

# 4th Sustainability Conference

*University of Akureyri, Iceland*



Abstracts

12.04.2024

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## Greetings from the organising committee

The environmental council of the University of Akureyri invites everybody to the 4th sustainability conference at the University of Akureyri on 12.04.24. Participation is free of charge and no registration is required. The conference will be held in a hybrid format, to accommodate both on-site interaction but also online, environmental friendly participation of international speakers and guests. The conference's language is English.

The conference starts with a student-led session about ocean health, initiated by our environmental council member Johanna Maria Franke, followed by several sessions on selected topics. Ocean health and clean water, but also climate vulnerability and other topics reached us in the form of abstracts. We are looking forward to vibrant discussions!

Yvonne Höller, Natalia Ramirez Carrera, Audrey Matthews, & Sean Scully



## **Set Sails for Sustainability: Ocean Missions NGO citizen-science expeditions and micro-plastic research**

Charla J. Basran, Belen G. Ovide, Carlota Vialcho, Taïme Pellure Smit, Johanna Franke

Ocean Missions NGO was founded in 2019 in Húsavík, Iceland with the overarching goal of conducting research, promoting sustainable practices, and involving and educating the public on marine conservation issues. We run two citizen-science sailing expeditions per year where data on whales, birds, zooplankton, and macro- and microplastics are collected. To-date, there have been nine expeditions, and sampling during them has allowed us to shed light on the microplastic pollution issue in different areas around Iceland's north and west coasts. For example, we estimated that the waters around Grímsey have the highest mean concentration of surface microplastic particles (1943 particles/km<sup>2</sup>). Additionally, through a partnership with North Sailing, we have started dedicated weekly monitoring of microplastic in Skjálfandi Bay since summer 2022. After achieving the declaration of Iceland's first "Hope Spot", we have expanded our public outreach work, including hosting public events and collecting survey data, with the support of Mission Blue NGO led by the legendary oceanographer Sylvia Earle.

## **Towards Marine Conservation and Sustainability in a Dynamic Area in Iceland: The Case of Skjálfandi Bay**

Huld Hafliðadóttir (STEM Húsavík), chairman of board

Marianne H. Rasmussen (Rannsóknasetur HÍ), board of SVÍVS

Charla Basran (Rannsóknasetur HÍ & Ocean Missions), board of SVÍVS Bélen Garcia Ovide (Ocean Missions), board of SVÍVS

Eva Björk Káradóttir (Hvalasafnið á Húsavík), board of SVÍVS

Skjálfandi Bay is an area with high biodiversity and a rich marine ecosystem. Additionally there are many users of the bay including both recreational and commercial, such as whale watching, cruise ship tourism, and fishing, with a rapid increase in tourism during the last decade.

Discussions about improving the sustainability and protection of the bay date back to 2012. As uses of the area continue to increase, we formed SVÍVS, Samtök um verndun í og við Skjálfanda, to work within the community towards formally starting a pilot project of marine protection.

The steps of the proposed plan first included local stakeholder and municipal government information meetings, to be followed by submitting a formal request to the national government. We hope that this project will be able to serve as a model for other locations in Iceland in the future.

## **Ocean CDR: A Crucial Player in the Battle Against the Climate Crisis**

Íris Mýrdal (Running Tide)

Since the onset of the Industrial Revolution, the extensive extraction and burning of fossil fuels have expedited the transfer of carbon within the Earth System from the 'slow' to the 'fast' carbon cycle. This human-induced interference with the global carbon cycle in marine ecosystems has led to consequences such as the loss of marine habitats, shifts in species distributions, diminished biodiversity, and ocean acidification. Recognizing the need to mitigate the adverse effects of anthropogenic CO<sub>2</sub>, the Intergovernmental Panel on Climate Change (IPCC) identifies Carbon Dioxide Removal (CDR) as a crucial tool. Running Tide is dedicated to developing technology aimed at restoring ocean health by sustainably enhancing various pathways in the natural carbon cycle. This includes actions like submerging terrestrial biomass in the deep ocean (> 1 km), fostering the growth and descent of macroalgae in open waters, and augmenting ocean alkalinity (OAE). As the advancement of CDR through these pathways continues, there is a growing imperative to accurately measure and monitor both positive and negative impacts, particularly within the context of biodiversity and ecosystem functioning. Running Tide integrates the knowledge of prominent third-party ocean and climate scientists, leveraging the expertise of our independent science advisory board and collaborating with research partners. This collaboration, combined with Running Tide's in-house engineers and applied science team, enables the development of a robust set of design principles for our Carbon Dioxide Removal (CDR) system. The objective is to optimize global system benefits while minimizing localized impacts.

