



2 - 3 | November | 2023 | Kuopio, Finland

**3rd International Conference for
Sustainable Resource Society**
Water Cycle in the Environment and Society



Conference proceedings and abstract collection

Kristina Leppälä and Ville-Veikko Piispanen, editors



UNIVERSITY
OF EASTERN
FINLAND



RESEARCH COMMUNITY



FORESTS AND BIOECONOMY



CLEHE



CENTER FOR
PHOTONICS
SCIENCES



3rd International Conference for Sustainable Resource Society; Water Cycle in the Environment and Society. Conference proceedings and abstract collection.
Editors: Kristina Leppälä and Ville-Veikko Piispanen

(ePDF) ISBN: 978-952-61-5024-6

3rd International Conference for Sustainable Resource Society : Water Cycle in the Environment and Society Conference Proceedings and Abstract Collection
Editors: Kristina Leppälä & Ville-Veikko Piispanen

University of Eastern Finland



ICS23

Note: all text related to the conference program and the abstracts/posters is as were submitted to the conference system and are presented here as they were received. The conference is not responsible for any errors, omissions, or other factors. Some abstracts/poster information may not be included in this collection, as the submitting party did not give permission for the inclusion into this collection.



Contents

Welcomes.....	3
Program.....	8
Abstracts	20
Posters.....	85
Notes	113
Last Words.....	115



WELCOMES



The International Conference for Sustainable Resource Society is a multi-disciplinary conference focused on challenges of sustainability transitions in society, environmental change, and sustainable use of natural resources. ICS23 is organized around five working groups: bio society, climate, water, energy & minerals, and circular economy and sustainable society. ICS23 is jointly organized by a consortium of University of Eastern Finland Research Communities: RESOURCE, FOBI, WATER, CLEHE, and PHOTONICS.

ICS23 offers a platform for researchers from all fields of science to share research insights and discuss the complex global and local challenges on sustainability transitions, the use of natural resources, environmental and climate change, and circular economy themes from a broad perspective, or those themes which are related to the conference theme.

We warmly invite paper or poster submissions covering the themes of sustainability transitions and the sustainable use of natural resources; these are described in detail in the session descriptions. We especially welcome submissions that explore and discuss the ICS23 special theme:

Water Cycle in the Environment and Society

Water is essential to life on Earth. Water connects the Earth's climate system through air, clouds, oceans, lakes, rivers, and vegetation. Humans use water in various ways for drinking and agriculture, ditching peatlands and wetlands, for hydropower, traffic, waste disposal, and recreation, to mention a few. Watersheds are also impacted heavily by human actions such as industry, mining, forestry, fisheries, and consumption, etc. Water is also crucially a social and cultural element in our societies. In this way, water brings together topical sustainability questions concerning climate change (mitigation and adaptation, floods, and droughts), biodiversity loss and nature restoration, and use of natural resources and energy. Our important task is to improve the integration of various research fields when measuring, assessing, understanding, managing, and governing the aquatic systems in different societal contexts.

The conference will be organized as a hybrid event and there are no conference fees for conference participation or for the evening event (maximum of 150 participants, potential waitinglist). The on-site event will be held at the Kuopio campus of the University of Eastern Finland.

Welcome!

Rauno Sairinen

Professor of environmental policy and as a director of the RESOURCE RC (Sustainable Resource Society: Circular Economy, Energy and Raw Materials) at the University of Eastern Finland. Adjunct professor in the Centre for Social Responsibility in Mining (CSR/M) at the University of Queensland, Australia.



Dear Colleagues and Guests,

On behalf of the organizing committee, it is with great pleasure that I extend a warm welcome to all of you for the 3rd International Conference for Sustainable Resource Society on "Water cycle in the Environment and Society." We are delighted to gather, both physically and virtually, as we embark on a journey to explore and address the pressing issues surrounding water resources, the environment, and their critical intersections with society. Water, often referred to as the lifeblood of our planet, is indispensable to the well-being of both nature and humanity. As we convene for this conference, we do so with a shared sense of responsibility and commitment to ensuring the sustainable management of our water resources. Our theme, "Water Cycle in the Environment and Society," underscores the intricate relationship between the hydrological cycle and the broader societal and environmental challenges we face.

This conference, I believe, will be an enriching and informative experience for all attendees. We have gathered an excellent keynote speaker, and presenters who will share their expertise and insights. The sessions will encompass a wide range of topics, including but not limited to water conservation, climate change adaptation, water quality, ecosystem sustainability, policy development, and community engagement. The collaborative discussions that ensue will undoubtedly stimulate fresh ideas and encourage cooperative efforts towards a more sustainable future.

Moreover, this conference provides a unique platform for networking and collaboration for the members of five Research Communities at our University. We encourage you to actively participate in sessions, and poster presentations.

As we collectively tackle the challenges associated with the water cycle in the environment and society, it is crucial that we not only identify problems but also explore sustainable solutions and approaches. I hope that this conference will be a catalyst for interdisciplinary research on our understanding of water resources and the environment.

Once again, I extend my sincere welcome to all participants, whether you are joining us in person or virtually. Your presence and contributions are integral to the success of this conference.

Thank you to the organizing committee for the great work. Let us work together to safeguard our planet's most precious resource – water – and build a more sustainable, resilient, and harmonious future.

Jussi Kukkonen

Professor, Ecotoxicology
Vice dean, Faculty of Science, Forestry and Technology
Chair of Water Research Program UEF//Water
University of Eastern Finland, Department of Environmental and Biological Sciences

Keynote speaker



We warmly welcome the Keynote speaker, Professor Dave Huitema, to the University of Eastern Finland and to our conference, ICS23. Huitema is a professor and chair group holder Public Administration and Policy at Wageningen University and Research at Wageningen University and Research in the Netherlands.

His research is focused on the role of government in accomplishing transformations in the sustainability domain. How can government play a role in facilitating certain ongoing transformations, how could government trigger certain transformations, and how does government need to transform itself in light of desirable transformations? In light of this, Huitema has focused in the past on the ways in which individuals (so called policy entrepreneurs) can consciously affect policy dynamics, learning processes in government (for instance through citizen participation, through evaluation, through serious games, or policy experiments), but he has also focused on the way governments can enhance the societal impact of citizens collectives that seek to introduce more sustainable approaches.

Much of the work done by Huitema is aimed at the domains of water management, climate change and energy. Conceptually he connects to theories about policy dynamics, the science-policy interface, adaptive governance and polycentricity. Huitema received his degree from Twente (M.A. and PhD) and previously worked for the Vrije Universiteit Amsterdam and the Open Universiteit as professor of environmental policy. At the moment, Huitema is involved in various ongoing research projects, notably NWO funded project ADAPT-LOCKIN about locked in policy system, NWO-TTW project AquaConnect about circular water management, and the Marie Skłodowska-Curie Action NEWAVE that aims to give an impetus to the global way of thinking about water governance. Huitema teaches in various courses



at the WUR and is welcoming students who would like to do research together in his expertise areas.

Professor Huitema's pre-conference greeting is as follows:

"For me the International Conference for Sustainable Resource Society is a welcome and timely initiative. Interdisciplinary collaboration is often difficult as it requires cutting across distinct and diverging understandings of reality and talking to each other and developing mutual understandings is very relevant. For me personally, the focus is very much on sustainability transformations and how we are going to make those a reality in a world that seems to be stuck on outdated practices, routines, and understandings. How to change this is a very urgent question, and I expect that the conference will help us getting close to the answer in this respect."

Text from an interview with Professor Huitema and the university's profile pages.



PROGRAM

2 - 3 | November | 2023 | Kuopio, Finland

3rd International Conference for Sustainable Resource Society

Water Cycle in the Environment and Society



CONFERENCE DAY 1

TIME (Finnish time, GMT+2)	ACTIVITY	PROGRAMME	BUILDING AND ROOM
8:00-15:00	Registration	Badge, lunch tickets and general information	Snellmania, Entrance Hall 2nd Floor, Yliopistonranta 8, Kuopio
11:00-12:30	Conference Lunch		Snellmania, Food & Co. 1st Floor
13:00-13:30	Opening by Conference Chairs	Welcome to the Conference: Professor Rauno Sairinen , Head of RESOURCE Professor Jussi Kukkonen , Head of WATER Greetings: Professor Heli Peltola , Head of FOBI Professor Annele Virtanen , Head of CLEHE Professor Jyrki Saarinen , Head of PHOTONICS	Snellmania, SN100 Auditorium
13:30-14:15	Keynote	Professor Dave Huitema , Wageningen University and	Snellmania, SN100 Auditorium



		Research, The Netherlands The transformative state – Public policies for sustainability transformations	
14:15-14:30	Coffee Break		Snellmania, Entrance Hall 2nd Floor
14:30-17:15	Parallel sessions 1	<p>Session 1. Forests and Bioeconomy</p> <p>Session 2. Businesses Accelerating Sustainable Transition</p> <p>Session 3. Societal and Social Perspectives on Sustainability</p> <p>Session 4. Organizational Perspectives on Sustainable Circular Economy</p> <p>Session 5. Climate Change Strategies and Solutions</p> <p>Session 6. Measuring, monitoring, and modelling aquatic systems</p> <p>Poster Session.</p>	<p>Snellmania, SN202</p> <p>Snellmania, SN203</p> <p>Snellmania, SN204</p> <p>Snellmania, SN205</p> <p>Snellmania, SN300</p> <p>Snellmania, SN200</p> <p>Snellmania, 2nd Floor Hallway</p>
19:00-23:00	Dinner	Sokos Hotel Puijonsarvi, Puikkari Conference	Minna Canthin katu 16, 70100 Kuopio By RSVP and dinner ticket only

CONFERENCE DAY 2

TIME (Finnish time, GMT+2)	ACTIVITY	PROGRAMME	BUILDING AND ROOM
8:00-10:00	Registration	Badge, lunch tickets and general information	Snellmania, Entrance Hall 2nd Floor, Yliopistonranta 8, Kuopio



8:30-10:00	Parallel sessions 2	<p>Session 7. Perspectives on Circular Economy</p> <p>Session 8. Governing the Restoration of Aquatic and Water Dependent Ecosystems</p> <p>Session 9. Climate Change and Carbon Emissions</p> <p>Poster Session.</p>	<p>Snellmania, SN202</p> <p>Snellmania, SN200</p> <p>Snellmania, SN300</p> <p>Snellmania, 2nd Floor Hallway</p>
10:00-10:20	Break		Snellmania, Entrance Hall 2nd Floor
10:20-12:00	Parallel sessions 3	<p>Session 10. Mining, Minerals, and Society</p> <p>Session 11. Sustainable Energy Transition</p> <p>Session 12. Exploring the Amenity Values of Blue Spaces</p> <p>Poster Session.</p>	<p>Snellmania, SN204</p> <p>Snellmania, SN203</p> <p>Snellmania, SN201</p> <p>Snellmania, 2nd Floor Hallway</p>
12:00-13:00	Conference Lunch		Snellmania, Food & Co. 1st Floor

THURSDAY, NOVEMBER 2, 2023

Parallel sessions 1, 14:30-17:15

SESSION 1. Forests and Bioeconomy. (Chair: Heli Peltola | Snellmania, SN202) [TEAMS LINK](#)

1. Diana-Cristina Simon (University of Eastern Finland), Päivi Lyytikäinen-Saarenmaa (University of Eastern Finland), Mikko Pelto-Arvo (University of Eastern Finland), Johanna Tuviala (University of Eastern Finland), Maiju Kosunen (University of Helsinki), Eija Honkavaara (Finnish Geospatial Research Institute), Roope Näsi (Finnish Geospatial Research Institute) Olli-Pekka Tikkanen (University of Eastern Finland), Antti Kilpeläinen (University of Eastern Finland), Heli Peltola (University of Eastern Finland), **Infestation symptoms as indicators of a sustained bark beetle outbreak in conserved and managed Norway spruce stands in south-eastern Finland.**
2. Darren R. Healy (University of Eastern Finland), Anna Kårlund (University of Turku), Santtu Mikkonen (University of Eastern Finland), Soile Puhakka (University of Oulu), Leila Karhunen

- (University of Eastern Finland), Marjukka Kolehmainen (University of Eastern Finland), **Associations of low levels of air pollution with cardiometabolic outcomes and the role of diet quality.**
3. Jani Holopainen (University of Eastern Finland), Tuomo Takala (University of Eastern Finland), Jukka Tikkanen (University of Eastern Finland), Jari Vauhkonen (University of Eastern Finland), Veera Tahvanainen (University of Eastern Finland), Aki Ranta (Lapland University of Applied Sciences), Anu Laakkonen (University of Eastern Finland), Katri Rusanen (University of Eastern Finland), Hannes Pasanen (University of Eastern Finland), Minna Tuominen (University of Eastern Finland), Henrik Lindberg (Häme University of Applied Sciences), **Towards strong sustainability forest services.**
 4. Marianna Halinen, Nino Ruusunen, Heli Hallikainen, Tommi Laukkanen (University of Eastern Finland), **The subtle scent of sustainability: Understanding the role of congruent scents in consumers' willingness to pay for green products.**
-

SESSION 2. Businesses Accelerating Sustainable Transition. (Chair: Esa Hiltunen | Snellmania, SN203) [TEAMS LINK](#)

1. Kim Simon Strunk and Susanne Grabl (University of Passau), **Destined to fail? Exploring the underachievement in organizational sustainability transformations of large organizations.** [ONLINE](#)
 2. Sari Silvennoinen, Hanna Lehtimäki, and Henri Teittinen (University of Eastern Finland), **Challenges in management accounting and control systems in triple-bottom-line adoptions - Findings from small circular economy firms in Finland.**
 3. Riikka Holopainen, Kang Li, Esa Hiltunen and Sari Rissanen (University of Eastern Finland), **Sustainability reporting related to the profitability of healthcare companies in Asia, Europe, and the United States.**
 4. Kaisa Henttonen, Ville-Veikko Piispanen and Hanna Lehtimäki (University of Eastern Finland), **Narratives of circular entrepreneurs: circular venture resource acquisition.**
 5. Jatta Pitkänen (University of Eastern Finland), **Project-as-practice: a semi-systematic literature review.**
-

SESSION 3. Societal and Social Perspectives on Sustainability. (Chair: Subhanjan Sengupta | Snellmania, SN204) [TEAMS LINK](#)

1. Irene Kuhmonen (University of Jyväskylä), Tuomas Kuhmonen (University of Turku) and Annukka Näyhä (University of Jyväskylä), **Leverage points in the transition towards a just post-fossil society: lessons from a Delphi study.**
2. Harri Kalimo (Vrije Universiteit Brussels, University of Eastern Finland), Antti Jukka (University of Eastern Finland, Vrije Universiteit Brussels), Petrus Kautto, (Finnish Environment Institute, Lifset, Reid, Yale School of the Environment), **Coordinating environmental product policy – the government and the markets in the development of extended producer responsibility.**
3. Hanna Lehtimäki (University of Eastern Finland), Ari Jokinen (Tampere University) and Juha Kotilainen (University of Eastern Finland), **The catalyst approach to generate a systemic change for sustainability.**

4. Subhanjan Sengupta and Hanna Lehtimäki (University of Eastern Finland), **Connecting social sustainability and circular economy through entrepreneurship.**
 5. Heli Harjama (University of Helsinki), **Experimental circular economy education in high schools: insights from the Finnish context.** [ONLINE](#)
 6. Mbetjiura Noabeb and Rachel Johanna Freeman (University of Namibia), **Building a sustainable society through circular economy solutions for solid waste materials: pilot arts and craft project from trash to treasure in the Windhoek correctional facilities in Namibia.** [ONLINE](#)
-

SESSION 4. Organizational Perspectives on Sustainable Circular Economy. (Chair: Ida Parkkinen | Snellmania, SN205) [TEAMS LINK](#)

1. Ida Parkkinen (University of Eastern Finland), **Exploring multistakeholder engagement in sustainability transition.**
 2. Udayan Karnatak, (SOIL School of Business Design), **On the greenwashing practices in Indian MSMEs.** [ONLINE](#)
 3. Mark Gabriel Wagan Aguilar (Calayan Educational Foundation), **Navigating environmental challenges: exploring Siargao's path to sustainable tourism and circular economy practices.** [ONLINE](#)
 4. Janne Kirjavainen (University of Lapland), **Sustainability transition of a socio-technical system – Risks and barriers in the transition towards sustainable mobility in the Arctic.**
 5. Hanna Lehtimäki, Kristina Leppälä, Olena Liakh, (University of Bologna) Subhanjan Sengupta, Kaisa Henttonen, Ville-Veikko Piispanen, Ida Parkkinen, Nuppu Mielonen (University of Eastern Finland), **A cross-disciplinary review of sustainable innovation literature to produce a multidimensional framework.**
Mikko Lampinen (University of Eastern Finland), **Barriers and opportunities of the circular economy – case Seinäjoki.**
-

SESSION 5. Climate Change Strategies and Solutions. (Chair: Anna Lähde | Snellmania, SN300) [TEAMS LINK](#)

1. Keynote: Jussi Heinonsalo (University of Helsinki).
 2. Javid Rostami, A.A. Paski (University of Tehran), **Development assistance strategy in response to climate change and water resource management; case study: Islamic Republic of Iran.**
 3. Oksana Skaldina (University of Eastern Finland), **Nature-based solutions in the restoration of ecological connectivity between structural elements of urban green infrastructure.**
 4. Wendy Moya Bastos, O. Skaldina (University of Eastern Finland), **The resource capacity of traffic-related urban green spaces in conservation of pollinator biodiversity in Finnish cities.**
-

SESSION 6. Measuring, Monitoring, and Modelling Aquatic Systems. (Chairs: Carlos Palacin-Lizarbe & Taija Saarela | Snellmania, SN200) [TEAMS LINK](#)

1. Keynote: Eva Eronen-Rasimus (Finnish Environment Institute), **Under-ice methanotrophy may offset Baltic Sea ice methane fluxes.**
2. Carlos Palacin-Lizarbe (University of Eastern Finland), Stefan Bertilsson (Swedish University of Agricultural Sciences), Henri J. Siljanen, (University of Eastern Finland) Hannu Nykänen (University of Eastern Finland), Christina Biasi (University of Eastern Finland), Moritz Buck (Swedish University of Agricultural Sciences), Tong Liu (Swedish University of Agricultural Sciences), Mikko Kiljunen (University of Jyväskylä), Sanni L. Aalto (Technical University of Denmark), Antti J. Rissanen (Tampere University), Anssi Vainikka (University of Eastern Finland) and Jukka Pumpanen (University of Eastern Finland), **Winter nitrogen cycling in sediments of large boreal lakes affected by browning and mining.**
3. Jarkko Akkanen (University of Eastern Finland), **Contaminated aquatic sediments – challenges in the environmental management.**
4. Augustine-Moses Gaavwase Gbagir and Alfred Colpaert (University of Eastern Finland), **The ecological state of Lake Ladoga: twenty-four years later (1998 – 2021).**

10 min. Break

5. Eevi Kokkonen (University of Eastern Finland) Jukka Syrjänen (University of Jyväskylä) and Anssi Vainikka (University of Eastern Finland), **Population biological constrains of fisheries management of the brown trout (*Salmo trutta*).**
6. Giovanna Mottola (University of Eastern Finland, Natural Resource Institute Finland, Frank Panitz (Natural Resource Institute Finland), Tuomas Leinonen (Natural Resource Institute Finland), Anssi Vainikka (University of Eastern Finland), **Conservation challenges and genomic insights in salmonid populations: a study of brown trout in Northern Finland.**
7. Vivek Kumar Nair (Indian Institute of Technology Delhi), Hauz Khas (Indian Institute of Technology Delhi), Anushree Malik (Indian Institute of Technology Delhi) and Pooja Ghosh (Indian Institute of Technology, Delhi), **Efficient removal of pollutants for detoxification of anaerobically treated textile effluent through microalgal bacterial granular sludge.**
8. Deepti Surana (Indian Institute of Technology, Delhi), Pooja Ghosh and Satyawati Sharma (Indian Institute of Technology, Delhi), **Microplastic pollution assessment in WWTP treating textile industry effluent in India.**

FRIDAY, NOVEMBER 3, 2023

Parallel sessions 2, 8:30-10:00

SESSION 7. Perspectives on Circular Economy. (Chair: Mona Arnold | Snellmania, SN202) [TEAMS LINK](#)

1. Mona Arnold (VTT) and Eriona Canga (ALCN), **Biochar for agricultural water management.**
2. Aman Chourasia, Debaditya Gupta, Ashmita Das and Sudip Mitra (Indian Institute of Technology, Guwahati), **Comparative study of biochar from different feedstocks: physicochemical properties, and role in the circular economy.**

3. Sachin Krushna Bhujbal, Pooja Ghosh and Virendra Kumar Vijay (Indian Institute of Technology Delhi), **Integrated anaerobic digestion and biochar for enhanced biomethane production: A way forward to sustainable waste management.**
 4. Moritz Albrecht (University of Eastern Finland), **Unfolding alternative imaginaries in novel blue bioeconomy developments: Sectoral study on seaweed farming and recirculating aquaculture systems.**
 5. Pinaki Dasgupta, Vivek Kumar and Anushree Malik (Indian Institute of Technology, Delhi), **Life Cycle Assessment as policy enabler for circular economy in decentralised wastewater treatment systems.** [ONLINE](#)
 6. Sophie Melchers (Utrecht University), **European approaches to wastewater reuse regulation: A comparison between Catalonia, Malta, and the Netherlands.** [ONLINE](#)
 7. Firuz Suleymanov (University of Eastern Finland), **Transboundary water governance between Armenia and Azerbaijan as a source of collaboration in the post-conflict period.** [ONLINE](#)
-

SESSION 8. Governing the Restoration of Aquatic and Water Dependent Ecosystems. (Chairs: Niko Soininen and Suvi-Tuuli Puharinen | Snellmania, SN200) [TEAMS LINK](#)

1. Amy Fallon (Charles Sturt University), Marko Keskinen (Aalto University) and Lee Baumgartner (Charles Sturt University). **Governing sustainable hydropower transformation in Indonesia: Negotiating trade-offs, perspectives, and goals through a social-ecological-technological systems (SETS) lens.**
 2. Irina Mancheva (Umeå universitet), Marko Keskinen (Aalto University), Matilda Miljand (Stockholm University), Mia Pihlajamäki (Aalto University), **Whose knowledge counts? The knowledge use in the implementation of EU Water Framework Directive in Finland and Sweden.**
 3. Eerika Albrecht, Antti Belinskij, Suvi-Tuuli Puharinen, Elina Heikkilä & Niko Soininen (University of Eastern Finland), **Horizontal coherence for mitigating nutrient emissions in the Archipelago Sea.**
 4. Julián Suárez (Cork School of Law). **Could rights-based approaches to environmental protection enhance restoration aquatic diversity of water bodies? The case of the Spanish Mar Menor lagoon rights.** [ONLINE](#)
-

SESSION 9. Climate Change and Carbon Emissions. (Chair: Olli Sippula | Snellmania, SN300) [TEAMS LINK](#)

