analysis includes seismic zones characterizing the impact, subsoil types crucial for earthquake wave transmission and damping, and the importance factor characterizing the societal significance of buildings as a measure of the impact on residents. The comparison of standards reveals some similarities but also differences. For instance, both codes define social significance in the same way. Nevertheless, the geological boundary conditions and, consequently, the degree to which the population is affected differ significantly. This contrast is ultimately manifested in these codes, among other factors, through distinct approaches to design parameters for planning resilient buildings in both countries.

Submission ID: 48

Exploring Challenges in Implementing Community-based Disaster Risk Management (CBDRM) Framework at the Grassroots Level: A Theoretical Study

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Abstract

Introduction: Frameworks serve as conceptual and operational blueprints that help in the systematic planning, implementation, and evaluation of certain activities. They offer a structured approach to understanding the complexities involved and provide guidelines for effective practice. Community-based Disaster Risk Management (CBDRM) is a participatory approach that engages vulnerable communities in disaster risk reduction (DRR) activities. Several frameworks have been formulated to aid in operationalisation of CBDRM in the ground. The purpose of this study is to explore the challenges and gaps in implementing these CBDRM frameworks at grassroot level for the vulnerable communities that are exposed to different kinds of hazards. The research aims to conduct a systematic literature review to assess the existing frameworks in CBDRM. Thus, a two-pronged literature research was conducted. Firstly, we identified existing CBDRM frameworks from various geographies. Next, we identified CBDRM implementation case studies. Web of Science and Scopus databases were used for both the searches. We analysed each framework's key features, strengths, and challenges.

The identified CBDRM frameworks address topics like public participation, risk reduction, policy, governance, and disaster preparedness in a generic way, lacking specific community-level details, step-by-step implementation guidelines, and a focused approach on vulnerable demographic groups. Establishing a universally effective CBDRM framework is challenging due to the unique characteristics of each global community, requiring customization to cater to the specific needs and conditions of vulnerable populations.

Methodology: The search was done using Web of science and Scopus through a systematic literature reviews as primary methodology. This includes an analysis of 39 case studies and frameworks adhering to the implementation of Community-based Disaster Risk Management at grassroot level. The paper has thoroughly scrutinised the CBDRM framework and its grassroots application, examining their scope, objectives, approach, strengths, challenges, gap.

Research limitation: The study acknowledges constraints in its thorough examination of 39 case studies, indicating that the utilization of these frameworks is lacking practical implication at the grassroots level, for vulnerable communities that are exposed to different kinds of hazards. These gaps highlight the shortcoming of CBDRM framework that do not adhere to the vulnerable communities at the grassroot level.

Findings: The study's results indicate that numerous CBDRM frameworks do not effectively contribute to enhancing resilience at the grassroots level for vulnerable communities. Frameworks failing to fulfil their intended purpose become ineffective. The existing frameworks demonstrate substantial shortcomings, incapable of addressing the diverse geographical needs of each vulnerable community

Practical Implication: The study's significance lies in recognizing the gaps and challenge of an effective CBDRM framework, emphasizing that they do not serve the purpose to vulnerabilities communities with diverse culture and traditions. It ensures the future reserarch work for relevant CBDRM framework in evolving disaster scenarios.

Future relevance: The study discusses possibilities for more comprehensive and integrated CBDRM framework of vulnerable communities that can be implemented at grassroots level.

Submission ID: 117

Unraveling the Territory: A Systematic Review of Literature on Sensemaking in the Territorial Context

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Abstract

This study aims to analyze the state of the art of the concept of territory-based sensemaking, seeking to identify key elements, trends, and research gaps and investigating the interconnection between territory and sensemaking, uniting the two dimensions. As a specific objective, we seek to understand how sensemaking is formed in planned territories as a product of the real estate market. To this end, a systematic literature review was carried out in the Scopus database, covering the period from 2000 to 2023, which resulted in a corpus of 18 scientific articles. Data analysis took place using content analysis and statistical treatment tools such as Vosviewer to cross-check keywords and statistical treatment of abstracts using Iramutec software.

Based on the statistical results obtained by analyzing the article summaries using the Iramuteq software, five distinct classes of words were identified and grouped according to their semantic similarities and differences. These classes were named according to the sets of words suggested by the software: Organizational Studies, Urban Development, Collective and Governance, Place and Context, and Smart and Creative Communities. This approach allowed a deeper understanding of the conceptual and thematic diversity present in the articles analyzed, contributing to the understanding of the dynamics present in studies on sensemaking and territory.

Preliminary analyses indicate that this discussion is possible and is multidisciplinary. Thus, it has the potential to shed light on the spatial, social formation and dynamics of planned territories, seeking to form a theoretical framework for the creation of sensemaking in planned territories as a product of the real estate market.

Through the evolution in the understanding of sensemaking training that is attributed to territories, more effective strategies and actions can be identified to promote sustainability in these regions, aligned

with the UN Sustainable Development Goals (SDGs) for the year 2030. The study relates with greater proximity to objective 11, which seeks to make cities and human settlements inclusive, safe, resilient, and sustainable—connecting especially with target 11.3, which aims to increase inclusive and sustainable urbanization and capacities for the planning and management of participatory, integrated and sustainable human settlements, in all countries.

The context of the conference "Linking Mountain and Ocean Futures: rescuing the 2030 SDGs for sustainable livelihoods" implies recognizing that solutions for sustainability are comprehensive and need to connect different realities. This study on the state of the art of the concept of sensemaking Territory-based offers an opportunity to examine how understanding territory as a physical and social environment can influence communities' decisions and actions towards sustainability and livelihoods. By investigating the interconnection between territory and sensemaking, especially in planned territories resulting from the real estate market, we can identify how perceptions and interpretations of built spaces influence people's practices and behaviors concerning the use of resources, the adoption of sustainable practices, and the development of a balanced livelihood.

Submission ID: 133

Bangalore's Lost Symphony: Learning from Traditional Water Management System for a Sustainable Urban Future

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Abstract

Dating back to ancient times, the relation between water and cities is unique. This relation weaves a distinct identity for each of these cities and its inherent populace, by means of their water harnessing techniques and their association with the adjacent water-bodies. This notion is

also identified in SDG 6, which focuses on sustainable management of water and its availability to all, through the targets 6.5 and 6.6 aiming at *integrated water management solutions* and *protection and restoration of water related ecosystems.* The existing literature review reveals the need of sustainable water management practices of the indigenous local communities across the globe (Feyen, Shannon & Neville, 2008). At present, there is a lapse in the translation of the traditional wisdom of vernacular water management system of the past to the current practices and way of living. It is further researched that the natural water features, which used to be integral to the origin and evolution of urban landscapes, have been reduced to unwanted backyards in the present cities. Against this context, the present research aims to: (a) identify the key aspects of prevalent traditional water management system; (b) analyse its role as an integrated urban water management system and its impact on urban settlements. To meet the need of the aforesaid objectives, this research has selected the Bangalore region, which is known as the 'Region of Thousand Tanks'. The city of Bangalore is located on a ridge in the Deccan Plateau, where it is drained by three valleys, which feed into the tributaries of the river Cauvery. Since ages, this city sustains on a system of interlinking water-tanks, connected through a network of water-channels or storm-water drainage system. This network was constructed, following the topography of the city's location and terrain.

The insensitive planning approaches catering to the future urban development trends of Bangalore, have resulted in the ignorance of urban water-bodies among the stakeholders. The present work considers primary research as a key aspect to get a holistic idea of the context. Pilot survey, expert opinion survey through structured and semi-structured interviews were adopted for this research. This paper compares the historical water-management system with its current scenario, to analyse the impacts of compatible and non-compatible land-uses on the urban water-bodies, in the current context of Bangalore. The collated data reflects on sustainability as a way of living, practiced by indigenous communities, which advocates safeguarding the natural resources and symbiotic living of the local settlements. Further, analysis of the critical factors (affecting the sustenance of urban water-bodies), guides in arriving at solutions, which are inspired by indigenous past practices. This research contributes towards identification of (a) the transformation patterns of urban water-bodies and their surroundings and (b) the

factors responsible for the degradation of Bangalore's historical water-management system. This comprehensive approach should aid in the detection and prevention of further damage to its present water network. This research would be useful for researchers, policymakers, urban planners and stakeholders at various levels, to enhance the quality of urban water-bodies.

Submission ID: 143

Application of GIS towards Disaster & Climate Resilient WASH Service Delivery in Nepal

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Abstract

The access to sustainable and reliable water sanitation (WASH) services has been affected by the impacts of climate change. According to the 2022 GLAAS report, approximately 40% of the countries have incorporated measures to address climate change risks to WASH services in their national WASH policies or plans. Nepal is one of the vulnerable countries to climate change, yet it is not adequately prepared for its impacts.

This paper explores the use of Geographical Information System (GIS) in enhancing the resilience of WASH services to disaster and climate change, specifically by building the capacity of the government officials and water sanitation users at the municipal level. It aims at understanding the local context and creating a critical WASH infrastructure map to contribute towards planning the resilient WASH system. The study includes a methodology that involve secondary literature review on GIS usage in climate induced disaster in urban area and primary data collection through consultation with the relevant municipal and national WASH portal officials.

The study found out that a critical WASH infrastructure map prepared with involvement of local water sanitation users and municipality officials provides a realistic ground information and updates. To develop a comprehensive critical WASH infrastructure map, geo-tagged location of water and sanitation infrastructures, along with potential hazard areas, is collected using 'Kobo toolbox'. Subsequently, this data is mapped using GIS and verified by local government officials and water sanitation users. With the aim to integrate these datasets in the national N-WASH portal, the data formats are aligned with the N-WASH database format. This data integration into the national portal will contribute to the development of knowledge & skills based on evidence, fostering political will and prioritization for climate resilient WASH service delivery. This aligns with the recommended prioritized activity outlined in the multi-stakeholder Climate Risk-Informed WASH Bottleneck Analysis of Nepal conducted in 2023.

Submission ID: 160

Towards Inclusive Urban Water Security: Capturing Community Perspectives on Water Risks in Emerging Cities to Enhance Resilience.

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Abstract

Urban water crisis is exacerbated due to global urbanization and climate change impacts. In response the evolving research paradigm for urban water security increasingly inculcates various associated water risks and a community-oriented scholarship to foster a more inclusive, resilient and sustainable urbanism. Hence, it becomes important to explore how community perceive their risks and which critical factors influence their resilience or vulnerability. The research was designed to empirically embed external and internal, biophysical and social factors of hydrometeorological risks, built-environment, socio-economic demographics, perceptions, attitudes participation and representation respectively in resilience framework. A case study of emerging city of Dehradun from India was selected where the research gathered social perspectives on the risks in a critical hotspot through a semi-structured

questionnaire from 452 respondents at the neighbourhood-level, and subsequently analysed them in exploratory and explanatory multi-factor analysis to identify the key determinants for urban water security. A close synergy between the socio-economic demography and the built-environment was observed. The results indicate that household income, education, and size; dwelling unit plot size and structure were the critical internal socio-spatial determinants for urban water security. The results for perceptions about external biophysical factors indicate that though there is a general high agreement on periodic months of water insecurity, a differential impact duration among various community groups is observed due to different internal and external social and biophysical factors. This is certainly significantly more for groups with low education and poor income. Participation and representation were an important enabling factor for urban water resilience. The results show very little percentage of participation and representation in the study area, yet, the role of participatory process was a crucial external social factor in determining urban water security for those who had good interaction with their local leaders or government agency, and received help and support in times of need. Based on the results. Effective participation and representation can enhance water security but its absence can adversely impact the livelihood, health or property of different groups even within one community which can lead to inequity and injustice. Thus, the perception and attitudes towards external biophysical factors are influenced not only by internal biophysical and social factors but also by external social factors. Hence, in order to foster a 'just' and equitable resilient strategies it is important to consider the internal social and biophysical factors in conjunction with participatory processes that enable better inclusion while effectively capturing the perceptions as well as aspirations of the community.

Submission ID: 205

Resilience Governance of Shanghai's Tourism in the Post-COVID-19 Era

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Abstract

Resilience, as a pivotal concept in confronting environmental hazards and disasters, has experienced robust development in the past decade,

emerging as a focal point of contemporary scholarly inquiry. Previous academic investigations, spanning from seismic events, floods, and hurricanes to strategies for disaster mitigation within socio-ecological systems and spatial planning, have progressively expanded to encompass diverse dimensions such as resilient urbanism, community resilience, and industrial resilience. However, since 2020, the onset of the COVID-19 pandemic, deemed the most significant global crisis since World War II, has posed formidable challenges and crises across political, economic, and societal domains. Preexisting resilience frameworks and risk society paradigms, formulated to address global climate change and environmental hazards, now confront a rigorous test in the face of the COVID-19 global pandemic.

Amidst these circumstances, world cities, deeply entrenched within the fabric of economic globalization, have notably borne the brunt of these impacts. Their international economic and trade engagements, cross-border flows of population and finance, and tourism sectors have experienced profound disruptions, with the tourism industry being particularly affected. This study focuses on Shanghai, representing one of these world cities, and investigates its tourism industry. Utilizing the TOPSIS model, the study constructs a resilience assessment framework for the tourism industry in the 'post-pandemic era', evaluating Shanghai's tourism sector's capacity for response, adaptation, and transformation since 2019 through the lens of Actor-Network Theory (ANT), thereby reconstituting the resilience triad of resistance, recovery, and transformation underpinning resilient tourism development.

Findings from this study reveal that Shanghai's diversified economic structure and rich tourism resource base have underpinned its capacity to withstand the impacts of the COVID-19 pandemic. Proactive revitalization policies and agile adjustments in local government tourism strategies have guided tourism stakeholders towards the development of diversified tourism products tailored to the unique features of COVID-19, fostering a secure domestic tourist market and endowing Shanghai's resilient tourism sector with adequate recovery resilience amidst 'zero-COVID' policies. In the post-pandemic era, the convergence of online and offline realms, coupled with policy interventions and stakeholder engagements, will drive the tourism sector towards a more diversified trajectory of transformative redevelopment.

Track 6c Sustainable Cities and Communities - The power of art and culture in sustainable cities and communities

Submission ID: 34

Fostering Sustainability through Art and Culture: Exploring the Impact of Yakshagana.

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Abstract

India's art and cultural wealth stands as indispensable elements intricately woven into the fabric of our nation's heritage over time. Culture plays a pivotal role in the development of any nation, embodying a collective set of attitudes, values, goals, and practices. Its influence extends across various realms, with art and culture evident in nearly all economic, social, environmental, political, educational and other activities. The cultural wealth of India is intricate and diverse, embracing a wide range of traditions and expressions across various facets of art like dance, music, art and craft, culinary traditions, festivals, architectural marvels, literature, textiles, and numerous other elements. To facilitate effective community development, a comprehensive understanding of folk culture, customs, and traditions is imperative.

Folk dances play a pivotal role in India's rich tradition and culture, holding enduring significance. Yakshagana, a traditional theatrical art form originating from Karnataka, a southern state in India, boasts a documented history spanning over 500 years. This powerful medium of folk communication relies on a combination of independent creative elements, including gestures, facial expressions, body movement, costuming, make-up, music, dance, and dialogue. Indeed, Yakshagana literally translates to the "song (gana) of the yaksha (nature spirits)." This paper seeks to analyze and establish connections between the themes of the Yakshagana and the representation of nature spirits, exploring their impact on fostering environmental consciousness.

Yakshagana has been employed extensively as a means of conveying

themes related to various societal issues, including health, environment, literacy, family planning, women empowerment, social harmony, and agricultural development. The central focus in leveraging Yakshagana for environmental awareness is to weave storytelling with messages addressing environmental concerns, integrate traditional ecological wisdom, champion green initiatives, and incorporate sustainable practices into performances. The study focuses on a case analysis centered around the narrative titled “Vayu Vijaya” (The Triumph of the Wind). The present research aims to investigate how Yakshagana can effectively promote environmental consciousness through the vibrant medium of Yakshagana, a traditional folklore of Karnataka.

Submission ID: 60

Audience development management in the context of sustainability in cultural institutions

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Abstract

The role of the audience as an active partner in cultural dialogue is becoming increasingly important today. As recently as the 1990s, audiences were mainly understood as recipients of culture, assumed to be passive, who at most “voted with their feet”, taking advantage of a given offer or not. The main attention of cultural institutions was directed towards marketing, which used increasingly sophisticated tools and techniques to attract audiences. The contemporary discussion on the role and place of the audience in the strategic management of a cultural institution is the result of discussions and successive international agreements related to the achievement of the Sustainable Development Goals, that have taken place since the 1970s. At the same time, issues related specifically to audience development have been present in the scholarly discourse in a scattered way. The main focus has been on the changing participation in culture, the development of the concept of audience development, or placing it in the context of social change - less often does it appear in the understanding of the management of cultural institutions and the challenges they meet. Meanwhile - from the other side of the spectrum, the adaptation of the institution’s strategy

to public policy goals and sustainability strategies can be observed in management practice.

The research was based on the results of a preliminary analysis, which showed that, in a declarative way, cultural institutions consider the audience and its development as a strategic goal. Institutions pursue their objectives in various ways, including artistic activities (investing in the development of human capital, which builds social capital), and managing their relationship with the audience (e.g. through marketing or educational activities). In their assumption, they are supposed to lead to maintaining a kind of balance and equilibrium in the functioning of a cultural institution in its social environment. In the conducted research, it was decided to verify this approach and take a closer look at the management practices that are important for achieving the strategic goals of cultural institutions, including maintaining a dialogue with the audience and building relations (the entire research will be presented in the scientific monograph that is being prepared). The results of the statistical analyses and qualitative research indicated a gap between the awareness of the importance of the audience and efforts aimed to effectively achieve their own strategic goals and public policy objectives. It results, among other things, in an underestimation of the audience's influence on the functioning of cultural institutions, a lack of competence (especially in the use of management tools and techniques), or a lack of awareness of the responsibility of cultural institutions towards society. The search for balance, however, forces institutions to work towards actual, rather than declarative, cooperation with the public, to perceive it as a co-creator of cultural activities, or to search for effective and efficient management tools.

Submission ID: 61

Volunteering as a synergy of cultural and social capital in building local identity

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Abstract

Human capital theories have evolved to a more comprehensive concept that encompasses health, skills, and competencies, which focus on

people's attributes and identity as catalysts for social, cultural, and economic change. This can be observed in how small communities outside of large urban areas function. Contemporary rural or urban-rural communities are diverse, and the individuals who create the local community influence the development and well-being of the residents. These communities form informal or formal organizational structures that allow them to undertake various activities aimed at their own development, the acquisition of competencies, knowledge, or skills, and the field of action is frequently connected with the local heritage. Thus, we can observe a traditional approach using the history and traditions of the region and the creation of new heritage, which draws more or less from local tradition. In both cases, the activity is based on the voluntary and selfless commitment of individuals. The contemporary perception of volunteering is moving towards adaptation for achieving common goals homelands, creating a new perspective for building a belief in the attractiveness of a place among both residents and visitors. In this way, human capital creates social capital and contributes to sustainable development. The following topic was derived from research on volunteering, will be published in a scientific monograph, and for this text, we have extracted the proposed component that is related to the development of local activities based on the involvement of individual residents. This component is reflected in the present-day functioning of rural housewives' circles in Poland (KGWs) and local activity centers (CALs). KGWs are a specific form of activity that originated in the 19th century and continued to exist during the communist era. However, they were reduced to supplementing the offer of village events. Now, they are being revitalized. CALs, on the other hand, are a relatively new type of form, resulting from a systemic approach to activating local communities. To obtain a greater saturation of data and to make it more representative, we supplemented the earlier research by interviewing representatives of KGWs and CALs. The changes that are happening in local communities make it necessary to adopt a new approach to volunteering, one that emphasizes its role as a desirable form of civic activity, a tool for social integration, and a bonding dimension of voluntary activity. This type of volunteering is characterized by its care for tradition and historical continuity, local identity, and the symbolism of what is socially valued. The symbiosis in the approach to understanding socially important issues presents opportunities for cooperation, inclusive solutions, and practices that build resilience in global society using human and social capital.The UN Agenda 2030 identifies building social dialogue, social

support, and trust between public actors and their partners as one of its primary objectives for the achievement of development goals. When viewed through the lens of human capital, volunteering can help convince stakeholders to create the right conditions for the formation of specific attitudes and behaviors needed to achieve objectives in line with the public interest.