## **Lake Debris in urban-scape small-scale fisheries, Is there a cause to worry? The case of Winam Gulf in Lake Victoria, Kenya**

Patrick Otuo Wanguche<sup>1\*</sup>, Horace Owiti Onyango<sup>1,2</sup>, Fonda Jane Awuor,<sup>1</sup> James Last Keyombe,<sup>1</sup> Jacob Ochiewo<sup>3</sup>, Hezron Odhiambo Awandu<sup>1</sup>, Julia Akinyi Obuya<sup>1</sup>, Tabitha Onyango,<sup>1</sup> Kevin Osongo,<sup>1</sup> Winnie Owoko<sup>1</sup>, Eric Okuku<sup>3</sup>, Chrispine Nyamweya,<sup>1</sup> and Christopher Aura Mulanda<sup>1</sup>

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Urban lakescapes that support small-scale fishing are more susceptible to pollution from a variety of sources than rural riparian zones with fewer people and fewer industrial activities. Regardless, there is a scarcity of information about the type and volume of litter injected into urban lake systems, as well as its potential impact on small-scale urban fisheries. Within Kisumu city's lake scape, this study looked at the sources, types, brand audit, and distribution of urban waste across demographic and economic zones. For nine months, data was collected through weekly clean-ups at one urban beach, one informal community, and an industrial location. In order to establish their perceptions on overt changes in the urban fisheries owing to debris impacts, qualitative data was obtained from community opinion leaders utilizing key informant interviewing guides. Descriptive analyses were used to summarize litter characteristics, and an ANOVA was used to assess any statistical significance of the litter distribution across study sites. Plastics (60%), glass and ceramics (10.1 %) and cloth (8.3 %), were found to be the most prevalent sorts of litter, with wood being the least common (0.0 %). There was also a statistically significant link between counts of litter and the research site ( $p < 0.05$ ). We recommend reduction of plastic pollution in the Lake's environment.

Key Words: Lake Victoria, Kenya, composition, mitigation, Lake debris, urban

## **Ethics in glacier protection under the pressure of climate change**

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With climate change, cryospheric habitats are under severe pressure. Especially Alpine tourism areas relying on snow reliability suffer severely under the scarcity thereof. Countermeasures to guarantee the quality of glacial skiing are connected with extreme effort in manpower and investments. Glacier ski operators in Austria, Italy, Switzerland, Slovenia and France are hence in the mode of covering neuralgic spots on industrial glaciers with geotextiles to increase albedo. In the county of Tyrol, ca. 100 hectares with increasing trend are covered with white blankets made of polypropylene (PP). By covering large areas of ski slopes over the summer months ca. 1,80m in height of snow and ice can be retained from melting verifying the mechanical success story of this method. However, geotextiles made of polypropylene fleece are severely altering conditions in the cryobiota such as nutrient concentrations, light conditions, the cut off of atmospheric input, etc. On top of it, those geotextiles release substantial amounts of plastic fibers (up to 3.000 accumulated meters of fibers m<sup>-2</sup>). In high altitude conditions, PP fibers show a tendency to degrade to smaller particles which are to be categorized as microplastics. These particles are incorporated into the sensitive high alpine food chains such as aquatic insect larvae in glacial rivers. Additionally, it has been proven that the presence of microplastics can foster antibiotic resistance genes of bacteria dwelling in snow and ice. The dilemma is obvious: The enormous economic pressure from touristic areas has to compete with ecological concerns. The evident microplastics pollution of high-altitude areas is still not quantified sufficiently, however, the question about the ethics to conserve glacial structures “by all means” is meanwhile asked by numerous ecologists and NGOs. As a final consequence, scientists, politicians, stakeholders and economists must cooperate to ensure the usage of sustainable and economically friendly materials.