1. Keynote: Marja Maljanen (University of Eastern Finland), **Sustainable agriculture on peat soils.**
2. Deepak Pandit, S. Trehan, R. Kaushik, **Study the impact on the adoption of more inclusive approach towards sustainable clean energy.** [ONLINE](#)
3. Arya Mukherjee, M. Ihalainen, P. Yli-Pirilä, M. Somero, A. Hartikainen, J. Louhisalmi, J. Tissari, H. Czech, O. Sippula (University of Eastern Finland), **Black carbon and particle lung deposited surface area in small scale wood combustion emissions: effects of an electrostatic precipitator and photochemical ageing.**



4. Muhammad Tanveer, T. Karhunen, O. Sippula, A. Lähde (University of Eastern Finland), **The effect of size, morphology and composition of synthetic and anthropogenic soot on their optical properties.**
 5. Nabin Subedi, A. Lähde (University of Eastern Finland), **Post-synthetic modification of metal-organic frameworks for carbon dioxide capture.**
-

Parallel sessions 3, 10:20-12:00

SESSION 10. Mining, Minerals, and Society. (Chair: Nuppu Mielonen | Snellmania, SN204) [TEAMS LINK](#)

1. Nuppu Mielonen (University of Eastern Finland), **PhD Research - The paradox of green: Circular economy ecosystems of electric mobility.**
 2. Juha Kotilainen, Rauno Sairinen, Hanna Lehtimäki and Nuppu Mielonen (University of Eastern Finland), **Rapidly developing battery industry in multilevel governance: Experiences from Finland.**
 3. Cassia Johnson, Kathryn Moore and Deborah Johnson (University of Exeter), **Small-Scale mining in the Global North: Maturing the concept of small-scale mining (SSM) using concept evaluation criteria on the placer mining industry in Yukon, Canada.**
 4. Olga Sydd (University of Eastern Finland), **Social aspects of the new technology adoption: the case of technologies for small-scale mining in Southern Europe.**
 5. Diana Arbeláez Ruiz and Rauno Sairinen (University of Eastern Finland), **Policy developments on energy transition minerals at key lithium producing countries: the cases of Australia and Chile.**
 6. Toni Eerola (Geological Survey of Finland), **Not in my leisure area! (NIMLA): Mining and mineral exploration disputes associated to water systems, tourism and second homes in Finland.** [ONLINE](#)
-

SESSION 11. Sustainable Energy Transition. (Chair: Sai MA | Snellmania, SN203) [TEAMS LINK](#)

1. Tarek Safwat Kabel (University of Sadat City, Egypt) and Mohga Bassim (University of Buckingham, UK), **Economic impacts of renewable energy in Egypt by using a CGE model.**
 2. Sai MA (Heidelberg University), **Balancing the conflicts: A review of renewable energy investment regulatory regimes.**
 3. Ashmita Das, Aman Chourasia, Ramagopal VS Uppaluri, and Sudip Mitra (Indian Institute of Technology Guwahati), **Thermochemical conversion of spent mushroom substrate: A potential circular economy approach for sustainable environment.**
 4. Julia Loginova, (The University of Queensland), **Global energy transition rush and resource frontiers: policies and responses across the Arctic.** [ONLINE](#)
 5. Fatemeh Shayan (University of Isfahan), **Russia's environmental sustainability and the gas market.** [ONLINE](#)
-



SESSION 12. Exploring the Amenity Values of Blue Spaces. (Chair: Henna Konu | Snellmania, SN201) [TEAMS LINK](#)

1. Kelsey M. Johansen (University of Eastern Finland), **The amenity value of blues spaces and water trails: local business perspectives on the viability of tourism development collaborations in southern ontario Canada.**
 2. Jarno Suni, Raine Kortet, Henna Konu, Raija Komppula (University of Eastern Finland), **The potential monetary value of fishing competitions in Finland – Insights and estimations about the use of money.**
 3. Mia Pihlajamäki (Natural Resources Institute Finland), Riikka Latva-Somppi (Aalto University), Kati Pitkänen (The Finnish Environment Institute), Taru Peltola (The Finnish Environment Institute), Kristaina Svells (Natural Resources Institute Finland), Matti Salo (Natural Resources Institute Finland), Himansu Mishra (Natural Resources Institute Finland), Juha Hiedanpää (Natural Resources Institute Finland), Maarit Mäkelä (Aalto University), Katriina Soini (Natural Resources Institute Finland), **Sense of Water: conceptual framework for unravelling care for water.**
 4. Elli Vento (University of Eastern Finland), Henna Konu (University of Eastern Finland), Katja Pasanen (University of Eastern Finland), Muhammed Khogali (University of Eastern Finland), Petra Blinnikka (Jamk University of Applied Sciences), Minna Tunkkari-Eskelinen (Jamk University of Applied Sciences), Sari Minkkinen (Jamk University of Applied Sciences), **The transformative potential of water-based tourism experiences.**
-

Multidisciplinary Poster Session. (Snellmania 2nd Floor Hallway)

1. Sidra Iftekhara, Ondřej Haluska, Arezoo Rahmani, Rinez Thapaa, Joakim Riikonen and Vesa-Pekka Lehto (University of Eastern Finland), **Harnessing the potential of biogenic nanostructured silicon carbide functionalized bisphosphonate for uranium and scandium extraction from secondary and primary sources.** [POSTER](#)
2. Mirjami Ikonen and Päivi Kosonen (University of Eastern Finland), **Trust in organizational management: Addressing the challenges of sustainability transitions.** [POSTER](#)
3. Lauri Kurkela (University of Eastern Finland, Kausal Oy), Jouni T. Tuomisto (Kausal Oy, Finnish Institute for Health and Welfare, THL), Bernhard Bliem (Kausal Oy), Juha Yrjölä (Kausal Oy), Tero Tikkanen (Kausal Oy) and Maija Faehnle (Finnish Environment Institute, SYKE), **Value profiles as tools to understand and guide societal decision making.** [POSTER](#)
4. Summaira Saghir and Reijo Lappalainen (University of Eastern Finland), **Preparation of biochars from field and forest residues, sustainable applications and benefits: A review.** [POSTER](#)
5. Katja Pulkkinen and Juhani Pirhonen (University of Jyväskylä), **Recovering nutrients and carbon dioxide in algal biomass from recirculating aquaculture system.** [POSTER](#)
6. Veli-Pekka Ikonen (University of Eastern Finland), Ranjith Gopalakrishnan (University of Eastern Finland), Petteri Packalen (Natural Resources Institute Finland), Janne Rätty (Natural Resources Institute Finland), Ari Venäläinen (Finnish Meteorological Institute), Mikko Laapas (Finnish Meteorological Institute), Pentti Pirinen (Finnish Meteorological Institute) and Heli Peltola (University of Eastern Finland), **Wind damage risk assessment tool based on QGIS open-source platform (a prototype).** [POSTER](#)
7. Noora Jokinen (University of Eastern Finland), Tuomo Keinänen (University of Eastern Finland), Laura Tomppo (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland), Jouko Vepsäläinen (University of Eastern Finland), **CPC separation of phenols for sustainable coatings.** [POSTER](#)
8. Umme Sara Santana (University of Eastern Finland), Hanna Ruhanen (Natural Resources Institute), Marja Poteri (Natural Resources Institute), Anne Uimari (Natural Resources Institute), Aybami Salami (University of Eastern Finland), Noora Jokinen (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland), **Sustainable solution of controlling plant diseases such as *Sclerotinia canker* and Grey mold in vivo (Biorefining liquids against plant diseases).** [POSTER](#)
9. Isa Lyijynen, (University of Eastern Finland), Minna Vikman (VTT), Umme Sara Santana (University of Eastern Finland), Victor Carrasco Navarro (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland), **Ecotoxicity testing with water fleas of sustainable samples from biodegradability test.** [POSTER](#)
10. Jiro Karlo (Indian Institute of Technology Dharwad) and Surya Pratap Singh (Indian Institute of Technology Dharwad), **In situ tracking the unsaturated fatty acid dynamics in environmentally significant bacteria *Escherichia coli* using Raman reverse stable isotope probing.** [POSTER](#)
11. Johanna Kerttula and Henri Siljanen (University of Eastern Finland), **Do metagenomic studies help to find linkage on N₂O and CH₄ metabolizing microbes and the fluxes in plant tissues of Boreal and Arctic biomes?** [POSTER](#)
12. Maija Marushchak, Wasi K. Hashmi and Paula Martinez-Risco Martinez, (University of Eastern Finland), **Thaw-N project - On the fate of soil nitrogen in the warming Arctic.** [POSTER](#)



13. Vincenzo Abagnale, Carlos Palacin-Lizarbe, Dhiraj Paul, Johanna Kerttula and Henri M.P. Siljanen (University of Eastern Finland), **Role of nitrogen cycling microbes in *Platismatia glauca* cryptogamic lichen in boreal Norway spruce forests.** [POSTER](#)
14. Dhiraj Paul (University of Eastern Finland), Anuliina Putkinen (Helsinki University), Christopher M. Jones (Sweden University of Agricultural Sciences), Sara Hallin (Sweden University of Agricultural Sciences), Mari Pihlatie (Helsinki University) and Henri M.P. Siljanen (University of Eastern Finland), **Insights into nitrogen metabolism in the phyllosphere of boreal spruce forests.** [POSTER](#)
15. Krishnapriya Thiagarasaiyar (University of Eastern Finland), Dhiraj Paul (University of Eastern Finland), Johanna Kerttula (University of Eastern Finland), Kaido Soorsaar (Tartu University), Katerina Macháčová (Global Change Research Institute of the Academy of Sciences), Jukka Pumpanen (University of Eastern Finland) and Henri Siljanen (University of Eastern Finland), **Nitrogen mestabolizing microbial communities in terrestrial vegetation across temperate to sub-Arctic regions.** [POSTER](#)
16. Yu Zheng (University of Eastern Finland), Perttu Virkajärvi (LUKE), Sanna Saarnio (LUKE), Mari Rätty (LUKE) and Marja Maljanen (University of Eastern Finland), **The mitigation of greenhouse gas emissions by manipulating water table level on peat soil growing grass in eastern Finland.** [POSTER](#)
17. M. Somero (University of Eastern Finland), M. Ihalainen (University of Eastern Finland), P. Yli-Pirilä (University of Eastern Finland), A. Mukherjee (University of Eastern Finland), K. Köster (University of Eastern Finland), M. Ruppel (Finnish Meteorological Institute), V. Vakkari (Finnish Meteorological Institute), H. Czech- (University of Rostock), A. Virtanen (University of Eastern Finland), O. Sippula (University of Eastern Finland), **Laboratory assessment of particle and gas emissions from fires in boreal forest, peatlands, and savannah fires.** [POSTER](#)
18. S. Basnet (University of Eastern Finland), A. Hartikainen (University of Eastern Finland), A. Virkkula (Finnish Meteorological Institute), P. Yli-Pirilä (University of Eastern Finland), M. Kortelainen (University of Eastern Finland), H. Suhonen (University of Eastern Finland), L. Kilpeläinen (University of Eastern Finland), M. Ihalainen (University of Eastern Finland), S. Väätäinen (University of Eastern Finland), J. Louhisalmi (University of Eastern Finland), M. Somero (University of Eastern Finland), J. Tissari (University of Eastern Finland), G. Jakobi (University of Rostock), R. Zimmermann (University of Rostock), A. Kilpeläinen (University of Eastern Finland) and O. Sippula (University of Eastern Finland), **Estimating BrC emissions of residential wood combustion.** [POSTER](#)
19. Tuukka Kokkola (University of Eastern Finland), Mika Ihalainen (University of Eastern Finland), Hendryk Czech (University of Rostock), Joel Corbin (National Research Council Canada), Jason Scott (National Research Council Canada), Martin Sklorz (Helmholtz Zentrum München), Deeksha Shukla (Helmholtz Zentrum München), Uwe Etzien (University of Rostock), Bert Buchholz (University of Rostock), Thorsten Streibel (University of Rostock; Helmholtz Zentrum München), Ralf Zimmermann (University of Rostock; Helmholtz Zentrum München), Olli Sippula (University of Eastern Finland) and ULTRHAS consortium, **Light-absorbing properties of aerosol emissions from a marine engine.** [POSTER](#)
20. Oksana Skaldina and Victor Carrasco-Navarro (University of Eastern Finland), **Microplastics (MPs) contamination of pollinators in cities.** [POSTER](#)
21. Hannu Nykänen (University of Eastern Finland), Sanni Semberg (Natural Resource Institute Finland), Japo Jussila (University of Eastern Finland), Harri Kokko (University of Eastern Finland),



- Dynamics and distribution of nitrogen and carbon from fish feed in aquaponic system estimated using stable isotopes and biomass measurements.** [POSTER](#)
22. Tuomo Soininen, Kaisa Raninen, Emilia Uurasjärvi, Shahina Karim, Roosa Visuri, Jouko Vepsäläinen, Sirpa Peräniemi, Essi Järvelä, Arto Koistinen, Laura Tomppo (University of Eastern Finland), **Developing analytical methods of microplastics for industrial quality control.** [POSTER](#)
23. Hemanta Timilsina, Minna Hiltunen, Olivia Söderena, Juhani Pirhonen, Katja Pulkkinen (University of Jyväskylä), **Cultivation of *Chlorella vulgaris* in nutrient-rich effluent and CO₂ from a recirculating aquaculture system – biomass production and nutrient removal efficiency.** [POSTER](#)
24. Taija Saarela, Wasi Hashmi, Lukas Kohl, Carlos Palacin-Lizarbe, Henri Siljanen, Xudan Zhu, Frank Berninger, Jukka Pumpanen (University of Eastern Finland), **The role of land cover and hydrology in regulating methane (CH₄) and carbon dioxide (CO₂) emissions from subarctic streams.** [POSTER](#)
25. P. Caballero-Carretero (National Distance Education University (UNED), Madrid, Spain), Victor Carrasco-Navarro (University of Eastern Finland), Jussi V.K. Kukkonen (University of Eastern Finland), J.L. Martínez-Guitarte (National Distance Education University (UNED), Madrid, Spain), **Gene expression analysis of *Chironomus riparius* in response to acute exposure to tire rubber particles and leachates.** [POSTER](#)
26. Victor Carrasco-Navarro, S. Musse and Jussi V.K. Kukkonen (University of Eastern Finland), **Toxicity assessment of used and pristine cigarette filter microplastics and their leachates to *Daphnia magna*.** [POSTER](#)
27. Shahidul Mallick (University of Eastern Finland), **Culture, climate change, and water conservations: Water ecosystems and culture-based adaptations in developing countries/Bangladesh.** [POSTER](#)
28. Minna Hiltunen, Hemanta Timilsina, Olivia Söderena, Juhani Pirhonen, Katja Pulkkinen (University of Jyväskylä), **Biomass composition of *Chlorella vulgaris* grown in nutrient-rich effluent and CO₂ from recirculating aquaculture system.** [POSTER](#)



Abstracts





Abstract ID: 90

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Online

Title: Could rights-based approaches to environmental protection enhance restoration aquatic diversity of water bodies? The case of the Spanish Mar Menor lagoon rights

Author: Julián Suárez, University School Cork School of Law

Keywords: -

Content:

Rights of nature are gaining track as one of the most developed rights-based approaches to environmental protection. They seek to enhance such protection in line with the social, economic and environmental aspects of sustainable development. They have been used in many jurisdictions - e.g. India, Colombia, New Zealand- to restore aquatic diversity in affected rivers, lagoons and glaciers. However, many critics have questioned the effectiveness of rights of nature as an alternative or a complement of existing water body legislation. This is also the case of Spain. It has been almost a year since Law 19/2022 -giving rights to the Mar Menor and its basin- was enacted, but after its severe eutrophication, no reversal of the lagoon's negative biodiversity trend has been recorded. This paper will offer an overview of the Spanish rights of nature law, considering the socio- environmental context of its adoption, and its reception among Spanish scholars, to further contrast its substantial and procedural implications to existing environmental legislation. In particular, I will present the law's 'right to restoration' of the Mar Menor and its basin, and assess its scope of protection, paired with an observation of that right's overlapping, redundant, and conflicting features regarding existing environmental protection. Bringing the former premises together, I will attempt to draw preliminary conclusions regarding the low level of effectiveness of Law 19/2022 in achieving its ambitious restoration aim. I will make the case that the right of nature to restoration, based on eco-theological considerations, adds very little to the enhancement of water body protection. Furthermore, it risks the same problems of lack of enforcement as existing environmental legislation. Instead, I will explore the possibility of introducing duties to respect nature's ownership to its own biotic and aquatic resources, and environmental public interest limitations to riparian property rights.



Abstract ID: 6

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Not in my leisure area! (NIMLA): Mining and mineral exploration disputes associated to water systems, tourism and second homes in Finland

Author: Toni Eerola, Geological survey of Finland (GTK)

Keywords: Dispute, mining, mineral exploration, Finland, not in my leisure area

Content:

The Finnish mining and mineral exploration disputes (MMEDs) are related to project location associated with tourism destination, protected area (PA), indigenous Sámi homeland, reindeer herding, lake area with second homes (cottages), and uranium. Issues may overlap and several MMEDs are associated to water systems, tourism, and cottages. They are called as the 'not in my leisure area' (NIMLA) phenomenon. NIMLA is characterized by allegations presented by tourists, tourist entrepreneurs, cottage owners and non-governmental organizations (NGO) on negative social, and economic impact on tourism and cottages caused by any project. Usually, moral panic is associated. The oldest mining-related NIMLA cases are the Hannukainen iron-copper-cobalt-gold, and Juomasuo gold-cobalt mine projects in Kolari and Kuusamo, northern Finland. Both are close to rivers that are feared to be polluted by the future mines' effluents and in regions with nature-based tourism and PAs. Juomasuo is also associated with uranium. Disputes were inherited from former project holders. Most of the NIMLA cases have been in the lake region of southeastern Finland. The disputes in this area started in 2018, when a company was exploring for graphite in the Heinävesi area. This was followed by other cases in 2020, when companies applied for exploration permits along the lake areas due to battery minerals boom. Several mining-skeptical groups emerged. The most recent NIMLA cases are in Koli, and Pyhä-Luosto in eastern and northern Finland, respectively. While the disputes of Hannukainen and Juomasuo are long-standing, many of the most recent ones have been ephemeral. Exploration does not necessarily continue, and even less leads to a mine; the area is abandoned by a company and opposition is dissolved. However, abandon has also happened because of resistance. NIMLA brings a new regional dimension of attachment to a place for local MMEDs and a challenge for social license to operate in Finland.



Abstract ID: 14

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Navigating Environmental Challenges: Exploring Siargao's Path to Sustainable Tourism and Circular Economy Practices

Author: Mark Gabriel Aguilar, Calayan Educational Foundation, Inc.

Keywords: Balancing tourism growth and environmental protection, Circular economy, Waste management, Sustainable tourism practices

Content:

The Philippines' growing tourism industry, exemplified by the magnetic allure of Siargao Island, has been stained by escalating environmental challenges. This research paper delves into the intricate interplay between tourism and environmental practices, focusing specifically on Siargao's rapid ascent as a tourism destination. With an influx of visitors comes a surge in waste generation, placing a spotlight on the necessity of sustainable solutions. Siargao's journey towards embracing a circular economy, an approach that values waste reduction and resource efficiency, takes center stage in this study. Amidst the attractive landscapes and pristine waters, the island grapples with the adverse impacts of its own popularity, motivating the researcher to analyze the mechanisms through which the island's circular economy is being fostered to counteract these challenges. Through a mixed methods approach, the research unravels the strategies deployed to manage solid waste accumulation. By examining waste collection, recycling initiatives, and community engagement, this paper provides a comprehensive overview of Siargao's circular economy in action, underscoring the importance of collaboration between local authorities, businesses, and residents to achieve a sustainable equilibrium. Moreover, the paper emphasizes the symbiotic relationship between tourism and the environment, showcasing instances where responsible practices can elevate both sectors. The role of ecotourism initiatives and education campaigns in fostering awareness and driving behavioral change among tourists is highlighted. With these, this research contributes to the growing body of knowledge on sustainable tourism practices as the world deals with escalating environmental concerns demonstrating that responsible tourism practices can pave the way for harmonious coexistence between human recreation and natural preservation.



Abstract ID: 63

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Experimental circular economy education in high schools: insights from the Finnish context

Author: Heli Harjama, University of Helsinki

Keywords: circular economy, education, pedagogy of concrete utopias, new materialism, diffractive methodology

Content:

Education seeks to provide a good living environment for children and youth and prepare them for the challenges they will face in fully-fledged adulthood. Therefore, education needs to be in immediate connection with the circumstances that students will later enter. As we are facing unprecedented sustainability problems, education needs to be connected with solutions, such as the circular economy and the related transformation. Currently, education emphasizes providing preconditions for further studies or working life, which is insufficient when compared with the demands of the transformations and results in reproducing linearity. Within this problematic, the Circular Citizens project has been organizing experimental education for upper secondary students, i.e., circularity transformation workshops. The exercises are grounded in the students' material, practical living, and the students are positioned as active citizens in the nascent circularity transformation. The research data consists of the assignments completed by the students, observations, and curricula. The research is qualitative and applies new materialism with diffractive methodology (Barad, 2007). The research questions are: "What kind of differences and exclusions re/produce linearity through education?" and "What kind of entanglement would constitute education for circularity transformation?". Preliminary findings from the workshops indicate that 1. within education, the youth are cut as disconnected individuals, whose meaningful social, material and practical lives are excluded from education. In school, the youth are students who are expected to know in an abstract manner that is distanced from the mundane practical-material existence. 2. From the perspective of the circularity transformation, the youth do know in relevant manner: they position their un-distanced personal materialities in a framework of ethics of global economy. As this kind of being and knowing is excluded from education, education as entanglement does not call for the materialization of ethical material agents. The results can be applied to educational transformation for circularity.



Abstract ID: 31

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: On the greenwashing practices in Indian MSMEs.

Author: Udayan Karnatak, SOIL School of Business Design

Keywords: Green washing, Sustainability, Sustainable Finance

Content:

This study will try to get an idea behind the major bottle necks related to the implementation of the sustainable practices by the India's MSME sector. Also, it will be helpful to identify the green washing practices that can affect the sustainable productivity of the firms in the informal sector and formal sector too. Therefore, the objective of this study is to identify the themes related to the barriers for the adoption of the sustainable practices by the MSME in India. Another purpose of this study is to determine the degree to which MSME businesses engage in green washing and to evaluate the environmental claims made by these businesses using a weighted scale ranging from 1 to 5. In addition, this study would analyze the correlation between the green washing score and the total CSR score, as well as conducting a cross-sector examination of the green washing scores of various industries.



Abstract ID: 84

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Global energy transition rush and resource frontiers: policies and responses across the Arctic

Author: Julia Loginova, University of Queensland

Keywords: -

Content:

The global clean energy transition, in the context of climate policies, geopolitical competition, corporate strategies and governance re-arrangements, presents both opportunities and disruptions to frontier regions. These regions characterised by remoteness, low levels of industrialisation and urbanisation, with significant rural and Indigenous communities seeking to defend rights to their lands and territories, face unique challenges. One concern is the scale and speed of decision-making and project development, which could undermine social and environmental safeguards and hinder local development opportunities. It is necessary to interrogate policies, strategies and responses in frontier regions, addressing local-scale pressures stemming from energy transition minerals and large-scale renewable energy projects. This presentation will focus on the Arctic region as a potential source of supply. While much is known about the Arctic's vulnerability to climate change and the region's resource potential, few connections are being made between the geographical, temporal and geopolitical drivers of the energy transition and local pressures across this vast global region. The project involves assessing inventories of energy transition minerals and energy transition infrastructure in the Arctic; exploring national and regional policies and strategies shaping Arctic governance in terms of scale and speed of project and infrastructure development as well as the protection of social and environmental safeguards and the promotion of local development opportunities. Additionally, we will review existing academic and grey literature that identifies social, environmental and governance pressures from across the region. Drawing insights from across the Arctic, this presentation aims to contribute valuable insights to the broader discourse on frontier regions' responses to the global energy transitions, and in particular highlight the critical need to re-centre community participation and ensure Free, Prior, and Informed consent in decision-making in these frontier regions.