Submission ID: 141

Cultural Sustainability and Cultural Ecosystems Related Aspirations and Emphases in European and Ibero-American Capital of Culture Programmes

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Abstract

The European and the Ibero-American Capital of Culture (ECoC and IACoC) programmes are the world's longest running Capital of Culture (CoC) initiatives. The ECoC was launched in 1985 with the Greek capital city Athens as the first title holder. Six years later, in 1991, Bogotá in Colombia was the first city to celebrate its IACoC year. Over the years, many changes and developments have occurred in both CoC programmes, not just regarding their organisational and funding models but also in their selection criteria, aspirations, and priorities concerning sustainability.

In my proposed presentation, which is based on the second article of my PhD dissertation, I will analyse how the cultural sustainability and cultural ecosystems related criteria and goals have developed over time in the official agendas of the ECoC and IACoC. In addition, I will study how such developments are reflected in the programmes and emphases of designated Nordic and Latin American CoC cities in the 2000s. I am interested in how the two concepts are addressed and if and how they are seen as interlinked in the ECoC and IACoC agendas and programmes.

In my own understanding of cultural sustainability, I refer to both the internal sustainability of the cultural sector as well as to the wider role of culture in advancing sustainability aims in other areas. I study cultural

sustainability as an ecosystemic question, by which I mean that I approach the cultural sector as an ecosystem, consisting of various relationships, networks, interconnections, interdependencies, and exchanges that take place and have an impact at different levels, e.g., within and between particular cultural ecosystems, with different societal areas and policy sectors, and between local, national, and international levels.

The article is still a work-in-progress, and the findings to be presented at the conference will be preliminary. The data consist of existing documents, including meeting agendas, legislative acts, declarations, and websites of the ECoC and IACoC, as well as official programme documents and reports of designated CoC cities. To analyse the data, I will use the frame analysis method to study how the concepts and understandings of cultural sustainability and cultural ecosystems are framed, i.e., how they are interpreted and constructed in the context of the CoC programmes.

The paper is closely related to sustainable development questions, approaching them in the context of culture and cultural policy. Although not directly linked to a specific SDG, several goals (3, 8, 9, 10, 11, 12, 13, 16, 17) are very relevant from the point of view of CoCs. The research is also relevant for the main theme of the conference: it specifically approaches cultural sustainability through an ecosystemic lens, highlighting connectivities at different levels as essential sustainability considerations. Moreover, I aim to actively and consciously challenge the Western- and anthropocentric perspectives that still prevail in the academic discussion on (cultural) sustainability and, I believe, limit our understanding of sustainability issues and potential solutions.

Submission ID: 148

The affective power of art: The meat norm and affective communities in the debate around Finnish artistic group Gustafsson&Haapoja's *Pigs* exhibition in Seinäjoki, Finland.

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Abstract

In Finland and in many societies where meat is produced on an industrial

scale, a change in the role of meat as a cultural food norm is needed for a sustainable, climate-resilient and more ethical food system. To maintain the meat norm, people attach their emotional status to eating and producing meat. Emotions bring certain subjects together - forming an affective community - and turn them against others.

In this paper, I study the unveiling of affective communities in the events and discourses around the Finnish artistic group Gustafsson&Haapoja's solo show Pigs (2021). Consisting of three conceptual installations, the exhibition discussed ecological and ethical questions concerning pork production and questioned the oppression of pigs as material. In 2021, the exhibition was on display in a municipal contemporary art gallery Kunsthalle Seinäjoki, Finland, where I conducted ethnographic fieldwork, and where I also worked as a curator. Seinäjoki is a mid-size town in a meat-producing district in Western Finland. The exhibition generated extensive media coverage, and sparked heated debate through, for instance, provoking the neighbouring town of Kurikka to ban the exhibition from school adolescents.

Drawing from data that consist of my field journal and opinion writings published concerning the exhibition, I aim to increase understanding of the affective communities connected to meat production and meat-eating. I further strive to find out how art can make us more aware of animals, make cracks in the meat norm, and pursue change through awareness. As I was one of the organizers of the exhibition, and therefore, an agent in the events, I use autoethnography as part of a wider ethnographic approach in this study.

In the events associated with Pigs, communities linked to the normative status of pork production can be seen as affective communities that, in responding to the exhibition, are reacting to signals and proposals for social change. The media frenzy caused by the exhibition is largely attached to the affective practices of defending the meat norm. The themes of death and killing arise as central notions. In addressing and tackling injustice in society the politics of mourning should be considered. When the authors in my data mourned for the farm pigs represented in the artworks, they considered the pigs as once living beings, not as material or as "meat" or "livestock". Questioning a norm can change the affective relationship with the norm when our emotional investment starts to change. My findings indicate that the connections to affective

communities make the change more complex: we should be more aware of the animal in a more tangible way and that awareness can be pursued through experiencing art.

This abstract relates to the following SDGs and SDG targets: Sustainable cities and communities (Target 11.6), Responsible consumption and production (Target 12.8) and Climate Action (Target 13.3), and contributes to the conference theme by providing new insights into the power artistic expression can have on cultural change and how art can provoke societal discussion on urgent matters.

Submission ID: 162

The Preservation and Evolution of Cultural Assets in Tamsui: Shaping the Vision of Sustainable Development Through Art and Literature

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Abstract

Tamsui is an ancient town in Taiwan, with rich historical and cultural landscapes and architecture. However, since the 1970s, many valuable street spaces, riverside environments, and historical buildings have been destroyed due to urban development and tourism pressures. Nevertheless, over the past 50 years, many local historians, enthusiasts, artists, and writers have been concerned about the town's development and future. This paper analyzes the preservation and evolution of the town's cultural assets environment from 1970 to 2020, focusing on how art and literature have been used to shape the vision of sustainable development in Tamsui. The research methodology primarily employs historical research methods, focusing on analyzing how literature and art express views on urban landscape destruction. Three periods are discussed using case studies: the controversy over the Tamsui Fort San Domingo incident, the development of the Riverside Expressway, and the preservation of Chongjian street in Tamsui. The analysis examines how literature and art have influenced these processes. The research concludes that: 1. The construction of a sustainable environment in Tamsui involves a process of mutual struggle among various

stakeholders. However, it is the concern and efforts of caregivers that can change the dilemma of preservation and development in the face of urban development and tourism pressures. 2. Through the study cases, it is found that the improvement of Tamsui's urban environment for sustainable development requires discourse formation within the system, but external forces still need to be maintained. 3. The vision of sustainable development shaped by art and literature in Tamsui enables us to see new relationships amid historical and present realities.

Submission ID: 213

Theatre-based initiatives for urban sustainability transformation: a literature review

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Abstract

Global environmental and social challenges, such as climate change, biodiversity loss, natural resources use and social equity, urge the need to protect ecosystems and build inclusive societies. Cities and urban systems play a paramount role in such paradigm change as they are at the forefront of global transformation. Scholars in urban transformations and scholars in socio-ecological systems have shown the importance of agency and interaction of individuals for transformation as one of the critical components for fostering bottom-up approaches towards a sustainable urban. The concept of transformative space is emerging to develop the necessary agency and interaction. Transformative spaces are transdisciplinary solution-oriented collaborative environments enabling dialogue, reflection, and reflexive learning. There are many approaches for experimentation in these spaces, and arts-based research is developing in the field. Scholars have recently targeted theatre as a transformative engagement approach.

Performing theatre promotes creativity and resourceful solutions and consuming theatre improves empathy, changes attitudes, and promotes pro-social behaviour. However, in transformative research, theatre

(and broadly arts) is often used as a facilitation procedure where the researcher guides the participants through the process. Theatre (and arts) is seen as a more engaging technique, but there is always the researcher's intervention. There is little work on theatre (and drama) for triggering urban transformation imaginaries, with few interventions from a researcher. This study aims to address these gaps by exploring, expanding, and assessing the role of theatre as a transformative space for urban socio-ecological systems.

The research will do a literature review of theatre-based initiatives for urban transformations. This research seeks to contribute to our understanding of both bottom-up and top-down initiatives using theatre as a transformative space for urban socio-ecological systems. The findings will shed light on the efficacy of theatre in fostering urban transformation imaginaries, the dynamics of power within these performances, and the perceptions of spectators regarding the envisioned urban transformation futures. Overall, by focusing on theatre-based initiatives for urban sustainability transformation this research contributes to SDG 11.3 (enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management). Also, theatre as a practice connects people's livelihood and their culture, in line with the conference's theme.

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Submission ID: 220

Temporary and mobile art initiatives – an opportunity for large-scale urban development projects and beyond

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Abstract

Flemingsberg is suburban setting in southern Stockholm characterized by infrastructure elements as a major railroad to the capital passes right through, accompanied by roads and large-scale houses that accommodate a major hospital, district court and other public facilities as well as residents. The area is today fragmented, with roots in the so called 'million program' a housing project of the 60s and 70s, and is nowadays characterized by segregation, physical and social barriers, and with related socio-economic challenges.

In coming decades, central parts of Flemingsberg will become a construction site, as an emerging regional city centre takes shape in the 'midst of the fragmentation'. To cope with emerging challenges: the large-scale construction phase, and for pro-active preparations of the future, different types of initiatives will be undertaken. A mobile art initiative is one of them.

This initiative is based on opinions expressed by current residents. According to them, the neighborhoods have been forgotten in terms of both maintenance and access to culture and services. There are also present concerns and criticisms regarding the development that will be carried out in Flemingsberg, as well as a desire of the community to be more involved in the planning of the new city centre. It is furthermore related the municipality's responsibilities to support inhabitants' access to art and culture as well as to private real estate company's interest in creating value. All in all, the study we are conducting suggests that art initiatives are both an important means of community participation in the development of urban space, as well as a possible way of (re-) generating the living idea of the commons.

The purpose of our paper is to present and reflect upon concepts of permanence and mobility/temporality in art, in the designed living environment and to explore if and how art can contribute to resilience in large-scale urban development projects. Empirically, a municipal initiated project will be in focus, in which artists, residents and urban construction actors will be invited to participate.

As a way of triangulating our reflections, we will include the voice of a London based multidisciplinary artist, Dominika Kieruzel, who has been working with similar challenges since more than a decade in the

suburb of Thamesmead which can be said quite similar to Flemingsberg in several important regards.

In this project, there is a special interest in art and culture related to participation and co-creation as fundaments for a participatory and democratic society, the commons, public benefit. We believe that such an approach to the commons may help in generating of a sense of safety and belonging in a suburban setting with socio economic and segregation challenges.

This paper relates to a number of SDGs. We relate to SDG 11 *Sustainable cities*. We furthermore lean on UNESCO's thematic indicators for culture in the 2030 Agenda; culture and participation (SDG 9,10,11,16), knowledge and skills (SDG 4, 8, 9, 12, 13), prosperity and livelihood (8, 10, 11), environment and resilience (2, 6, 9, 11, 12, 13, 14, 15, 16).

Submission ID: 229

Unveling Cultural Gems: Exploring the Intangible Cultural Heritages of the Limbu Community for Developing Cultural Tourism in Darap, Sikkim

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Abstract

Sikkim is a north-eastern state in India. Sikkim offers mesmerizing views of the Himalayas and thus, this state is very famous among the tourists and nature lovers. Tourism is one of the most important contributors to the GDP of Sikkim. A large number of residents of Sikkim are thus involved in the tourism sector, either directly or indirectly. This state has a rich cultural heritage. Numerous ethnic communities are present in Sikkim. Among these communities, Nepali, Lepcha and Bhutia communities are predominant in this state. Every ethnic community of Sikkim is different from the other communities. Each ethnic community has different customs and traditions. Limbu is a tribe of Sikkim that belongs to the Nepali ethnic community. Limbu tribe has unique cultural practices, customs, traditions etc. This tribe has its own festivals, traditional music and dance forms, food, fairs etc. that make this tribe unique in terms of culture and distinguish it from the other tribes and ethnic communities

of Sikkim. Darap is a village in Gyalshing district (earlier West Sikkim district). It is only 8 km away from Pelling, a famous tourist destination. Darap is mostly occupied by the Limbu population. Tourism can be developed in Darap based on the exclusive cultural elements of the Limbu tribe. Tourism will also support the locals of Darap by providing job opportunities to them. Thus, tourism will eventually help the economy of Darap to flourish. This research work will try to understand the intangible cultural identities of the Limbu community of Darap and their potential appeal to tourists. This research work will be based on quantitative approach. The primary data has been collected through a predefined set of questionnaire and survey method has been used to collect the primary data for investigating the potential ways for using intangible cultural heritages of the Limbu community for developing sustainable cultural tourism practices in Darap.

Submission ID: 240

Studying the Cultural Landscape and Economy of Kathputli Colony's 'Street Performers' in Delhi.

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Abstract

Delhi is home to many artists and laborers from other states, and as a metropolitan area, it offers numerous opportunities for outsiders to make a living. Delhi's Kathputli colony, which dates back to the 1950s, is well-known for its street performers, the majority of whom are from the state of Rajasthan. These street artists execute a variety of Rajasthani traditional folk arts for their livelihood. Especially recognized for its Kathputli art (puppeteers), but it is also the home of various musicians, dancers, acrobats, magicians, snake charmers and other folk artists.

Here, providing a comprehensive and in-depth explanation of the field is the goal. To go deeper into the issue or subject, a qualitative approach has been applied in the current study. The study examines their cultural landscape, where these street performers' economy is primarily focused on achieving specific objectives. The Delhi Development Authority

initially demolished the illegal colony they had created in accordance with the Delhi Redevelopment Plan. The majority of them were relocated to temporary transit camps in Anand Parbat, where they are still residing in squalid and degraded conditions. They used to perform in most open, public locations, but those spaces are now mostly unavailable, therefore their economy has faced several challenges and changed with time. A number of art forms performed by these street performers have vanished, while a few others are progressively disappearing and becoming less prevalent. The study's overall focus is on the cultural landscape and cultural economy of street performers, which have changed significantly over the course of their existence. Many artisans have already left Delhi as a result of the difficulties and issues they encountered, and those who have managed to stay are working hard to make ends meet as they wait for the commitments given by the Government of Delhi. This paper will also address the sustainable approaches to the rehabilitation and relocation of these artists, as well as the revival of traditional folk forms of art.

Submission ID: 266

The design practice exploration of work well-being in sustainable development theory in urban public art: A case study of 2023 Changsha Public Art Plan "Are We Becoming Labour Machines" design project

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Abstract

Public art is an important part of urban art and culture, which directly affects the thinking and behavior of local residents. With the sustainable design concept elicited by sustainable development theory, public art can inspire people's resonance through speculative interactive installation, so as to pay more attention to sustainable development. Through reflection on design, a more sustainable society can be created. The well-being of work, such as the protection of labor rights and the right concept of work, is an important part of the concept of sustainable development, which affects human well-being and the future.

Changsha Public Art Project "GaZang" is a public art project supported

by the local government and organized by UCCA to awaken the vitality of the city and the sense of identity of residents. As part of this, my project "Are We Becoming Labour Machines" responds to the SDG with the sustainable design theory, designing a public art interactive installation with the theme of well-being at work, inviting the audience to complete ridiculously repetitive tasks, rolling with repetitive music generated by repetitive work, and testing whether people are working machines, so as to arouse people's reflection on the current work ethics.

This paper will be carried out from the following parts:

Exploration of the relationship between sustainable development concept and public art;

The significance of work well-being as sustainable development concept in public art;

Work well-being in public art application case introduction, which contains work well-being research, design development, design, audience response and feedback, reflection and discussion.

My project responds to SDG+Target 8.8

Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.

Q: How the proposed contribution relates to the theme of the Conference?

A: As stated in the introduction to the Conference, "sustainability is a way of living" that is not only environmental, but also social and cultural. My research and practice are related to the theme of the conference as follows: 1)Public art, as a medium, can effectively spread ideas and arouse thinking, and it provides a possibility to publicize the Sustainable Development Goal. 2)Well-being at work is an important part of the concept of sustainable development, and the research in this paper reminds people to pay attention to well-being at work and achieve a happier life. 3)Through sustainable living concepts and ways to make people concerned about the environment, society and culture.

Track Seven

Social-economic Aspects of Sustainable Development

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 7a Social-economic Aspects of Sustainable Development - Global inequality and poverty

Submission ID: 85

Impact of Air Pollution on Health and Quality of Life of Individuals in Low-to-Middle Income Countries (LMICs): a review

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Abstract

Air pollution, both indoor and outdoor, threatens the health of millions of people worldwide as it results in significant health-related consequences. In the 2019 Global Burden of Disease study, it was reported that air pollution from fine particulate matter had resulted in 6.4 million premature deaths. Furthermore, air pollution also imposes a significant cost burden on countries, largely Low-to-Middle-Income countries (LMICs), who already suffer from declining health-related quality of life. Disparities in outcomes have only increased as particulate matter concentrations have decreased in developed countries and increased in developing countries. However, research on the consequences of air pollution on health and quality of life has been predominantly largely focused on High-Income Countries (HICs). Few reviews have synthesized the associations between air pollution and health and quality of life in LMICs. We conducted a systematic review of peer-reviewed articles with the aim of summarizing the current research regarding evidence regarding the impact of air pollution on the health and quality of life of individuals in LMICs. Electronic and manual searches were performed until November 2023. From an initial search of the PubMed database and Google online database using the inclusion criteria, we identified 74 articles (50 from PubMed and 24 from the Google database). Upon further screening of these 74 articles, we excluded 24 (32%) studies due to duplicates (n=12), non-English publications (n=4), and abstract-only publications (n=8). Out of these 50 articles, a further evaluation excluded more (n=20) for having not met the current literature review objectives. The final number of studies that were selected for this review was 30. The literature shows that the negative impacts of air pollution on health and quality of life related to LMICs are greater compared to High-Income Countries. However, due to resource limitations, LMICs lack the health resources and medical infrastructure to respond to the global trend of

increased air pollution and lower air quality in this environmental crisis. Therefore, well-designed, cost-effective, and monitored inventions are required to combat this crisis. Furthermore, additional research to monitor the air quality of life is required to understand and identify policy changes that can decrease region-specific and population-driven impacts of air pollution.

Submission ID: 276

The use of trend and mathematical simulation tools in participatory water management in Brazil – the necessary capacity building of members of the Hydrographic Basin Committees and its application to SDG 6

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Abstract

The National Water Resources Policy in Brazil has enabled a decentralized and participatory water management through basin committees. These spaces bring together community representatives for discussions and decisions related to water resources management, sharing responsibilities with the government. Their duties include approving and monitoring water resources plans, as well as participating in decisions regarding other instruments. To fulfill these functions, it is essential to train committee members, providing them with effective tools such as trend analysis and mathematical simulation models (like QUAL-UFMG and SWAT). These tools allow for the analysis of monitoring data, creation of scenarios, and evaluation of water quality, directly contributing to decentralized and participatory management. There are ten (10) interstate Basin Committees and approximately two hundred and twenty-three (223) state Basin Committees in Brazil. The institutional arrangement involves a high number of different types of representatives, including people with higher education and others with practical experience. By producing scientific data and translating it adequately to civil society representatives in these committees, the aim is to improve the quality of decisions made by them, enhancing qualitative debates and consequently, qualitative

decisions as well. Furthermore, Sustainable Development Goal (SDG) 6, which aims to ensure clean water and sanitation for all, aligns with these efforts. Through the use of these tools, especially the ones presented in this study, it will contribute to the training of committee members who will work with integrated water resources management (indicator 6.5.1) and with a more assertive participation of local communities through indicator 6.b.1.