## **Climate change and land use in Iceland**

Brynhildur Bjarnadóttir

Associate Professor, department of Education, University of Akureyri.

Sustainable land use is one of the most important climate actions in Iceland. To date, almost 2/3 of Iceland's total emissions are related to the sector Land Use and Land Use Change and Forestry (LULUCF). Emissions are mainly coming from 3 sources; agricultural land, grasslands and drained wetlands while forestry and revegetation sequester carbon. Authorities are working on implementing policies that rely on environmental conservation and responsible land management. But what research do we have on different land use options in Iceland? Which practices should we aim at and what do research tell us? An overview of latest data on forestry, revegetation and drained wetlands will be discussed and put into perspective for sustainable land use practices in the face of climate challenges.

## **Sustainability Efforts between University of Akureyri (IS) and St. Mary's College of Maryland (USA)**

Christina Goethel<sup>1\*</sup>, Sophia Garms<sup>1</sup>, Maren Bleiss<sup>1</sup>, Eva Maria Ingvadóttir<sup>2</sup>

<sup>1</sup> St. Mary's College of Maryland, St. Mary's City, MD, USA

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\*Presenting Author

This presentation will describe ongoing research collaborations between the University of Akureyri (UNAK) and St. Mary's College of Maryland (SMCM) in the United States from an initial Fulbright Fellowship in 2022. Two recent SMCM visits to UNAK (January and March) will be summarized and current ongoing efforts described, which include academic projects and sustainability goals. Details from a January visit in which the sustainability fellow from SMCM came to Akureyri to share in conversation current programs in sustainability and how UNAK may be able to implement some of those initiatives, and vice versa, where UNAK policies and programs could be deployed at SMCM will be provided. We will also present updates about efforts at SMCM that have been utilized post the initial January visit. Second, a visit in March by a current Environmental Studies student from SMCM, will be presented for academic collaborations between the two schools. Updates from their work designing tools for conservation and about invasive species with focus on the Arctic will be shared.

## **“From Sea to Street”: Addressing Sustainability Challenges through Street Art and Citizen Science**

Marta Dievina

S. Kochalski, B. Pruse, M. Dievina, I. Gianelli, K. Roubedakis, M. Helmus, E. Ekström, L. Montecchio, T. Straka, S. Rogge, A. Kinds, N. Lazzari, M. Schreiber, S. Villasante

The world's oceans and seas are under growing threat, from climate change and biodiversity loss to overfishing and pollution. To address these challenges, innovative and interdisciplinary solutions are essential. Enter “From Sea to Street”, a citizen science initiative aiming to better understand and strengthen people’s relationship with the ocean and the seas through the transformative lens of street art. Collaborating with muralists, city guides and art enthusiasts, an interdisciplinary team of young scientists carried out a cross-national collection of ocean/sea-themed murals across three European countries - Spain, Latvia and the Netherlands. Over a period of six months, each of the collaborating countries made efforts to engage the public by organizing street art tours or interactive workshops, participating in street art festivals, publishing on social media, or integrating the project approach into a university course. Citizen scientists were encouraged to (a) search for marine-themed murals, (b) take photos of these murals and (c) report the photos and the emotions, thoughts, or memories they associate with the image to the “From Sea to Street” team. In addition, an online survey with 300 participants explored which emotions people were experiencing when seeing murals depicting different human-ocean relationships.

The presentation will provide an insight into the results and lessons learned, as well as explore the potential role of street art as a tool for strengthening viewers’ connection with the sea and the ocean and for raising and maintaining public interest regarding environmental issues. We are looking for an exchange with the conference participants about what fresh ways there can be at the intersection of environmental science, art and citizen science to speak about the people-sea connection in new and different ways and to move from sustainability problems to action.

**Keywords:** citizen science, street art, public engagement, ocean literacy, marine ecosystems, urban environment, interdisciplinarity, cross-country comparison



## **The Complex Relationship of Sustainability and Wilderness: Illustrated Through the Icelandic Case**

Christopher Dunn

Fulbright Scholar in Akureyri hosted by the Stefansson Arctic Institute

What is wilderness, how does it relate to sustainability, and what is sustainability sustaining anyways? This presentation will offer novel insights into these questions with a particular focus on Iceland's Central Highland. This is timely as Iceland works through its land use priorities in an attempt to balance climate change mitigation, biodiversity conservation, and the tourism economy. Particular consideration will be given to the relation of wilderness to larger environmental issues and to human flourishing.