Abstract ID: 24

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: European approaches to wastewater reuse regulation: A comparison between Catalonia, Malta, and the Netherlands

Author: Sophie Melchers, Utrecht University

Keywords: wastewater reuse; regulation; circular economy

Content:

Wastewater reuse is encouraged and facilitated across the EU with legislation. A clear example is the Regulation 2020/741 on minimum requirements for water reuse, which entered into force on 26 June 2023. Legal developments such as these have gone hand-in-hand with an increase in research in technological innovations to realise wastewater reuse, including advanced water treatment technologies. Despite these harmonised developments, there appear to be large differences across the European Union in the approaches to wastewater reuse and its regulation. This paper seeks to provide an overview of the diversity of wastewater regulation across the European Union. To do so, it carries out a comparative legal analysis of the Catalan, Maltese, and Dutch contexts. Key indicators along which these Member States differ – often quite drastically – include stakeholder engagement, the level of decision-making fragmentation, the content of the substantive water reuse provisions including its stringency and extensiveness, and financial incentives and disincentives for water reuse.



Abstract ID: 29

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Building a Sustainable Society through Circular Economy Solutions for Solid Waste Materials: Pilot Arts and Craft Project from Trash to Treasure in the Windhoek Correctional Facilities in Namibia

Authors: Mbetjiura Noabeb and Rachel Johanna Freeman, University of Namibia

Keywords: Sustainable Society; Circular Economy; Solutions; Solid Waste Materials; Trash to Treasure

Content:

Waste disposal has become a serious threat to the achievement of social and ecological justice, especially in developing countries. In Namibia, there is a general lack of information and understanding on how to manage solid waste. Most of the time, waste minimization concepts are ignored. There is a lack of statistics and information on practices and the management of solid waste, especially in the Namibian Correctional Facilities (NCFs). There is a need to improve data and generate scientific evidence surrounding solid waste management practices in Namibia (Ministry of Environment and Tourism, 2017), particular in the NCFs. Although there may be support for solid waste management programs in correctional facilities, it can be challenging for leaders to implement comprehensive sustainable initiatives (CalRecycle, 2012; MCSO, 2012). Most correctional facilities have fixed resources because their budgets are part of a larger governing body. Jail and prison administrators have not fully recognized environmental sustainability as an organizational practice and took minimal steps to reduce the waste generated and contributed to the environment. Advocates and scholars suggested the current practice of ignoring the problem must change to prevent further harm to the environment (CalRecycle, 2012; Feldbaum et al., 2011; McKenzie-Mohr, 2011; Ulrich & Nadkarni, 2008). The environment will not remain viable for future generations unless organizations, such as the Namibian jails and prisons move toward the realization of sustainable solid waste management practices. These facilities can contribute to environmental sustainability and building sustainable societies through circular economy solutions for solid waste materials. This can be achieved through the Pilot Arts and Craft project "From Trash to Treasure" (FTT) in the Windhoek Correctional Facilities in Namibia by recycling, reducing and reusing solid waste materials into arts and craft products, reducing their contribution of waste to landfills. This innovative pilot FTT project aims to explore and describe how to build sustainable societies through circular economic solutions for solid waste materials towards employment creation in the reduction of recidivism and waste management. The FTT project activities will co-generate information on the circular economy of solid waste materials to co-produce arts and craft products by offenders, to shift the attitudes and practices of communities towards active



participation in circular economy and waste management practices. It will be linked to educating societies how to become self-sustainable through circular economy solutions for solid waste materials. The project is expected to generate knowledge production and capacity building in social entrepreneurship, leadership in circular economy, waste management and upscaling opportunities for social justice among the participating communities in Namibia. The project will be reviewed and the results will be used to highlight the embedding of new practices for circular economy solutions for solid waste materials.



Abstract ID: 8

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Online

Title: Transboundary water governance between Armenia and Azerbaijan as a source of collaboration in the post-conflict period

Author: Firuz Suleymanov, University of Eastern Finland

Keywords: water, transboundary water governance, post-conflict, Armenia, Azerbaijan

Content:

It should not be surprising that water resources have a significant impact on post-war politics. In the pre-war, wartime, and post-war confrontations between Armenia and Azerbaijan, the rivers of this area and the larger Kura-Aras river basin draining into the Caspian Sea in the South Caucasus served a vital but underappreciated role. In surrounding conflict-affected regions, where water is particularly scarce, climate change and regional hydrological patterns play a particularly crucial role in supplying water. Moreover, the paper answers how transboundary water governance between Armenia and Azerbaijan can accelerate regional collaboration in South Caucasus in the post-conflict period. How transboundary water governance can be a part of further peace treaty? As a result of research, the paper determined that transboundary water cooperation between former enemies in South Caucasus is crucial for regional collaboration. This governance can also lead to sustainable peace in the region.



Abstract ID: 75

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Online

Title: Study the impact on the adoption of more inclusive approach towards sustainable clean energy.

Authors: Deepak Pandit, S. Trehan, R. Kaushik, BMU University, Gurgaon, India

Keywords: Sustainable clean energy, green behavior, emotional intelligence

Content:

Abstract: While there are many research studies underwent to study the societal challenges of sustainability transitions in clean energy in the past, but still the adaptation and acceptance of green individual behavior is still at large. While Private Companies, Government institutions and regulatory agencies are working towards development of sustainable clean energy, but organization faces challenges in adoption as currently the sustainability framework is built on the top-down approach that is very useful for meeting any budgetary/funding and regulatory compliance requirements towards SDG goals. The aim of this research is to empirically investigate, and bridge the gap and come up bottom up approach to drive and adopt sustainable clean energy. The study will consider emotional intelligence as a multidimensional construct and compares the effects of these dimensions on green behavior by understanding individual's social, emotional behavior towards any new sustainable business practices and models in clean energy. Qualitative data has been used to obtain and examine the hypothesized relationships among the data variables used in the study. The finding has suggested that there is a need to identify Green Agents (defining degree of centrality) who plays a crucial role in influencing the individuals in the organization for wide and effective adoption of sustainable clean energy.



Abstract ID: 85

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Winter nitrogen cycling in sediments of large boreal lakes affected by browning and mining

Authors: Carlos Palacin-Lizarbe (University of Eastern Finland), Stefan Bertilsson (Swedish University of Agricultural Sciences), Henri J. Siljanen, (University of Eastern Finland) Hannu Nykänen (University of Eastern Finland), Christina Biasi (University of Eastern Finland), Moritz Buck (Swedish University of Agricultural Sciences), Tong Liu (Swedish University of Agricultural Sciences), Mikko Kiljunen (University of Jyväskylä), Sanni L. Aalto (Technical University of Denmark), Antti J. Rissanen (Tampere University), Anssi Vainikka (University of Eastern Finland) and Jukka Pumpanen (University of Eastern Finland).

Keywords: Nitrogen cycle, denitrification, DNRA, N₂O, winter limnology, sediment microbiome

Content:

The ice-covered period of boreal lakes has contrasting environmental conditions respect to the ice-free, with cold temperatures, absence of light, and minor gas exchange between water and atmosphere. Focusing on the nitrogen (N) cycle, winter seems a suitable period for N-transforming prokaryotes with a high availability of reactive N due to minor assimilation by photoautotrophs. However, there is limited data about winter N cycling rates and the microbes involved on, and about the role of organic matter quality on N cycling processes. We studied two oligotrophic large boreal lakes in North Karelia, Finland, Lake Viinijärvi and Lake Höytiäinen, each lake with clear-water (CW) and brown-water (BW) sides. Viinijärvi has an additional side affected by mining activities in the catchment showing higher nitrate and sulphate levels in the hypolimnion. During winter of 2021 we sampled five sites at the beginning (January-February) and at the end (March-April) of the ice-covered period. Using the Isotope Pairing Technique we incubated sediment cores with ¹⁵NO₃⁻ and quantified the products of 1) complete denitrification (N₂), 2) truncated denitrification (N₂O), and 3) dissimilatory nitrate reduction to ammonium (DNRA, NH₄⁺) to infer the process rates. In addition, to see the role of organic matter, we perform anoxic slurry incubations of the top sediment layer with ¹⁵NO₃⁻ and 1) lake water, 2) milliQ water, 3) algal dissolved organic matter (DOM) extract, or 4) peatland DOM extract. We characterized the DOM using FT-ICR MS. We also explore the genetic potential (DNA) of the sediment microbiome by using several sequencing techniques: 1) amplicon (16S rRNA), 2) targeted, using probe captures for the main N and CH₄ functional genes, and 3) shotgun. The sediment-water interface is an active compartment during winter. The top sediment microbiome has heterotrophic bacteria with flexible metabolism, breaking-down OM during winter despite most of the DOM is recalcitrant. Impacts of browning and mining with major differences between sites in the physico-chemistry of the hypolimnion, of the water



overlying the sediment, and of the top sediment; also, in the top sediment with differences in the prokaryotic community. About N cycling, the genetic potential of the sediment microbiome indicates more recycling of reactive-N and GHG consumption in CW, while in the mining-impacted site and BW sites the dominant pathway depends on the sediment layer with truncated denitrification (N_2O production) in top layer, and methanogenesis (CH_4 production) and N-fixation in sub-top layer. The N_2O production, that fits the genetic potential, is highest in the mining-impacted site, followed by the BW sediments, with the lowest rates in the CW sediments.



Abstract ID: 95

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Barriers and opportunities of the circular economy – case Seinäjoki

Author: Mikko Lampinen, University of Eastern Finland

Keywords: -

Content:

A range of environmental problems such as climate change, ozone depletion, disruption of nutrient cycles (nitrogen and phosphorus) and biodiversity loss, all linked to increasing global consumption, raise questions about whether current trends that support well-being can be maintained in the future. This has contributed to revealing a number of tensions in our social and economic systems. Thus, the radical circular economy, which undermines the current linear economic system, has gained momentum in research and policy makers' agendas. In my thesis, I aim to find out how companies in the Seinäjoki area view the circular economy as part of their sustainable development work, what factors are possible barriers to a more comprehensive adoption of the circular economy by companies and how, in turn, its more effective adoption could be promoted. I will also explore the opportunities that the circular economy offers both for businesses and for Seinäjoki as a region. Below are the research questions: How do companies in Seinäjoki view the circular economy as a driver of sustainable development and how is it reflected in their operations? What are the perceived barriers and opportunities for the adoption of the circular economy now and in the future (in the region and in the companies' own operations)? How does this future outlook reflect the circular economy objectives of the region/nation/EU? I analysed my data based on the thematic interviews and the companies' strategies and programmes using theory-based content analysis and thematic analysis, which can be considered as a form of content analysis. The results of the study have yet to be processed and a conclusion drawn, so no further details are given here for the time being.



Abstract ID: 56

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Contaminated aquatic sediments – challenges in the environmental management

Author: Jarkko Akkanen, University of Eastern Finland

Keywords: contamination, aquatic environment, regulation

Content:

Despite of their importance, sediments are many times forgotten part of the aquatic ecosystems. Aquatic sediments act as archives for the past, reflecting natural and anthropogenic changes in the environment. Thus, many types of chemical contaminants are found to accumulate in different sediment layers. Firstly, sediments being sinks is beneficial, and water quality on top of the sediment can be rather good despite of the sediment contamination. Secondly, contaminated sediments turn into sources, even after the original sources and loading have ceased, causing ecological and health risks. Sediment contamination, as such, is not regulated in Finland, and problems usually arise only with navigational dredging or construction work where sediment is lifted from the bottom. In many cases, neither ecological problems nor human health issues are sufficient to start risk assessment processes or remedial operations for the sediments. Examples of challenges in the management of sediment contamination will be presented and discussed. The examples include contamination by 1) persistent organic contaminants and 2) metal mining effluents. These represent different types of cases. In the first case, the problem is contamination that biomagnifies in the food chain. In the second case, the problem is not just a question of the direct toxicity of the substances but also their effects on the elemental cycles in the system. The examples will indicate that the regulation and management of contaminated sediments is challenging but not impossible.



Abstract ID: 25

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Horizontal coherence for mitigating nutrient emissions in the Archipelago Sea

Authors: Eerika Albrecht, Antti Belinskij, Suvi-Tuuli Puharinen, Elina Heikkilä & Niko Soininen (University of Eastern Finland)

Keywords: horizontal coherence; nutrient emissions; Archipelago Sea

Content:

The EU Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD) call for member states to prepare ecosystem- and area-based management plans and take measures that cover different sectors and point and diffuse sources alike to achieve good status of water bodies and marine environment. Baltic Marine Environment Protection Commission, Helcom has listed Archipelago Sea as environmental hotspot in the Baltic Sea, because of its vulnerability to the impacts of eutrophication. Agricultural run-off is the main source of excess nutrient loading, although aquaculture, tourism, wastewater treatment and internal loading contribute to it. In this paper, we focus on the horizontal coherence of nutrient mitigation policies in the Archipelago Sea region. Research data consists of policy and legal documents and 11 thematic interviews. The aim of this paper is to study what kind of synergies and challenges exist between integrated management planning and different policy sectors and how these synergies and challenges contribute to the delivery of overall environmental objectives. On the one hand, evidence from the Archipelago Sea case study shows that lack of coherence between the sectoral policies can cause effectiveness challenges in policy implementation. On the other, it is possible to find synergies between the implementation measures of the international and EU legal frameworks to steer sectoral decisions in an integrated manner and thus strengthen marine resilience and biodiversity.



Abstract ID: 34

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Unfolding alternative imaginaries in novel blue bioeconomy developments: sectoral study on seaweed farming and recirculating aquaculture systems

Author: Moritz Albrecht, University of Eastern Finland

Keywords: Blue bioeconomy, sustainable transformations, seaweed farming, RAS, spatial imaginaries

Content:

Considering the mismatch between aquatic based bioresource use in society compared to the spatial prevalence of wet materialities on the earth's surface (and volume) the blue bioeconomy has become a political and henceforth economical focal area for increased investment and resource exploitation. Tied predominantly with UN SDG's such as zero hunger, climate action or sustainable consumption and production, but also with high potentials to revitalize coastal communities, deliver means of carbon, nutrient, and pollutant sequestration, and to provide a yet unknown array of bio-applications in medicine, energy and biomaterials it has become a champion of sustainable transition development. The paper critically addresses two such novel and politically hyped sectors in the blue bioeconomy: seaweed farming and recirculating aquaculture systems. Framed within a sustainability transition rhetoric and equipped with capacities to contribute towards alternative engagements with the spaces of (blue) production and consumption some of the sectors current, early-stage developments and their spatial imaginaries question this potential, however. Following, the paper unfolds the interrelations between the sectors rhetorical claims and practices, the interrelationship between governmental conduct and blue materialities, and the inherent socio- economic and spatial assembling processes of the two sectors that challenge their potential to engage in alternative imaginaries for blue sustainable development. By highlighting the frictions, contestations, and multiple values that underpin the sectoral development the key barriers but also the multiple capacities towards a just sustainable transformation are dissected and displayed.



Abstract ID: 52

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Policy developments on Energy Transition Minerals at key lithium producing countries: the cases of Australia and Chile

Authors: Diana Arbeláez Ruiz and Rauno Sairinen, University of Eastern Finland

Keywords: Energy transition minerals, ETM, critical raw materials, CRM, lithium, mining, energy transition, mobility electrification, Chile, Australia, battery minerals, batteries

Content:

Global efforts to mitigate climate change will continue to see the demand for battery technologies and the necessary minerals soar (Wilson & Martinus 2020, IEA 2021). The e-mobility solutions the world needs for this transition will significantly increase the demand for critical minerals (Ballinger, et al. 2019, Lèbre, et al. 2020, IEA, 2021). The energy system will transition from fuel- to materials-intensity (IEA, 2021). Large quantities of lithium are necessary for battery technologies. In addition, there is no readily available material to replace lithium in portable batteries in the short term. Questions about mineral availability, geopolitics, social and environmental risk in the supply chain abound. This has seen the emergence of an array of policy and strategy pieces on Energy Transition Minerals (ETMs) at the global and national level. While the project pipeline for lithium is growing, production is currently concentrated in a few countries, with Australia and Chile solidly taking the lead in production figures. This paper contrasts the public policy landscapes on ETMs in the world's two largest lithium producers: Australia and Chile. It examines policy priorities, the elements of the value chain that policy solutions address, the policy instruments being mobilised, and the key actors shaping policy responses and public debate.



Abstract ID: 46

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Integrated anaerobic digestion and biochar for enhanced biomethane production: a way forward to sustainable waste management

Authors: Sachin Krushna Bhujbal, Pooja Ghosh and Virendra Kumar Vijay (Indian Institute of Technology Delhi)

Keywords: Anaerobic digestion; Biochar; Biomethane; Waste Management; Lignocellulosic biomass

Content:

Anaerobic digestion is a promising technology for energy recovery from lignocellulosic wastes. However, limited lignocellulose biodegradability and stability are major concerns. The application of waste biomass-based biochar as an additive has proven to improve lignocellulose degradation and stability of anaerobic digestion. Therefore, this study investigated the impact of the substrate to inoculum ratio (1:1, 1:2) and sugarcane bagasse biochar (1%, 2%, 3%) on the anaerobic digestion of rice straw. All reactors supplemented with biochar showed an increment in biomethane yield, and the highest cumulative biomethane yield (232.99 mL/g VS) was recorded at substrate to inoculum ratio of 1:2 and 2% biochar. The biochar supplementation stabilized the pH and facilitated microbial colonization. The biomethane yield was positively correlated with the reduction of volatile solids ($R^2=0.8893$). Integrating anaerobic digestion and biochar seems to be a promising approach for sustainable utilization of lignocellulosic waste.



Abstract ID: 67

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Comparative study of biochar from different feedstocks: physicochemical properties, and role in the circular economy

Authors: Ashmita Das, Aman Chourasia, Ramagopal VS Uppaluri, and Sudip Mitra (Indian Institute of Technology Guwahati)

Keywords: Biochar; Circular economy; Contaminants; Slow pyrolysis; Wastes

Content:

Biochar, a carbonaceous byproduct obtained from ligno-cellulose biomass has gained great interest in recent days due to its various benefit of increasing crop productivity, improving soil properties, removing various emerging contaminants, and many more. The biochar obtained from different waste is considered one of the essential final products of a circular economy, as it shows multiple functions in different sectors. In this current study, we have used areca nut husk (AH) and gulmohar pod (GP) as a feedstock for biochar production using slow pyrolysis at temperature range 300°C - 400°C. The produce biochar is further characterized by ultimate analysis, Raman, SEM-EDX, XRD, and FT-IR to understand its physicochemical properties. The result shows that the yield of produced biochar of GP is more than AH for both temperatures. SEM analysis shows that the porosity of the produced biochar increases along with the carbonization temperature. Apart from that, FT-IR analysis also reveals the presence of oxygen containing functional group on the surface of the biochar. Such characteristic of biochar presents it as a potential adsorbent for the removal of microplastics from the environment.



Abstract ID: 42

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Thermochemical conversion of spent mushroom substrate: A potential circular economy approach for sustainable environment

Authors: Ashmita Das, Aman Chourasia, Ramagopal VS Uppaluri, and Sudip Mitra (Indian Institute of Technology Guwahati),

Keywords: Spent mushroom substrate; Biochar; Slow pyrolysis; Circular economy

Content:

The commercial production of edible mushrooms has obtained noteworthy attention in recent years due to the escalating demand for nutritional food. However, a sustainable strategy for handling the huge quantity of spent mushroom substrate (SMS) generated during post-harvest operation is yet to be developed instead of dumping or burning in the open area. In the current research, we majorly focussed on the production of porous biochar from spent mushroom substrate (SMS) used for the cultivation of *Pleurotus florida* via slow pyrolysis process. The biochar was produced at three different pyrolysis temperature (300°C, 400°C, and 500°C). The produced biochar was further characterized using elemental analyser, FESEM, FTIR, Raman, and ICP-MS. The maximum production yield (73%) and elemental carbon content (23%) was obtained at 300°C. Various characterization studies revealed the highly porous structure as well as the presence of different oxygen containing functional groups on the surface of the biochar. Hence, the SMS biochar could be used for the adsorptive removal of emerging contaminants.



Abstract ID: 69

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Life Cycle Assessment as policy enabler for circular economy in decentralised wastewater treatment systems

Authors: Pinaki Dasgupta, Vivek Kumar and Anushree Malik (Indian Institute of Technology, Delhi)

Keywords: Circular economy, LCA, decision making, decentralized wastewater treatment, policy, rural systems.

Content:

Decentralised wastewater treatment systems (DWWTS) have been implemented in semi-urban and rural settings. These are cost effective in their operations and maintenance for several geographical as well as demographic profiles. Different models DWWTS exists around the world, which have demonstrated their use and efficiency, not only in terms of ensuring water security but community empowerment and livelihood generation. Life Cycle Assessment (LCA) is now common in both research and industry. It is utilised for several applications from sustainable design to investor reporting especially in the context of circular economy, albeit with caution. LCA is carried out under the framework specified under the ISO 14040 and ISO 14044 standards. LCA studies are dependent on type of products, processes, data quality, consistency as well as reliability of data. LCA can be a sub-set of larger decision-making process which influence the results of any policy imperatives. Moreover, circular economy which is fundamentally based on reduce, recycle, and reuse concepts could be strengthened through the application and interpretation of LCA. The paper covers the diverse decisions considered in LCA studies which were conducted on decentralised wastewater treatment systems globally in the context of circular economy. The paper draws case studies in the Indian village context to establish circular economy and enable policy environment for amplifying such models in other regions.



Abstract ID: 68

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Governing sustainable hydropower transformation in Indonesia: Negotiating trade-offs, perspectives, and goals through a social-ecological-technological systems (SETS) lens

Author: Amy Fallon, Charles Sturt University

Keywords: sustainability transitions; water governance; fisheries; Indonesia;

Content:

While hydropower is often promoted as a low-carbon source of renewable energy and tool for climate change mitigation, hydropower infrastructure often disrupts water flows and fragments vital riverine ecosystems, undermining its sustainability. Hydropower is particularly contentious in regions experiencing rapid infrastructural development despite millions of people depending upon healthy rivers for their food and livelihood security, such as Southeast Asia. Resultant trade-offs between social, economic and ecological goals therefore create complex governance challenges with no simple solutions due to multiple (often-conflicting) perspectives and needs. Using a social-ecological-technological systems (SETS) lens, we look at the complex governance challenges associated with hydropower development in contexts where dams are negatively impacting fisheries and livelihoods. Drawing on theories of resilience, interactive governance, and social-ecological systems, a resilience-governance framework (Fallon et al., 2022) is used as a conceptual tool for understanding the multi-scalar systemic impacts of hydropower development across a SETS, as well as the 'goodness of fit' of the existing governance arrangement. We argue that if a governance arrangement is not well-suited to the SETS context, 'rigidity traps' may emerge in some parts of the system, locking it into an unsustainable – and often unjust – trajectory. We apply the framework to a case study in Indonesia, where 99 hydropower dams are currently in existence or under construction, with another 18 planned (Yuen et al., 2023). In Indonesia's Sulawesi Island, recent hydropower dam construction is impacting fish and eel populations. Technical interventions – such as fish passages – are underway to address the situation. However, arising environmental conflicts between local communities and the associated energy company highlight the need for social interventions to ensure both sustainable and equitable outcomes. A systems' approach may improve our understanding of complex SETS undergoing rapid infrastructural change, as well as 'windows of opportunity' for governance interventions for more sustainable and equitable transformations.