Track 7b Social-economic Aspects of Sustainable Development - The future of employment and good work

Submission ID: 40

Common Good HRM & Sustainability-Oriented Innovation

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Abstract

Sustainability-oriented innovation (SOI) involves planned organizational changes in its products, processes, or practices in response to the call for an active role of organizations in tackling environmental and societal challenges and to create and realizing social and environmental value in addition to economic returns.

Environmental innovation refers to the introduction of any new or significantly improved product or service, manufacturing process, reform, or marketing solution that reduces the use of natural resources and the release of hazardous materials throughout the business life cycle (Arundel & Kemp, 2009; Carrillo-Hermosilla, del González, & Könnölä, 2009; Kemp, 2010). Following the categorization of Atuahene-Gima (2003), Leitner et al. (2010), Chen et al. (2014), and Kennedy, Whiteman, and van den Ende (2017), this study classifies environmental innovation into incremental environmental innovation and radical environmental innovation. The former effectively improves the efficiency of the utilization of existing resources, while the latter generates new knowledge and technology to

support environmental protection behavior (Kennedy et al., 2017).

Grand challenges such as environmental degradation and social inequality and intranational initiatives such as United Nation's sustainable development goals have led businesses to play a proactive role and adjust their processes in order to address environmental and social challenges. Consequently, in the field of human resource management (HRM), we have been observing the development of concepts such as socially responsible HRM (i.e. recruitment and selection, development, deployment, and release of employees in a socially responsible and economically appropriate manner (Thom & Zaugg 2004)) and green HRM (i.e. increasing employees' environmental awareness and behavior (Renwick et al. 2016)). The concept of common good HRM (CGHRM) is recently been introduced as a paradigm shift in the field. Principles of CGHRM include (1) the contribution of HR in solving societal grand challenges such as climate change, corruption, migration, poverty, or youth unemployment (2) equal and fair employment relationships, (3) providing all business stakeholders with opportunities for "*participation and democratic workplace representation to achieve locally adapted HR solutions"* and (4) "*protecting human needs for employment, which includes security, safety, and meaningful work*" (Aust et al. 2020).

Although previous studies have improved our understanding of common good HRM, we still lack a solid understanding of its performance outcomes. For example, to date, it is not clear how a firm's level of CGHRM fosters innovation. Some researchers have studied the effects of HRM practices and processes on different types of performance but CGHRM as a new concept in HRM is less studied. The firm outcome this paper focuses on is innovation, particularly sustainability-oriented innovation. Although recently some researchers have argued that firms' engagement in sustainable HRM can improve their performance (), the innovation performance and the mechanism through which CGHRM fosters innovation are lacking. Thus, our study closes these gaps in the HR management literature.

Submission ID: 54

At arm's length: migrants, staffing agencies and the commodification of labour in a high-income setting

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Abstract

Precarious work and labour exploitation is a global phenomenon. High-income countries of the welfare state sort are by no means immune to practices that verge on or indeed imply modern slavery. What might differentiate the global North from the global South, however, is that it is still often workers from the latter that are at risk. In parallel to the mounting incidence of non-standard employment – temporary work, zero-hour contracts, fake self-employment etc. – shifts in the relations of employers to their work force seem to pave the way for viewing labour as a mere commodity. This paper is addressed to this issue. It moves beyond the discussion of geographically extended supply chains and the risk for a race to the bottom at the expense of labour in foreign locations; it does so by turning the magnifying glass to settings where labour-intensive production activities take place in the home market. Specifically, it focuses on the role of outsourcing, intermediaries and above all the institutions (in the sense of rules and social norms) that enable dominant firms to turn a blind eye to the fate of contingent workers, thereby contributing to the ongoing normalisation of workforce exploitation also in high-income countries that else have an enviable reputation for decent working conditions.

Using Sweden as an illustrative case, it sheds light on how changes in policies, institutions and the organisation of industries might engender or support precarious work as integral to business models (LeBaron 2021) or even allow modern slavery as a management practice (Crane 2013). Although it is not necessarily the case that only migrant workers are at risk, our focus is the sourcing of labour from abroad and how this is expedited by intermediaries that take advantage of changes in policy and legislation.

We contribute to discussions on precarious work and sustainable

development where the quality of the institutional environment is seen as a key factor (Moussa *et al*. 2022). Here, SDG 8 and its target 8.5 are particularly salient. However, it is not only formal rules that appear to pave the way for the recruitment of workers who are made to accept working conditions that are not in line with local norms. In addition to the desire or dire need of workers to find more remunerative sources of income than available back home, other processes can be found to be at work.

Submission ID: 281

The neoliberal university in Germany: A systematic review

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Abstract

Universities' neoliberalization has become an influential research lens in management and organization studies. A neoliberal-university-lens offers scholars to use neoliberal-related concepts—such as competition, profit maximization, or growth—to generate innovative insights about managerial and organizational phenomena within academia. Furthermore, insights on the micro level can be investigated (e.g. consequences for academics). Such insights are important because seeing universities decoupled from neoliberalization creates blind spots and distortions. Thus, scholars increasingly use a neoliberal-university-lens to advance research in various areas, including gender studies, managerialism, labor studies, critical management studies, and higher education studies.

Research has considered the evolving patterns of the neoliberal university (Aguinis et al., 2020; Bottrell & Manathunga, 2019; Lorenz, 2012) and established its importance for management and organization studies. Nevertheless, different researchers have various, implicit, and often narrow ideas of what characterizes a neoliberal university, where neoliberalization is relevant, and how it matters for universities and their members. Moreover, there is no common terminology concerning the neoliberal university (e.g., 'corporate university', 'academic capitalism' or 'toxic university'). However, "a diversity of approaches and assumptions

implies richness" (Blagoev et al., 2023: p. 2). But if approaches and assumptions remain implicit, such diversity can prevent researchers from building integratively on each other's work (Blagoev et al., 2023) and ultimately hinder them from filling research gaps of the neoliberal university.

Therefore, a review is timely, necessary, and valuable to clarify the neoliberal university in Germany, identify its dominant manifestations, and synthesize findings from the existing literature in order to outline future directions. This paper offers the first systematic review of the diverse body of research. I undertake this review guided by three questions: (1) What is the current status of the literature on the dominant manifestations of the neoliberal university in Germany? (2) What is the trajectory of its thematic development? (3) What are the implications for future research suggested by my findings?

I followed established guidelines for systematic reviews when conducting my review (Kunisch et al., 2023; Simsek, Fox, & Heavey, 2023; Tranfield et al., 2003) to make my results reliable, verifiable, and reproducible (Booth et al., 2012). My approach includes several steps.

As this is a work in progress paper and I have not yet completed my literature review, it is unfortunately not possible to report the main results at this stage. However, observations on my part have already been made. Firstly, I was able to observe that there is no consistent terminology regarding the construct of the neoliberal university. This is also my first contribution: my review creates clarity in the field of the neoliberal university. Secondly, I can already see that many manifestations of the neoliberal university thwart the Humboldtian ideal. Consequently, my second contribution is: my review helps to illustrate the negative effects of a neoliberalized university on the Humboldtian ideal and thereby provide potential transferable results to audiences outside the German university system.

Track 7c Social-economic Aspects of Sustainable Development - Economic and financial innovations for sustainability transitions

Submission ID: 30

Where we have come from and where we will go – a literature review of sustainability accounting

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Abstract

The three decades have witnessed the worsening environmental and social situations and at the same time, the rise of a force that goes against that tendency. It is a new branch of accounting –sustainability accounting. Sustainability accounting aims at changing the "game rules" of the business world and in this way influencing business behaviours, to make a concerted effort in the business sector towards a sustainable future. However, there are only a few literature reviews about the thirty years' development of sustainability accounting. This study will thus review the literatures from the early start of sustainability accounting, through its development progress, to reach the current status quo of this field, finding gaps and suggesting research directions. In other words, it will seek to find where we have come from and where we will go.

Sustainability accounting can be divided into two categories. The first one is general sustainability accounting methods. Through devising accounting tools, it takes the additional costs and income that a company's environmental and social activities have into consideration (Mathew 2000, p.189; Gray et al 1996, p.186; Bebbington and Gray 2001; Bebbington et al 2001). Another is specific sustainability accounting methods. It seeks to solve themed accounting issues, such as water, soil, climate and biodiversity (Bebbington et al. 2021, p.122). This study will research the two kinds of methods separately and finds research gaps in the two fields.

Moreover, practitioners have engaged actively in the process of making and implementing sustainability accounting methods, such as the Global

Reporting Initiative (GRI), the Science-Based Target Network (SBTN), the Corporate Sustainability Reporting Directive (CSRD), the System of Environmental Economic Accounting (SEEA) and the International Sustainability Standards Board (ISSB) standards. This study will also shed light on these accounting methods in practice and find research gaps and research directions.

This study has the potential of leading to undiscovered gaps and research directions for scholars and practitioners, to create a better future for sustainability and Sustainable Development Goals (SDGs).

Submission ID: 75

Navigating the Maze: Paradoxical Complexities around Materiality in Non-Financial Reporting - A Case Study

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Abstract

This paper aims to identify the paradoxical complexities influencing the reporting of material issues in non-financial reporting and to explore how an organisation manages them. The study uses a qualitative research approach - a single case study with a UK house builder. Using thematic data analysis, it examines the empirical data collected from 35 semi-structured interviews with internal and external stakeholders and from document analysis. The findings showed that in the case of voluntary sustainability reporting, industry-specific context drives the engagement with and focuses on material aspects in non-financial reporting. The study reveals the tensions between the paradoxical complexities that included early adopter position, a lack of understanding of the materiality definition, multiple stakeholders, goal balancing, and issues around the non-financial data quality. The observed responses of the organisation to these complexities were to create a sustainability ethos / inspiring culture, develop a sustainability team, actively manage external stakeholders, and set up materiality determination, data collection and feedback processes. The study adds to the organisational paradox

literature by showing that interconnectivity between complexities can be circular and create complexity loops, and/or form a complexities chain. The study offers insight into the possible management responses to and techniques for adapting double materiality reporting processes.

Submission ID: 98

Assuring Sustainability in a New Industrial Revolution

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Abstract

The world is simultaneously facing the aftermath of the second industrial revolution, and a new industrial revolution, facilitated by information technology, which is changing the way markets and economic systems function. Economic efficiency, characterised by supply and demand equilibrium and investments with a return exceeding the cost of capital, crucially assumes an absence of externalities and interdependencies. Sometimes external effects are taken into account by financial mechanisms, and economic instruments, such as charges, taxes, and land use controls; these can be systematic (carbon pricing), or pragmatic (congestion charges). This paper argues that external impacts, positive and negative, are pervasive: the rule, not the exception, with interdependencies intensified by new technologies and networking effects. The impacts of economic activity, and their incidence, can range in scope from the immediate to the wide-ranging, with both spatial and temporal dimensions. Inter-temporal phenomena have proved particularly challenging for sustainable development: what may appear to be a beneficial investment (both in financial terms and the wide social context) in the short-term may prove less worthwhile in the longer-term. This is highlighted by de-industrialisation and its consequences, as the the second industrial revolution runs its course in OECD countries. The response to inter-temporal impacts has typically been ad hoc, highlighting the absence of strategies to cover the life-cycle and legacies of industries. Meanwhile, can the new industrial revolution do better? What mechanisms are needed to avoid repeating the errors of the past, and safeguard wider societal interests into the future? A

key issue here is the degree of permanence of institutions and economic actors: a comprehensive and resilient framework is needed to pursue long-term economic efficiency, and hence true sustainability. The purposes of this paper are to highlight the underlying issues, and to identify the elements of a general strategy to address these issues

Submission ID: 119

Problematizing the 'finance gap' in Biodiversity Conservation: Discourse analysis of UNDP and UNEP's publications

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Abstract

Despite critiques of the neo-liberalization of nature, the dominant proposed solution to address biodiversity loss has been to fill the so-called "finance gap" by increasing private-sector investment in conservation through various market-based instruments. Within the United Nations, the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) have the mandate to collaborate with member countries to find solutions for increasing private finance for biodiversity conservation, in line with targets set by the Kunming Montreal Global Biodiversity Framework (GBF). Yet little is known of how the UNDP and UNEP are grappling with this mandate in practice or how the current focus on privatisation is perceived and conceptualised by these agencies. This research aims to investigate the *problematization* of the biodiversity "finance gap", by analysing over 30 publicly available UNDP and UNEP reports published over two decades, in addition to webinars and online knowledge products concerning biodiversity finance.

By using Carol Bacchi's 'What's the Problem Represented to be?' (WPR) method for discourse analysis, this research seeks to examine how is the role of private finance in biodiversity conservation represented and constructed within UNDP and UNEP's reports and knowledge products. Informed by feminist and poststructuralist epistemologies, the WPR method challenges the conventional view that policies address "problems that exist". Instead, the method helps investigate underlying

assumptions for "the construction" of the problem, which potentially creates winners and losers due to a focus on particular issues, and more importantly, examining other issues that have received less attention or that have been silenced.

Preliminary findings reveal a shifting definition of 'private sector investment,' expanding from corporate sectors and philanthropy to financial institutions such as banks, insurance and investment companies. While the reports depict an optimistic conservation outcome with increased private investment, they fail to engage in nuanced discussions regarding criticisms or the potential for failure associated with this approach. Additionally, the "tools of government" like regulation are being reframed as finance solutions, and in line with the regulatory capitalism literature there is an observable transition in how the role of government is represented in the reports - from primarily enforcing environmental regulations, towards facilitating favourable market conditions.

Given the pivotal roles UNDP and UNEP have in assisting Global South nations in achieving the goals set out in the GBF, it is critical to understand how their functions may be shaped and informed by the problematization of biodiversity conservation as a finance problem; which subsequently influences global environmental governance and public and private policy responses at national and sub-national scales. This research directly addresses the conference theme of *'Linking Futures of Mountain and Ocean: Rescuing the SDGs 2030 for Sustainable Livelihood'.* It contributes to SDG 14 (Life below water) and 15 (Life on land). The findings will be presented in person using PowerPoint slides to facilitate the discussion.

Submission ID: 130

Innovations for creative green economy: scope for growth, necessary for Nepal's prosperity

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Abstract

Nepal, with its rich biodiversity and natural resources, more than 45 per cent forest coverage and 23.4 per cent land into protected areas which stands at the crossroads of development and environmental conservation. The contribution of the agricultural sector (agriculture, forestry and fisheries) to the GDP is gradually declining. It was estimated that the contribution of this sector was 23.9 per cent in the country in 2021/22. The untapped endowed with natural beauty and resources, grapples with challenges in transforming its economy into a green and creative force. The green Innovative approaches are pivotal to overcome these challenges and pave the way for a thriving green economy.

This paper used content analysis of policies, innovative technologies and collected best cases which have been utilizing green based products such as fiber and non-timber based forest products. This policy review, including a few thematic cases, explores the innovation deficit within Nepal's policy landscape and emphasizes the imperative role of inventive strategies in fostering the nation's prosperity through sustainable development through various creative green economy evolutions. The incorporation of digital platforms, block chain for transparent supply chains, and the integration of smart technologies in manufacturing processes can revolutionize industries. These innovations not only reduce environmental footprints but also enhance efficiency and competitiveness on a global scale. Furthermore, fostering a culture of innovation and entrepreneurship is vital for Nepal's prosperity.

The government must create an enabling environment that encourages research and development, supports start-ups, and incentivizes green innovations. Collaborations between academia, industry, and government can catalyze the creation and implementation of novel solutions, driving the country towards a creative green economy. In conclusion, addressing weak domain areas through innovative solutions is imperative for Nepal's transition to a creative green economy, in particular, nature-based creative innovations. The technological supports and its adoption at the local communities embracing innovative strategies can propel the nation towards prosperity by harmonizing economic growth with environmental sustainability. The synergy of innovation and sustainability is the key to unlocking Nepal's potential in the global landscape of green economies.

Submission ID: 249

Paddling canoes to the moon? Investing in a carbon-constrained world.

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Abstract

The global community has agreed that climate change represents an existential threat to civilisation and that transition to low carbon energy, transport, industrial, and agricultural systems is a priority, achieving a net zero carbon emissions economy by 2050. While it is agreed that this transition must also support social justice and equity, there is little explicit consideration of how economic systems may need to transform to achieve desired sustainability outcomes. Instead, market-based approaches and economic adjustments are seen as key tools for driving change.

The financial sector is critical to achieving this transition through development, growth, and innovation. The world's one hundred largest pension funds represent over USD $17 trillion, with the top ten countries' sovereign wealth funds representing a further $9.23 trillion. This capital is invested in emerging technologies, companies, and sectors to generate returns for investors that support retirement incomes and personal and institutional wealth. This capital determines the energy systems trajectories of countries and regions, the technologies that thrive or fail, and the industrial development pathways we implement.

Achieving a just and sustainable net zero transition requires investment in sectors and markets that are not comfortably aligned with established approaches to investment lifecycles because of their higher risk profiles. Capital flows are also needed into emerging markets and developing economies (EMDEs) – if the transition does not occur in EMDEs, the net zero outcome will fail. Yet traditional investment decision making is constrained by issues that are not just critical but paradigmatic – issues central to the investment world view. These include the nature of regulated fiduciary responsibilities, benchmark expectations and hurdles on investment return requirements, and risk considerations in new markets.

An important question is therefore whether the economic tools being leveraged in the net zero transition are sufficient to achieve it, and if not what else is necessary? Further, how can key challenges be overcome?

This paper considers the key factors involved in the carbon-constrained (or climate-aligned) investment paradigm of the transition decades to 2050: carbon pricing (emission trading schemes or carbon taxes) and litigation against governments and corporate actors by regulators (for greenwashing and other commercial misbehaviours) and civil society. Literature review of peer-reviewed and grey literature is undertaken across the contextual themes of economic transition and investment calculus, and the results of this analysis are assessed in view of future climate-based macroeconomic scenarios.

The paper argues that the just and sustainable net zero transition is being attempted using tools that are inappropriate for the context. In other words, our responses to climate change are not unlike trying to paddle canoes to the moon. While we need a vehicle and a set of actions (the canoe, the use of paddles), these are not adequate or appropriate for the environment, the context, and the nature of the challenge (not floating on an ocean but leaving an atmosphere and moving through a vacuum).

This work is relevant to all SDGs, but especially SDGs 8 (decent work and economic growth), 9 (industry, innovation, and infrastructure), and 13 (climate action).

Submission ID: 257

Towards a Common Definition of Sustainable Finance: A Review on Consensus-Building

Hiu Ching CHUNG[1], Wanxin LI[1,2]

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Abstract

The world faces tremendous climate and sustainability challenges that necessitate a global, coordinated effort and financing over the next few decades. The Paris Agreement has set a target of limiting warming

to 1.5°C (United Nations, 2023), while 193 nations have agreed upon the UN Sustainable Development Goals (SDGs) to achieve by 2030 (United Nations, 2015, 2023). Meeting these ambitious targets by 2030 is crucial to avoid the catastrophic environmental, economic, and social consequences projected by organizations such as the UN and International Rescue Committee.