Chris Dunn is a Fulbright Scholar in Akureyri hosted by the Stefansson Arctic Institute working on an NSF-Arctic project titled Applying the Environmental Humanities to Conservation Management and Policy in Iceland. He is based primarily in the U.S. state of Colorado. Find him at [chrisdunnonplanetearth.com](http://chrisdunnonplanetearth.com).

## **The impact of climate vulnerability on new firm formation**

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The aim of the paper is to examine the influence of climate vulnerability (CV) on the formation of new firms. Employing a large sample of 140 countries spanning the time frame 2006-2020, it has been found that climate vulnerability harms new firm formation. The empirical results show that the negative impact of CV on the average new business formation rate has been 34.02. The results prove to be robust for alternative subsamples and methodology. Furthermore, the results of the quantile regression highlight a parameter heterogeneity in the effect of CV on entrepreneurial activity. Overall, the empirical findings highlight the key role of climate vulnerabilities in developing public policies aimed to spur entrepreneurial activity.

Keywords: climate vulnerability; climate risk; new firm formation; entrepreneurship.

## **Plastics – From ‘Wishcycling’ to Recycling**

Audrey Matthews, University of Akureyri

Plastics are indispensable in our modern world and there are many instances where such materials are essential, such as in some food packaging and healthcare. However, we are well aware that plastic pollution is present as we continue to use plastics. Many believe that the plastic waste problem should be tackled at the source, and we have seen innovative initiatives to replace plastics with biodegradable materials, such as rice husk for food containers.

There has recently been significant focus on the recycling of plastics, with reports of ocean plastics, and discarded plastic waste affecting wildlife and humans alike. However, in order to ensure that plastic recycling is effective, the recyclers need to be informed of the correct categorisation and what is not recyclable due to contamination or being composed of mixed materials.

We have evidence that, whilst the efforts to recycle plastics are admirable in Akureyri, many people have focussed more on keeping the waste from landfill, rather than accurately sorting recyclable plastics. This is evident from surveying residents, and monitoring the Facebook group ‘Interest Group on Recycling and Reuse’ where Icelanders ask about specific recycling issues. This behaviour can also include ‘wishcycling’ where people believe that particular materials should be recycled, even if there is no current mechanism to do so. The UK press reported on this issue on 31/05/23, where batches of ‘good’ recyclable plastics were discarded to landfill due to contamination with non-recyclable materials, and the UK government now has an initiative to recycle less, but to do it more accurately.

This study will present results of a plastics recycling survey with residents in Akureyri. It will include a critical evaluation of the current guidelines for recycling and offer solutions to promote more accurate sorting of plastics, and therefore effort and cost savings for the municipality.

## **Materials Science and Microbial Biotechnology: How collaboration between two fields can lead to improvements in sustainable bioplastics production**

Emily Herbert

Microbial biotechnology and materials science research are two independent fields of study, but the research at their intersection has the potential to make sustainable plastics. Materials science is the study of the relationship between the structure, properties, processing, and performance of solids, while microbial biotechnology is the study of living organisms and their derivatives to produce useful products. However, these two disciplines overlap in the area of bioplastics production, specifically polyhydroxyalkanoate (PHAs) production and processing. Polyhydroxyalkanoates are a family of polyesters that are produced by microbes, are biodegradable, and are processable in much of the same ways that traditional plastics are. However, unlike traditional plastics, PHAs are not extracted from non-renewable resources, and are readily biodegradable. Two of the main drawbacks of PHAs are their brittleness and high melting temperature, but this can be combated by altering the structure of the polymer using certain techniques in microbiology, and by altering the composition of the polymer in the melt, which is an established materials science processing technique. In my talk, I will discuss methods in microbiology and in materials science that contribute to improvements in this promising polymer and its impact on sustainable materials production.

*All Abstracts have been added to this booklet as we obtained them from the speakers.*