Abstract ID: 65

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: The Ecological State of Lake Ladoga: Twenty-Four Years Later (1998 — 2021)

Author: Augustine-Moses Gaawase Gbagir and Alfred Colpaert (University of Eastern Finland)

Keywords: Ecological State, Lake Ladoga, CMEMS, chlorophyll-a, climate change.

Content:

The ecological state of Lake Ladoga changed from oligotrophic (1910s) to mesotrophic (1980s). The main source of the lake's pollution has been wastewater from coastal communities and pulp industries. The lake is the largest freshwater body in Europe, with a surface area of 18, 135 km². It has an average depth of 51 meters, while the deepest areas reach up to 230 meters. The lake is ecologically significant, given its unique biodiversity and vital ecosystem services it provides. It contains relict species such as the endangered Ladoga ringed seal, Arctic char, and the Ladoga salmon. We combined geostatistical methods and visual interpretation to analyze global remote sensing data, characterizing the changes in the ecological status of the lake. We utilized the chlorophyll-a data from the Copernicus Marine Environmental Monitoring Service (CMEMS) for June, July, August, September, and October. We calculated the pixel-wise trend analysis and seasonal mean values. The findings revealed both improvements and deterioration in water quality. The improvements were moderate, mostly in the central pelagic waters, while there was little to no indication of improvement along the southern littoral coastal areas. This southern coastal area receives effluents from the Volkhov basin, but most significant is the self-loading of the lake's bottom sediments. The closure of pulp and paper mills and improved wastewater management practices have contributed to the moderate improvement of the lake's water quality. The effect of climate change will result in longer warm days and higher water surface temperatures, which will aggravate the growth of phytoplankton in the lake. There is uncertainty on how climate change will affect the lake's precipitation, but it is assumed that precipitation will increase. Consequently, this increase in precipitation will lead to higher leaching of soil nutrients.



Abstract ID: 19

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Destined to fail? Exploring the underachievement in organizational sustainability transformations of large organizations

Authors: Kim Simon Strunk and Susanne Grabl, University of Passau

Keywords: sustainability, tensions, sustainability transformation

Content:

Large organizations claim substantial efforts for becoming increasingly sustainable. However, overall progress appears to be slow at best. Building on 30 interviews from large multinational organizations, we were struck by the small-scale changes these organizations have implemented – often peripheral or unrelated to their core business activities. Yet, our informants widely emphasized the need for sustainable business practices and expressed the view that their organization was effectively engaged in sustainability. Puzzled by this contrast, we decided to explore the narratives further and to provide an explanation for the seemingly incremental progress. We identified five tensions as potential strategic explanation. As internal factors, 1) the conditional resources for sustainability tension, 2) the employee attraction tension, and 3) the scope of sustainability communication tension show how incremental and small step progress for sustainability can be more opportune to organizations than revolutionary large-scale changes. These tensions were further reinforced by two additional business ecosystem factors: 4) the indirect customer proximity tension and 5) the regulatory scope tension. Taken together, these tensions highlight that small step progress for sustainability allows organizations to manage the conflicting demands and expectations in these tensions. Taking a critical management stance and applying relational agency lens, we theorize a) how to overcome the limited sustainability effect in organizations and add to b) agency theory by highlighting the impact of social context and shared narratives to organizational strategic decision making. Particularly, we illustrate how even under widely shared goals, uncertainty regarding the necessary measures and actions, socially limits viable options for managerial decision-making and employee actions. For practitioners, we suggest that managing sustainability parallels managing innovation and subsequently, sustainability may benefit from creating independent sustainability units and ventures, distinct resources and long-term impact KPIs for assessing the resulting impacts.



Abstract ID: 38

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Oral presentation

Title: The Subtle Scent of Sustainability: Understanding the Role of Congruent Scents in Consumers' Willingness to Pay for Green Products

Authors: Marianna Halinen, Nino Ruusunen, Heli Hallikainen, Tommi Laukkanen (University of Eastern Finland)

Keywords: Sensory marketing, scent marketing, chemonudges, willingness-to-pay

Content:

Recent consumer research has devoted increasing research interest in the role scents play on consumer responses, but only a few studies have looked at how marketers could use scents to nudge consumers toward more sustainable consumption choices. Additionally, the research mostly focuses on odorous products such as food items or scented products, and it is not apparent whether the inducing effect of scents also applies to non-odorous products, not to forget the mechanism behind these effects. To address this gap, we build on the thematic congruency literature to explore how a carefully selected thematically congruent scent (spruce) relates to behavioural responses towards an environmentally friendly, non-odorous product (a wood-based t-shirt). Findings from a laboratory experiment with 42 participants show that congruent scent has no direct effect on willingness to pay for the wood-based t-shirt in comparison to a "normal" cotton t-shirt, which we also positioned as environmentally friendly. However, some consumers are more inclined than others to take the environment into account in their purchase-decisions, as reflected by their higher scores for green consumption values. Scent cues have been observed to be less effective when consumers' processing motivation is high, and consequently, consumers with high green consumption values may be less receptive to external scent cues than consumers with low green consumption values. Also, consumers with high green consumption values evaluate products with eco-friendly attributes more positively than consumers with low consumption values and are willing to pay more for them, which indicates that external cues might not be as effective for them. This is supported by our preliminary findings, which show that consumers with low / moderate green consumption values rated their willingness to pay for a wood-based t-shirt higher in congruent scent condition whereas consumers with high green consumption values did not differ in their willingness to pay.



Abstract ID: 16

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Oral presentation

Title: Associations of low levels of air pollution with cardiometabolic outcomes and the role of diet quality

Authors: Darren R. Healy (University of Eastern Finland), Anna Kårlund (University of Turku), Santtu Mikkonen (University of Eastern Finland), Soile Puhakka (University of Oulu), Leila Karhunen (University of Eastern Finland), Marjukka Kolehmainen (University of Eastern Finland),

Keywords: air pollution, cardiometabolic health, diet, particulate matter, ozone, traffic-related air pollution

Content:

Background: Exposure to air pollution is associated with adverse cardiometabolic health effects and increased mortality, even at low concentrations. Some of the biological mechanisms through which air pollution can affect cardiometabolic health overlap with health outcomes associated with diet quality and changes in diet. Objective: The objective of this study is to investigate associations of air pollutants at concentrations below the World Health Organisation 2021 air quality guidelines with cardiometabolic outcomes. Furthermore, potential interaction between air pollutants and diet quality will be assessed. Methods: 82 individuals with obesity participated in a combined weight loss and weight loss maintenance study for a total of 33 weeks. A secondary analysis was conducted incorporating air pollution measurements. Data were analysed with linear mixed-effects models. Results: A total of 17 significant associations were observed for single pollutants with 10 cardiometabolic outcomes, predominantly related to blood lipids, hormones, and glucose regulation. Diet quality, as measured by the Baltic Sea Diet score, did not appear to mediate the association of air pollution with cardiometabolic outcomes, however, diet quality was observed to significantly modify the association of PM_{2.5} with total cholesterol, and the associations of NO and O₃ with ghrelin. Discussion: These findings suggest that exposure to levels of ambient air pollutants, especially particulate matter, at levels below World Health Organisation 2021 air quality guidelines were associated with changes in cardiometabolic risk factors. Diet may be a personal-level approach for individuals to modify the impact of exposure to air pollution on cardiometabolic health.



Abstract ID: 36

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Narratives of circular entrepreneurs: circular venture resource acquisition

Authors: Kaisa Henttonen, Ville-Veikko Piispanen and Hanna Lehtimäki (University of Eastern Finland)

Keywords: Circular entrepreneurship; Resource acquisition; Narratives; Sustainability

Content:

The objective of this proposal is to examine how narratives are used to acquire circular venture resources. This is an important topic academically as we do not yet know in detail how circular entrepreneurs put together the resources necessary to the development of their ventures. Data were collected from interviews with 35 entrepreneurs involved in the circular ventures and their stakeholders (a customer, investor, public organization) during 2019-2023. Data consists of 98 interviews. Analysis of the data is qualitative: thematic and abductive. Preliminary results indicate a categorization of circular venture opportunity narratives personal, venture business, sustainability). Additionally, it seems that these narrative types are used strategically to emphasize different characteristics of their venture and they are presented to different stakeholders.



Abstract ID: 41

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Oral presentation

Title: Towards Strong Sustainability Forest Services

Authors: Jani Holopainen (University of Eastern Finland), Tuomo Takala (University of Eastern Finland), Jukka Tikkanen (University of Eastern Finland), Jari Vauhkonen (University of Eastern Finland), Veera Tahvanainen (University of Eastern Finland), Aki Ranta (Lapland University of Applied Sciences), Anu Laakkonen (University of Eastern Finland), Katri Rusanen (University of Eastern Finland), Hannes Pasanen (University of Eastern Finland), Minna Tuominen (University of Eastern Finland), Henrik Lindberg (Häme University of Applied Sciences)

Keywords: Sustainability, Forestry, Management Models, Forest services

Content:

The research project investigates the need for a new type of forest service that is based on the principles of strong sustainability, which means that the consideration of the environment is given priority over short-term economic goals. The authors argue that the current forest service models, which are primarily focused on timber production, are not sustainable in the long term and that a new model is needed to address the challenges of climate change and biodiversity loss. In the research project, a new business model for forest services following the principles of strong sustainability will be developed. The business model would involve providing a range of services that support forest owners in managing their forests in a way that is beneficial to both nature and society. These services could include advice on managing forests according to strong sustainability principles, assistance with forest certification, and support for enhancing multiple-uses of forests, such as providing non-timber forest products and ecosystem restoration. In the research project also the need for developing new educational programs for forest professionals is investigated. The new programs would prepare professionals to deliver strong sustainability forest services. The current forestry education programs do not adequately address the challenges of sustainability and that new programs are needed to train a new generation of forest professionals who are committed to strong sustainability forest management.



Abstract ID: 91

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Sustainability reporting related to the profitability of healthcare companies in Asia, Europe, and the United States

Authors: Riikka Holopainen, Kang Li, Esa Hiltunen and Sari Rissanen (University of Eastern Finland)

Keywords: sustainability, private healthcare, profitability, contingency theory

Content:

We study the effect of company responsibility—more specifically, the responsibility of listed healthcare companies—on the company's profitability. We aim to determine whether the company's responsibility measures can act as a buffer in a difficult business climate. Using a cross-sectional sample of 4,874 European, US, and Asian healthcare companies in 2022, we empirically tested whether there is a connection between sustainability reporting and company performance. This study shows that corporate responsibility reporting in the healthcare sector has an impact on company success and that sustainability activities have increased, especially in the countries which performed more modestly in sustainability in previous years. Our research results are useful for practical business life in revealing the importance of sustainability reports for the company's managers and stakeholders. This thus shows that the realization of responsibility can be more than just a company expense item; it can also improve the company's performance.



Abstract ID: 23

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: The Amenity Value of Blues Spaces and Water Trails: Local Business Perspectives on the Viability of Tourism Development Collaborations in Southern Ontario Canada

Author: Kelsey Johansen, University of Eastern Finland

Keywords: Amenity Values; Blue Spaces; Water Trails; SMEs; Recreation and Tourism Development

Content:

Blue spaces, including bodies of water like lakes, rivers, canals, and landlocked seas, along with areas near bodies of water, like beaches, and waterfront trails, have numerous amenity values. Amenity values are typically conceived of as the environmental characteristics, and cultural and recreational attributes, of a recreation area or tourism destination that contribute to the pleasantness, aesthetic coherence, and attractiveness of that area as a place to live, work, recreate, and/or visit. While many factors contribute to the perception of an area's amenity values, they are predominately studied from the perspective of current and future residents, recreationists, and tourists, including their contributions to residents' wellbeing, ability to drive migration to natural amenity-rich regions, capacity to act as destination pull factors, and influence on tourists' revisit intentions. Limited research has explored the impact of local businesses' perceptions of the amenity value of blue spaces on their willingness to collaborate in tourism destination development. This research, based in Southern Ontario, Canada employed a self-administered online and paper survey of local small and medium enterprise (SME) business owners/operators in communities within the Grand River Watershed to explore the impact of the perceived amenity value of water trails on their buy-in and support for trail tourism destination development and collaborative destination marketing, including the mediating effect of proximity and business type. Important insights were generated into the adaptation of existing land-based trail town models and supportive business programs for blue spaces and to stimulate local economic development and transformative place-making endeavours in the Watershed. The need for further engagement with local Business Improvement Areas (BIAs) and Chambers of Commerce to cultivate support both amongst SMEs and in conjunction with the Grand Watershed Trail Network (GWTN) was identified as a pivotal next step towards developing additional tourism products, packages, and a collaborative destination marking plan.



Abstract ID: 70

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Small-Scale Mining in the Global North: Maturing the Concept of Small-Scale Mining (SSM) Using Concept Evaluation Criteria on the Placer Mining Industry in Yukon, Canada

Author: Cassia Johnson, Kathryn Moore and Deborah Johnson (University of Exeter, UK)

Keywords: Scales of Mining; Sustainable Development; Rural Development; Formalization

Content:

An empirical study of the placer gold mining industry in Yukon, Canada reveals how small-scale mining relates to large-scale, medium-scale and artisanal-scale mining, historically in the Global North and in the contemporary global context. This work significantly matures the concept of small-scale mining, despite its widespread use in varied geographical and policy contexts. Interviews collected from the industry, community, and government informants (2021 and 2022) was interpreted using Concept Evaluation Criteria, which looks at definitions, characteristics, preconditions and outcomes, and boundaries. The Yukon's small and medium-scale mining enterprises have endured despite the co-existence of large-scale enterprise, playing an active role in modern wealth distributions and economic diversification in the rural area. Legislation in Yukon does not specifically separate small-scale from large-scale mining, however, it does offer differentiated governance according to deposit type (i.e., Placer Mining Act and the Quartz Mining Act). Placer mining is dominated by the smaller scales of mining, and Quartz Mining is dominated by large-scale mining. A characteristic of small-scale mining is that it is fully legalized and formalized, which is possible through proactive governance, and industry-community-government dynamism. Market-protective legal frameworks such as Canada's National-Instrument 43-101 effectively preclude small-scale mines from participating in stock markets. Small-scale mine enterprises use independent capital, or can access alternative sources of capital; at times evolving into medium-scale enterprises. The implications of the research are considered in the context of diversification of mining and sociological solutions to diversify responsible access to ore deposits, and provide insight into rural development.



Abstract ID: 71

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Coordinating environmental product policy – the government and the markets in the development of extended producer responsibility

Authors: Harri Kalimo (Vrije Universiteit Brussels, University of Eastern Finland), Antti Jukka (University of Eastern Finland, Vrije Universiteit Brussels), Petrus Kautto, (Finnish Environment Institute, Lifset, Reid, Yale School of the Environment),

Keywords: Circular Economy; product policy; governance; extended producer responsibility; market incentives

Content:

The Circular Economy concept has been promoted as aligning environmental considerations with economic activities. In a Circular Economy, the embedded value of energy and materials is sought to be retained within the economy, as opposed to a linear economy, where material goods are removed from the economy at their end of life, landfilled, and replaced by new production and consumption. However, the means for realizing a Circular Economy have been slow to emerge, with policies addressing the environmental impacts of products directly and across their entire life cycles and value chains being few and far between. Certain governance instruments enable the government to regulate the energy and material aspects of products as units of commerce directly – for example, through the European eco-design regulatory framework. There are also market interventions – for example, green taxes – which rely on market dynamics to bring about desired change. The division of roles and responsibilities between the public sector and private (market) actors in governing Circular Economy transformations vary. The division crystallizes in extended producer responsibility (EPR), an intervention which assigns responsibility for the collection and recycling of wasted products – that is, typically public services – to the producers of the wasted products themselves. This privatization of waste management duties has been expected to incentivize the producers to design their products for efficient recycling – thus closing the material loops of products. However, research suggests rather limited effects on product design. Our research seeks to identify how the role division in the public-private joint governance of EPR should be arranged to incentivize the greening of products more effectively. Historically, EPR has been a thoroughly market-based instrument – but our research suggests that more public sector involvement is required if EPR is to function as an effective environmental intervention for accelerating a more Circular Economy.



Abstract ID: 12

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Economic impacts of renewable energy in Egypt by using a CGE model

Authors: Tarek Safwat Kabel (University of Sadat City, Egypt) and Mohga Bassim (University of Buckingham, UK)

Keywords: Computable general equilibrium (CGE) models, Egypt, Social Accounting Matrices (SAM), Renewable energy subsidy (RES), Renewable Portfolio Standard (RPS)

Content:

This paper aims to assess the economic effects of increasing renewable energy share in Egypt's electricity generation by using the Computable General Equilibrium (CGE) modelling. Using the CGE model, we have studied the impact of expanding the use of renewable energy in electricity generation on a number of economic variables (sectoral output, commodity prices, welfare, factor market, trade, macroeconomic variables, and GDP). We used a single country, multi-sector static CGE model to test the macroeconomic and sectoral impacts of three policy instruments that support renewable energy deployment under three scenarios that simulate renewable energy targets. We simulate renewable energy targets in three scenarios that assume that the share of renewable energy in electricity generation is 20%, 42%, 53%, respectively, in addition to the base scenario, which assumes that the share of renewable energy in electricity generation will remain 10% as it was in the base year in the absence of renewable energy policies. In order to support the deployment of renewable energy, we assume that the increase is achieved through three policy instruments. These policies are: 1) introducing tax incentive policy by imposing a tax exemption for electricity generated from renewable energy, 2) introducing Renewable energy subsidy (RES), and 3) introducing the Renewable Portfolio Standard (RPS) policy by assuming that it is financed by increasing the price of electricity generated by fossil fuels. The simulation shows that an increase in the share of renewable energy in electricity generation results in an increase in GDP under all policies in all scenarios, except under the tax incentive policy when the share of renewable energy in electricity generation reaches 20%. Although the RPS policy reduces household consumption, the subsidy and tax incentive policies increase household consumption. The study concludes that the expansion in the use of renewable energy in electricity generation positively impacts the Egyptian economy, but the degree of impact varies according to the policy used.



Abstract ID: 27

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Whose knowledge counts? The knowledge use in the implementation of EU Water Framework Directive in Finland and Sweden.

Authors: Irina Mancheva (Umeå universitet), Marko Keskinen (Aalto University), Matilda Miljand (Stockholm University), Mia Pihlajamäki (Aalto University)

Keywords: water governance, water policy, EU Water Framework Directive, knowledge use, policy implementation

Content:

Informing decision-making means to have the power to influence the political agenda. Therefore, what types of knowledge are used in decision-making may impact its acceptance, accountability and legitimacy as well as actual outcomes. This is particularly the case in collaborative governance processes, where decisions are based on consensus between actors with often conflicting interests. While expert (scientific and technical), bureaucratic (administrative) and experiential (lay, practical) types of knowledge are all typically seen as legitimate, their impact on the decision-making process may differ in degree and content. This leads to situations where some actors and the knowledge they represent may have less power to influence actual decisions. This dilemma is apparent in the implementation of the European Union (EU) Water Framework Directive (WFD) that stress the importance of broad participation, while at the same time being very much outcome oriented. Since EU member states exercise considerable discretion when transposing EU Directives, the WFD has been implemented not only by establishing institutions with varying degrees of participation, but also by prioritising different types of knowledge in decision-making. In our comparative case study of Finland and Sweden, we focus on the aspect of knowledge-use in the implementation of EU policy goals at the local-regional level, using document analysis (management plans) and key-informant interviews. We are interested in the potential conflict between, on the one hand the WFD's emphasis on outcomes (achieving 'good water quality') and its implementation being dominated by experts (predominantly natural scientists), and on the other hand requiring broad participation and cross-sectoral interaction. Both Finland and Sweden implement the directive through collaborative governance processes but with differing institutional design, we want to investigate what knowledge is used in decision-making and whether the legitimacy of processes and outputs varies between the two states. Our preliminary results show that despite the similarities in how the WFD is transposed at the national and local-regional level in Finland and Sweden, the two countries have different approaches to the types of knowledge that are used in decision-making. At the local-regional level, Finland largely relies on expert knowledge



based on computational methods, whereas in Sweden, bureaucratic knowledge also plays a central role. Such differences between the two states and their use of knowledge could have broad implications on the collaborative water governance processes and stakeholders' influence on policymaking as well as on implementation in practice.



Abstract ID: 15

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Sustainability transition of a socio-technical system – Risks and barriers in the transition towards sustainable mobility in the Arctic

Author: Janne Kirjavainen, University of Lapland

Keywords: sustainability transition, socio-technical system, transport, Arctic

Content:

A shift towards sustainable mobility is strived for in various sectors of the transport system as it is estimated that more than one quarter of EU emissions are caused by the transportation of people and goods. Sustainability transition of the transport and mobility system is a major challenge, as it seems that current efforts are not sufficient to achieve the goals set in the Green Deal of the European Union. It seems that the transition does not happen at the same pace in different regions. The Arctic is a set of unique regions, where the impacts of climate change are more severe than elsewhere. Mobility in the Arctic regions is characterized by long distances, varying weather conditions and a scarce transport infrastructure network. In Finnish Lapland, tourism seasonally raises traffic volumes, which sets periodic pressure on the transport network of the region. Building on these premises, sustainability transition of the transport and mobility system in the north can differ to some extent from the transition in the southern regions. The main objective of this study is to trace (a) barriers hindering the transition towards a sustainable mobility system and (b) risks produced by the transition. The aim is not to produce a global-local dichotomy but to embrace a glocal approach to the elements concerning the transport system in the Arctic and Finnish Lapland. The risks and the barriers will be mapped out by analysing several policy documents and conducting theme interviews based on the theoretical viewpoint of land-based road transport as a socio-technical system.