As most major economies have pledged to achieve net-zero emissions by 2050, the annual investments required are estimated to be around US$9.2 trillion until 2050, totalling US$275 trillion (Mckinsey, 2022). Additionally, transitioning developing countries to sustainability will require a yearly investment of at least US$6.9-7.6 trillion until 2030 (UNCTAD, 2023). However, sustainable financing currently only mobilizes US$0.4 trillion (Kumar et al., 2022), highlighting significant investment gaps. Without sufficient funding, humanity risks failing to realize critical climate and sustainability goals by 2030, 2050, and 2060 (UNCTAD, 2023).

Although sustainable finance has seen growth, there is a lack of agreement among different stakeholders about specific definitions. The World Bank restricts its focus to environmental factors, while the ISO considers a broader range of environmental, social, and governance criteria. Due to this ambiguity, there are difficulties in mobilizing large-scale private capital, which is urgently required.

This study aims to comprehensively analyze the various definitions of sustainable finance in academic literature and reports by prominent international organizations, standards authorities, and governments. A unified definition of sustainable finance that encompasses essential parameters will be proposed by utilizing bibliometric and text-mining techniques to identify areas of agreement and disagreement.

This research seeks to address the lack of consensus surrounding sustainable finance by establishing a shared understanding of key definitional elements. These findings can aid in developing standardized practices, facilitate cross-border investments on an unprecedented scale, and ensure that financial resources are directed towards crucial priority needs. The results will strengthen the policy relevance of creating a shared understanding - a critical factor in attracting the trillions of dollars needed worldwide by 2030, 2050, and beyond to build a sustainable future for all.

Submission ID: 258

From Green GDP to GEP (Gross Ecosystem Product)

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Abstract

China's approach to environmental policy has evolved over time. Initially, the focus was on mitigating the negative impacts of human activity on the environment. However, the government has since shifted its focus to incentivizing the creation of positive environmental values. In 2007, the World Bank estimated that air and water pollution costs China's economy $100 billion annually, which is equivalent to 5.8% of the country's GDP. To address this issue, the government launched the Green GDP project, which factors environmental degradation and ecological damages into the evaluation of regional economic growth and government officials' performance. The National Major Functional Zoning Plan and the National Major Marine Functional Zoning Plan were also established to promote a scientific approach to development, especially in balancing the protection and exploitation of the marine eco-environment.

China's marine ecosystems, which include estuaries, wetlands, mangroves, coral reefs, seagrass beds, and islands, face significant threats from human activities, both on land and offshore. While researchers have attempted to map human activities and their impacts on marine ecosystems globally, there is still a lack of understanding regarding the dynamic interactive relationships between these activities and the marine environment. Therefore, a governance approach is essential to build consensus and collective action among stakeholders and improve the balance of eco-conservation, eco-restoration, and development for the territorial and marine ecosystems.

Preserving ecosystems provides many benefits, including nutrients, ecological services, and recreational activities that can improve overall well-being. The government is exploring alternative approaches to quantify development, such as incorporating gross ecosystem product (GEP) into a nature-social-economic accounting system. This approach

values the total value of final ecosystem goods and services supplied to human well-being in a given region annually.

Recently, the Central Committee of the Communist Party of China and the State Council announced the comprehensive advancement of the construction of "Beautiful China." The Guangdong-Hong Kong-Macau Greater Bay Area was selected as a pioneer region, experimenting with land-sea integrated development approaches and helping other areas build capacities through knowledge transfer. These initiatives demonstrate the government's commitment to promoting sustainable development and protecting the environment.

Submission ID: 259

Mapping the Evolution of Sustainable Finance: A Bibliometric Analysis

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Abstract

Creating a shared definition of sustainable finance is essential in mobilising the necessary capital to carbon neutrality and sustainable transition development goals. However, different practitioners and standard-setting bodies have varying perspectives on what constitutes sustainable finance. Without a universally agreed definition, there is uncertainty around what exactly qualifies as sustainable investment, increasing uncertainty and ambiguity risk for investors. A vague understanding of sustainable finance opens a greenwashing door for "green"/ "sustainable" projects, which leads to undermining trust in the market and difficulty in regulation.

This project aims to adopt a bibliometric analysis approach to help guide the field towards consensus. This study employed science mapping, network analysis, and text-mining techniques to examine peer-reviewed literature spanning several decades.

The research identifies trends and patterns in the academic discourse surrounding sustainable finance. It sheds new light on the diffusion

of ideas within this interdisciplinary domain, revealing the “invisible colleges” that have influenced scholarly conceptualisation. Additionally, text mining was used to extract and compare definitional elements to understand how they developed.

The findings offer actionable insights for stakeholders, enabling them to integrate published views into an overarching framework. This supports ongoing standardisation processes that help to qualify sustainable investment and regulations. The study also provides evaluative metrics to benchmark influential academic contributions and inform future research priorities.

Collaboration patterns were mapped to indicate where cross-sector knowledge transfer can be improved, and the results are intended to align understanding between researchers, policymakers, and industry to maximise capital mobilisation for sustainability.

Overall, this bibliometric analysis makes significant contributions to sustainable finance. It provides a comprehensive view of the conceptual evolution of sustainable finance within the literature, distils common ground to strengthen definition consensus, and supports applied progress towards this critical sustainability financing goal. By enhancing our understanding of sustainable finance, we can better promote sustainable investment and development for a more sustainable future.

Submission ID: 285

Innovative economic and financial practices to promote sustainability in the food production chain based on the verification of the impact of fish yield on the gross profit of a haute cuisine restaurant.

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Abstract

The case study addresses a crucial issue for organizations in the food and beverage sector, especially those dealing with high-cost ingredients such as fish. Here are some observations on the points raised:

Fish Consumption Trends: A projected increase in per capita fish consumption reflects a global trend towards a healthier diet, which may

contribute to the demand for fish- based products. However, the price remains a limiting factor for many consumers.

Cost Management: Cost management is essential to ensure the profitability of a company, especially in a competitive sector like food and beverages. Evaluating the impact of fish yield on the financial results of the organization is fundamental to maintaining the financial health of the business.

Efficiency in the Use of Raw Materials: Analyzing the yield of different fish species is crucial to maximizing efficiency and minimizing waste in food production. This can help reduce production costs and improve profitability.

Sustainability: The case study approach is also aligned with the Sustainable Development Goals (SDGs), especially concerning innovative economic and financial practices to promote sustainability. Reducing food waste and optimizing the use of natural resources, such as fishing, is essential to achieving broader sustainability goals.

Economic Viability: By associating the cost of raw materials with the final product's selling price, the organization can determine the economic forecast of its operations and identify opportunities for optimization and growth.

In summary, the presented case study offers valuable insights into how effective cost management and maximizing resource utilization can influence the financial health and sustainability of an organization in the food and beverage sector.

Submission ID: 316

Understanding Development Dynamics: A Comparative Study of Nepal and Australia

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Abstract

Nepal and Australia, despite their vast differences in physiographic attributes, share intriguing parallels in socio-economic development.

This paper aims to conduct a comprehensive comparative analysis of their developmental courses, current models, and the pivotal insights they offer for fostering economic growth, social progress, and sustainable development within each nation. Despite their geographical disparities, Nepal and Australia exhibit remarkable similarities in their socio-economic fabric. Both nations boast similar demographic indicators and economies predominantly reliant on natural resources. Furthermore, recent political transformations in Nepal have resulted in a governance structure akin to Australia's federal political system, enhancing the parallels between the two countries. A subtle understanding of the historical context and influential factors shaping the development paths of Nepal and Australia sets the foundation for this comparative analysis. While Nepal has navigated recent political transitions, both nations share federal governance structures that influence their policy frameworks and developmental trajectories. The examination of demographic, geographic, political, and economic dimensions unveils the intricate interplay of factors shaping the development strategies of Nepal and Australia. Despite varying landscapes, common themes emerge, highlighting the significance of natural resource endowments and governance frameworks in shaping development trajectories. An exhaustive analysis delves into the characteristics of each country's development model, scrutinizing key dimensions such as innovation in agriculture, infrastructure development, human capital investment, IT sector advancements, and governance structures. By dissecting these elements, valuable insights emerge, shedding light on the efficacy of different approaches in driving socio-economic progress. The comparative analysis identifies lessons learned and best practices gleaned from the experiences of both nations. It underscores the importance of context-specific policies, evidence-based decision-making, long-term planning, stakeholder engagement, and international cooperation in achieving sustainable development goals and economic prosperity. In conclusion, this paper offers valuable insights into the diverse pathways to development traversed by Nepal and Australia. It emphasizes the imperative of continuous adaptation and innovation in response to evolving global challenges. Recommendations are provided for policymakers, stakeholders, and development practitioners, advocating for tailored strategies to enhance development outcomes not only in Nepal and Australia but also in other contexts worldwide.

Track Eight

Social Foundations of Sustainability

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 8a Social foundations of sustainability - Gender, inclusivity and human rights

Submission ID: 114

Women's Role in Corporate Governance for Scaling ESG in Kenya's Banking Sector

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Abstract

This study investigates the participation of women in the corporate governance of commercial banks in Kenya by understanding their profile as directive board members, and their potential in advancing ESG practices implemented by the banks. Governance literature demonstrates a relationship between women's participation in corporate governance and ESG practices. Other literature shows ESG practices are emerging in sub-Saharan Africa. Therefore, our study builds on these two knowledge contributions. The study uses a mixed methods approach in two consequent phases. The first phase involves a quantitative analysis of the descriptive statistics of board compositions of banks listed on Nairobi Securities Exchange (NSE). The integrated and ESG/sustainability reports of banks are used to understand the state of the art of women´s participation in corporate governance and consequently to select 6 cases for further analysis. The second phase of the study uses the case studies identified in the first phase to analyze the role women play as board members in advancing the ESG practices in their respective financial institutions by using qualitative data collection methods, specifically interviews and document analysis. Preliminary findings show that women are represented in board level positions among Kenyan banks. The analysis of the ESG and/or sustainability reports demonstrate that commercial banks provide substantial ESG disclosures and use well established sustainability reporting frameworks. The relationship between women participation in boards and their influence on the ESG practices used by commercial banks is yet to be shown by the study. These preliminary research findings may have implications for both

policymakers and practitioners (especially bankers and investors). Commercial bank boards that purposefully include women directors, could perform better in terms of ESG disclosures. The results may also present criteria for identifying women´s leadership profile and call for an increment in the proportion of women´s participation in the corporate governance of African banks. Commercial banks represent important capacity for scaling impact targets of the Sustainable Development Goals (SDGs), as they provide critical resources to implement and scale initiatives with positive environmental and social impacts. Banks that include women in positions of corporate governance might implement better ESG disclosure practices or improve their potential to scale sustainable finance assets, and consequently enhance progress of SDG targets achieved at a country level. This study examines the relationship between women´s participation in banks' board structures and their effect on ESG implementation. This study builds upon advances in literature that confirms women´s participation in corporate governance of banks as an influencing factor of ESG implementation, and considers findings that identify leadership of board members, as drivers of ESG. This study evaluates the state of the art of women´s participation in commercial banks in Kenya and develops leadership profiles of women´s board members, as references for increasing gender diversity in the corporate governance of banks.

Submission ID: 169

Gender-Inclusivity under the plurality of Hindu Law : A study on the need of importance and the rights in architecture.

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Abstract

The environment and the society remains consistent and sustainable, if it is shaped with the combination of different individual mindsets and abilities. One of the key element of sustainable society is gender equality. This paper is based on the sustainable approaches and the design considerations for gender, inclusivity and human rights in architecture plurality of Hindu Law, as women and the LGBTQ+ people do faces many challenges because of the society. This paper is based on the exploratory

study which utilizing the various primary and secondary data collection sources, including visual surveys, literature study, journals, interviews and the case studies. This study focus on the different challenges and the discriminations faced by the women and the LGBTQ+ people because of the gender inequality and the deriving strategies to mitigate them. It also focus on the design parameters and approaches taken to make such people more secure and safe. There are some laws and policies sought by Indian Government to improve the status of woman like as Committee on Status of Woman in India(CSWI)(1971-1974) and National Plan of Action for the girl child (1992), whereas with regard to the rights of LGBTQ+ people, even though the Supreme Court of India in Navtej Singh Johar v. Union of India judgement, 2018 stepped up by abolishing the part of Section 377 of Indian Penal Code which criminalized act of homosexuality. In conclusion this research extends beyond analyzing the challenges and the law and policies stated by the Indian Government for the women and LGBTQ+ people and defines about how gender is framed and how facilities are to be provided. This paper also defines how women and the LGBTQ+ people can achieve better work environment in terms of architecture and also focus on the designing, planning and orientation of the spaces to create a better and safe environment for them.

Submission ID: 221

Redefining mobility: An ethnographic study of women's experiences of daily travel in Kathmandu

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Abstract

In Nepal, there is a lack of comprehensive understanding of women's experiences and challenges related to daily travel in urban areas. This research gap limits the consideration of gender-specific needs in urban planning and decision-making processes, resulting in a lack of policies and interventions to address women's mobility concerns.

This ethnographic study aims to bridge this gap by investigating the daily travel experiences of women in Kathmandu and redefining the concept of mobility from their perspective. The research questions guiding this study are as follows: How do women's mobility experiences in Kathmandu

intersect with other aspects/roles of their lives, such as employment and care-giving responsibilities? What challenges do women face while navigating the urban mobility in Kathmandu? What mobility solutions are effective in addressing these issues? And what are the policy and practice implications of the findings?

The study employs in-depth interviews with women representing different backgrounds and roles in Kathmandu. By collecting qualitative data through these methods, the research has gained insights into the daily mobility patterns, experiences, and challenges faced by women in their various roles, including as workers, caregivers, and active members of their communities.

Drawing upon existing literature on gender and urban mobility, this research utilizes qualitative research techniques such as empathy mapping to explore the intersecting factors that shape women's mobility experiences in Kathmandu. The data collected from participant diary studies and interviews are analyzed thematically to identify recurring themes, challenges, and potential solutions. The findings are then presented and discussed in focus group discussions with participants from diverse backgrounds.

In summary, this ethnographic study seeks to redefine mobility by exploring women's experiences of daily travel in Kathmandu. By considering their diverse roles, challenges, and aspirations, the research aims to inform the development of gender-responsive urban policies, enhance the design of inclusive mobility infrastructures, and create more equitable and sustainable urban environments in Kathmandu and beyond.

Submission ID: 236

Addressing Gender-Related Disparities in STEM Education for Students Ages 15-18

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Abstract

In the ever evolving and fascinating landscape of education, the fields of Science, Technology, Engineering, and Mathematics (STEM) have become pivotal for innovation, economic growth, and societal progress. However, a persistent issue hinders the full realisation of the potential of STEM disciplines: gender-related disparities among students aged 15-18. These disparities are influenced by various factors, including cultural norms, societal expectations, and lack of exposure to female role models in STEM fields. This research project aims to investigate these disparities and propose strategies for mitigating them, with a specific focus on the role of parental influence.

The research design includes a quantitative approach using cross-sectional survey methodology to collect data from high school students aged 15-18 in France. Additionally, existing 2022 PISA data will be analyzed to assess students' creative problem-solving abilities and family background factors in order to include a qualitative approach among the same students. Regression analysis and descriptive statistics will be used to analyze the data and identify trends and disparities.

Through this study, we expect to uncover nuanced insights into the gender-related disparities in STEM education among 15 to 18 year old students, particularly regarding parental influence on female students' academic performance and career choices. These findings aim to inform targeted strategies and interventions that promote gender equality and inclusive STEM education, ultimately contributing to a more diverse and equitable STEM workforce. In 2019, only 25% of new entrants in engineering, manufacturing and construction degree programs were female in France (OECD, Education at a Glance 2021: OECD Indicators, 2021), contributing to the under-representation of women in STEM fields and a lack of female role models. While they can have an impact

from the earliest age on elementary school pupils, these disparities take root at the crucial stage of secondary school, where teenagers aged 15 to 18 are the first to be affected by these stereotypes and biases, which undermine women's self-confidence.

STEM careers are often seen as the jobs of the future, as they promote innovation, social well-being, and sustainable growth in a world driven by technology and digitalization (World Economic Forum, 2023). This research contributes to the broader goal of promoting gender equality and inclusive education by addressing barriers to women's participation in STEM fields and providing targeted strategies for fostering equitable opportunities for all students.

SDG+ Target: SDG 5: Gender Equality, SDG 4: Quality Education, SDG 10: Reduced Inequality.

Submission ID: 264

A Sociological Evaluation of Problems Encountered by Women Related to Disasters and Disaster Locations

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Abstract

Disasters and gender issues have been scrutinized separately for quite a long time. When we look at their considerations together in the literature, it is closely linked to vulnerability issues. However, recently these evaluations revolved around risk evaluations concerning the shift in disaster management to risk management approaches. Due to the gradual increase and expansion of the impact areas and dimensions of disasters, the necessity of increasing the studies to be carried out on disasters has come to the fore. Although disasters have left their deepest traces on vulnerable groups. Due to the social construction of women's relations with society, they are affected by disasters in different dimensions, and there is an increase in the dimensions of vulnerability that already exist in post-disaster environments. Although disasters are natural, they can turn into hazards depending on the coping capacity of societies. Female individuals, who are already present in the social sphere

and are vulnerable to dangers, have come to light in disaster situations with their roles and relationships in social life. In the relational analysis of the disaster with female individuals, it has come to an important point to address the issue due to the unpreparedness of women for disasters, their difficulties in accessing resources in all processes of the disaster, their security problems, and social problems. In the relational integrity of disaster and women's studies in national and international literature; It has been seen that it is associated with the framework of concepts such as vulnerability, hopelessness, victimization, and helplessness. Due to the socio-economic status of women in society, a situation has emerged that works against them in the face of disasters, causing them to face many other problems, especially security, in disaster and post-disaster processes. To understand present situations, it is necessary to adopt a sustainability approach and accept disaster issues as processes combined. Recent experiences reveal these necessities.

This study, which is limited to national and international literature studies, is aimed to evaluate the problems experienced by women, who are one of the vulnerable groups in the society, in the face of disasters. In the study, firstly, the theoretical framework related to disasters will be evaluated then the relationship between disasters and women's problems and risks will be mentioned. At the end of the study; The security risks and problems of women related to disasters will be evaluated in the light of the accessed existing worldwide literature. The findings will be evaluated on the grounds of derived perspectives from recently experienced international and Turkish examples. Hangün's special M.A study on women's experiences after the Kahramanmaraş and Elazığ earthquake in Elazığ and Öner's distinction on different experiences, risks, and present conditions of nearby different locations related to disasters sets important grounds for discussions.

The findings reveal that it is necessary to study gender-related problems by taking gender, sustainability, and process perspectives at the core of future studies to understand, evaluate, and summarize their situations, problems, risks, and solutions properly by considering disasters and disaster locations.

Submission ID: 282

Quilombola Women & Environmental Racism in Brazil:non-extractive research supporting communities

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Abstract

Our paper aims to examine the protagonism of quilombola women fighting against community problems related to social and environmental rights in Brazil. Qualitative research based on the history of oral testimonial tradition was carried out, in the context of two Quilombola Communities in Brazil. The researchers adopt the Engaged Research approach using non-extractive methodologies of research. We try with this research strategy to support the protagonism, autonomy, and centrality of the communities fighting for rights.

A study was carried out in the Quilombola Community of Arturo's and Ribeirão, the first being located in the city of Contagem, and the second in the city of Brumadinho, both in the state of Minas Gerais, Brazil. Arturo's quilombo was chosen because it is the first community recognized as Intangible Heritage in the state of Minas Gerais, which occurred in 2014, and the second quilombola community in Ribeirão for having suffered the effects of the collapse of the Córrego do Feijão mining dam in Brumadinho, which took place on January 25, 2019.