Abstract ID: 62

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Population biological constrains of fisheries management of the brown trout (*Salmo trutta*)

Authors: Eevi Kokkonen (University of Eastern Finland) Jukka Syrjänen (University of Jyväskylä) and Anssi Vainikka (University of Eastern Finlan

Keywords: brown trout, adfluvial, life history

Content:

Brown trout *Salmo trutta* shows a multitude of heritable life-history strategies in waterbodies with the fast-growing, migratory inland populations (i.e. adfluvial) being the most endangered due to damming, intensive land use and unsustainably high fishing pressure both in lakes and rivers. The wild southern populations are currently completely protected in Finland, but the protection does not prevent prevalent by-catch mortality in gill-net fisheries. Due to the lack of solid population biological modelling efforts, the management of this species has remained vague and virtually no Finnish populations except for individual anadromous populations show positive trends. We have reviewed all the available life-history data for adfluvial brown trout and calibrated a size-, maturity-, age- and habitat structured fish population model for a typical, strategic brown trout population representing a general adfluvial stock in Lakeland Finland. With the model we explore the constrains for developing a sustainable fishery and increasing population trends through restoration efforts. Our preliminary results show that egg and juvenile mortality in the spawning river, by-catch mortality during early feeding period in lakes, and adult fishing mortality are the key constrains for turning the current negative trends into positive stories. The egg-to-fry survival should exceed 10%, by-catch mortality should be eliminated to the very minimum and the adult mortality at sizes above 600 mm should not exceed 20% per year. These requirements are not currently met in Finnish freshwater brown trout management, which has also led to significant genetic erosion in the remaining stocks calling for urgent use solid scientific knowledge in the conservation and management.



Abstract ID: 60

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Leverage points in the transition towards a just post-fossil society: lessons from a Delphi study

Authors: Irene Kuhmonen (University of Jyväskylä), Tuomas Kuhmonen (University of Turku) and Annukka Näyhä (University of Jyväskylä)

Keywords: leverage points, just sustainability transition, circular bioeconomy, rural

Content:

Detaching from a society fuelled by fossil metabolism requires a radical systemic transformation towards circular bioeconomy. Such a shift can open up new possibilities for social organisation also in terms of the urban-rural divide and uneven power relations between cores and peripheries, which are currently shaped by strong tendency towards centralisation. However, the contemporary transition policies seem to be reproducing rather than remaking the regionally uneven power relations, which risks marginalising rural areas and actors even further. In this study, we set out to explore a just transition towards a circular bioeconomy from the viewpoint of rural areas. We asked, how should the transition process unveil in order to promote rural livelihoods. We conducted 60 interviews with expert stakeholders of 10 rurally relevant manifestations of the post-fossil society, ranging from biogas and wind power to alternative protein sources and fishing. From these interviews, we identified 20 critical issues, tackling of which is necessary for a just transition towards a post-fossil society. These critical issues were then given back to the interviewees to evaluate in a Delphi setting. Based on the responses, a number of leverage points critical for realising a just transition were identified. Paradigmatic issues are the deepest leverage points, which the respondents evaluated as the most critical in this study as well. These entail the determination of phasing out fossil metabolism together with promoting new sustainable alternatives, and the approach towards economic growth. Transition to a circular bioeconomy was seen to increase pressures on the use of natural resources, which is problematic especially from the point of view of biodiversity loss. The fossil metabolism and continuous economic growth go hand in hand, but once the fossil metabolism is abandoned, there is a need to reevaluate the growth orientation of societies.



Abstract ID: 18

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Efficient Removal of Pollutants for Detoxification of Anaerobically Treated Textile Effluent through Microalgal Bacterial Granular Sludge

Authors: Vivek Kumar Nair (Indian Institute of Technology Delhi), Hauz Khas (Indian Institute of Technology Delhi), Anushree Malik (Indian Institute of Technology Delhi) and Pooja Ghosh (Indian Institute of Technology, Delhi),

Keywords: textile effluent, microalgal bacterial granular sludge, detoxification, phytotoxicity

Content:

Textile industries are major contributors to environmental pollution, producing vast amounts of hazardous dye-laden effluent in their unit operations. Anaerobic treatment is a viable option for treating raw textile wastewater, but it can generate harmful intermediate chemicals, excessive turbidity along with residual COD in their treated effluent. Polishing these effluents with aerobic treatment processes like conventional activated sludge treatment also has some limitations which includes its poor settleability, high energy requirement and generation of waste activated sludge. To address these issues, this study applied a sustainable and alternative treatment technique, the microalgal bacterial granular sludge (MBGS) process, to polish and detoxify anaerobically treated textile effluent (AnTTE). MBGS system functions on the principle of utilizing photosynthesis for self-aeration, replacing the need for external aeration and the phenomenon of microbial assimilation act synergistically to remove pollutants from wastewater. The resultant algal bacterial granules formed in MBGS process enhances the settling efficiency, thus promoting easy harvesting and resource recovery from the surplus biomass. In this study the application of MBGS for the polishing of AnTTE was explored through a batch scale study conducted in a 1L jar at light intensity of $100 \mu\text{mol}/\text{m}^2/\text{s}$ with 24:0 light dark cycle and 60 rpm rotation. The present study demonstrated that after 48 hrs. of continuous operation MBGS was able to efficiently remove 100% Nitrate, 100% Phosphate, 94% Ammoniacal Nitrogen, 85% Turbidity, 60% sCOD and 50% residual color from the AnTTE. Additionally, MBGS had excellent settleability with a Sludge Volume Index (SVI) of 27. The phytotoxicity potential of the MBGS polished AnTTE was also evaluated through a seed germination inhibition assay using *Lactuca sativa* seeds. The result of the assay demonstrates that MBGS polished AnTTE had a relative seed germination, relative root development, and germination index of 96%, 96%, and 93%, respectively. This study for the first time demonstrates the effectiveness of MBGS process in polishing and detoxifying AnTTE, making it a sustainable alternative to the conventional aerobic treatment methods.



Abstract ID: 37

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: The catalyst approach to generate a systemic change for sustainability

Lead author: Hanna Lehtimäki, University of Eastern Finland

Authors: Hanna Lehtimäki (University of Eastern Finland), Ari Jokinen (Tampere University) and Juha Kotilainen (University of Eastern Finland)

Keywords: Catalyst, Sustainable circular economy, sustainability transition, complex systemic change

Content:

In this paper, we discuss catalyst as a metaphor for a trigger that puts the sustainable circular economy transition into motion. In sustainability transition literature there is a call for novel metaphors/concepts to complement the established concepts of barriers/enablers and leverage points. The paper portrays a pre-assumption about sustainable circular economy transition as a complex systemic change, and compares and contrasts the metaphors of catalysts, barriers and enablers and leverage points in studying the sustainable circular economy transition. The paper will conclude with a discussion on how academic research can catalyze the sustainable circular economy transition.



Abstract ID: 35

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: A cross-disciplinary review of sustainable innovation literature to produce a multidimensional framework

Authors: Hanna Lehtimäki, Kristina Leppälä, Olena Liakh, (University of Bologna) Subhanjan Sengupta, Kaisa Henttonen, Ville-Veikko Piispanen, Ida Parkkinen, Nuppu Mielonen (University of Eastern Finland)

Keywords: Sustainable innovation, Systemic literature review, Organization Science, Entrepreneurship, Strategy

Content:

Considering the grand challenges related to the on-going sustainability transition, we are addressed with the urgent need for cross-cutting, sustainable innovations which encompass the triple-bottom line of social, economic, and environmental factors. Existing definitions for innovation and sustainability are recognized as separate approaches; however, we find the emerging and unfolding notions which approach these two separate concepts as a combination as one concept of "sustainable innovation", thus revising the traditional view of innovation. Sustainable innovation is viewed as an emerging and unfolding notion which combines definitions of innovation with sustainability into one concept. These aspects, when combined, ensue with attention paid to the numerous discussions related to sustainable innovation. We examine how academia understands the emerging concept of "sustainable innovation" and addresses this emerging, unfolding theme from three, different research streams: organization studies, entrepreneurship, and strategy. Through a systematic literature review, we identify 205 relevant articles over a 22-year period and analyze them for the range and prevalence of definitions, attributes, and determinants to produce a scoping synthesis and summary of findings per examined field. We examine the overlaps between the three fields and identify the gaps therein. We ascertain the prevalence and commonalities of definitions, theoretical approaches, and descriptive attributes. In the forthcoming paper, we produce an overarching model of sustainable innovation, thus moving towards a formal, multi-dimensional sustainable innovation framework as an independent field of academic study connected to the imperatives for contributing to planetary health and ecosystem survival.



Abstract ID: 32

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Balancing the Conflicts: A Review of Renewable Energy Investment Regulatory Regimes

Author: Sai MA, Heidelberg Center for the Environment, Heidelberg University, Germany

Keywords: Renewable Energy Investment, Law, Conflict, Balance

Content:

Regulatory support plays an important role in achieving the climate targets under the Paris Agreement by facilitating sufficient renewable energy investments to decarbonize the energy sector. However, conflicts have arisen due to interactions between different regulatory systems governing renewable energy investment. The significant rise of renewable investment disputes brought by renewable energy investors against host states triggered by renewable energy regulatory dismantling processes has revealed two key issues: (1) the lack of adaptability in renewable energy regulatory design, and (2) the challenge to balance conflicting interests between different shareholders in the context of decarbonization under international investment law. In this vein, we may ask: What kinds of renewable energy regulations are needed to support renewable energy investments? While answering this question from a single legal lens can assist in incorporating climate change concerns into climate laws and regulations, it is insufficient for us to comprehensively understand the dynamic relationship between law, investment and decarbonization. Given this concern, this paper will take a reverse research approach by trying to understand the legal issues through the lens of energy. It will first identify the conflicting interests related to renewable energy investment governance and then examine whether such conflicting interests can be balanced under the current regulatory design.



Abstract ID: 11

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Water Myth: Tale of an Eco-Village in Bangladesh

Author: Shahid Mallick, University of Eastern Finland

Keywords: Water, Climate change, Ecology, Culture

Content:

Countries are deltaic in nature and the abundance of water resources is the basis of nature base occupations and employment. Bangladesh being a deltaic land has huge natural occupation and nature base dependence. However, changes in the atmosphere and global warming impacted everything i.e. natural and cultural. Peoples of southwestern coastal villages of Bangladesh are accustomed to saltwater but not to climate change. The rise in sea level increases the saltwater intorsion, inundating the cultivatable land and change in occupation or loss of culture. The climatic events and storm surges exuberate the problems further. Dikes in these areas become nonfunctional, ineffective, and fragile mostly because of the cultivation of shrimp inside the polders. People of the coastal village used to catch fish from the bay or work as fish laborers. Agriculture in most of these villages is subsistence in nature. The availability of fresh and drinking water in many of the coastal villages is as always, a precious resource and now it's become rare. Almost half of the local people are dependent on surface ponds and canal water for general purposes. Taking a shower and the personal health and hygiene of the young girls take a new dimension. Local social and power structure takes new form based on water access and control.



Abstract ID: 28

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: PhD Research - The Paradox of Green: Circular economy ecosystems of electric mobility

Author: Nuppu Mielonen, University of Eastern Finland

Keywords: circular economy, ecosystems, battery materials

Content:

With the green transition and the broader shift towards environmental sustainability, societies strive to transition from unsustainable fossil-fuel-intensive growth models to a decarbonized and environmentally sustainable economy. Electric mobility is a prospect for reducing carbon emissions and contributing towards a more sustainable future. However, as electric vehicle batteries are composed of many raw materials acquired by mining, a certain paradox of sustainability exists. Circular economy can be seen as a way to increase the sustainability of electric mobility through recycling, reusing and reducing the use of materials. A paradigm shift to circular economy requires significant innovation within current value and operating systems. Circular economy ecosystems disrupt through co-producing together as a set of actors, where the number, nature, and relationships of actors play a decisive role. This research concentrates on circular economy ecosystems of battery materials in electric mobility. The purpose of the research is to increase understanding about relational dynamics in ecosystems that aim at creating new operating practices and business logics and models. This is qualitative research that explores the circular economy ecosystems of electric vehicle battery materials as they are emerging and developing. The research builds upon the existing literature on circular economy, ecosystems, and narrative sensemaking. The empirical study will be conducted in Pori-Harjavalta and Kokkola where ecosystem relations and actors are mapped. The empirical data comprises interviews, online research, and participant observation during workshops. The results of the research will produce new knowledge about the forming and developing of future circular economy ecosystems, and with that contribute towards more sustainable business and society.



Abstract ID: 81

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Oral presentation

Title: The resource capacity of traffic-related urban green spaces in conservation of pollinator biodiversity in Finnish cities

Authors: Wendy Moya Bastos, O. Skaldina (University of Eastern Finland)

Keywords: Pollinators, Biodiversity, Urban ecosystems

Content:

Pollinator biodiversity is essential for maintaining the ecosystem health and food production. Understanding how anthropogenic activities affect biodiversity and organisms' performance is fundamental for species conservation strategies. It has been discussed that modern cities can be pollinator-friendly and offer a diversity of ecological niches to pollinators. However, urban green spaces should be properly managed to provide sufficient resources and a safe environment to pollinators. In the metropolitan areas, plant-pollinator interactions are still very much affected by habitat transformation and pollution. Urban green infrastructure (UGI) includes various elements such as parks, city forests, home yards, flower beds, and the others. Traffic-related urban green spaces such as road verges, traffic islands, or parking lots are also spatially and functionally significant for UGI. They constitute about 10% of the land use types in Finland and provide connectivity for urban flora and fauna. However, their role in conservation of pollinating insects is rarely assessed and considered for theoretical and practical biodiversity frameworks. Results of our extensive field-work assessment in three metropolitan areas in Finland (Helsinki, Tampere, and Turku) with 90 studied urban and suburban locations revealed that traffic-related elements of UGI are rich in pollinator biodiversity. We collected a total of 547 insect pollinators using standard entomological methods. Further, specimens were freeze-killed and identified up to species level. We specifically focused on bumblebees as key pollinators for Nordic ecosystems. It was found that both total pollinator abundance and the abundance of bumblebees increased with increasing coverage of flowering plant species. At the level of morphotypes (bees, flies, moths, wasps, beetles), pollinator richness didn't differ between urban and suburban locations. The number of pollinators was the highest on the roadsides and the lowest in traffic islands. The role of traffic-related urban green spaces in the conservation of pollinator fauna should be reevaluated.



Abstract ID: 83

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Oral presentation

Title: Black carbon and particle lung deposited surface area in small scale wood combustion emissions: effects of an electrostatic precipitator and photochemical ageing

Authors: Arya Mukherjee, M. Ihalainen, P. Yli-Pirilä, M. Somero, A. Hartikainen, J. Louhisalmi, J. Tissari, H. Czech, O. Sippula (University of Eastern Finland)

Keywords: Wood combustion, BC, electrostatic precipitator, photochemical ageing, lung deposited surface area

Content:

The lung deposited surface area (LDSA) is an important metric developed to assess the negative health effects of particles deposited in different regions of the human respiratory tract. Due to its health relevance, it could potentially serve as a good metric to evaluate the development of new emission control technologies for wood stoves. Black carbon (BC), on the other hand, is the optically defined highly absorbing particle fraction produced especially by combustion processes. In this study, the LDSA of fresh and photochemically aged wood stove emissions were measured with and without electrostatic precipitator (ESP). Real life residential wood combustion emissions were generated by burning beech logs in a modern chimney stove. The flue gas stack was equipped with an ESP (Oekotube) and particle samples were taken with both ESP off and on. Further, the emissions were photochemically aged using the PEAR oxidation flow reactor (Ihalainen et al., 2019) in the presence of UV lights and oxidising agents to simulate the physico-chemical changes of the emission aerosols in atmosphere. LDSA emissions were measured using a Nanoparticle Surface Area Monitor (NSAM, TSI) and an Electric Low Pressure Impactor (ELPI, Dekati). Equivalent BC, measured by a seven wavelength aethalometer (AE33, Magee Scientific). Finally, the morphologies of particles emitted from three distinct combustion phases, namely ignition, flaming and ember phases, were studied by a tandem Aerosol Particle Mass Analyzer (APM, Kanomax) and Scanning Mobility Particle Sizer (SMPS, TSI) system and electron microscopy. For primary emissions, BC had excellent correlation with particle LDSA (Pearson $R = 0.9$) in majority of the combustion phases (Fig 1 a,b,c). ESP reduced BC and LDSA from emitted particles on average by 53% and 73%, respectively (Fig 1 d,e), indicating a good potential to reduce harmful impact of wood stove emissions on climate and human health. Aging conditions and combustion phases had significant effects on particle size distribution, morphology, and effective density as formation of secondary organics coated the particles. The results of this work indicate LDSA as potential low-cost metric to evaluate small-scale wood combustion emissions. The positive correlation of BC and LDSA was, however, removed by photochemical aging due to the formation of secondary organic aerosols (Fig. 1 b,c)



Abstract ID: 59

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Exploring multistakeholder engagement in sustainability transition

Author: Ida Parkkinen, University of Eastern Finland

Keywords: multistakeholder engagement, circular economy, sustainability, storytelling

Content:

The ongoing sustainability transition is challenging us to reframe our ways of organizing, for example, materials, people, and resources in modern societies. Particularly, there is a pressing need for more sustainable and circular business solutions to catalyze regenerative circular economy. However, research on sustainability transition has primarily considered technological innovations, recycling, and waste management as aspects of circular economy. Little is known about socio-cultural aspects related to sustainability transition, future anticipation, and multistakeholder dynamics to implement changes in organizations and society at large. Considering that the benefits and challenges are ecological, economic, and social, regenerative circular economy represents a systemic issue. The goals related to such an issue are ambitious and require the joint efforts of various societal actors, highlighting the complexity of systemic development. This complexity becomes an opportunity to reimagine our future and create collaboration between different stakeholders. The purpose of this presentation is to explore dynamics that shape the future of regenerative circular economy as multistakeholder engagement in sustainability transition. This presentation contributes to a hopeful story for an unfolding sustainable future. It offers insights into multistakeholder engagement as a way to cultivate shared experiences of ongoing action in advancing and processing several aims and opportunities related to regenerative circular economy. Through multistakeholder engagement as purposive action, the future starts to unfold, and the future possibilities become realized.



Abstract ID: 53

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Sense of Water: conceptual framework for unravelling care for water

Lead author: Mia Pihlajamäki, Natural Resources Institute Finland (Luke)

Authors: Mia Pihlajamäki (Natural Resources Institute Finland), Riikka Latva-Somppi (Aalto University), Kati Pitkänen (The Finnish Environment Institute), Taru Peltola (The Finnish Environment Institute), Kristaina Svells (Natural Resources Institute Finland), Matti Salo (Natural Resources Institute Finland), Himansu Mishra (Natural Resources Institute Finland), Juha Hiedanpää (Natural Resources Institute Finland), Maarit Mäkelä (Aalto University), Katriina Soini (Natural Resources Institute Finland)

Keywords: Tacit knowledge, emotions, practices, hydrosocial communities, care

Content:

Despite the rapid expansion of scientific knowledge on water related environmental problems and the various policies designed to tackle them, many of these problems have persisted and, in some cases, have become crises. This underlines the limits of the techno-scientific and political solutions in use, and calls for novel ways to observe, understand and communicate on the socio-ecological challenges, and to mobilize legitimate actions. Diverse and inclusive ways of knowing and means of communicating, including narratives, concepts, and emotions, have been shown to be effective in fostering individual and collective care for the environment, thereby providing hope and meaning needed for action. Care for the environment emerges from a personal process based on a sense of place – a perception of belonging to and acting as part of one’s own surroundings through individual and shared feelings and emotions. Through transdisciplinary research that integrates science and art, and engaging various hydrosocial communities, we develop the boundary concept of Sense of Water to explore how the personal translates into collective care for water. The paper provides insight on the roles of knowing, doing and feeling, and their interconnections to caring for water.



Abstract ID: 79

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Project-as-practice: a semi-systematic literature review

Author: Jatta Pitkänen, University of Eastern Finland

Keywords: Project-as-practice, leadership-as-practice, strategy-as-practice, sustainability, circular economy

Content:

This semi-systematic literature review focuses on Project-as-practice literature. In the theory section I will discuss practice theory, what “as-practice” is and how the literature has evolved. There are three different main “as-practice” streams of literature: Strategy-as-practice, leadership-as-practice and the newest one Project-as-practice. The first two streams of literature are more established and the purpose of the paper is to find out how Project-as-practice literature is supported by the two other streams of literature and what kind of Project-as-practice research there is. The aim of the paper is to study how the practice theory approach could be useful especially in the sustainability and/or circular economy research.



Abstract ID: 7

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Oral presentation

Title: Development Assistance Strategy in Response to Climate Change and Water Resource Management; Case study: Islamic Republic of Iran

Authors: Javid Rostami, UNICEF, A.A. Paski (University of Tehran)

Keywords: Climate Change, Global Warming, Good Donorship, Development, Water Management

Content:

Development countries contribute to the displacement context, have been conducting by various modalities, including, donorship and funding humanitarian operations, International NGOs implementation of humanitarian assistance, etc. For instance, International Cooperation and Development (DevCo) and Humanitarian Aid and Civil Protection (ECHO) Directorates-General are among 10 biggest donors around the world, working with international humanitarian organizations, including UN bodies, ICRC and INGOs. Alongside those collective initiatives, Some of the European countries, e.g., Germany, Netherlands, etc. running their own funds individually. Many of International NGOs which are raising their operation in humanitarian setting, are based in Europe or North America. The reason that made those attempts essential, in addition to the global sharing of responsibility against disasters and crisis, is the fact that migration root and displacement will also affect European countries, as it is currently obvious in economic and market-based challenges. Climate change and global warming are among the word upraising challenges, probably the most profound challenge ever to have, which confront every single country around the world. Science indicates that the action or omission by each country will influence the status globally, i.e., any single step forward for adoption, will affect all the countries worldwide and any inaction will be costly; the massive burden will be on the shoulders of the whole countries worldwide. The responsibility of industrialized and developed countries are now more than others to addresses the needs of developing countries for upscaled financial support, technology, and capacity-building in regard with the adoptive solutions and disaster management. In this paper, we are looking for the lesson-learns of those mentioned initiatives in humanitarian setting in order to describe a comprehensive strategy of donorship and capacity building operations by relevant stakeholders and actors to act against climate change and global warming; The case study conducted in the context of Iran, but the conclusion and roadmap could be extended to all the affected contexts.



Abstract ID: 96

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Connecting social sustainability and circular economy through entrepreneurship

Authors: Subhanjan Sengupta, Hanna Lehtimäki, University of Eastern Finland

Keywords: Sustainable development, human development, social sustainability, circular economy, entrepreneurship

Content:

Current research on circular economy largely focuses on the technocentric advances for a material and resource-based reformation, while giving lesser attention to the socio-cultural and socio-economic potential of circular economy. Although the current conversation generates information mainly on material flows and value chains for an environmentally sustainable economy, there is also a need for research in the context of social sustainability (such as empowerment, inclusion, well-being, ethics) in circular economy. This case study research illustrates how offering solutions and services based on circular economy principles, and practicing human development through care and empowerment, are inseparable and intertwined in entrepreneurship pursuing sustainable development. With that, this study proposes entrepreneurship to be viewed as an agency in creating circular economy solutions (products, services) that enable, and are being enabled by, social inclusion, empowerment, and care. Hence, it makes two contributions for future research. First, it creates grounds for future research on exploring how social sustainability and circular economy are intertwined, so that they can be made to work for each other. Subsequently, in doing so, it shows how it is achievable through entrepreneurial action.



Abstract ID: 87

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Oral presentation

Title: Infestation symptoms as indicators of a sustained bark beetle outbreak in conserved and managed Norway spruce stands in south-eastern Finland

Authors: Diana-Cristina Simon (University of Eastern Finland), Päivi Lyytikäinen-Saarenmaa (University of Eastern Finland), Mikko Pelto-Arvo (University of Eastern Finland), Johanna Tuviala (University of Eastern Finland), Maiju Kosunen (University of Helsinki), Eija Honkavaara (Finnish Geospatial Research Institute), Roope Näsi (Finnish Geospatial Research Institute) Olli-Pekka Tikkanen (University of Eastern Finland), Antti Kilpeläinen (University of Eastern Finland), Heli Peltola (University of Eastern Finland)

Keywords: forest disturbance; forest management; Ips typographus; tree symptoms; ground-based visual observations

Content:

The European spruce bark beetle (SBB, *Ips typographus*) is expected to expand its distribution in the European Boreal forests. The increase in wind regime and drought would make spruce forests more vulnerable, which provides favourable conditions for SBB outbreaks. To minimize the impact of an outbreak, early-stage measures need to be promoted. Early ground observations on symptoms are preactive SBB management measures necessary for the early decision-making process. In this study, we use ground visual observations of the trees attack symptoms based on entrance-exit holes, resinous flows, bark damage, crown defoliation and discoloration to: i. assess and compare the damage intensity of an SBB outbreak in both managed and conserved forests, ii. evaluate how the damage intensity correlates with the stand variables, and iii. assess how the stand structure changes during an outbreak. Stand characteristics and individual trees attack symptoms were measured on 60 sampling plots in 2014-2017 in conserved areas and in 2019-2021 in both conserved and managed areas in south-eastern Finland. The plots were established in an outbreak area which was promoted by a massive wind disturbance in 2010. The results have shown that conserved areas had significantly higher levels of tree infestation and overall damage scores compared to managed areas. The basal area of alive trees and the age of spruce are the stand variables that significantly correlated with the damage score, and they explained more than 50% of the variation. In conserved areas, the stand dynamics was stronger showing high mortality 2nd year after initial colonization and a high decrease in standing volume and basal area 6th to 7th year after the initial colonization. This study shows the importance of management in minimizing the effects of an outbreak and here we promote an early-stage detection method that can support owners and other stakeholders in their decision-making process.



Abstract ID: 80

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Oral presentation

Title: Nature-based solutions in the restoration of ecological connectivity between structural elements of urban green infrastructure

Author: Oksana Skaldina, University of Eastern Finland

Keywords: ecological connectivity, nature-based solutions, resource utilization, urban green infrastructure

Content:

Resilient ecological connectivity enables efficient restoration and conservation practices in natural and artificial ecosystems. It is especially important for urban environments where fragmentation and pollution create spatial and functional barriers for living organisms. Urban green infrastructure (UGI) provides numerous ecosystem services for citizens. Those are an increase of air quality, pollutants' filtration, food, and shelter, reducing of urban heat island effect, enhancing biodiversity, as well as numerous cultural and recreational services. Currently, various elements of UGI lack ecological connectivity which weakens the overall system's functioning. Ecological connectivity can be enhanced by practices united by the umbrella concept of nature-based solutions (NbS). Grouped according to the degree of effort and implementation into three levels, NbS provide relatively easy and inexpensive methods to increase environmental quality and improve resource availability in cities. This has been shown during the implementation of the CarPlant project. The simplest NbS require minimal intervention to nature and proper monitoring actions using ecological indicators and non-invasive practices. Those can be, for example, properly planned vegetation mowing of urban meadows or using lichens to indicate pollution pressure. The second group relies on the creation of local-scaled physical resources such as flower beds, pollinator meadows, green roofs, or tree stripes. Third group of NbS implies more significant restoration actions, for example, green corridors. However, once designed with the utilization of native local soils and organisms, they further need minimal interventions and maintenance costs. While considering NbS for improving ecological connectivity of UGI, it is needed to plan and utilize the vectors of socio-ecological interference. Urban spaces can develop as sustainable and resource rich environments. However, NbS in UGI should gain the same level of importance as other sectors such as build environment, industry, or commerce.



Abstract ID: 54

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: The potential monetary value of fishing competitions in Finland – Insights and estimations about the use of money

Lead author: Jarno Suni, University of Eastern Finland

Author: Jarno Suni, Raine Kortet, Henna Konu, Raija Komppula (University of Eastern Finland)

Keywords: Monetary value, fishing competitions, local economy, economic benefits

Content:

Competitive fishing refers to organized competitions between anglers who fish for inducements that can range from tangible goods or money to accolades and public acclaim. Although the phenomenon's scope is significant on a worldwide scale, its full economic effects are not yet fully known. Here, we provide information on the participants and their spending habits in Finnish fishing competitions. Data presented is based on 261 survey respondents who had been on an overnight domestic angling competition trip within the last two years. The respondents were asked to assess how much money they spent each day per person on food, accommodation, transportation, fishing equipment, entry fees, and baits during an overnight trip to an angling competition. Additionally, details about competitive participation in angling were acquired. The results show that Finnish anglers spend in fishing competitions, on average, €261 per day on overnight competition trips, with accommodation and travel, making up the majority of the costs. The findings indicate that holding multi-day events that draw participants from outside the area may have an economic impact on the host community. More than half of the money spent by angling competition participants stays in the area in the form of participation fees and spending on hospitality services. In conclusion, fishing competitions have likely both direct and indirect economic benefits for the region. (For session: Exploring the amenity values of blue spaces)



Abstract ID: 33

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: Microplastic Pollution Assessment in Indian WWTP Treating Textile Industry Effluent

Authors: Deepti Surana (Indian Institute of Technology, Delhi), Pooja Ghosh and Satyawati Sharma (Indian Institute of Technology, Delhi)

Keywords: Microplastics, ecotoxicity, textile effluent

Content:

The widespread application of synthetic organic polymers(plastics) has increased over the years. Due to its detrimental effects on the ecosystem and ecology, microplastic contamination is receiving more and more attention globally. In this study, which focuses primarily on the effluent from textile industry effluent treatment plants (ETPs), the presence and quantity of microplastics in wastewater treatment plants (WWTP) in India is examined. A WWTP located in the Panipat (region of India receives effluent from almost 50 textile industries and has been selected for the study purpose. Inlet, primary treatment, secondary treatment, and final effluent were all sampled, providing for a thorough evaluation of the dynamics of microplastics throughout the treatment process. With the aid of filtering, digestion, and microscopy, microplastics were extracted and characterized. The results from the present research show that the effluent from WWTPs that receive wastewater from ETPs in the textile industry contains considerable amounts of microplastics. The most common varieties, which come in a wide variety of sizes and forms, were found to be polyester, polyacrylonitrile, and nylon microfibers. The amount of microplastics varied depending on the stage of treatment, with concentrations noticeably falling off during the secondary procedures. Additionally, by encouraging eco-friendly textile materials and sustainable textile manufacturing methods, this study highlights the need for improved regulatory measures and industry-driven initiatives to address microplastic contamination at its source.



Abstract ID: 26

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Social aspects of the new technology adoption: the case of technologies for small-scale mining in Southern Europe

Author: Olga Sydd, University of Eastern Finland

Keywords: technology adoption; small-scale mining; European mining; community attitudes

Content:

In recent years the need for more sustainable resource use and reliable supply chains of critical raw materials within Europe has catalysed the testing and adoption of numerous new technologies into the mining sector. Various research and industry teams offer innovative solutions for different types of mining and stages of the mining cycle. These technologies aim to increase the efficiency of operations, lessen environmental pollution, and minimize negative side impacts. Little is known, however, about the community attitudes to the adoption of these technologies. This is partly because the social impacts of the adoption are poorly understood. Based on the case-study of the adoption of new technologies for small-scale mining in Bosnia and Serbia we seek to assess possible society responses and to understand how the innovativeness of the technology affects attitudes towards the mining project.



Abstract ID: 9

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Oral presentation

Title: The effect of size, morphology and composition of synthetic and anthropogenic soot on their optical properties

Authors: Muhammad Tanveer, T. Karhunen, O. Sippula, A. Lähde (University of Eastern Finland)

Keywords: Soot, Carbo photocatalyst, Reactive organic species, Morphological and optical properties.

Content:

Incomplete combustion of carbon containing fuels produces soot. It forms major share of aerosol mass in the environment and causes global warming. Moreover, it poses serious health effects to human including long term respiratory and cardiovascular complications. However, soot also has very intriguing photocatalytic properties. Soot is mainly comprised of organic carbon and elemental carbon exhibiting reduced graphene like structure. The optical properties of both anthropogenic and synthetic soot containing small carbon dots make them very good candidates for carbo-photocatalysts. The band gap of the soot particles is typically below 2 and it can produce reactive organic species (ROS) upon irradiation of visible light. These ROS are the potential candidates to induce photocatalytic behaviour of the soot particles either in the process occurring in the nature or in the engineered applications. This study mainly focuses on the investigation of the morphological and optical properties of soot obtained from the flame synthesis, diesel engine emissions or wood combustion. SEM and TEM analysis have been carried out to study the soot surface morphology and its particle size. Amorphous and graphitic structure of the soot particles is studied through the Raman spectra analysis. Band gap and UV-Vis absorption studies were carried out using UV-Vis spectrophotometer. The purpose of the study is to explore the variation of the optical properties among different soot obtained from the different origins and especially their photocatalytic behaviour.



Abstract ID: 20

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral presentation

Title: Challenges in management accounting and control systems in triple-bottom-line adoptions - Findings from small circular economy firms in Finland

Authors: Sari Silvennoinen, Hanna Lehtimäki, and Henri Teittinen (University of Eastern Finland)

Keywords: Management accounting and control, triple bottom line, circular economy

Content:

Organizations are constantly developing their sustainable business in various forms. In contemporary organizations, they are also required to be able to measure, control, and report their sustainable activities. The role of management control systems is to support managing, controlling, and advancing sustainable development. One of the well-known approaches is the triple-bottom-line concept for measuring and reporting sustainability actions in organizations, including economic, social, and environmental perspectives. However, despite the long history of the triple-bottom-line concept, it has not been widely diffused in small and medium-sized companies. Thus, in this study, our purpose is to explore the challenges that emerged in management accounting and control systems when implementing triple-bottom-line practices in small circular economy firms. In this paper, we used an explorative case study method. We gathered the data from four circular economy firms. For the data analysis, we applied qualitative content analysis. We found that circular economy firms operate in a sustainable way, and they highlight sustainability issues in their business and strategy, but sustainable actions are not holistically measured and reported. We argue, that challenges emerged due to no standardized and harmonized ways exist in small firms to measure and report sustainability according to the triple-bottom-line. Our results contribute particularly to the management accounting and control systems literature, in implementing actions to measure and report sustainability issues.



Abstract ID: 86

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral presentation

Title: The transformative potential of water-based tourism experiences

Authors: Elli Vento (University of Eastern Finland), Henna Konu (University of Eastern Finland), Katja Pasanen (University of Eastern Finland), Muhammed Khogali (University of Eastern Finland), Petra Blinnikka (Jamk University of Applied Sciences), Minna Tunkkari-Eskelinen (Jamk University of Applied Sciences), Sari Minkkinen (Jamk University of Applied Sciences)

Keywords: -

Content:

This study aims to increase the understanding of the transformative potential of water-based tourism experiences. Transformative experience is defined as a highly subjective phenomenon requiring a certain type of stimuli or a trigger that an individual processes and interprets to generate transformation (Pung et al., 2020; Tasci & Godovyk, 2021). The transformative tourism experience can facilitate the psychological transformation that may benefit both individual wellbeing as well as the society and the environment (e.g., Coghlan & Weiler, 2018; Teoh et al., 2021; Reisinger, 2013; Pung et al., 2020). Some previous studies have explored the experiential value and transformative power of water-based activities such as river rafting (e.g., Arnould & Price, 1993; Pung & Chiappa, 2020; Dimitrovski et al., 2022). Even though some studies have focused on the possible impact of the experience on the everyday lives of the individuals, the data has been usually collected just on-site (e.g. Dimitrovski et al., 2022) without having follow-up after the experience or not specifically focused on exploring the particular elements of the facilitated trip/activity that are experienced to lead to transformation for the participants. This case study explores the role of external elements and components in triggering transformative tourism experiences within a water-based context. The empirical data collection is conducted as a longitudinal study to explore the lasting effects of a water-based tourism experience for individuals who are taking part in a workplace wellbeing trip together with their co-workers. The data is collected on-site in Central Finland during the experience through participant observation and participant interviews. The on-site data collection is later complemented with follow-up interviews. Currently, the data collection is in progress and the study will present tentative findings. The findings of the study will help to identify the prerequisites of service providers to facilitate eudaimonia-generating and transformative tourism experiences in water-based tourism activities.



Abstract ID: 97

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Oral Presentation

Title: Biochar for agricultural water management

Authors: Mona Arnold VTT and Eriona Canga ALCN (Alchemia Nova)

Agricultural runoff and wastewater can contain considerable nutrient loads released to the environment without precaution and lack of treatment. Capturing and reusing these nutrients in agriculture can have significant economic and environmental potential.

In this work, various types of biochar produced from sidestreams were assessed for nutrient uptake. Biochar has been shown to increase both soil water holding capacity and available water capacity, but it also has the potential to recover nutrients from runoff. However, the biochar's efficiency depends on its properties, soil texture, the raw material(s) and processing conditions. Char activation increases the char's specific surface and active sites and will likely improve the nutrient adsorptive efficiency.

This work assessed commercially available biochars' capacity to adsorb nutrients from a solution and their potential to act as a substrate for retaining nutrients from runoff water. The biochar materials were pyrolysis products of various organic materials, wood and agricultural sidestreams. In addition zeolite – a recognised adsorption material was included for the sake of comparison

The results indicate that most biochar has some capacity to retain $\text{NH}_4\text{-N}$. The capacity to retain $\text{NO}_3\text{-N}$ again varied between not considerable to ca 0.34 mg/g $\text{NO}_3\text{-N}$ ($\text{Mg}(\text{OH})_2$ cherry biochar). Thermal activation of biochar increases the number of adsorption sites and thus also improves the adsorption efficiency.

Commercial biochars did not show any significant affinity towards phosphate, but only after being coated with $\text{Mg}(\text{OH})_2$. Instead, the natural phosphorous content of biochar seems to leach into a solution easily. However, phosphorous leaching did not have any noticeable fertilising effect, neither that of $\text{NO}_3\text{-N}$ nor $\text{NH}_4\text{-N}$.

In conclusion, $\text{Mg}(\text{OH})_2$ -coated biochar performed better than all other materials to retain $\text{NO}_3\text{-N}$ (0.34 mg/g or 74% retention rate) and PO_4 (0.25 mg/g or 98% retention rate). Zeolite retained better $\text{NH}_4\text{-N}$ (78%) compared to all other materials, followed by coated cherry biochar (48% retention rate) and coated biochar (34% retention rate).

Biochar is a circular product which has been successfully applied as a soil amendment, thereby improving the structure and water-retaining capacity of various soils. Based on the



results obtained here, tested substrates' role in contributing to the nutrient balance varies between nutrients and materials applied.



Abstract ID: 30

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral Presentation

Title: Conservation challenges and genomic insights in salmonid populations: a study of brown trout in Northern Finland

Lead author: Giovanna Mottola, University of Eastern Finland

Authors; Giovanna Mottola (University of Eastern Finland, Natural Resource Institute Finland), Frank Panitz (Natural Resource Institute Finland), Tuomas Leinonen (Natural Resource Institute Finland), Anssi Vainikka (University of Eastern Finland)

Keywords: Conservation genomics, salmonid migration, population structure, outlier SNPs

Content:

Salmonid conservation is becoming an issue of public concern worldwide. Among salmonids, brown trout (*Salmo trutta* L.) is one of the most diverse species with significant anthropogenic threats to the migratory, fast-growing life-history types. Brown trout form a continuum of migration strategies from residency to anadromy, but the genomic underpinnings of this variation have remained unresolved. Thus, tools that would efficiently produce data on single nucleotide polymorphism (SNPs) related to life-history variation, such as migration tendency, would be pivotal for monitoring and management. As a first step towards a routinely usable genomic monitoring tool, we utilized two distinct bioinformatic methods, both targeting the genetic mechanisms behind different migration tendencies and population structure in previously RADseq-genotyped brown trout from Koutajoki and Oulujoki water basins in Northern Finland. Originally, these data were analysed by using the Atlantic salmon reference genome for brown trout RADseq reads, succeeded by Bayesian and Principal Component analyses to detect migration strategy-related outlier SNPs. However, as the brown trout reference genome has become available since then, we applied a method mirroring these steps but utilizing the current brown trout reference genome for alignment and a distinct genomic pipeline for SNP identification. All these methods yielded comparable results when inferring population structure but detected distinct candidate outlier SNPs associated with varied genome regions responsible for diverse physiological functions, such as immunoregulation and spermatogenesis. These outliers might not directly explain the diverse brown trout migration tendencies but might be related to reproductive strategies. These results suggest the importance of reference genome selection in outlier marker identification and provide us with a basis to continue our project with new samples and data.



Abstract ID: 98

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Oral Presentation

Title: Rapidly developing battery industry in multilevel governance: Experiences from Finland

Author: Juha Kotilainen, Rauno Sairinen, Hanna Lehtimäki and Nuppu Mielonen (University of Eastern Finland)

Keywords: multilevel governance, energy transition, urgency, battery industry

Content:

The rapidly growing and developing electric vehicle battery industry is intricately intertwined across several vertical and horizontal governance levels in Europe – from the European Union (EU) to member states, down to regional governments, cities and business driven local battery clusters.

However, the rapid pace of growth, accelerated by the urgent need to transition away from fossil fuels, may pose challenges for the multilevel governance (MLG) systems such as the EU. At the same time, the societal analysis of the roles and relations of the different governance levels and their alignment in this massive undertaking is lagging.

In this paper, we investigate a potential risk that, if left unaddressed, the speed and its impact on governance can result in limited capacity for self-reflexivity within the battery sector, which can have consequences in the form of various social and environmental impacts. We argue that these questions arising from the speed and urgency challenge the existing MLG for developing EV battery industry, especially regarding issues of effectiveness, reflexivity and responsibility.

We offer a perspective from Finland, which serves as an interesting case study within the EU, as it contains activities across the entire battery value chain. The Finnish government has also actively supported the development of the industry, which is illustrated for example by the national battery strategy, released in 2021 among the first countries in the World. Thus, the paper's contribution is twofold: it investigates speed and urgency in relation to MLG and provides a prospective view of the current state of an emerging major industrial field, which has not yet been comprehensively analyzed from a governance perspective.



POSTERS





Abstract ID: 51

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Role of nitrogen cycling microbes in *Platismatia glauca* cryptogamic lichen in boreal Norway spruce forests

Authors: Vincenzo Abagnale, Carlos Palacin-Lizarbe, Dhiraj Paul, Johanna Kerttula and Henri M.P. Siljanen (University of Eastern Finland)

Keywords: nitrogen, nitrous oxide, nitrous oxide consumption, *nosZ* gene, lichen, boreal forest, greenhouse gas.

Content:

The boreal spruce forest soil can assimilate strong greenhouse gas nitrous oxide (N_2O) from atmosphere through symbiotic relationships with bacteria, especially during spring and autumn, when aerobic microsites in the soil can be form. Balance between the consumption and emission of nitrous oxide in the forest soils is usually observed to be close to zero, and even to assume negative values in some cases, thus suggesting that soils can consume atmospheric N_2O . Presence of cryptogamic covers of mosses and lichens in temperate forest stems can increase the consumption of N_2O , where usually it is thought to play major role in the soil and the root system. However, the role of N_2O consuming microorganism in epi/endophytic tissues of cryptogamic covers in the boreal forest is unknown. We studied, N_2O dynamics of the cryptogamic lichen, *Platismatia glauca*, in the boreal Norway spruce forest. The quantitative of analysis of nitrous oxide reductase gene fragment *nosZ* with real-time PCR in lichen tissues were used. Analysis of N_2O dynamics, *nosZ* gene abundance and *nosZ* gene transcription abundance will be discussed in the presentation. The presented results unveil more the role of nitrogen cycling in the cryptogamic covers in boreal forest systems.



Abstract ID: 64

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Estimating BrC emissions of residential wood combustion

Authors: S. Basnet (University of Eastern Finland), A. Hartikainen (University of Eastern Finland), A. Virkkula (Finnish Meteorological Institute), P. Yli-Pirilä (University of Eastern Finland), M. Kortelainen (University of Eastern Finland), H. Suhonen (University of Eastern Finland), L. Kilpeläinen (University of Eastern Finland), M. Ihalainen (University of Eastern Finland), S. Väätäinen (University of Eastern Finland), J. Louhisalmi (University of Eastern Finland), M. Somero (University of Eastern Finland), J. Tissari (University of Eastern Finland), G. Jakobi (University of Rostock), R. Zimmermann (University of Rostock), A. Kilpeläinen (University of Eastern Finland) and O. Sippula (University of Eastern Finland)

Keywords: Brown carbon, absorption Ångström exponents, aerosol, emission, residential wood combustion

Content:

Residential wood combustion significantly contributes to light-absorbing carbonaceous aerosols in the atmosphere, impacting the Earth's radiative balance at regional and global levels. This study investigates the contribution of brown carbon to the total particulate light absorption in the wavelength range of 370 to 950 nm ($\text{BrC}_{370-950}$) and the particulate absorption Ångström exponents ($\text{AAE}_{470/950}$) in 15 different European residential combustion appliances (modern and conventional masonry heaters (MMH & CMH), modern chimney stoves (MCS), sauna stoves (SS), pellet boiler (PB), and a non-road diesel engine (NrDE)) using various wood fuel qualities. The BrC quantification involves the determination of the wavelength-dependent light absorption and subtracting the inferred BC absorption at specific wavelengths. The wavelength dependence of aerosol light absorption is generally described by the AAE based on a selected wavelength pair. The experiments were conducted in the ILMARI (www.uef.fi/ilmari) and SIMO combustion laboratories of the University of Eastern Finland. Dual-spot aethalometer (AE33, Magee Scientific) was used to measure the light absorption coefficients (babs) at seven wavelengths ($\lambda = 370-950$ nm) and organic carbon (OC), and elemental carbon (EC) were analyzed from filter samples using the thermal-optical carbon analyzer (Sunlab). The $\text{BrC}_{370-950}$ was estimated to be from 1% to 21% for wood log stoves and was primarily influenced by fuel moisture content with minimal impact from the combustion appliance type. The $\text{BrC}_{370-950}$ contribution was 10% for a fully automatized residential pellet boiler. Correlations between the OC/EC ratio and BrC indicated that one unit increase in OC/EC corresponded to approximately a 14% increase in $\text{BrC}_{370-950}$. Additionally, $\text{BrC}_{370-950}$ increased with decreasing combustion efficiency. $\text{AAE}_{470/950}$ of wood log combustion aerosols ranged from 1.06 to 1.61. The diesel aerosols exhibited an $\text{AAE}_{470/950}$ of 1.02, with $\text{BrC}_{370-950}$ contributing only 0.66% to the total absorption, aligning with the assumption employed in source apportionment.