Oral tradition history comprises living narrators and is based on issues from the past, to maintain myths and traditions, which are passed from generation to generation. Narrative analyses aim to find experiences, with practices being the phenomenon to be investigated. In these authors' view, the temporal, social, and physical context are the basis for a narrative study. These authors intersect the temporal, interactional, and contextual dimensions and relate them to the experience of each research subject.

Quilombo is understood as: "groups of escaped slaves; expressions of cultural and political resistance; ethnically and culturally differentiated social groups; collective identity processes and more new subjects of sociocultural rights." (Rodrigues, 2010, p. 254).

The condition of quilombola women outside their territory is one of discrimination, due to their condition of being a woman, they suffer from sexism, racism, social class, and quilombola stigma. These oppressive attributes add up, providing triggers for greater prejudice by a sexist and racist society. Still, they do not overlap, but permeate each other, leading to disempowerment, which is why black quilombola women are more concentrated at the base of the economic pyramid, due to low education and work most of the time as a domestic worker.

However, within quilombos women are empowered and take on roles in fighting for better living conditions, and are recognized and respected. Quilombola women are matriarchs, queens of the Congado, a traditional Brazilian religion and cultural manifestation, they take charge of the needs of the quilombola people, such as obtaining public transport for children, obtaining income, guaranteeing the culture and memory of traditional peoples. This study can be a starting point for greater debate in academia and, thus, move beyond theory to the daily lives of black people, going beyond the record in history, enabling black people to have the right to citizenship and Quilombos to become communities where the Environmental Racism no longer exists.

Track 8b Social foundations of sustainability - Communication for sustainability

Submission ID: 174

Fostering Sustainability through Effective Communication:Perspectives from Higher Education in Cape Verde

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Abstract

Higher Education Institutions (HEIs) have a central role in communicating sustainability within and beyond their campuses. Leveraging their educational and transformative role through teaching, research, and outreach, they catalyze sustainable practices, driven by communication strategies. Although communication is a fundamental part of the movement towards more sustainable HEIs, there is still a lack of effective involvement in "communication for sustainability" at the Higher Education level in Cape Verde. While sustainability has recently become a pivotal point in the national discourse of the Cape Verdean government, its integration with effective communication pathways still reveals a notable gap. This study aims to explore how HEIs in Cape Verde can promote their communication strategies to showcase and inspire the broader integration of sustainability practices within their institutions and beyond.

To do so, a holistic diagnosis approach is employed, encompassing a documentary analysis of existing strategies, plans, and programs for HEIs' communication for sustainability at both national and international levels, exploring the effectiveness of these plans and how it will be perceived by various target groups, including decision makers and HEIs community. As a complementary stage, a set of semi-structured interviews is carried out with key figures, who have a pivotal role in shaping the plans and strategies for communication for sustainability in Cape Verde, predominantly involving presidents of the Higher Education Regulatory Agency (ARES), and the leaders of three Cape Verdean HEIs, serving as representatives of both public and private institutions. The results are analyzed by applying a qualitative content analysis for document review and the interviews.

The preliminary findings reveal certain deficiencies in terms of establishing integrated communication pathways for sustainability throughout the whole community of HEIs (including teaching staff, non-teaching staff, and students). This integrated approach is essential not only for internal improvement but also for extending outreach sustainability activities beyond the institution's boundaries. Despite the detected challenges, some noteworthy sustainability initiatives are observed, among them rainwater capturing to clean facilities, reduction in the usage of printed materials, and growth consciousness on the use

of resources (water, electricity, etc.), which can serve as focal points for adoption the communication strategies within their institutions. These preliminary results will later serve to develop a set of guiding principles for developing a strategic communication plan for sustainability in Cape Verdean HEIs.

The results support Cape Verdean HEIs to leverage communication as a focal element in their institutional plan to convey sustainability actions within their community and to the broader society. This strategic approach contributes to facilitating progress towards achieving the Sustainable Development Goals (SDGs), among them SDG 17 and target 17.9, as the ultimate goal is to create an association or office, supporting the HEIs by providing consultancy services in the selection of the best tools to communicate and promote sustainability practices.

Track 8c Social foundations of sustainability - Just transitions

Submission ID: 125

Justice in Nature-based Solutions: A framework for just sustainable design practices

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Abstract

Urban planning and design practices have contributed, whether intentionally or unintentionally, to the disparity in quality of life across generations and among socially marginalized and vulnerable communities. Nature-based Solutions (NbS) have been globally adopted in policies as a key strategy for coping with climate change. However, these adoptions often overlook justice in achieving sustainable development goals. At the local scale, climate justice considers the systemic vulnerability of communities in coping with climate change-associated hazards and

applies an intersectional approach of vulnerability, resilience, and sustainability to understand community resilience (Cheng 2022). The concept of Climate Justicescape has been developed as a framework for spatial analyses of social-ecological-technological systems and distributive justice to vulnerable populations and urban resilience (Cheng 2016, 2019).

This research aims to address justice, design, and sustainable design of NbS in urban and community resilience. We propose an integrated design justice theory and practice framework with four dimensions of justice to transform society in rectifying justice systems and practices. Drawing from justice theory and urban design practice, this research proposes a framework to integrate theory and practice in addressing climate justice by embedding four areas of justice—procedural, distributive, restorative, and generational justice—in the co-design process with communities on solutions related to SDG 11+Target 11.3. The literature review and case studies from design education and practices suggest an interactive co-design procedure. The research proposes a climate justice design framework outlining a design process that includes meaningful engagement with communities and governance with justice principles for an inclusive sustainable development process and outcome. This framework is crucial to achieving justice in sustainable development and ensuring that further investment in sustainable design practices does not perpetuate persistent systemic injustice.

Our framework, with illustrations of NbS design justice practice, is intended to be applied at various scales and allow communities to customize and contextualize in the local context. The implementation of NbS and sustainable design with justice as core guiding principles and values will rebalance power and priorities in the decision-making process to address justice goals in every community.

Submission ID: 189

Renewable energy and environmental justice nexus in Africa. A systematic literature review

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Abstract

Historically, the world has gone through various phases of energy transitions such as the transition from whale oil to kerosene and from wood to coal (Carley and Konisky, 2020). The present-day renewable energy (RE) transition (from fossil fuel to RE) is coming against the backdrop of chilling evidence linking the climate crisis to fossil fuel usage (Levenda, Behrsin, Disano, 2021). The whole value chain of the fossil fuel industry (and the resultant climate change) has been linked to disproportionate impacts on the poor sections of society (Outka, 2012). The most recent (sixth) synthesis report from the United Nations Intergovernmental Panel on Climate Change makes it abundantly clear that averting the effects of climate change will require a stop to the development of new fossil fuels, phasing out the use of existing fossil fuels and bold shift to RE (Centre for Biological Diversity, 2023). In light of this, the number of RE projects being implemented in Africa has increased in recent years and is predicted to continue to rise as we move closer to 2050. Studies have shown that there will be winners and losers in transitions (Outka, 2012; Carley & Konisky, 2020), therefore interrogation of RE transition through the lens of environmental justice (EJ) is paramount. This systematic literature review, utilising the PRISMA approach examined peer-reviewed journal articles on RE transition policies, processes, and programs from the perspective of EJ at the community level in Africa. The societal benefits of RE projects implemented in Africa have not been studied thoroughly (Ikejemba & Schuur, 2020). worse still in the context of EJ. A few studies have shown mixed benefits of RE projects in communities.

Submission ID: 196

The energy-poverty nexus and just transitions in the Arctic

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Abstract

People living in and near the Arctic, in communities across Alaska, Canada, Norway and Russia have to contend with multiple infrastructural challenges. The harsh climate, remoteness and sparseness of the region is a cause and a compounding factor to the vulnerability of infrastructure. In this backdrop, energy transitions i.e., the shift from traditional sources of energy to fossil-based and more recently, renewable energy infrastructure holds a critical position of influence in causing generative or extractive shifts to the quality of life in Arctic communities. This interaction of energy systems with systemic poverty and its potential to either enable or impede sustainable development pathways is termed as the energy-poverty nexus.

This study captures several examples form the Arctic geography, illustrating the diverse ways in which energy transitions are creating conditions for enhancing sustainability, creating landscapes of uneven burdens and benefits, or forcing trade-offs that holdback the pursuit of safe and culturally generative sustainability. Deconstructing specific examples of the energy-poverty nexus using a sociotechnical systems approach, this study investigates the phenomenon from three intersecting perspectives – the household and community level interactions, energy production and its political economy, and the role of institutions. The analysis two aspects of energy transitions that are critical to the formation of the energy-poverty nexus. First is the increasing dependence of critical infrastructure and services, e.g., transport, water, municipal services on less diverse and increasingly sophisticated energy infrastructure. The expertise thresholds for financial, technical and governing functions of the energy infrastructure lowers opportunities for localized innovation to address the nexus. Secondly, the socio-cultural shifts and economic burdens brought about in the lifestyles and social practices affect the capabilities of households and communities to cope with change. In

the case of Indigenous peoples of the Arctic, such changes extend their contestation between traditional and colonially imposed ways of living, while for settler communities it is cause for burdens to their constructed ways of living.

The analysis identifies points of intervention including accelerating the energy transitions in ways that costs of coping are minimized, complementary interventions in other infrastructure domains to lower their dependency on energy systems, and investing in social, cultural and economic interventions to enhance quality of life parameters directed at households and communities. These findings have important lessons for pursuing multiple SDGs in Arctic geographies, both independently and as interconnected goals. This predominantly includes poverty (SDG1, Targets 1.4,1.5), affordable and clean energy (SDG 7, Targets 7.1 – 7.3), climate action (SDG 13, Targets 13.1, 13.b), peace and justice strong institutions (SDG 16, Target 16.6, 16.b), among other SDGs. The findings are also relevant to other geographies with harsh climates and difficult terrains like the Himalayan region, broadening the scope of knowledge exchange for sustainable development.

Track Nine

Governance and Institutional Frameworks

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 9a Governance and Institutional Frameworks - Peace and sustainable development

Submission ID: 13

The Futures of Peace and International Law

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Abstract

Maintaining peace and stability in a period of unparalleled global challenges requires the sustainability of the core tenets of international law. This paper examines the application of international law especially against potential threats to global peace emanating from geo-political conflicts, territorial disputes and resource scarcity or rivalry. It will examine the current trends in the application and interpretation of international law from international courts and tribunal decisions, publicists and public opinions. The trends in international law through a shared historical lens will be analyzed from its conception, in particular the intentions and objectives as manifested in texts and context of the treaties and the preambles of key legal instruments such as the United Nations Charter. Drawing upon futures studies methodology, this paper aims to construct plausible scenarios for the future of international law. These scenarios include the preferred future, envisioning a world where collaboration among nations flourishes from a democratized and reformed structure of international law; the unwanted future, characterized by the neglect of international legal norms and escalating conflicts; business as usual, depicting a continuation of current trends with slow changes; and the outlier, representing unforeseen disruptions or paradigm shifts in the international community. In the present moment in the international law history, with the most contested conflict in the century being brought to the International Court of Justice, it offers a unique opportunity to influence international law and state practice towards a more inclusive and equitable framework, contributing to the maintenance of global peace and stability. By exploring these future scenarios, policymakers, legal scholars, and stakeholders will gain valuable insights into the challenges and opportunities inherent in shaping the future of international law.

Submission ID: 214

Seven incidents within a fortnight in Nepal: Is violence against healthcare professionals curbed by tougher laws?

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Abstract

In September 2023, a surge of violence against healthcare professionals occurred in Nepal within a two-week span, despite recent legal amendments aimed at curbing such incidents. This manuscript explores whether stricter legislation effectively deters these acts. The violence is rooted in Nepal's healthcare system's inadequacies, leading to overcrowded and understaffed hospitals, patient frustration, and healthcare professional burnout. Misinformation and rumors, particularly in rural areas, can trigger outbreaks of violence, exacerbated by media sensationalism. The lack of legal consequences for attackers is a significant factor. Perpetrators often go unpunished, emboldening others to resort to violence when dissatisfied with medical services. Political affiliations and third-party involvement for financial gain are common. The psychological toll on healthcare workers is profound, resulting in burnout, depression, and post-traumatic stress disorder, contributing to a significant brain drain of doctors from Nepal. This paper underscores the importance of enforcing existing laws to create a safe workplace and making the malpractice complaint process accessible to the public to deter resorting to violence.

Submission ID: 170

Examining the Role of Nepalese Social Entrepreneurs in Advancing Sustainable Development and Circular Economy Practices

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Abstract

Despite fifty years of development initiatives and budgets, Nepal continues to grapple with exacerbated societal issues. Vulnerable populations have borne the brunt of unintended consequences stemming from both governmental and international projects. Thus, private businesses and the government seem unconcerned about the poverty and misery of the people. So, the ugly and pitiable exhibit of poverty among people of economically advanced nations has garnered unwanted attention.

Recent years have seen a surge in environmental challenges such as pollution, inadequate waste disposal, biodiversity loss, deforestation, and soil degradation. Concurrently, persistent issues including poverty, limited access to healthcare and education, gender disparities, infrastructural deficits, unemployment, entrenched cultural biases, and reliance on external aid persist unabated. Educational institutions have failed to make children aware of the value of our environment, compassion, and empathy. They instead promote market-oriented values, materialistic ideals and digital distractions and glorify economic growth, personal success, and careers.

This research investigates the pivotal role played by Nepalese social entrepreneurs in driving forward sustainable development agendas and fostering circular economy practices within the country to address these social issues. Through qualitative analysis encompassing interviews, case studies, and documentary evidence, this study delves into the strategies, challenges, and impacts of social entrepreneurship initiatives on Nepal's sustainable development landscape. By scrutinizing the innovative approaches and collaborative efforts undertaken by social entrepreneurs, this research aims to elucidate their contributions towards achieving sustainable development goals and transitioning to circular economic models.

Social entrepreneurs in Nepal are pioneers of the transition to satisfying and nourishing a genuinely sustainable way of life. Social entrepreneurs use their courage, talent, skills, and resources in their position to make society a little bit better. SE is beyond charity since a social entrepreneur study the situation becomes the master of his cause and commits to making a difference. They are fighting for justice, equality, humanity, and the rehabilitation of the most fallen members of society. They are

challenging conventional education as the education system is outdated. The schools run by social entrepreneurs are amidst nature, and children are taught to think critically about how to live sustainably and contribute towards the world from a young age.

Social entrepreneurs believe in an inclusive society, and the process, they hire disabled people, trafficked victims, and marginalised people. However, it has become a challenge because rather than getting support from communities, they have become the victims of social stigma. Social entrepreneurs seem to be genuine souls trying to empower other individuals to the extent that they become agents of change themselves. They have given up their comfortable life, their career, their personal goals and in some cases, they have left their family to come to Nepal and do something meaningful. Many social entrepreneurs who were involved in this study returned from abroad to follow their hearts. SE in Nepal is beyond charity and has become the medium to express solidarity. However, social entrepreneurs are battling many challenges on their journey to achieve social goals.

Track 9b Governance and Institutional Frameworks - Collaboration and co-creation for sustainability, SDGs initiatives and scale of governance

Submission ID: 22

Beyond Neoliberalism – Addressing the Challenge of Sustainable Consumption for Governance and Policy Development

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Abstract

'Green growth' has been established by industry, governance and society as one of the major incentives and motivators for the betterment of the environment, allowing companies to shift their focus in a sustainable manner. This can provide consumers with a plethora of information which, in some cases, leads to difficulties in decision making. While

this approach is proposed by governing entities, its final execution befalls on consumers and corporations alike. This study aims to advance understanding of decision making within governments, corporations and consumers which will allow for a better integration of the 'Green growth' approach. This will be addressed by utilizing an established framework which distinguishes behaviour in society as falling into one of three categories: the utilitarian, social/psychological and/or systems of provision/institutional approach. By establishing these relationships, a more thorough understanding of collaborative action in society may be achieved. This could provide a basis on which to leverage individual environmental motivation from a policy context. An analysis of 'the expand or perish' approach widely proclaimed by the contemporary economic system will be undertaken by evaluating the incitements that motivate enterprises to push the green growth approach even further. These aims will be achieved by the employment of both bottom-up (consumer) and top-down (regulations and policy) data collection methods. By using data from both of these perspectives, it is hoped to obtain a better understanding of the interplay of consumption and governance/regulation. This in turn will facilitate a more thorough review of current policy tools designed to promote green growth, as well as identify gaps in current legislation.

Submission ID: 83

Co-creation in a quintuple helix, the art of including natural environments of society in a living lab that includes different types of stakeholders and monitoring the quality of this process of co-creation.

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Abstract

In the last decade, co-creation has not only become a widely used concept in academic discourses but also in public policies that aim to tackle so called 'wicked problems', a term coined in the 1970s (Rittel & Webber, 1973) that is nowadays often interchangeably used with societal challenges or SDGs.

This focus on tackling societal challenges by governments in collaboration with citizens opened the door for new concepts such as 'living labs' in 2006 (Rădulescu et al., 2022) 'policy labs', 'innovation hubs', 'co-creation

labs' and recently 'public sector innovation (PSI) labs' (Fuglsang & Hansen, 2022; Hansen & Fuglsang, 2020; McGann et al., 2021; Torvinen & Jansson, 2022). The use of labs has also been addressed by the OECD in their publication on innovation in the public sector outlook to make policymakers aware of the importance of public sector innovation (OECD, 2015).

Literature research in combination with questionnaires into these types of labs showed that the definitions of PSI labs are quite 'fuzzy', sometimes even interchangeable and are heavily dependent on the national, regional and local context as well (McGann et al., 2018). In addition, research also showed that it is difficult to distinguish good practices, let alone to define specific conditions for these good practices (Meister Broekema et al., 2022).

In addition, an inductive analysis of a large number of EU policies shows that on a conceptual level, the EU uses specific interpretations of social innovation (Moulaert & MacCallum 2019) and co-creation in open innovation ('Open Innovation 2.0' 2013), influenced by the concept of triple- and quadruple helix innovation in which universities, governments and enterprises are collaborating, sometimes for the benefit of society as a whole (Carayannis & Campbell 2012; Leydesdorff 2010). Co-creation as such is used merely as a criterion within social innovation projects that aim to tackle societal challenges, therefore neglecting the quality of the process of co-creation (Meister Broekema et al. 2021).

In order to maximise the impact of co-creation and be able to tackle societal challenges such as climate change, it is therefore essential to focus more on the quality of co-creation between 4 helixes in these processes and include the environment as a fifth helix (quintuple helix innovation as defined by Carayannis et. al. 2012). In the talk, a novel framework will be presented that will support collaborators in a project that aims to tackle a societal challenge by including the right stakeholders at the right time and monitor progress and satisfaction continuously (Meister Broekema 2023) in a quintuple helix setting.

This presentation will contribute mostly to SDG 17 (partnership for the goals) and SDG4 (Quality Education) and is best suited for SDG13 (Climate Action).

The insights can be used to enable multiple stakeholders from

government, education and research, enterprises and citizens within a natural environment (mountains & oceans) to co-create in a quintuple helix setting, maximising their impact on climate change and strengthening partnerships for this goal.

Submission ID: 156

Double Blade of Sustainability: International Agreements and Local Applications of International Companies

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Abstract

Sustainability has been scrutinized through linkages to different issues. The Our Common Future and previous preparative studies were important achievements. However, The Rio Congress in the 1990s and Agenda 21, SDGs for 2030 are assigned as important international agreements. However, these agreements are not the sole rules to follow. There are other signed agreements for the protection of humans, environment, etc. Some international treaties are not observed by international companies in other countries' land and applications on them. Power can be evaluated with different criteria. This paper will evaluate the double blade of sustainability in the context of the usage of power and application in others' land, present rules in their country, and their applications on others' land in line with or against legal procedures. Capitalism has been forging violent mining actions recently. For sustainability, they have to be scrutinized and results put forward properly to take action for the future.