Abstract ID: 76

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: Gene Expression Analysis of *Chironomus riparius* in Response to Acute Exposure to Tire Rubber Particles and Leachates

Authors: P. Caballero-Carretero (National Distance Education University (UNED), Madrid, Spain), Victor Carrasco-Navarro (University of Eastern Finland), Jussi V.K. Kukkonen (University of Eastern Finland), J.L. Martínez-Guitarte (National Distance Education University (UNED), Madrid, Spain)

Keywords: microplastics; tire rubber; gene expression; toxicity; ecotoxicology

Content:

An important challenge is aquatic pollution caused by tire rubber microparticles (TRP) entering aquatic ecosystems through stormwater. Tire rubber includes many microplastic particles and chemical additives which are a cause for concern. Currently, the information on the molecular effects of TRP, or specially its additives, in freshwater organisms is scarce. To address this problem, an array covering different cellular processes has been designed for the freshwater midge *Chironomus riparius*. Fourth-instar larvae were exposed to two concentrations of TRP (1 mg·L⁻¹, 10 mg·L⁻¹) and two concentrations of tire rubber leachates (TRL) (0,0125 %, 5 %) to evaluate the transcriptional activity by Real-Time PCR. To assess acute toxicity, larvae were exposed for 24h and genes related to endocrine system, stress response, DNA repairing mechanisms, oxidative stress, and detoxification mechanisms were evaluated. The activity of the enzymes: glutathione S-transferase (GST) and catalase was also examined. The main pathway affected was the stress response, showing overexpression of HSPs. Moreover, there is a reduction of the GSTd3 and catalase disrupting the antioxidant system. Most of these alterations are caused by TRL, showing higher toxicity than TRP. The results obtained in this work provide the first approach at the molecular and cellular levels to elucidate the impact of TRL in freshwater organisms. To perform a realistic evaluation of the TR effects, additional research is required to assess the TR long-term effects at the molecular level.



Abstract ID: 77

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: Toxicity assessment of used and pristine cigarette filter microplastics and their leachates to *Daphnia magna*

Authors: Victor Carrasco-Navarro, S. Musse and Jussi V.K. Kukkonen (University of Eastern Finland),

Keywords: microplastics; ecotoxicology; aquatic environment; *daphnia magna*;

Content:

Littering is one of the main causes of plastic contamination in the environment and it may enhance the production and dispersion of microplastics (MPs). Cellulose acetate is one polymer widely used in cigarette filters (CF) and one of the most prevalent sources of littering and MPs. The toxicity of used and pristine CF microplastics and their leachates was assessed using the water crustacean *Daphnia magna*. *Daphnia* species inhabit very diverse water bodies and are a key prey species of planktivorous fish and other larger invertebrates. The leachates were prepared by shaking a suspension of CF (80g L⁻¹) in artificial freshwater 2.5mM in Ca²⁺ and Mg²⁺ for 15d at 160rpm. Followingly, the suspension was filtered (0.22 µm pore size membranes) and the resulting leachate was considered as 100% leachate. Dilutions to 5, 2.5, 1, 0.5, 0.25, 0.125 and 0.025 % were used. Furthermore, we cryogrinded both pristine and used cigarette filters previously cut in smaller pieces (~ 20mg) and used the obtained microplastic to prepare suspensions at concentrations equivalent to the ones used in the leachate tests. *D. magna* neonates were added to experimental vessels with 10ml of the experimental waters at the concentrations mentioned above. Mobility of the organisms was monitored after 24 and 48h after a gentle shake of the vessels. Dose response curves were built and EC_{xx} values obtained. The results indicated that only the particles and leachates from the used CF were toxic at the concentrations used. The CF particles were more toxic than the leachates (EC₅₀ values of 0.29 and 0.38g L⁻¹ at 48h, respectively). While recognizing that the values found to cause significant toxicity would be hard to be reached in large water bodies, we speculate that populations of organisms living in small ponds or puddles of water may be at risk if littering of CF continues.



Abstract ID: 82

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Poster

Title: Harnessing the potential of Biogenic Nanostructured Silicon Carbide functionalized bisphosphonate for Uranium and Scandium Extraction from Secondary and Primary Sources

Authors: Sidra Iftekhar, Ondřej Haluska, Arezoo Rahmani, Rinez Thapaa, Joakim Riikonen and Vesa-Pekka Lehto (University of Eastern Finland)

Keywords: Biomass, biogenic silicon carbide, magnesiothermic reduction, bisphosphonates, metal adsorption

Content:

Anthropogenic activities such as ore processing and mining generate a substantial volume of wastewater contaminated with metal pollutants. Given the inherent toxicity of these metals, their removal is imperative to protect both human health and the environment. Notably, metals like Uranium (U) and scandium (Sc) are highly sought after worldwide for their wide-ranging technological applications, yet their limited availability presents a significant challenge. The most viable method for extracting and decontaminating wastewater containing low metal concentrations, such as U and Sc, is adsorption. However, most adsorbents suffer from degradation after just a few adsorption and desorption cycles, rendering them ineffective in selectively removing these metals. In this study, we opted for a novel approach: magnesiothermic reduction via self-propagating high-temperature synthesis to create nanostructured silicon carbide (nSiC) from agricultural waste, specifically barley husk. Subsequently, we coupled the nSiC with bisphosphonates (BP-nSiC, at a mass ratio of 1:2), which function as metal chelators, to facilitate the extraction of U and Sc from tailing effluent and leached ore solutions. The findings demonstrated that BP-nSiC exhibited a remarkable adsorption capacity of 41.67 $\mu\text{mol/g}$ for U and 48.61 $\mu\text{mol/g}$ for Sc, both at pH 1. Notably, BP-nSiC displayed exceptional reusability, as it maintained its adsorption capacity throughout 20 consecutive adsorption/desorption cycles within a flow-through setup, with no significant decline in performance. This underscores the potential of BP-nSiC for selectively recovering U and Sc from tailing effluent, highlighting its viability for extracting metals from secondary sources.



Abstract ID: 92

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Poster

Title: Wind Damage Risk Assessment Tool based on QGIS open-source platform (a prototype)

Authors: Veli-Pekka Ikonen (University of Eastern Finland), Ranjith Gopalakrishnan (University of Eastern Finland), Petteri Packalen (Natural Resources Institute Finland), Janne Rätty (Natural Resources Institute Finland), Ari Venäläinen (Finnish Meteorological Institute), Mikko Laapas (Finnish Meteorological Institute), Pentti Pirinen (Finnish Meteorological Institute) and Heli Peltola (University of Eastern Finland)

Keywords: Wind damage, risk assessment, stand, wind climate, topography, land use

Content:

We introduce a tool for wind damage risk predictions based on open-source forest, topology, and climate data. The tool is implemented using QGIS open-source platform. We used forest data from Finnish Forest Centre (FFC), terrain data from National Land Survey of Finland (NLS), and wind climate data from Finnish Meteorological Institute (FMI). The tool predicts critical wind speeds (CWS) thresholds at the edges of new clear-cut areas, i.e., wind speeds above this threshold results wind damage of trees (uprooting). CWS for wind damage was calculated using regression model based on mechanistic HWIND model calculations. Stand boundaries under a potential risk of wind damage (at-risk edges) were searched for in the landscape. These were expected to be in stands with a dominant tree height above 16 m with at least 25% lower adjacent stand height along the upwind direction. CWS predictions were based on the characteristics of both the adjacent stand (mean height and area of the stand) and the subject stand (tree species, mean tree height, and diameter/height ratio). The CWS predictions were compared to the wind speed predicted for the target at-risk edges based on wind speeds at a nearby weather station. The wind speed at the target at-risk edge was calculated using information on the topography of the terrain (1000 m) and roughness of the landscape based on land use (500 m) in the upwind direction. The tool is still a prototype and needs improvements, e.g., user-friendly interface and visualization of wind damage risk through gamified approaches. We envision that the final version of the tool can be used in forest areas of boreal zone and beyond - where suitable stand data is available.



Abstract ID: 94

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Poster

Title: Trust in organizational management: Addressing the challenges of sustainability transitions

Authors: Mirjami Ikonen, Päivi Kosonen, University of Eastern Finland

Keywords: Trust, Leadership, Change, Sustainability transitions, Organizational structures, Open communication

Content:

Regarding sustainability, the importance of trust in leadership and organizational structures is emerging as a key factor in catalyzing positive change. As societies grapple with the profound implications of environmental change and the pressing need for prudent use of resources, the role of trust becomes crucial. This paper seeks to unravel the intertwined relationship between trust and the challenges associated with sustainability transitions. At the organizational level, trust fosters a culture of open communication, and promotes cross-sectoral cooperation and proactive response mechanisms. In the context of environmental change, organizations that foster trust are better equipped to cope with uncertainties, adapt to changing circumstances, and implement innovative solutions. However, recent studies show that in the co-creation of multiple, even conflicting, aspirations and interests, and new innovations, trust issues may easily lead to reputational harm, and it takes time to rebuild reputation. It is therefore necessary for all the actors to understand the complexity of trust and to be familiar with the mechanisms for both building and repairing trust to prevent unintentional breaches of trust. In an era when conflicts over natural resources can exacerbate social divisions, trust can act as a unifying force that mobilizes collective action for equitable resource sharing and sustainable practices. Organizations and communities united by trust are more likely to work together towards the common goal of resource conservation. This commitment is crucial to bridging the gap between understanding and implementing the requirements of sustainable development. As the global community stands at a crossroads of impending sustainability reform, fostering trust within and between organizations is not just a soft skill but an indispensable asset. Trust is crucial to support the engagement of stakeholders, be they local communities, investors, or policy makers.



Abstract ID: 40

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Poster

Title: CPC separation of phenols for sustainable coatings

Authors: Noora Jokinen (University of Eastern Finland), Tuomo Keinänen (University of Eastern Finland), Laura Tomppo (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland), Jouko Vepsäläinen (University of Eastern Finland)

Keywords: Biorefining, bioeconomy, centrifugal partition chromatography, purification, pyrolysis

Content:

The industrial need for renewable alternatives for petroleum-based chemicals is growing due to increasingly tightening environmental and safety regulations. Plant-based phenolics are a diverse compound group that have industrial significance in applications among materials, medical and food industries. They can be used as building blocks for production of e.g. elastomers, coatings, and pharmaceuticals and further developed into polymers with specific characteristics, such as antibacterial and antioxidant properties. In this research, industrial and lab-produced birch-based pyrolysis oils were processed with a Centrifugal Partition Chromatography (CPC) - High-Performance Liquid Column (PLC) purification system with HEMWAT solvent systems. Separated fractions were pooled based on the UV detector chromatograms. ¹H NMR and ¹³C NMR spectroscopy (1D and 2D) measurements were carried out for characterization. The aim of this research was to develop a proof-of-concept protocol for the CPC separation of phenols for industrial coating applications with a pilot-scale equipment. The overall phenolic yield of approximately 10 % and purity >70 % were obtained. Typically, the separated fractions consisted of 1 – 4 phenolic components. Individual single-compound fractions were obtained at a purity level >95 %. Future research will focus on optimization of the protocol for higher yields and industrial feasibility as well as functional testing of the phenolic fraction in e.g. coatings.



Abstract ID: 10

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: In situ tracking the unsaturated fatty acid dynamics in environmentally significant bacteria *Escherichia coli* using Raman reverse stable isotope probing

Authors: Jiro Karlo (Indian Institute of Technology Dharwad) and Surya Pratap Singh (Indian Institute of Technology Dharwad)

Keywords: Raman Spectroscopy, Stable isotope probing, Metabolomics, Lipidomics, microbiology

Content:

Escherichia coli are bacteria which shows mutualism i.e., it is found in the lower intestinal tracts of homeothermic animals like humans. However, studies have reported *E. coli* strains can adapt and become naturalized i.e., becoming a part of environmental microbial community. Its presence in animal feces also makes it an indicator of fecal contamination of water resources such as rivers, ponds, drinking water and others. The evolving nature of bacteria with respect to environmental conditions and stress includes alteration of lipid composition in bacteria. Therefore, studying lipid profile and dynamics is important to monitor and track its evolving nature and pathogenic activity. In our study we have studied lipid metabolite, more specifically bacterial unsaturated fatty acid (UFA). Conventionally microbial lipid profiling is done using liquid chromatography mass spectrometry, ultra high-pressure liquid chromatography coupled with high resolution mass spectrometry. However, these highly efficient gold standard techniques cannot be applied to monitor UFA dynamic study in situ. Our study provides an unprecedented view of the dynamics of nascent unsaturated fatty acid biosynthesis and its turnover using Raman spectroscopy and reverse stable isotope probing in a noninvasive and nondestructive approach. We have grown the carbon 13 labelled *E. coli* cells in unlabeled medium and have done temporal monitoring studying the blue shift in UFA Raman bands. This shift is due to the change in reduced mass which acts as a Raman marker of UFA turnover in the cells. To further validate the peak from the nascent unsaturated fatty acid we have done inhibition assay using Cerulenin, known inhibitor of the UFA pathway in *E. coli*. Furthermore, tracking overall metabolic activity was done targeting carbon deuterium band arising due to deuterium incorporation. Our findings hold promise that Raman spectroscopy can be an adjunct tool for future in situ bacterial metabolite biosensing.



Abstract ID: 89

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Do metagenomic studies help to find linkage on N₂O and CH₄ metabolizing microbes and the fluxes in plant tissues of Boreal and Arctic biomes?

Authors: Johanna Kerttula and Henri Siljanen (University of Eastern Finland)

Keywords: -

Content:

A regional greenhouse gas budget in Boreal biome is significantly impacted by the N₂O and CH₄ dynamics of trees. One of the dominant tree species in boreal forests, Scots pine (*Pinus sylvestris* L.), have been shown to consistently emit N₂O and CH₄ from the stems and shoots in the field conditions. The contribution of chemical reactions or microbial activity on the fluxes was left undiscovered. Likewise, Norway spruce (*Picea abies*) canopies have been found to both emit and uptake CH₄ in field flux measurements. However, they also identified CH₄ producing methanogens and potentially CH₄ consuming monooxygenases in the plant tissues. This highlights the importance of above-ground vegetation as a flux component lacking from ecosystem budgets based on only forest floor measurements. While there are studies on abiotic greenhouse gas dynamics in tree tissues, the importance and dynamics of microbially driven flux dynamics are less understood. The aim of this study is to quantify the potential for microbial N cycling and CH₄ cycling microbes in above-ground vegetation commonly found in Boreal and Arctic biomes. This is done by systematic search of the short read archive (SRA) under National Center for Biotechnology Information (NCBI) public sequence data base. To identify relevant sequences, we used keywords such as “*Picea abies* metagenome”, and to target above-ground vegetation, we excluded, e.g., sequences related to from root, soil and rhizosphere. This approach allowed us to compile a data set of metagenomic sequences of the most common trees, shrubs, lichens, bryophytes, epiphytic and endophytic crusts in Boreal forests, peatlands, and the Arctic. Full-length nucleotide sequences (hmmer profiles) are aligned with the metagenomic data set to determine the relative abundance of N cycling and CH₄ producing and reducing functional genes in the total sequence data set collected. Then, we used further statistical analyses to assess the taxonomic diversity and relative abundances of the functional genes in the most common above-ground vegetation in the Boreal and the Arctic biomes and peatland ecosystems. This study aims to show evidence for biogenic N cycling in the above-ground vegetation and potential for microbially-driven N₂O and CH₄ dynamics within tree and plant tissues.



Abstract ID: 78

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Light-absorbing properties of aerosol emissions from a marine engine

Authors: Tuukka Kokkola (University of Eastern Finland), Mika Ihalainen (University of Eastern Finland), Hendryk Czech (University of Rostock), Joel Corbin (National Research Council Canada), Jason Scott (National Research Council Canada), Martin Sklorz (Helmholtz Zentrum München), Deeksha Shukla (Helmholtz Zentrum München), Uwe Etzien (University of Rostock), Bert Buchholz (University of Rostock), Thorsten Streibel (University of Rostock; Helmholtz Zentrum München), Ralf Zimmermann (University of Rostock; Helmholtz Zentrum München), Olli Sippula (University of Eastern Finland) and ULTRHAS consortium

Keywords: marine engines, particulate matter, black carbon, light absorption

Content:

Ship traffic is a major source of particulate matter (PM) in marine regions. PM emissions can alter the radiative forcing of marine and coastal areas, depending on their optical properties. Fossil-fuel-powered marine engines emit substantial amounts of light-absorbing carbon (LAC), which can have a negative impact on albedo-sensitive areas like the Arctic. LAC is often split into two categories, black carbon (BC) and brown carbon (BrC). The light-absorbing properties of aerosol emissions from a research marine engine, operated with marine gas oil (MGO) and heavy fuel oil (HFO), were studied as a part of ULTRHAS campaign in Rostock, February 2023. Emissions were introduced into a Photochemical Emission Aging flow tube Reactor, which simulates photochemical aging occurring in the atmosphere. Emissions were measured using 7-wavelength Aethalometers, a Photoacoustic Extinctionmeter and Laser-Induced Incandescence. Additionally, filter samples were analysed offline with a multiwavelength thermal-optical carbon analyser. Emission factors and optical properties, including wavelength dependence of absorption as Absorption Ångström exponent (AAE), brown carbon contribution to absorption (BrC%), multiple-scattering coefficient (C), and mass-absorption cross-section (MAC), were assessed from the four measurement methods. Average BC emissions were over 3 times higher with HFO compared to MGO, peaking at two lowest engine loads. AAE mostly remained near the assumed value of pure BC. BrC absorption was mainly evident at 25% load with both fuels. Aging did not affect absorption wavelength dependence significantly. MAC remained uniform for primary emissions but showed variability with aging. Fuel and engine load had a major effect on light absorption and BC mass, indicating that engine-specific operation conditions may substantially alter the radiative effects of emissions from oil-powered ship engines. This should be considered when planning shipping routes, especially nearby sensitive areas. Importantly, transitioning to cleaner power sources would help to mitigate not only this but various other challenges.



Abstract ID: 58

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Poster

Title: Value profiles as tools to understand and guide societal decision making

Authors: Lauri Kurkela (University of Eastern Finland, Kausal Oy), Jouni T. Tuomisto (Kausal Oy, Finnish Institute for Health and Welfare, THL), Bernhard Bliem (Kausal Oy), Juha Yrjölä (Kausal Oy), Tero Tikkanen (Kausal Oy) and Maija Faehnle (Finnish Environment Institute, SYKE)

Keywords: Decision support, climate change, municipalities, open policy practice, sustainability.

Content:

Climate change stands as one of the most formidable challenges that humanity has ever confronted, necessitating sustainable decision-making across all tiers of governance. To protect human welfare locally and globally, municipalities need to take bold actions. However, even in situations with support for ambitious targets, the complexity and conflicting interest in details severely hinder sustainable transition to carbon neutrality. We combined open policy practice and other decision support methods into a framework that allows for citizen participation and systematic, public description and evaluation of participants' factual and value basis of their priorities. The similarities and differences of thought are explicated. Particular information objects are used for actions, outcomes, hypotheses, priorities and value profiles. In this proof of concept, we analyzed priorities and arguments about climate change from a voting advice application for the Finnish Parliamentary election in 2023. The content was described on the web platform Kausal Watch as it had many of the functionalities that would be needed for the full-blown implementation of the framework. The information objects described fairly well the respondents' mental models. The approach clarified the nature of disagreements, as some were due to values and some factual beliefs. The framework seems to be able to describe this information in such a structured way that enables further scrutiny and co-development of policies. Additionally, in our ongoing research we will be examining reasonings behind climate actions on a municipal level. The research is going to be a qualitative study where we interview relevant stakeholders regarding climate actions and form comprehensive analysis based on the results.



Abstract ID: 57

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Poster

Title: Ecotoxicity testing with water fleas of sustainable samples from biodegradability test

Author: Isa Lyijynen, (University of Eastern Finland), Minna Vikman (VTT), Umme Sara Santana (University of Eastern Finland), Victor Carrasco Navarro (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland)

Keywords: ecotoxicity, water flea test, biodegradability test

Content:

Testing of new sustainable bio-based binders and coatings is important already in the research and product development stage to avoid problems in the later phase. Chemicals in new materials may be a threat for both the aquatic environment and human health. Thus, it is important to test ecotoxicity and toxicity when developing new sustainable solutions. Samples included suberin and micro cellulose-based components and solutions as well as industrial reference. These samples were collected from the biodegradability test at two different time points with two different concentrations. Ecotoxicity test is based on standard which measures an acute toxicity. We used *Daphnia magna* species, which were grown from eggs. We carried out four replications per sample and all replications included 5 water fleas. A light and dark cycle was followed throughout the test. The test took 48 hours and immobilization was recorded after 24 hours and 48 hours. Tests succeeded because the controls included over 90 % mobile water fleas. The results indicated that the samples are environmentally non-toxic by this test. The test pointed out also challenges. For example, if the sample contains particles or the solution is semi-transparent, it is difficult to detect the *Daphnias*, no matter whether they are dead or alive. In addition, it is important to keep the parameters of the test constant because the *Daphnias* are very sensitive.



Abstract ID: 93

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Thaw-N project – On the fate of soil nitrogen in the warming Arctic

Authors: Maija Marushchak, Wasi K. Hashmi and Paula Martinez-Risco Martinez, (University of Eastern Finland)

Keywords: Nitrogen cycle, soil, arctic, permafrost, nitrous oxide

Content:

The Thaw-N project (Academy of Finland, 2023-2028) addresses this question with the focus is on the microbial transformation processes in the soil. These processes convert organic nitrogen into labile inorganic forms, which are prone to losses to aquatic ecosystems and to the atmosphere as nitrogen containing gases, including the strong greenhouse gas nitrous oxide. In the project, we will use stable isotopic tracer technique based on ^{15}N application to resolve the gross rates of the nitrogen transformation processes in the soil and study their contribution to N_2O emissions. We will look at the microbial community structure responsible for these processes by targeted sequencing of functional genes. With stable isotope probing we will investigate which microbes are the first to use the nitrogen released from permafrost for their growth. The study design is based on the contrast between the seasonally thawing active layer and permafrost and between mineral and organic soils. The results of the Thaw-N project will help us to identify soils particularly vulnerable to N losses. Further, they will be used to improve the representation of the soil nitrogen cycle in process and earth system models.



Abstract ID: 48

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: Dynamics and distribution of nitrogen and carbon from fish feed in aquaponic system estimated using stable isotopes and biomass measurements

Author: Hannu Nykänen (University of Eastern Finland), Sanni Semberg (Natural Resource Institute Finland), Japo Jussila (University of Eastern Finland), Harri Kokko (University of Eastern Finland)

Keywords: aquaponic, soilless cultivation, whitefish, stinging nettle, C and N retention, fish feed, stable isotopes, carbon dioxide, nitrous oxide

Content:

Aquaponic farming combines aquaculture of fish and soilless cultivation of plants in closed systems that recirculate nutrient-rich water. Thus, aquaponic farming has lower environmental impacts compared to traditional separated aquaculture and plant production. In this experiment, whitefish (*Coregonus maraena*) and stinging nettle (*Urtica dioica*) were grown as model species in aquaponic system established in UEF. The aim of this study was to estimate transfer efficiency of carbon and nitrogen in fish feed to fish and plant biomass. Since the total isotopic abundance is conserved in biological systems, the mass of ^{13}C and ^{15}N is equal to the mass in products and thus helps with biomass measurements in estimating C and N retention and dynamics in aquaponic farming. The fish in three aquaponic systems were fed either by commercial fish feed or ^{13}C and ^{15}N spiked *Scenedesmus* or *Acutodesmus* algae. Ammonium, nitrate, conductivity, pH and temperature were monitored, and water quality was adjusted when diverting from the optimum for fish or plants. The proportion of carbon and nitrogen accumulated to produced biomass fractions (e.g., fish, plant and solid waste material) and released from the systems was estimated by measuring amounts of C and N and their isotopic composition in each fraction. Besides this, CO_2 and N_2O released from the aquaponic system as well as inorganic carbon and nitrogen dissolved in water was estimated. This study shows that the combination of whitefish and stinging nettle is suitable for aquaponic farming. The experiment with feed-enriched nitrogen stable isotopes helps to evaluate nitrogen distribution to fish biomass and ammonium excretion to recirculating water. It helps to follow ammonium recycling to nitrate and its utilization as a plant nutrient.



Abstract ID: 73

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Insights into Nitrogen Metabolism in the Phyllosphere of Boreal Spruce Forests

Authors: Dhiraj Paul (University of Eastern Finland), Anuliina Putkinen (Helsinki University), Christopher M. Jones (Sweden University of Agricultural Sciences), Sara Hallin (Sweden University of Agricultural Sciences), Mari Pihlatie (Helsinki University) and Henri M.P. Siljanen (University of Eastern Finland)

Keywords: Nitrous oxide; greenhouse gas; phyllospheric; Functional genes; Boreal Spruce Forests

Content:

Nitrous oxide (N₂O) is a strong greenhouse gas (GHG). The sink strength of N₂O consuming activity can be important for climate change mitigation in the warming climate. Currently, in the climate change assessment and GHG flux models, there is a lack of information on microbiological mechanisms consuming atmospheric N₂O within above-ground vegetation. Therefore, in the present study we investigated the activity of the N₂O consumption in above-ground processes. We have collected phyllospheric samples from spruce upland forest in Finland from Viikki, Kuopio and Pallas. Activity of N₂O dynamics in microcosm experiment will be discussed. However, there was variation in the samples collected closely to the city environments or from the pristine environment. Optimization of microbial DNA extraction protocol for plant samples was evaluated with captured metagenomics on nitrogen cycling genes. Bioinformatics analysis was done to identify the abundance of functional genes involved in the process in phyllospheric samples. Functional gene diversity analysis indicated abundance of nitrogen cycling genes in all the samples. There was variation in the clade distribution among nitrous oxide reductase gene *nosZ*. Bacterial genera *Bradyrhizobium*, *Acidovorax*, *Thaueria*, *Azoarcus*, *Rubrivivax*, *Leptothrix* were observed. Abundance of genes on nitrogen fixation and denitrification activities by microbes in the phyllospheric samples. Therefore, our finding indicates the importance of microbial interactions in above-ground systems on nitrogen metabolism.



Abstract ID: 44

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Poster

Title: Recovering nutrients and carbon dioxide in algal biomass from recirculating aquaculture system

Authors: Katja Pulkkinen and Juhani Pirhonen (University of Jyväskylä)

Keywords: microalgae, recirculation aquaculture system, effluent, carbon dioxide, circular economy, green transition

Content:

Microalgae are photosynthetic microscopic organisms that can sequester carbon dioxide from emission sources and nutrients from effluents, while producing large amounts of valuable biomass and compounds. MIDAS consortium project is a joint project between the Faculty of Information Technology and the Department of Biological and Environmental Science of the University of Jyväskylä and the Technology Research Centre VTT Oy. The aim of the project is to develop microalgae cultivation methods, including spectroscopic monitoring and dynamic process modelling, to improve the control of microalgae-based processes, integration with emission sources and process interlinking. The project is funded by the EU's Recovery and Resilience Facility (RRF) to promote green and digital transition. In the Department of Biological and Environmental Science, we aim at improving microalgal biomass production to sequester nutrients and carbon dioxide produced by recirculating aquaculture system (RAS). The RAS research system will also serve as a test bed for spectral imaging of algal growth and potential disturbances and provide data for process modelling.



Abstract ID: 72

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: The role of land cover and hydrology in regulating methane (CH₄) and carbon dioxide (CO₂) emissions from subarctic streams

Authors: Taija Saarela, Wasi Hashmi, Lukas Kohl, Carlos Palacin-Lizarbe, Henri Siljanen, Xudan Zhu, Frank Berninger, Jukka Pumpanen (University of Eastern Finland)

Keywords: methane, carbon dioxide, dissolved organic carbon, freshwater ecosystems, subarctic

Content:

Freshwater rivers and streams transport carbon compounds and nutrients from terrestrial to aquatic ecosystems, being significant sources of powerful greenhouse gases methane (CH₄) and carbon dioxide (CO₂) to the atmosphere. Across northern landscapes, climate-induced changes in vegetation cover and hydrology have been found to increase the export of dissolved organic carbon (DOC) from terrestrial to aquatic ecosystems. The increased delivery of terrestrial organic carbon might further accelerate the degradation of DOC and consequent greenhouse gas emissions from freshwaters. To provide more accurate estimates of landscape-scale carbon balances in a changing climate, it is crucial to understand the factors regulating the sources, processing, and fate of carbon along the terrestrial-aquatic continuum. This study aims to investigate the influence of land cover and seasonality on the emissions of CH₄ and CO₂ from subarctic streams. We conducted floating chamber flux measurements and stable isotope analyses of CH₄ and CO₂ and analyzed CH₄-related microbial communities in two pristine subarctic catchments differing in vegetation, soil type and water quality. Monthly flux measurements and analyses were performed from spring to fall during two growing seasons (2022–2023). The study area is situated in a subarctic coniferous forest located in Värriö Strict Nature Reserve (67° 44' 16" N, 29° 38' 58" E) in Finnish Lapland close to Värriö Subarctic Research Station (SMEAR I). Meteorology, water level and DOC concentrations are continuously monitored at the research station. Preliminary results show the highest fluxes of both CH₄ and CO₂ in the peatland-associated stream throughout the year. In both streams, the fluxes of CH₄ and CO₂ peaked during spring freshet. The results indicate a strong influence of catchment vegetation and hydrological conditions on the dynamics of CH₄ and CO₂, demonstrating the close connection between terrestrial landscapes and small headwater streams.



Abstract ID: 43

Topic groups: Sustainable Resource Society: Circular Economy, Energy and Raw Materials (RESOURCE)

Presentation types: Poster

Title: Preparation of biochars from field and forest residues, Sustainable applications and benefits: A review

Author: Summaira Saghir and Reijo Lappalainen (University of Eastern Finland)

Keywords: Biochar, Hydrochar, sustainability, environmental solution

Content:

Biochars/hydrochars are carbon-rich material derived from waste biomass through processes like pyrolysis and gasification, is gaining widespread attention due to their potential to address environmental challenges and provide sustainable industrial applications. With enhanced physicochemical properties compared to raw biomass, biochar's versatility, improved porosity, surface area, and stability make it suitable for soil improvement, water purification, energy storage, and carbon sequestration, aiding in climate change mitigation. Standardized characterization processes are essential to explore the full potential of biochar, making it a promising solution for a range of pressing global issues.



Abstract ID: 49

Topic groups: Forests and Bioeconomy (FOBI)

Presentation types: Poster

Title: Sustainable solution of controlling plant diseases such as Scleroderris canker and Grey mold in vivo (Biorefining liquids against plant diseases)

Authors: Umme Sara Santona (University of Eastern Finland), Hanna Ruhanen (Natural Resources Institute), Marja Poteri (Natural Resources Institute), Anne Uimari (Natural Resources Institute), Aybami Salami (University of Eastern Finland), Noora Jokinen (University of Eastern Finland), Reijo Lappalainen (University of Eastern Finland)

Keywords: Biorefining liquids, Scleroderris canker, Grey mold.

Content:

Thermochemical conversion techniques such as HTL and slow pyrolysis produce biorefining liquids or wood distillates. Bactericidal, fungicidal, and insecticidal activities have been demonstrated in wood vinegars. Scleroderris canker mostly infects conifer species and can be fatal to susceptible hosts in the nursery. Affected plants expire after outplanting, but they also act as centers for the fungus's spread. Discoloration patches in Norway spruce needles are caused by grey mold. Regular fungicide sprays in the nursery help control both Scleroderris canker and grey mold infection. We investigated a sustainable way to control these plant diseases in this study by using industrial, birch-based and hemp-based wood distillates which could be utilized as natural pesticides providing a sustainable alternative solution to chemical pesticides. Six biomass distillates were tested in this study to see if they might prevent Scleroderris canker and Grey Mold in vivo. The results indicate that some of these distillates have potential for controlling plant diseases and further RDI is well-justified.



Abstract ID: 74

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Microplastics (MPs) contamination of pollinators in cities

Authors: Oksana Skaldina and Victor Carrasco-Navarro (University of Eastern Finland)

Keywords: air quality, biodiversity, microplastics, pollinators, urban environments

Content:

Urban habitats possess a controversial role in conservation frameworks. With proper management and well-implemented biodiversity strategies, they can provide resources for wild fauna. Simultaneously, cities act as pollution hotbeds. Industry, traffic, and households generate gaseous and particulate pollutants including microplastic (MPs). Microplastics (MPs) are diverse set of particulate contaminants that are widely distributed in the environment. They have been found in several habitats, from deep sea trenches to Mount Everest, what highlights the importance of research into these contaminants and their potential toxic effects. Pollinating insects encounter these contaminants via residence or foraging in contaminated areas, ingesting contaminated food, direct deposition on their body surfaces or via contact with contaminated air. MPs contain (or interfere with) organic pollutants, and also metals. Metals are usually employed as additives in plastics and in addition, they can adsorb to microplastics in metal-contaminated sites. It has been previously shown that in urban areas, western honeybees (*Apis mellifera*) and vespid wasps (*Vespula* spp.) accumulate metal particles on the body surfaces and inside bodies. There is proven evidence of the surface MPs accumulation in honeybees within urban landscapes in Europe, what raises questions about the relation of metal and microplastic accumulation in these organisms. Furthermore, these insects forage for food close to roads, where they may capture traffic-related contaminants such as tire rubber MPs. Thus, tire's associated additives might be an extra threat for their health. MPs and their additives might alter pollinator resistance to stress, foraging and grooming (self-cleaning) behavior, and their pollinating efficiency. Pollinating insects can further act as vectors of MPs transfer to other environmental compartments. In the face of global pollinator decline, urban pollinators should be considered as important irreplaceable natural resource and they should be protected from pollutants, including MPs.



Abstract ID: 55

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: Developing analytical methods of microplastics for industrial quality control

Authors: Tuomo Soininen, Kaisa Raninen, Emilia Uurasjärvi, Shahina Karim, Roosa Visuri, Jouko Vepsäläinen, Sirpa Peräniemi, Essi Järvelä, Arto Koistinen, Laura Tomppo (University of Eastern Finland),

Keywords: Microplastic, quality control, toxicology, analytical chemistry, industrial

Content:

Microplastics (MPs) have been found everywhere in the environment. Although the information on exposure and health effects of MPs is incomplete for a comprehensive risk assessment, MPs should be managed in accordance with the precautionary principle. This requires methods to analyze microplastics, identify their potential sources, and assess their toxicity. Analysis methods of microplastics for industrial quality control were developed from the perspective of industrial processes. Analysis methods for MPs were introduced utilizing research expertise in the University of Eastern Finland on microplastics, food science, analytical chemistry, and toxicology. Imaging Fourier transform infrared spectroscopy and Raman spectroscopy methods were developed to study microplastics in industrial process samples. Protocols were developed for studying compounds leaching from plastics utilizing nuclear magnetic resonance and X-ray fluorescence technologies. Also, toxicological analytics were developed to assess the potential harmfulness of microplastics and the leaching compounds. Developed methods can be utilized for analyzing microplastics down to 15 μm in various industrial samples and for studying migration of microplastics and leaching compounds from plastics.



Abstract ID: 61

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Nitrogen metabolizing microbial communities in terrestrial vegetation across temperate to sub-Arctic regions

Authors: Krishnapriya Thiyagarasaiyar (University of Eastern Finland), Dhiraj Paul (University of Eastern Finland), Johanna Kerttula (University of Eastern Finland), Kaido Soorsaar (Tartu University), Katerina Macháčová (Global Change Research Institute of the Academy of Sciences), Jukka Pumpanen (University of Eastern Finland) and Henri Siljanen (University of Eastern Finland)

Keywords: N₂O metabolism, metagenomic analysis, greenhouse gas, abundance, ecosystem

Content:

Nitrous oxide (N₂O) is a strong greenhouse gas and it plays key role in the nitrogen cycling. Understanding the microbial communities responsible for N₂O metabolism within the above-ground vegetation in the terrestrial ecosystems is crucial for comprehending the regional and global the potential on microbes on the N₂O dynamics. This study investigates the distribution and diversity of nitrogen metabolizing microbes within above-ground vegetation along transect-spanning from temperate to sub-arctic regions. We also conducted tree stem N₂O concentration and flux measurements on the tree stem to understand how N₂O is either emitted or consumed by plants samples. Using probe targeted metagenomic analysis, we studied the composition of microbial communities and abundance of functional genes involved in nitrogen metabolism. To gain further insights into the microbial community structure, we studied the diversity of genes sequenced with targeted metagenomic analysis. Our findings reveal shifts in the abundance, diversity, and composition of nitrogen metabolizing microbes as we move from temperate to sub-arctic ecosystems. Through this research, we aim to elucidate the ecological drivers and mechanisms influencing on N₂O emissions and consumption in above-ground vegetation. This is shedding light on the potential impacts of climate change on these vital processes in terrestrial ecosystems across different climatic zones. This knowledge contributes to our broader understanding about greenhouse gas dynamics and can inform strategies for mitigating nitrogen metabolism in the plant tissues.



Abstract ID: 66

Topic groups: Sustainable Co-management of Water Resources and Aquatic Environments (WATER)

Presentation types: Poster

Title: Cultivation of *Chlorella vulgaris* in nutrient-rich effluent and CO₂ from a recirculating aquaculture system – biomass production and nutrient removal efficiency

Authors: Hemanta Timilsina, Minna Hiltunen, Olivia Söderena, Juhani Pirhonen, Katja Pulkkinen (University of Jyväskylä)

Keywords: microalgae, CO₂, RAS, MWC, wastewater

Content:

This study focused on cultivating *Chlorella vulgaris*, a single-celled green microalgae, in the nutrient-rich effluent of a recirculating aquaculture system (RAS). The objectives were twofold: producing valuable algal biomass and treating the RAS effluent. Two factors were investigated – media type (RAS effluent and modified Wright's cryptophyte medium – MWC, Guillard & Lorenzen, 1972) and aeration type (ambient/room air with about 400 ppm CO₂ and air from a RAS trickling filter with 700-1000 ppm CO₂). We analysed growth patterns, nutrient uptake, biomass productivity, and chlorophyll-a (Chl-a) content during both the exponential and stationary growth phases. Notably, *C. vulgaris* exhibited slightly accelerated growth in the MWC medium compared to the RAS effluent, probably due to the controlled nutrient composition. However, due to the lower initial nutrient concentrations, it entered the stationary phase earlier, on day 9, compared to the RAS effluent, which reached this phase on day 11. In the MWC medium, the maximum cell density of *C. vulgaris* was $34.9 \pm 0.8 \times 10^6$ cells mL⁻¹ (mean \pm SD) on day 9, while in RAS effluent, it reached $62.4 \pm 0.3 \times 10^6$ cells mL⁻¹ (mean \pm SD) on day 10. *C. vulgaris* cultured in RAS effluent had higher dry weight (DW), and Chl-a levels than those in MWC medium. *C. vulgaris* effectively removed nutrients from the growth media. When cultivated in the RAS effluent with RAS air, the average removal efficiencies were 100% for PO₄-P, 96% for NO₃-N, and 94% for total nitrogen. The study found that varying CO₂ concentration (comparing room air to RAS air) had minimal effects on the growth, DW, nutrient removal efficiency, and chl-a content of *C. vulgaris*. Regarding the growth medium, RAS effluent appears to be the preferred option for cultivating *C. vulgaris*, offering higher biomass yields and better economic and environmental outcomes compared to MWC.



Abstract ID: 39

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: The mitigation of greenhouse gas emissions by manipulating water table level on peat soil growing grass in eastern Finland

Authors: Yu Zheng (University of Eastern Finland), Perttu Virkajärvi (LUKE), Sanna Saarnio (LUKE), Mari Rätty (LUKE) and Marja Maljanen (University of Eastern Finland)

Keywords: greenhouse gas, grassland, peatland, water table, HONO

Content:

Peat soils drained for agriculture are significant sources of greenhouse gases, especially carbon dioxide (CO₂) and nitrous oxide (N₂O). Evidently, the most effective way to reduce N₂O and CO₂ emissions from cultivated peat soils would be raising water table close to soil surface, which is not feasible for crop production and leading to CH₄ emissions (Regina et al. 2019). It is not clear how the annual GHG balance and grassland crop yield will be affected by changing water table levels in boreal conditions. In addition, the impact of water table on the peat soil emissions of gaseous nitrous acid (HONO) and nitric oxide (NO), which are reactive gases in the atmospheric chemistry, are not understood so far (Bhattarai et al. 2018). This study consists of field and mesocosm experiments where annual greenhouse gas exchange is measured by chamber techniques in snow free season and with snow gradient method in winter. In the field experiment, gas flux measurements under natural water table fluctuation were accomplished from June 2021 to May 2022, thereafter water table manipulation (higher water table vs. lower water table) measurements are proceeding until September 2023. In the mesocosm experiment, 20 soil monoliths from the field site were randomized into four water table depths: -70, -50, -30, -20 cm from soil surface. The flux measurements will last from June 2022 to September 2023. HONO and NO emissions are measured in the laboratory under different moisture and temperature conditions. The results will be ready by the end of 2023 and published during 2024.



Abstract ID:99

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Biomass composition of *Chlorella vulgaris* grown in nutrient-rich effluent and CO₂ from recirculating aquaculture system

Authors: Minna Hiltunen, Hemanta Timilsina, Olivia Söderena, Juhani Pirhonen, Katja Pulkkinen (University of Jyväskylä),

Keywords: microalgae, lipid, carotenoid, RAS, wastewater, nutrients, CO₂.

ABSTRACT

Microalgae can capture nutrients from effluents, and the produced algal biomass can be utilized, for example, for biofuel production or as a source of valuable biomolecules. For the subsequent use, it is important to know how culture conditions affect microalgal biochemical composition. We cultured the green algae *Chlorella vulgaris* in photobioreactors using nutrient-rich effluent and CO₂ of a recirculating aquaculture system (RAS) housing rainbow trout, *Oncorhynchus mykiss*. To test how the CO₂ concentration affects the microalgal biochemical composition, the cultures were aerated with either room air (CO₂ ca. 400 ppm) or air from the RAS trickling filter (CO₂ 700-1000 ppm). The biochemical composition (C%, N%, lipid%, fatty acid composition, carotenoids) of *C. vulgaris* grown in RAS effluent was analyzed during exponential and stationary growth and compared to *C. vulgaris* grown in algal culture medium (modified Wright's cryptophyte, MWC). The CO₂ concentration had very little effect on biomass composition, however, the concentration in the RAS air was quite low. The carbon content (% of dry weight) was higher and nitrogen content lower in *C. vulgaris* grown in MWC than in RAS effluent. Lipid content (% of dry weight) and the proportion of monounsaturated fatty acids was higher in *C. vulgaris* grown in MWC than in RAS effluent during the stationary phase. This was likely due to lower initial nutrient concentrations and more severe nutrient limitation in MWC. Concentration of carotenoids was higher in *C. vulgaris* grown in RAS effluent during the exponential growth phase. Culturing in RAS effluent resulted in small differences in biomass composition when compared to algae in MWC, but depending on downstream application, RAS effluent may be a better option than the culture medium (for e.g. carotenoids). However, increasing algal lipid production in RAS effluent would likely require either longer culture period or modification of the nutrient ratios.



Abstract ID: 115

Topic groups: Climate Forcing, Ecosystems and Health (CLEHE)

Presentation types: Poster

Title: Laboratory assessment of particle and gas emissions from fires in boreal forest, peatlands, and savannah fires

Authors: M. Somero (University of Eastern Finland), M. Ihalainen (University of Eastern Finland), P. Yli-Pirilä (University of Eastern Finland), A. Mukherjee (University of Eastern Finland), K. Köster (University of Eastern Finland), M. Ruppel (Finnish Meteorological Institute), V. Vakkari (Finnish Meteorological Institute), H. Czech- (University of Rostock), A. Virtanen (University of Eastern Finland), O. Sippula (University of Eastern Finland),

Keywords: biomass burning, emission factor, boreal forest, savannah, peat

(BB) is major contributor of greenhouse gases (GHG), non-methane organic gases and carbonaceous aerosols i.e., black carbon into the atmosphere. However, there is a large uncertainty within the current emission estimates of aerosols from BB. (Andreae 2019; Akagi et al. 2011) Laboratory experiments with an open biomass burning device were conducted to measure gas and particle emission factors (EF) of different biomasses. The results were compared with values in literature to investigate if the burning device would be appropriate for characterising emissions for BB.

Material from savannah, boreal forest and peat were burned in Kuopio, Finland ILMARI-laboratory in Summer of 2022. Samples consisted of vegetation from savannah, boreal forest ground vegetation and soil, and peat samples from Finland, Russia, and Svalbard (Norway). Flaming and smouldering combustion phases were studied, and these conditions were controlled with the heating rate of an electric resistor. Particles were measured with a Fast Mobility Particle Sizer after dilution with the combination of a porous tube diluter and an ejector diluter. Organic and Elemental carbon concentrations were analysed from filters collected from the flue gases. EFs were determined by calculating a carbon mass balance and applying the SFS-5624-standard.

EC and OC EFs were in range of 0.07-4.4 and 4.86-28 g/kg, respectively. Overall, the mean values of EFs in g/kg for CO, CO₂, CH₄, OC and EC are in range with different literature sources, which includes results from prescribed burning, laboratory, and airborne measurements. The EFs of nitrogen oxides and total hydrocarbons were significantly higher in laboratory than in literature.

The results indicate it's possible to use the open burning device to emulate BB in laboratory setting. More experiments are needed to study the different burning conditions relation to EFs.



Notes



Notes



Last Words.....

Note from the operational team

We warmly thank you for participating in the conference, and hope that you will have great memories, new connections, and best of all – fresh ideas. The this conference has been, once again, a great show of multidisciplinary science, with global researchers connecting over the shared theme of sustainability.

This book serves as a collection of the work that was presented at the conference. We included the abstracts that had permission to be copied, and those which were presented during the sessions - as is the practice in conferences worldwide. They are included here as they were entered into the program's abstract submission system. We had to leave some out by submitter request, but a complete final version of the program is included in this collection.

We hope the pictures remind you of the beauty of autumn and early winter in Kuopio, and most of all, **we hope to see you next time!**

Best regards,

-Kristina Leppälä, Ville-Veikko Piispanen, and Mirkka Rovamo

Editors and conference organizing committee co-chairs.

Pictures are AI generated.



(ePDF) ISBN: 978-952-61-5024-6

3rd International Conference for Sustainable Resource Society : Water Cycle in the Environment and Society Conference Proceedings and Abstract Collection

Editors: Kristina Leppälä & Ville-Veikko Piispanen

University of Eastern Finland