This study will be scrutinizing some of the international cases Worldwide. The gold mining experiences will be evaluated in this frame. The Some of gold mining examples will be derived from South Africa, Canada, the USA, Turkiye, and other countries. The findings will be derived from literature and observations in recent times. Thus, the paper will indicate a double blade of sustainability through the structurization of legal frames and applications. This double blading is sometimes shadowed or hidden one way from one side. Through proper evaluation of the situation necessary thing is not to be biased and able to see together the double side of sustainability. If this vision is not possible, international agreements and

local applications might be conflicting. This will be putting sustainability issues in danger and halting it. Sometimes they may increase local responses much stronger. The paper will bring out these dilemmas through case studies.

Submission ID: 188

Collaborative Value Creation in the Specialty Coffee Industry: A Case Study of Competitor Cooperation for Sustainable Development

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Abstract

This paper explores the potential for competitors to collaborate and transform neglected industry values into new customer value. The research focuses on the Specialty Coffee industry in Colombia, aiming to understand how competitors can drive sustainability through collaboration. Resource constraints can limit smaller firms' ability to adopt sustainable strategies independently. However, addressing sustainability challenges within industries often requires collaboration among competitors to integrate neglected values into their business models.

Coopetition involves collaboration and competition among competitors to achieve common goals, emphasizing the strategic use of shared resources and capabilities. Values-based networks emphasize collaboration driven by shared values to create innovative and sustainable business models. However, gaps remain in understanding how competitors can effectively collaborate to address sustainability challenges and create value.

The study employs a qualitative small-N case study method and the Congruence Analysis (CON) approach to compare and contrast coopetition-based and values-based business model network theories. Interviews were conducted with 17 owners and managers of Colombia's Specialty Coffee Shops Network. The interviews explored perspectives on sustainability challenges, value adoption mechanisms, collaboration among competitors, and perceived benefits of the network.

The analysis revealed complementarities and convergences between coopetition-based and values-based business model network theories. Competitors collaboratively addressed sustainability challenges, adopted neglected industry values, and created new customer value through a networked approach. Interactions among key factors, such as sustainable challenges, values-based networks, value creation with competitors, and the transition from values to tangible value, illustrate the collaborative dynamics driving a values-based network among competitors.

The study contributes to understanding how competitors collaborate to address sustainability challenges and create value through a values-based network. For academics, the findings enrich the understanding of coopetition and values-based networks in driving sustainable business models. Practitioners can leverage coopetition for business model development and should support coordinated efforts to address sustainability challenges.

Relation to Conference Theme:

This paper directly addresses the theme of the 30th ISDRS Conference 2024 by focusing on collaboration and co-creation between societal actors in the context of sustainable development, specifically within the Specialty Coffee industry in Colombia. It contributes to the conference's goal of discussing principles, programs, methods, and applications of collaboration and co-creation among universities, the public sector, industry, and civil society. The paper explores how competitors in the industry can collaborate to address sustainability challenges and create new customer value, aligning with the conference's objective of encouraging contributions that examine enablers, barriers, empirical cases, and theoretical perspectives on collaboration and co-creation for sustainable development.

"SDG+Target: 12.6."

Submission ID: 319

Nepal's Zero Hunger journey: challenges and opportunities

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Abstract

Eliminating hunger is a top priority globally and also in Nepal.

Zero hunger is one of the most important among the Sustainable Development Goals (SDG). Indeed, it is not acceptable to have people suffer from hunger in this modern age. Governments throughout the world have committed to achieving Zero Hunger by 2030. Nepal is no exception and has made this a high priority.

Using a variety of secondary data, this paper provides an analysis on the trend of food security and nutrition in Nepal over the last few decades and its position in the regional and global context. It also provides an analysis on various factors contributing to food security. The main data used for the analysis include National Living Standards Survey (NLSS), national accounting, and agriculture census by the National Statistics Office of Nepal; agriculture statistics by the Ministry of Agriculture; global hunger index by the Concern worldwide, and State of Food Security and Nutrition in the World (SOFI) by FAO, WFP and UNICEF.

The analysis reveals that Nepal has made significant progress in improving the food security and nutrition of its population in the last few decades. This is reflected in the improving trends of food consumption, improvement in the global hunger index, reduction in prevalence of undernourishment and stunting of children under the age of five. Despite these improvements, the food security situation in Nepal remains vulnerable, as the improvement in consumption is mainly caused by an economy highly dependent on remittances of migrant workers. The agriculture productivity remains relatively low and the country depends on significant imports to meet its food needs, despite more than 60% of the population being engaged in agriculture. Furthermore, the agriculture sector is likely to be further affected with the impact of climate change. Opportunities exist in increase in agricultural production through improved farming and better inputs; diversifying livelihoods, coordinated approach to food security and nutrition, and more targeted social protection programmes. Though achieving zero hunger by 2030 (SDG2) seems no longer attainable, it is quite possible to have significant further improvement from the current situation.

Track 9c Governance and Institutional Frameworks - Public participation and the role of stakeholders

Submission ID: 176

Pursuing good governance through participatory budgeting: some insights from concrete experiences in European municipalities

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Abstract

International institutions involved in economic development emphasized the importance of governance in the public sector (Woods, 2000). Indeed, since 1989, the World Bank has established a framework for 'good' governance (GG) (Lateef, 2016). This concept was also explicitly noted by the International Monetary Fund, which based the definition on "the transparency of government accounts, the effectiveness of public resource management, and the stability and transparency of the economic and regulatory environment for private sector activity" (IMF, 1997). In addition, the OECD (2007) defined GG as follows: "Good governance is characterized by participation, transparency, accountability, rule of law, effectiveness, equity." From its beginnings, GG relates to democracy, community participation, accountability, efficiency, and responsiveness (Kim et al., 2005). In particular, the link between participation and democracy (Michels, 2012) appears as a critical factor since participation is necessary for democracy (Boyte, 2005). Thus, citizen involvement has emerged as a central feature of a 'new' type of GG (Blomgren et al., 2005). Discussions about GG have also extended to the level of local government (Lawton & Macaulay, 2014), further highlighting the link between governments and citizens and emphasizing the concepts of participation, democracy, engagement, transparency, and trust (Denters et al., 2016). Community involvement is achievable through participatory governance and budgeting, which emerges when public institutions apply interactive political leadership (Sørensen & Torfing, 2019), involving the community in policymaking (Edwards, 2001).

This work will analyze the possible role of participatory budgeting (PB) in developing the founding principles of GG in local governments. The work develops a framework for analyzing the characteristic features of GG through an analysis of the fundamental documents on this topic provided by international institutions and a literature review in public management studies. Consequently, the work applies a qualitative research methodology based on research interviews with public officials and local politicians directly involved in PB practices. The research interviews have been processed through a content analysis conducted following the approach developed by Gioia et al. (2013). The characteristic features of GG were structured into sublevels and discussed for consensus, following the recommendations of Vaismoradi et al. (2013). The author used a specific software for coding, and the texts of the research interviews were analyzed line by line and word by word.

The research is currently ongoing. About its expected results, on the one hand, this work will lead to the definition of a framework of the characteristic features of GG applicable at the local level. On the other hand, based on already consolidated PB experiences, the research will offer initial results of an exploratory nature on the ability of PB processes to encourage the development of the constitutive principles of GG at the local government level.

SDG+Target: 16.6; 16.7; 16.10; 17.17

This contribution relates to the topic of the Conference because it analyzes the potential of participatory budgeting to foster greater awareness of local communities in participating in governmental decision-making mechanisms, encouraging the promotion of new development strategies for environmental and social sustainability at the local level.

Submission ID: 187

Sustainable nature resources governance: stakeholders and participatory communication framework

Raimonds Ernsteins[1,2], Arturs Skute[1], Karlis Konkovs[2]

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Abstract

Dviete river region and Lubana lake region in Latvia as two cases of water resources management territories chosen have undergone comprehensive governance studies process. Case Study Research methodology was applied by approaching the study area as a socio-ecological territorial and human system, using in-depth semi-structured interviews (38) and express-interviews (61) in the region with all main local-regional and national stakeholder groups, including also experts, in addition to related document studies and territorial/objects' observations.

Sustainable water resources governance developments are still being partially limited by **not sufficiently developed cross-sectorial understanding** and its legal, planning, communication and top-down management applications, as it is to be seen also during evaluation of two Natura 2000 framed territorial watershed case studies research applications in Latvia, which to some extent are characterizing general situation in the country, also in the field of nature protection management.

From other side, as a kind of **partially compensatory mechanism**, there is to be recognized **local bottom-up management applications**, as real institutional instruments developing eventually more cross-sectorial understanding and practice at the local level, as well as, importantly having innovative participatory management qualities.

In the conditions of limited national management level support, local municipalities, having not enough administration capacities, are developing different specific management approaches being without locally present nature protection administration personal. This approach could be called as **non-governmental management approach.** However, NGO partnerships with municipalities are still important, particularly, in the lake/nature infrastructure maintaining and development etc. as in the studied case of Dviete River Valley NGO.

Another approach could be recognized and called as **tourism communication management approach**, in general comparison, being formally similar to the widely known traditional municipalities owned Tourism Information Centers. But in case of Lubana Wetland Information Centre, such institution is managing not only nature and tourism

information, but also education/training and pro-nature behavior activities, even participatory works, so covering whole **complementary set of nature-environmental communication instrument groups**. Also as Lubana lake and the whole Lubana Wetland Natura 2000 territory have no locally present nature administration, Lubana Wetland Information Centre is partially performing their duties too, especially, in information and consultation etc., what all can and shall be further developed in partnership between national Nature Protection Agency and municipality, and, in collaboration with other stakeholders.

Mentioned examples of specific bottom-up management approaches, actually recognize that either local **municipalities related NGOs, nature tourism and also nature communication institutions** could be assigned as really important sustainable water resources and nature protection management institutional instruments and often as the only one institutional instruments locally available. In the case of Lubana lake and wetland management, tourism should be emphasized not only as a management sector, but also as an important instrument for nature/lake protection and factor to stimulate the development of other local sectors.

All diverse sectorial and general stakeholder interests are to be communicated, coordinated and collaboratively governed, and, in particular, during **all the stages of governance process** (assessment, policy and planning, management, monitoring and communication), what's often is still not fully realized in practice.

Submission ID: 284

Governance of Regeneration in Mining Post-Disaster Communities: A Critical Analysis of Brumadinho, Brazil

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Pontifical Catholic University of Minas Gerais, Belo Horizonte, Brazil

Abstract

This study endeavors to conduct a comprehensive analysis of governance dynamics involved in the post-disaster reparation of Brumadinho, Brazil, following the catastrophic collapse of Vale S.A.'s tailings dam

on January 25, 2019. Recognized as the largest workplace disaster in Brazil's history, this event resulted in 272 fatalities and had profound socio-environmental and economic consequences. The selected case study stands out for the extensive involvement of actors from civil society, the State, and the market, shaping policies and programs for the reconstruction of the affected territory. This complex landscape has given rise to a nuanced interplay of disputes, conflicts, partnerships, and risks, influencing governance and sustainability in Brumadinho. The term "Reparation Governance" serves as a conceptual framework, guiding the understanding of diverse practices and interrelations among civil society, the private sector (including Vale and its subcontractors for reparation actions), and the State (encompassing municipal, state, and federal authorities, as well as the Public Ministry). While there is a scarcity of literature explicitly employing the term "Reparation Governance," the study highlights the need to consider governance and reparation elements in the post-disaster context. The research problem addresses the critical examination of corporate responsibility practices and Translocal Governance dynamics, focusing on the power dynamics of multinational extractive companies. Translocal Governance, prioritizing the well-being of marginalized communities, emerges as an alternative model challenging the dominance of such corporations. The study aims to fill a gap in the literature by providing empirical data on local governance patterns, analyzing political dynamics, and scrutinizing concrete policies. To address the central research question – "How is the proposed governance model for the post-disaster scenario promoting the reparation of Brumadinho's territory?" – the study adopts a triangulation of research methods. This approach seeks to offer a comprehensive analysis of the effectiveness of the proposed model, popular participation, and perspectives for improvement. Anticipated results include insights into the ongoing model's efficacy, discussions on popular participation, and the formulation of new study agendas to enhance future governance and reparation practices. This research, conducted precisely five years after the disaster, serves as a critical reflection on the state of reparation efforts, addressing challenges highlighted in previous literature. By exploring Brumadinho's governance structure and associated challenges, the study contributes to a deeper understanding of the complexities involved in post-disaster reconstruction, providing valuable insights for policymakers, stakeholders, and researchers. The ultimate goal is to promote a more resilient and effective approach to reparation governance in the aftermath of socio-environmental

disasters, ensuring a sustainable and equitable recovery process for affected communities.

Track 9d Governance and Institutional Frameworks - Legal aspects of sustainable development

Submission ID: 194

Nature as a stakeholder: how to give a voice to Nature in corporate stakeholder engagement processes as required by the EU Corporate Sustainability Reporting Directive?

Tineke Lambooy[1], Ebba Toomey Hooft[2], daan Van Apeldoorn[2], Alexandra Pimor[3], Jacobien Vietz[4]

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Abstract

This paper analyses the role of Nature as a stakeholder in corporate best practices and identifies various ways in which Nature can participate in the corporate governance structures.

The EU Corporate Sustainability Reporting Directive (CSRD) requires in the articles 19a and 29a that companies and groups should report on how their 'business model and strategy take account of the interests of [their] stakeholders …'. *(https://eur-lex.europa.eu/legal-content/EN/T/?toc=OJ%3AL%3A2022%3A322%3ATOC&uri=uriserv%3AOJ.L_.2022.322.01.0015.01.ENG).*

As set out in multiple reports, among others, by the Taskforce on Nature-related Financial Disclosures *(https://tnfd.global/)* and the WWF Living Planet Reports *(https://www.wwf.nl/wat-we-doen/focus/biodiversiteit/living-planet-report)*, corporate activities impact the state of Nature everywhere in the world. The Planetary Boundaries studies of the Stockholm Resilience Centre reveal that the planetary boundary of biosphere integrity has been transgressed substantively *(https://www.stockholmresilience.org/research/planetary-boundaries.html)*. The

Planetary Boundaries indicate the boundaries for a safe operating space of humanity. Currently, 6 out of 9 boundaries have been transgressed: biosphere, freshwater change, land-system change, climate change, biochemical flows (phosphate and nitrogen), and novel entities.

Besides the negative impact of loss of biodiversity and ecosystem services for human beings, the impact can also be considered from the perspective of the intrinsic value of flora and fauna. Although human beings are part of the community of life (Earth Charter, 2000), their economic and social activities have a great adverse impact on the non-human flora and fauna. Naess (Deep Ecology, 1987) approached environmental problems by looking for its roots deep in the structure of our western society and worldviews that guide it: “Ecological ideas won’t save us, what we need is ecological identity, ecological self”.

In this paper, as an attempt to amend such roots of the environmental problems, we propose to give Nature a voice in corporate governance structures to represent the interests of Nature in corporate decision-making. For our analysis, we conducted legal studies in several European jurisdictions (the Netherlands, Belgium, the United Kingdom, Denmark) and the US and Canada to identify legal forms for giving Nature a voice. Additionally, by conducting qualitative research, we explored and categorized best practices by companies in said jurisdictions that have structurally included Nature as a stakeholder in their governance structures and/or decision-making processes.

Based on the findings of both studies, we developed a taxonomy for innovative Nature-inclusive governance models, which is presented in this paper. This taxonomy is supported by a toolkit for other companies that intend to give Nature a voice as stakeholder.

This paper supports SDGs 14, 15 and 16.

Submission ID: 195

Rights of Nature in the Constitution or National Law: how to give a voice to Nature in our society? This paper analyses and compares initiatives to grant rights to Nature in the constitution or national law. The paper covers various countries in the Americas, Europe Africa and Asia.

Tineke Lambooy

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Abstract

As set out in multiple reports, among others, by WWF Living Planet Reports *(https://www.wwf.nl/wat-we-doen/focus/biodiversiteit/living-planet-report)*, human activities impact the state of Nature everywhere in the world. The Planetary Boundaries studies of the Stockholm Resilience Centre reveal that the planetary boundary of biosphere integrity has been transgressed substantively *(https://www.stockholmresilience.org/research/planetary-boundaries.html)*. The Planetary Boundaries indicate the boundaries for a safe operating space of humanity. Currently, 6 out of 9 boundaries have been transgressed: biosphere, freshwater change, land-system change, climate change, biochemical flows (phosphate and nitrogen), and novel entities.

Besides the negative impact of loss of biodiversity and ecosystem services for human beings, the impact can also be considered from the perspective of the intrinsic value of flora and fauna. Although human beings are part of the community of life (Earth Charter, 2000), their economic and social activities have a great adverse impact on the non-human flora and fauna. Naess (Deep Ecology, 1987) approached environmental problems by looking for its roots deep in the structure of our western society and worldviews that guide it: “Ecological ideas won’t save us, what we need is ecological identity, ecological self”.

In this paper, as an attempt to amend such roots, we examine and analyse how Nature can be given a voice in the public debate and in decision-making. For our analysis, we compared initiatives to grant rights to Nature in the constitution or national law. The paper covers initiatives and laws in Ecuador, Bolivia, El Salvador, Chili, Sweden, Finland, Ireland, Italy, France, Switzerland, Germany, the Netherlands, Uganda, the Navajo Nation, Aruba, Panama, and Bhutan. The text of the laws and legislative

proposals are compared. Special attention is given to the wording or description of Nature in those initiatives and laws.

Additionally, by conducting qualitative research, we explored and categorized the motivation for introducing such an innovative approach and we analysed in which way the initiative emerged, i.e. through a civil society initiative or another form?

Based on the findings of both studies, we developed a proposal for a Nature-inclusive constitution, which is presented in this paper. This proposal is supported by arguments supportive to be included in the Preamble.

This innovative approach contributes to the Deep Ecology theory.

Submission ID: 241

Right to be Free from Water Pollution in Malaysia – An analysis on the Legal aspects.

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Abstract

The availability of clean water has been a constant issue in Malaysia based on frequent unscheduled water disruptions due to industrial pollution. The severity of this issue causes not only economic loss but also causes health issues for affected victims. This continues even though many agencies are equipped with laws to control and prevent pollution. This research intends to address the legal issue in controlling industrial pollution, in particular how laws protect the right of a citizen to be free from pollution based on doctrinal analyses of legislations and case laws. The researchers found that 1) the Malaysian Federal Constitution which is the local equivalent of the UK's Bill of Rights, and the supreme law of the Federation guarantees nine (Articles 5 – 13) fundamental rights. However, a one court ruling in this regard is inadequate to uphold the right to be free from water pollution in the absence of such express provision in the Federal Constitution. 2) Although international principles and practices are not automatically binding in the absence of domesticating

it into the nation's context in Malaysia, major steps have been taken to ensure clean water and sanitation. This includes the 2005 constitutional amendment that allows the federal government to transform the water services sector, incorporating SDG 6 in the 12th Malaysia Plan (12MP), and the Water Sector Transformation (WST 2040). Nevertheless, the federal-state conflict remains an impediment to improve the water sector. 3) the relevant legal framework remains sectoral and has not been integrated in ensuring target 6.3 of SDG 6. Hence, there is no integration to improve water quality by reducing pollution, eliminating dumping, and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing water recycling. The discourse on human rights aspects of SDG6 will enhance the debate on environmental justice under SDG16 and the importance of public-private- partnership under SDG17.

Submission ID: 254

The Social Function of the Basic Sanitation Contract as an Instrument of Sustainable Development in Brazil.

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Abstract

The right to basic sanitation is a social right that depends on the state providing services to make it effective. To propose a public policy, in any sector, it is necessary to build norms, processes and institutional arrangements mediated by the law, which is considered an intrinsic element in the development of such policies. The legal framework for basic sanitation, structured by Law n. 11.445 of January 5, 2007, as well as the changes promoted by Law n. 14.026 of July 15, 2015, proves numerous public policies that go beyond the obligation to universalize water supply and sanitation to guarantee sustainable development. Thus, the aim of this study is to analyze the administrative contract, in compliance with its social function, as an instrument for promoting sustainable development in the basic sanitation sector.

Introduction

The global situation regarding access to quality water in sufficient quantity for a dignified life is still appalling. More than a billion people do not have access to quality water for their basic needs and 2.4 billion people in the world do not have access to sewage services (UN, 2003). In Brazil, according to the National Sanitation Information System of the Ministry of Regional Development, more than 35 million Brazilians do not have access to treated water and 100 million do not have sewage collection. The historical deficits in the sanitation sector mean that the sustainable development goals proposed in the United Nations 2030 Agenda must be met. One of the solutions presented in Brazil was the reconfiguration of the regulatory frameworks for the basic sanitation sector with the publication of Law no. 14.026/2020, which made the universalization targets for basic sanitation services mandatory and, from a contractual point of view, converted public procurement into a new opportunity for the development of public policies to achieve goal no. 6 of the 2030 Agenda. This is what we call the social function of the contract.

Method

In order to carry out the research and solve the proposed problem, we used a documentary study through bibliographical research and analysis of data on basic sanitation in United Nations documents and in reports from the Institute for Applied Economic Research (IPEA) and the National Sanitation Information System (SNIS).

Results

The regulatory restriction promoted in Brazil in the basic sanitation sector mentioned public laws for sustainable development, such as the construction of sanitation complexes for low-income families, the application of reasonable tariffs for users, among others. And he pointed out the obligation for services in the basic sanitation sector to be carried out by the Public Administration through delegation to third parties, via public contracts. The challenge is to develop legal forms and regimes that support public policies, expanding their reach and quality, with maximum use of scarce resources. From this perspective, public procurement has become an instrument for realizing social rights, with an economic, social and environmental bias, thus fulfilling its social function. The legislative changes promoted by Law No. 14.026/2020 in the basic sanitation sector in Brazil made it possible to include social clauses in contracts in order to

balance the triangle between governance, capacity to implement public policies and democratic control.

Conslusion

It can be concluded that, in addition to building a legal framework for the sanitation sector, the Brazilian Public Administration, through the choice of its managers, still needs to see the public contract as a public policy instrument, in order to guarantee the availability of water and sanitation for all (objective 6), in an equitable manner (6.1) by 2030 (6.2), especially for the most vulnerable, comforting the country's sustainable development, fulfilling the objectives of the 2030 agenda.

Submission ID: 267

Evaluation of SDGs and New Agenda. New ISDRS Series Proposal

Katarzyna Cichos

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Abstract

Presentation of a new ISDRS initiative to initiate a new publishing series on evaluation of 17 SDGs as a part of global discussion on new Agenda 2030.

The project will include writing 17 short manuscripts but also creating a platform that will invite researchers from around the world, build contacts with UN, promote the results, and maybe eventually join the process of writing the New SD Agenda.

The project would include (suggestion):

1. Creating the series editors' group

2. Creating 17 interdisciplinary groups. Each group should include at least a lawyer, experts on certain SDGs, experts which help prepare and evaluate the questioner.

3. Preparing methodology which will include:

   - analysis of legal acts and literature to identify the areas of SDG implementation (good and bad practices) where we can observe

the success and failure, and

- based on literature and legal act it will be prepared questionnaire for researchers and professionals dealing with certain SDG to consult which areas, actions, are in their opinion the most successful and the biggest failure to compare some "unpublished knowledge" with the literature results and based on them prepare the final suggestions.

4. Cooperation with the UN, UNU and other leading organizations working on SDGs. ISDRS might invite as authors leading professors from certain areas, whose role will be also to involve their communities and contacts into the consultation process to make questionnaires spread and promote the entire process.

5. Special Tract during ISDRS Conference in 2025 or 2026.

6. Funding applications.

7. 17 published short manuscripts (around 70-100 pages each).

The Track 9D, Governance, power and institution - Legal aspects of sustainable development can play leading role in this process.

Submission ID: 277

Legal aspects in the management of healthcare waste in Brazil:home care modality.

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Abstract

Home health care, also called home care, is a treatment used when the doctor recommends or allows the patient to receive health care in their home or residence. It covers health actions that can be carried out at home and by a multidisciplinary team aimed at promoting, maintaining and rehabilitating the patient. Such actions involve medical, housing, sanitation policies, among others, and generate the production of health service waste (HSW), that is, waste from health care that requires prior treatment for final disposal. The management of waste produced within the scope of home care must comply with specific legislation for the case,

meeting the objective of sustainable development to ensure responsible production and consumption standards. The management, involving the segregation, conditioning, storage, collection, transportation, treatment and final disposal of health waste is provided by several specific laws and technical standards, with Conama Resolution nº 358, of April 29, 2005, being the main one, classifying health service waste into 5 groups: I - Group A, waste with the possible presence of biological agents; II - Group B, waste containing chemical substances; III - Group C, materials that contain radionuclides; IV - Group D, waste that does not present a biological, chemical or radiological risk to health or the environment; V - Group E, sharp materials and all broken glass utensils in the laboratory and other similar items. Specifically for home care, the specific standards of the National Health Surveillance Agency (ANVISA), which also supervises the home care system, apply. The Resolution of the Collegiate Board of Directors (RDC) No. 222, of March 22, 2018, provides for the Technical Regulation for the management of waste from healthcare services. Therefore, the objective of the present study is to verify how the management (segregation, packaging, identification, transportation and final disposal) of healthcare waste occurs in the context of home care, aiming to exclude or minimize risks to the environment. Despite the standards prescribed in the cited in the RDC, the process is much more complex, requiring knowledge of other precepts found in various referenced resolutions and technical standards (NBR). The multidisciplinary team and the patient are also part of the management and, if they do not manage waste correctly, they may dispose of it incorrectly, bringing risks to people and the environment in which they live. When analyzing the management of health waste produced by home health care, inadequacies are observed due to the lack of regulatory knowledge; preparation of those living in the residence, as well as the home team; absence of physical structure in residences for temporary storage and safe transportation to the final destination. Regulatory restructuring and simplification, training of people who will care for the patient and who live at home, as well as an easily accessible public policy for the disposal of small-volume infectious materials, are necessary to preserve the health of the population and the environment. It is essential to practice humanized medicine with better quality for the patient, ensuring sustainable development, meeting responsible consumption and production standards.

Submission ID: 280

Navigating Ecoanxiety: Exploring the Interplay Between Climate Change Laws, Mental Health and, Sustainable Development Goals

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Abstract

This paper delves into the intricate relationship between climate change laws, Mental Health and the Sustainable Development Goals (SDGs), shedding light on the psychological implications of legislative responses to the climate crisis within the framework of sustainable development. Drawing upon interdisciplinary research in environmental psychology, policy analysis, public health, and sustainable development, this study examines how climate change laws influence individuals' perceptions, emotions, and coping mechanisms in the face of environmental uncertainty, while also contributing to the achievement of SDG 13 (Climate Action), SDG 3 (Good Health and Well-being), and SDG 17 (Partnerships for the Goals). The article explores five key relations between climate change laws, ecoanxiety, and the SDGs, including the impact of legislative response on public perception, the role of policy uncertainty in exacerbating anxiety, and the differential effects of climate policies on vulnerable communities. Moreover, the goal is to evaluate the trends and current stage of laws and ecoanxiety around the world and in Brazil, as it is or it is not generating ways to alleviate ecoanxiety within the context of climate governance and sustainable development. This article provides insights into the complex dynamics shaping psychological impacts concerning climate change and climate change laws, specifically on the field of ecoanxiety.

Track Ten

Special Themes

The 30th

Annual International Conference of ISDRS on

Sustainable Development Research

Track 10a Special Themes - ICT and Sustainable Transformation - Navigating SDGs

Submission ID: 9

Reshaping business strategy by integrating sustainability and digitalization? A literature review and research pathways

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Universidad de Antioquia, Medellín, Colombia. Radboud University, Nijmegen, Netherlands

Abstract

Addressing the challenges related to sustainability and digitalization currently captures the attention of society, and particularly businesses. The continuous demands from stakeholders, coupled with the apparent link that both topics have with value creation and competitive advantage, have generated special interest among managers and academics. As a result, fields of study are beginning to consolidate with the purpose of conceptually and empirically understanding the implications that various factors related to sustainability and digitalization have on the business. Progress has been made in analyzing how both topics, their techniques, tools, practices, objectives, achieve points of convergence and synergistic development from a complementary perspective. Consequently, both critical factors (i.e., sustainability, digitalization) for the company's operation in the current context are intrinsically linked to the business strategy. In this context, our systematic literature review emerges, aiming to understand how the literature is accounting for the linkage between sustainability, digitalization, and business strategy. Two scientific contributions are made with the systematic literature review: (1) This study reveals how the interest in linking sustainability and digitalization influences and begins to shape central elements (e.g., organizational capabilities, organizational resources, business model, organizational performance, stakeholders, networks) that make up and deploy business strategy. (2) The challenges and paths that future research should address are discussed and proposed.

Submission ID: 202

The implications of Artificial Intelligence on international development management

Bongs Lainjo

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Abstract

Artificial Intelligence (AI) has emerged as a powerful tool revolutionizing various sectors globally, including international development management. This research aims to explore the current landscape of AI implementation in global development management, assess the benefits and challenges associated with its adoption, and propose relevant policies and practices. A mixed research design, comprising qualitative and quantitative methods, was utilized to gather data from secondary sources. The qualitative section of the study draws upon case studies from diverse operational sectors to examine the impact of AI adoption. These case studies highlight how AI contributes to improved performance in various industries and the potential positive effects on individuals' lives. The quantitative part of the research utilizes data from renowned databases such as World Bank Open Data, United Nations Development Programme, International Monetary Fund (IMF), OECD Stat, and Global Open Data Index. Integrating qualitative and quantitative data allows for a comprehensive understanding of AI implementation's economic growth and development across different organizations worldwide. The findings reveal that AI adoption in international development management holds significant promise for enhancing organizational efficiency and individuals' well-being. However, the research also identifies various challenges associated with AI implementation, such as ethical considerations and potential job displacement. To address these issues, the study proposes policy recommendations and best practices that can guide organizations and policymakers in effectively harnessing the transformative potential of AI. This research contributes to international development management by providing a deep understanding of the importance of AI in the current context. The study offers insights for organizations adopting AI and

assists policymakers in identifying and resolving pertinent challenges. By completing this study, organizations and policymakers can proactively address the existing problems and develop strategies to maximize the benefits of AI while minimizing potential risks. In summary, this research underscores the immense potential of AI in driving development and improving lives, laying a foundation for future advancements in international development management.

Submission ID: 251

Systematic Literature Review: Mitigating social isolation through utilization of ICTs in volunteering

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Abstract

Social isolation and loneliness present significant challenges to individual well-being in our society. This phenomenon is prevalent among young people, although they are well-connected to strong social structures, such as school, university, work environments, family and friends, social media, and other interest groups. When transitioning between these environments, they face challenges and compromise social connections, which increases risk of social isolation and loneliness. While volunteering initiatives have traditionally served as effective means to foster social connections and alleviate isolation, the integration of Information and Communication Technology (ICT) introduces a promising avenue to augment the impact. The aim of this review is to investigate the relationship between youth volunteering participation and youth loneliness, with the goal of implementing volunteering as a strategy to overcome loneliness through a digital platform.

A systematic literature review is conducted using PRISMA framework to identify relevant articles from five databases. By using keywords such as 'social isolation', 'loneliness', 'technology', and 'volunteer*', 25 relevant articles have been selected to investigate the role of ICT in volunteering to reduce social isolation among young people.

Furthermore, this research seeks to evaluate the multifaceted contributions of ICTs, including applications, webs, or virtual companionship programs. By examining how ICTs can streamline volunteer engagement processes, optimise resource allocation, provide timely and personalised support to individuals facing social isolation, this study attempts to enhance the overall effectiveness and scalability of interventions.

Preliminary findings from this review highlights how ICT integration in volunteering has the potential to help promote community wellbeing and enhance interventions aimed at mitigating social isolation.

Submission ID: 260

Assessing the potential contributions of ICT towards ride-sharing services for sustainable transportation

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Abstract

Improving the sustainability of transportation has become a pressing concern due to the worsening urban traffic congestion and environmental pollution. Ride-sharing is gradually forming a new travel pattern by lowering the usage of private vehicles, which can efficiently lessen traffic congestion and save energy consumption. To assess the potential contributions of Information and communication technology (ICT) towards ride-sharing services for sustainable transportation, understanding the factors influencing ride-sharing utilization is important. Therefore, from the perspective of user factors, this paper aims to study the influencing factors and the potential contribution of ICT technology by doing a systematic literature review. The findings reveal five key factors that significantly influence ride-sharing adoption: social considerations, cost-benefit analysis, platform design, policy and regulatory frameworks, sustainable and environmental impact. At the

same time, the study shows that ICT can play a pivotal role in intelligent ride-sharing platforms by optimizing matching algorithms, implementing intelligent route planning, facilitating real-time information sharing, and providing personalized experiences. Based on the findings, further exploration of intelligent ICT solutions has the potential to contribute to future sustainable transportation and promote environmentally sustainable development.

Track 10b Special Themes - Sustainability in the Himalayan Region

Submission ID: 37

Shifting Linkages: Agro-pastoral changes and the emerging role of domestic dogs in the Indian Trans Himalayas

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Abstract

Mountain areas across the globe have been going through unprecedented rates of changes due to climate change, land-use changes and globalization compromising critical ecosystem services and human well-being. In a system where communities are dependent on natural resources for their livelihoods, externalities in the form of government policies and development interventions can have unexpected consequences. Our study investigates agropastoralism changes across a decade in the Upper Spiti Landscape (Himachal Pradesh, India) and evaluates these changes in the larger framework of ecological and social perturbations particularly with respect to human-dog relationships. We conducted 256 semi-structured interviews across 27 villages in the landscape as well as compared livestock trends across 26 years through secondary data. Nearly 72% of the respondents reported a decline in the livestock population in the last one decade (2003-2013). The landscape witnessed

a 44% decline in the population of livestock in the last 10 years with a significant reduction in small-bodied livestock. More than half of the respondents did not have small-bodied livestock (59%) and for 40% of these respondents, this change happened in the last 5 years. Though several reasons of decline were stated, livestock depredation by dogs was most frequently stated reason comprising in 66% of the responses. Overall, livestock population decline along with government schemes to increase area under agriculture resulted in accessing manure from outside. While lifestyles changes triggered by socio- economic changes have contributed to the initial declines in livestock, in the last decade, livestock depredation by dogs have resulted in the decline of small-bodied livestock as well as impediments in herding them. In the Trans-Himalayan arid landscape of the Upper Spiti valley, the interactions between traditional livelihood, and external market driven economics has produced an unlikely keystone player, the domestic dog, whose impacts have been disrupting the intricately linked production systems. This reiterates the need for concerted efforts by multiple agencies in dog population management in the landscape.

Submission ID: 124

Estimation of Environmental Impact Generated by Tourism and Mountaineering Activities in Sagarmatha National Park

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Abstract

Climate change and tourism are having a significant impact on mountain ecosystems and local communities' lifestyles. Local communities in mountainous areas benefit from ecosystem services generated by the mountain environment, however, have limited adaptive capacity to the impacts of climate change due to limited livelihood options. Understanding the impacts of climate change on local communities is an urgent issue in terms of sustainable mountain environment conservation. These analyses require baseline data collection through field surveys, but due to the difficulty of accessing the field, few studies

have been conducted on the impacts on cultural ecosystem services of alpine peoples.

This study reports on a baseline study conducted in a mountainous area of the Himalayas, a leading tourist destination visited by trekkers, to elucidate the environmental impacts on the social environment caused by direct and indirect environmental load associated with mountaineering and tourism use.

The target area of this study is Sagarmatha National Park (SNP) in the Khumbu region of northeastern Nepal, which includes the world's highest mountain, Mt. Everest, and is one of the most developed mountain tourism areas in Nepal, with its foothills serving as a major trekking route, but also imposes significant environmental impacts.

We conducted field surveys in Everest Base Camp (EBC) on the Nepal side from 2003 to 2005. From these surveys, the authors clarified that a large number of organic wastes such as human feces, urine, and miscellaneous domestic wastewater are discharged during the stay at the base camp due to mountaineering activities, polluting the water environment, and attempted to calculate the amount of environmental load. Based on the research obtained to date, this study estimates the environmental load within SNP.

Here we treated the example of the year 2019, the most visited year since the statistical history of the SNP: the number of visitors to the SNP in 2019 was 58,030. From previous studies, the average length of stay of visitors in SNP is 14.5 days. To estimate the environmental load, the amount of human organic waste (feces and urine), which hypothetically has the greatest impact on the environment, is taken as one of the variables. The intensity of human organic waste is 0.11 kg/day of feces and 1.5 liters of urine. Converted to units by weight, the specific intensity of organic waste discharged from humans is 1.61 kg/day. Multiplying the number of visitors, the intensity of organic waste generated, and the average number of days spent in the area, the environmental load in 2019 was estimated to be approximately 1,354.7 t. our findings suggest the possibility of calculating the carrying capacity necessary to consider sustainable mountain environment conservation measures by clarifying the mechanism and environmental load due to tourism use in SNP on

local communities.

SDG+Target: 13.2 and 15.4

Linking Futures of Mountain and Ocean: Clarifying the impacts of Climate Change on Cultural Ecosystem Services in the High Mountain areas and Proposing Adaptation Masseurs

Submission ID: 136

Towards source mapping for sustainable materials during post-disaster reconstruction

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Abstract

Nepal is prone to natural disasters including landslides, earthquakes, floods and fires. As a result, many buildings and infrastructure are affected and lives are lost frequently. The effects of the natural disasters are even more prominent in the hilly and mountainous regions due to poor road infrastructure. Recent trend in construction of houses, especially following the 2015 Earthquake, has seen popularity in using concrete as the choice construction materials even in remote places where materials like steel, cement, sand and aggregate are note easily available and requires trades people from outside of the local areas. In such situation, locally sourced materials can provide cost-effective and fast alternatives.

This study aims to develop a source map for different locally available sustainable construction materials to help the reconstruction work in post-disaster scenario. Through a couple of field trips in Sindhupalchowk district after 2015 earthquake and Melamchi district after the 2021 flood event, this paper presents the importance of using locally sourced materials for sustainable and responsible reconstruction work using sustainable construction materials and locally available man power. Field data from two reconstruction projects post 2015 earthquake and observation data from Melamchi river provide background for creating

source map. Visual representation of both sources of sustainable construction materials and delivery processes, including estimated time, can assist in effective decision making for re-building the disaster affected areas.

Submission ID: 200

Priority areas for conserving biodiversity and threats in the Pan-Himalaya

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Abstract

Biodiversity conservation is crucial in the face of increasing environmental challenges, requiring accurate extraction of biodiversity data for informed decision-making. The Pan-Himalayan region holds significant economic and ecological importance, linked to China's Belt and Road Initiative (BRI) and the conservation goals of the 15th Conference of the Parties (COP15). However, there is limited knowledge about its habitats and areas with threatened flora and fauna. Climate change poses a major threat, affecting habitat patterns and species adaptations.This study aims to assess the conservation status of endangered plant and animal species in the Pan-Himalayan region. Using various methods such as field monitoring, surveys, and GIS spatial modeling, the research will use the MaxEnt model to assess habitat suitability for target species. INVEST will be used to calculate ecosystem service functions and analyze stress factors. Mapping these data will help identify areas for plant and animal conservation and restoration based on ecological corridors. To address the lack of information on habitat distribution and hotspots, a "Basic Geodatabase of threatened flora and fauna" will be created. The study will also examine the role of protected areas in conserving biodiversity and ecosystem services, crucial for effective conservation. Historically, biodiversity studies focused on individual regions, neglecting

the Pan-Himalayan region's diverse physical geography and geological history. This project will highlight these subunits to propose strategic conservation planning, serving as a model for similar regions.

Track 10c Special Themes - Religious Philosophies and Sustainable Development

Submission ID: 223

Pre-service Science teachers' perceptions regarding the theocentric worldview of Education for Sustainable Development (ESD)

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Abstract

The ecological crisis facing humanity today can be viewed as a consequence of transgressing the delicate balance that exists within ecosystems. The inherent tensions arising from the integration of development and conservation so far have compelled numerous individuals and organisations to grapple with the continuum between anthropocentric and biocentric orientations. This paper advocates theocentrism as a conceptually and practically effective way to reconcile these conflicting worldviews. Faith possesses significant potential by leveraging on its ethical principles in order to call for the transformation of the minds and attitude of every individual. In pursuit of this goal, this ongoing case study investigates the integration of theocentric worldview of Education for Sustainable Development (ESD) and outdoor environmental education as an alternative and holistic approach to implement the sustainability curriculum. The topic is explored from the perspective of pre-service Science teachers in regards to the efficacy and practicality of the integrated approach in their teaching practice. Twenty final year undergraduate students studying to become Science teachers will participate together in an outdoor program that integrates this

worldview. Using reflection questionnaires as well as photo elicitation focus group discussions, this study aims to explore (i) pre-service Science teachers' perception on the approach and (ii) their self efficacy to apply the approach in their own teaching. By tailoring ESD to fit into the Malaysian religious context, the alternative and holistic approach could potentially serve as one of the practical strategies to push for a more effective sustainability curriculum. This research could also provide valuable information regarding teacher preparatory courses in the Malaysian college of education.

SDG +Target: 4.7, 12.8, 13.3 (Education for Sustainable Development)

Submission ID: 286

Sustainable Waste Management in Restaurants: An Islamic Managerial Approach Supporting SDG 12

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Abstract

Restaurants and food courts are significant contributors to solid waste generation in the commercial sector, comprising leftover food and damaged kitchen equipment. These waste streams not only pose environmental challenges but also result in substantial financial losses. Effective waste management strategies are imperative, with restaurant managers bearing a significant responsibility to mitigate environmental impact and optimize operational efficiency. This study explores four pivotal practices for sustainable waste management: inventory optimization, cultivating an eco-conscious organizational culture, implementing robust recycling initiatives, and embracing composting techniques. From an Islamic standpoint, the principles of responsible consumption and resource management are deeply rooted in the teachings of Islam. The Quran and Hadith emphasize the importance of avoiding waste and extravagance, promoting moderation, and being mindful of environmental stewardship. These principles align closely

with sustainable waste management practices advocated in this study. Inventory optimization involves meticulous monitoring of perishable goods, aligning procurement with consumption patterns to minimize waste—a concept consistent with the Islamic principle of moderation (wasatiyyah) and avoiding excess (israf). Restaurant managers, guided by Islamic ethics, play a pivotal role in formulating policies and procedures that encourage responsible resource utilization and waste reduction. Cultivating an eco-conscious organizational culture reflects Islamic teachings on stewardship (khalifah) of the Earth, emphasizing the responsibility to protect and preserve the environment. Encouraging recycling, reusing packaging materials, and promoting eco-friendly practices resonate with Islamic values of sustainability and conservation. Embracing composting techniques aligns with the Islamic concept of tending to the Earth (husn al-khuluq), where believers are encouraged to maintain a balanced and harmonious relationship with nature. Composting represents a proactive step in reducing waste and returning nutrients to the soil, in line with Islamic teachings on responsible resource management. Through a comprehensive sustainability approach rooted in Islamic values, including clear policies, effective leadership, and collaborative efforts, restaurants can contribute significantly to SDG 12: Responsible Consumption and Production. By integrating Islamic principles of moderation, stewardship, and environmental responsibility, this study underscores its relevance in fostering a sustainable environment while promoting sustainable livelihood goals.

Submission ID: 288

Integrating Islamic Teachings with Sustainable Practices: Exploring the Role of Swimming and Hiking in Achieving SDGs 2030

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Abstract

In the pursuit of sustainable development, it is essential to draw upon diverse cultural and religious perspectives to forge meaningful connections between human activity and environmental stewardship.

The intersection of Islamic teachings and sustainable practices offers a rich tapestry of values and activities that can contribute significantly to achieving the Sustainable Development Goals (SDGs) by 2030. This research aims to highlight the role of swimming and hiking within Islamic tradition as avenues for fostering sustainable livelihoods and achieving SDGs. In Islam, Prophet Muhammad emphasized the importance of physical activities such as swimming, archery, and horseback riding. These activities were not only seen as exercises for physical strength but also as means of building confidence and resilience. Moreover, historical accounts reveal that mount climbing and hiking were prevalent among the Prophet's companions, serving as crucial activities for physical fitness and spiritual contemplation. As an open water swimmer and hiker myself, I have experienced firsthand the profound connection between these activities and sustainable living. Swimming in open waters instills a deep appreciation for marine ecosystems and underscores the urgency of preserving our oceans. Similarly, hiking amidst mountainous terrain fosters a sense of reverence for nature's beauty while highlighting the importance of biodiversity conservation. Through rigorous research and active engagement with Malaysian respondents, it might be possible to harness the timeless wisdom of Islamic teachings to navigate the complex challenges of the 21st century and safeguard the future of our planet. This research will delve into the practical implications of incorporating Islamic principles of physical activity into sustainability efforts, examining how these activities can be leveraged to promote environmental conservation, community well-being, and sustainable development goals attainment. Through empirical investigation and interviews, this study aims to provide actionable insights for policymakers, educators, and practitioners seeking to integrate cultural and religious perspectives into sustainability initiatives on a global scale.

Submission ID: 292

A Psychospiritual Approach in Dealing with the Stress of Nurses Treating COVID 19 Patients

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Abstract

The work as a nurse in providing treatment to COVID 19 patients is very challenging. The effect can lead to the psychological well-being of nurses such as stress. Well-being is one of the focuses in SDG's. Therefore, this paper discusses the stress scenario among nurses who treat patients with COVID 19. The discussion refers to the results of a study that has been conducted on 353 nurses who were selected as respondents. The research instrument is through a questionnaire that has been developed by the researcher. Among the aspects discussed are the factors, effects and methods of dealing with stress. The results of the descriptive analysis show that the stress factor is the scope of the work (min=2.9671), the main stress effect is the fear of being infected with COVID-19 (min=3.15) and the treatment method that is often used to deal with stress by nurses is the spiritual approach (min=3.4966) compared to psychology (mean=3.2073). In this study, it is suggested that a psychospiritual approach be implemented to deal with stress among nurses who treat COVID 19 patients.

Track 10d Special Themes - Indigenous Systems and Sustainability

Submission ID: 23

Facilitating regenerative transformations towards 'being in right relationships' with the living: Proposing generative questions for Appreciative Inquiry Interviews to advance 'the Inner Compass' in the Inner Development Goals (IDGs) framework

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Abstract

Indigenous systems offer a unique perspective on sustainability and regeneration, emerging from a profound understanding of the intricate relationship between humans and the environment. At the

core of indigenous cultures lies a way of being in respectful reciprocal relationships with the living.

Right relations can then be seen as "an obligation to live up to the responsibilities involved when taking part in a relationship—be it to other humans, other species, the land or the climate". Being in right relationships does then reach into a way of being based on an underlying mindset and awareness. It can therefore be seen as a vital and profound input, inspiration, and foundation for the regenerative transformational change ahead regarding humanity, organizations, and society.

The need for such input is also currently stressed within the initiative and framework of inner development goals (IDGs). It is a framework that acknowledges that modern humanity seems to lack the inner capacity to deal with our increasingly complex environment and the challenges connected to caring for and sustaining life on this planet (https://www.innerdevelopmentgoals.org/). In response to that, the IDG framework raises the importance of developing our abilities to relate to and care for others and the world. One of the most foundational shifts highlighted in the IDG framework is the notion of developing our "inner compass", that relates to "having a deeply felt sense of responsibility and commitment to values and purposes relating to the good of the whole".

The purpose of this paper is to explore and propose how the development of 'being in right relationship' and the 'inner compass' in the IDG framework might be facilitated by generative questions in appreciative inquiry interview guides.

This is a conceptual paper, focused on exploring and proposing generative questions to be used within Appreciative Inquiry Interviews. It is an approach that acknowledges the power of questions as fundamental for facilitating change. More specifically, when discussing generative questions in relation to appreciative inquiry, research propose that the generativity of the questions increases if: 1) they are surprising; 2) they touch people's heart and spirit; 3) talking about and listening to these stories will build relationships; and 4) the questions force us to look at reality a little differently.

As a result, the paper presents a practical output in terms of questions

and question guides for appreciative inquiry interviews aimed to facilitate reflection, learning and transformation towards 'being in right relationship' and the 'inner compass' in the IDG framework.

The abstract contributes and relates to leadership development and building capability for continuous improvement and transformation in relation to all of the SDGs. The abstract also relates strongly to the main topic of the conference, as it addresses and elaborates on the destroyed relationship of modern humanity and the notion of sustainability and regeneration as a way of being in right relationship, as practiced by indigenous communities since millennia.

The paper is submitted to Track 10D and contributes with new insights about Indigenous Systems and Sustainability.

Submission ID: 73

Threaded Sustainability: Unraveling the Handloom Industry's Impact on Gulledgudda and North Karnataka's Socio-Economic Landscape.

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Abstract

As the second-largest income-generating activity after agriculture, the handloom sector in India stands out for its minimal environmental footprint, low power consumption, and substantial innovation potential, aligning seamlessly with the global drive towards sustainability. The industry functions decentralized, relying on households as primary production units and operating predominantly in rural areas; despite its economic significance, there is a need for better organization, with the sector drawing strength from the collective expertise and traditional knowledge passed down through generations. There is a need to explore the pivotal role of the handloom industry in shaping India's economy and to delve explicitly into its impact on the socio-economic landscape. The study underscores the robustness of the handloom sector's domestic value chain, connecting locally sourced raw materials to the final product

amidst global challenges such as climate change, biodiversity loss, and social justice concerns. Gulledgudda in North Karnataka emerges as a noteworthy case study, exemplifying enduring investment potential due to its rich tradition of craftsmanship. The primary aim is to assess the sector's sustainability and identify opportunities for supporting the weavers' community by adopting circular economy principles. This exploratory research integrates data from structured interviews with weavers and secondary sources. With the handloom industry gaining prominence in global markets, this study contributes an original perspective on sustainable development. Preliminary findings highlight challenges like power loom competition, economic pressures, migration, and limited market access. The study proposes suggestions for aligning traditional practices with circular economy principles to promote sustainable growth in Guledagudda's handloom sector.

Submission ID: 173

Building Bridges: Traditional Wisdom and Sustainable Development in Hill Towns

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Abstract

The traditional knowledge systems of older times were inherently context-specific, tailored to meet the unique demands and needs of specific geographical areas while being responsive to local climates. Serving as a crucial repository of development systems, these traditional practices were passed down from generation to generation. However, the rapid pace of urbanization in hill towns in recent years has led to the erosion of these traditional architectural techniques from society. This phenomenon of rapid urbanization has been associated with various environmental challenges, including the promotion of global warming, the formation of urban heat islands, loss of biodiversity, habitat fragmentation, exploitation of cultural heritage, traditional wisdom and much more. In this context, modern humanity's approach to nature has often been characterized by exploitation, viewing it merely

as a means of prosperity rather than recognizing its integral role in livelihood. Governments, acknowledging the urgent need to protect the planet and ensure their continued existence, have adopted Sustainable Development Goals (SDGs) as a framework for addressing these pressing environmental issues. This research paper aims to identify the key environmental problems stemming from rapid urbanization in hills and explore opportunities for solutions by drawing upon traditional wisdom. The methodology employed involves a thorough analysis of environmental challenges through literature study, utilizing qualitative content analysis to formulate a framework of parameters essential for sustainable design in hills. This framework is intended to serve as a valuable tool for a range of stakeholders, including policymakers, community leaders, and organizations, to foster a sustainable environment and promote environmentally conscious decision-making. Additionally, a case study of mud houses in Bhota, Himachal Pradesh, is conducted, involving interviews with local residents to assess the efficacy of traditional techniques. The findings of this study are expected to contribute to the establishment of Sustainable Development Goal Number 11: Sustainable Cities and Communities, by advocating for the integration of traditional knowledge into contemporary urban planning and development practices.

Submission ID: 197

Costs of coping with energy insecurity among First Nations in Northern Canada

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Abstract

Indigenous peoples in the Arctic North of Canada have inhabited these lands for centuries, building cultures of resilience to coexist with the harsh climate. Similar to other 'first peoples' around the world, the communities are built on traditions, knowledge and a well-articulated set of principles governing their relationship with nature and biodiversity. Scholars have identified several factors that constitutes social resilience among

indigenous communities. These include age old traditions rooted in their sense of belonging to the place and among people, culture of sharing and passing down generational knowledge, leadership structures founded in trust and shared values, and the ethic of cooperative communal service. Over time, with most sovereign Indigenous cultures and 'nations' becoming subservient to colonial governance structures, the relationships with the two-tiers of institutions and the ability to navigate the gray areas of governance among overlapping structures are additional factors to social resilience.

In this study, we explore how energy insecurity tests and strains the social resilience in one First Nations community in the province of Saskatchewan, Canada. A literature review is first carried out to explore the different ways in which energy insecurity is reported to be experienced in northern remote communities of Canada and in the comparable geography of Alaska. Applying the framework and comparing the relationship between social resilience and energy insecurity at the Deschambault Lake community, we find that coping with uncertain energy systems and their erratic transitions compels indigenous communities to leverage their social resilience capital and capabilities. In some situations, adapting to the uncertainty and erratic energy insecurity strengthens social resilience in terms of increasing the cohesion and willingness to act collectively. However, energy insecurity largely erodes and arrests the long-term value creation capabilities of the community and poses serious challenge to achieving sustainable futures. The persistent strain on household budgets and the burden of negotiating everyday challenges created by energy insecurity on community governance arrests their ability to imagine, plan and advocate for long term solutions. The traditional knowledge networks and culture is strained by the decline of spaces and opportunities to socialize, as such spaces have now been locked into a reliable supply of electricity. Declining practice of wood harvesting skills and opportunities has made the community more dependent on imported fuels, signaling the social risks of lowered diversity of energy resources.

We conclude that slow and indecisive energy transitions is giving rise to a period of increased social vulnerability and strained social resilience in northern Indigenous communities of Canada, which is causing significant

harm to their long-term potential to achieve sustainable futures. The findings offer urgent advice to address this 'in-between' challenge in the pursuit of all 17 SDG's and targets, where an explicit acknowledgement of Indigenous people in Arctic regions is a glaring gap. This is relevant to the Himalayan context as well, which shares many of the socio-cultural and geophysical features with the Arctic.

Submission ID: 283

Renewable Energy Technologies and Local Communities: a case study of Brumadinho, Brazil

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Pontifical Catholic University of Minas Gerais, Belo Horizonte, Brazil

Abstract

The manuscript takes as a contextual refinement the governance process about renewable energy for the municipality of Brumadinho, in the state of Minas Gerais, Brazil, a territory historically marked by mining activity. At the territory, certain local groups show limited access to electricity, and the state energy supply company – CEMIG – assumes that availability is unstable and has limitations, reinforcing the search for answers regarding alternative energy availability.

Since 2019, the "Mina Córrego do Feijão" dam disaster has had impacts on the population with a direct relationship to the cultural, environmental, and socioeconomic dynamics of the municipality. The episode was responsible for the deaths of two hundred and seventy-two people and spread ore residue throughout the "Paraopeba River" basin. What researchers classify as a stage of overcoming mining dependence (post-tragedy), for the groups studied, refers directly to rights violations, loss of memories, death of close ones, and a daily life surrounded by challenges.

The manuscript seeks to discuss and analyze, in the face of insecurity in electricity in the region, possibilities for promoting actions by public entities, the framework of public policies, and the search for solutions

on the renewable energy agenda. It is in the wake of the process of reparations for the mining sludge disaster, in compliance with the commitments made by Brazil in international forums and within concerns about climate change and the energy future that this investigation is positioned.

Traditional communities ("quilombola" and indigenous territories) and associations of recyclable collectors make up the groups researched. The action research model (planning-reflection-action) is the one that best suits the context of these groups as it provides space for the exercise of independence, self-determination, citizenship, and self-management capacity. Qualitative research, of an exploratory nature and with participant observation, defines the conditions identified as necessary for a better understanding of the facts presented. The methods and techniques employed include field visits, research diaries, and semi-structured interviews.

To date, it is possible to recognize advances in bringing researchers closer to the way of life of those being researched, the recognition of perennial conflicts in the repair process, the scenario of insecurity in electrical energy for the groups in question, as well as the emergence of social innovations/technologies that unfold by bringing, in the post-tragedy context, new directions for the lives of residents.

Submission ID: 313

A global climate niche for grazing

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Abstract

Grazing systems are critical arenas where intersections of climate change, food security, and welfare of impoverished populations converge. Future climate change will impact grazing practices, which will, in turn, further influence the broader climate dynamics. However, the specifics of how these interactions will unfold on a global level remain poorly

understood. Here we approach this complex problem from a fresh perspective by defining a climate niche for grazing as an entry point to a comprehensive perspective on these complex relationships. We leverage extensive datasets and computational simulations to identify a "grazing niche" (GN) where climatic conditions historically favor pastoralism, demarcated through the analysis of millennia-long climate and grazing data. In our paper, we yield three principal insights. First, we characterize and identify suitable areas for livestock grazing, as defined by "grazing niche', and find they are only a small subset of today's vast grassland resources. The second major finding of our study is that a significant portion of present grassland-based livestock has shifted away from the historically identified climate niche and has concentrated in regions with high dietary demand or scarce alternative options for economic production, leading to large-scale overshooting of grassland capacity both within GN areas and outside GN areas. Finally, we show that the future GN area will face a continental shift under different RCP scenarios in 2100. Presently arid regions in Asia such as the Turan Plain would be enveloped as a principal reservoir for niche grassland, while Europe, Africa, and Himalayas' usable grassland reservoirs will significantly decrease by 2100. Our research presents complementary views to the existing traditional research taking the course of examining plant species composition, soil properties, animal physiology, etc., and turning towards big data simulations by taking advantage of the available millennia-long historical dataset and future projections of climate and land data, attempting at probing the connections between climate change, human activity, and grassland changes. Through these analyses, we hope to offer a renewed perspective on an enduring, yet increasingly precarious, form of indigenous subsistence and its role within the global climate discourse.

This research is within the scope of 10d "Indigenous systems and sustainability" and corresponds to SDGs 1,2,3,10,13, and 15.

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