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Greenland Marine Research Seminar & Workshop on Status and Development of East Greenland Waters

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SEMINAR & WORKSHOP REPORT ECOTIP MILESTONE 4.1

GREENLAND MARINE RESEARCH SEMINAR & WORKSHOP ON STATUS AND DEVELOPMENT OF EAST GREENLAND WATERS

NOVEMBER 7TH, 2023 – HOTEL HANS EGEDE, NUUK, GREENLAND

BY: RATHCKE. K., JACOBSEN, R., POST, S., STEDMON, C.A

Pinngortitaleriffik, Greenland Institute of Natural Resources (GINR)

The Greenland Institute of Natural Resources conducts research into Arctic ecosystems, monitors the living resources and the environment in Greenland and advises the Government of Greenland and other authorities on sustainable exploitation of living resources and safeguarding the environment and biodiversity.

Investigating Ecosystem Tipping Points and Cascades in the Arctic Seas (ECOTIP)

ECOTIP operates at the important link between the physical and biological systems, where a regional change in the hydrography of the Arctic Ocean might trigger a biological change at the base of the marine food web with cascading effects both on the regional and local socio-economic systems through fisheries, and on the global climate through carbon sequestration. ECOTIP is attempting to anticipate and predict these changes. https://ecotip-arctic.eu/

ECOTIP is funded by the European Union's Horizon 2020 Research and Innovation program. Grant agreement No 869383

Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS)

WGIEAGS works to provide an Ecosystem Overview and identify trends, knowledge gaps and research priorities for the region. The Greenland Sea ICES ecoregion encompasses both open sea and shelf waters along the Eastern coast of Greenland from Cape Farewell in the south to the northern boundary of Kong Frederiks VIII's Land in the Fram Strait. https://iop.apl.washington.edu/project.php?id=davis

The future of Arctic coastal ecosystems – identifying transitions in fjord systems and adjacent coastal areas (FACE-IT)

Environments connected to Arctic fjords are changing rapidly, with consequences for society. A warmer climate is an important driver of change, but other factors also play a major role, including pressures and opportunities from fishing, tourism, shipping, and changing socio-economic conditions. FACE-IT aims to enable adaptive co-management of social-ecological fjord systems in the Arctic in the face of rapid cryosphere and biodiversity changes. https://www.face-it-project.eu/

FACE-IT is funded by the European Union's Horizon 2020 Research and Innovation program. Grant agreement No 869154

Davis Strait Observing System

A sustained observational network for Davis Strait - Understanding exchanges through a critical Arctic gateway. The Davis Strait observing system was established in 2004 to advance understanding of the role of Arctic – sub-Arctic interactions in the climate system by collecting sustained measurements of physical, chemical, and biological variability at one of the primary gateways that connect the Arctic and subpolar oceans.

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SEMINAR & WORKSHOP REPORT

GREENLAND MARINE RESEARCH SEMINAR & WORKSHOP ON STATUS AND DEVELOPMENT OF EAST GREENLAND WATERS

CONTENTS

INTRODUCTION

In the evolving landscape of global environmental changes, the Arctic emerges as a focal region, particularly highlighted by fast and on-going changes in the fjords and seas surrounding Greenland. This area holds immense significance, exerting profound impacts on society and serving as a critical focal point for comprehending climate and biodiversity changes. Amidst this context, the Greenland Science Week functioned as a platform for dissemination, discussion, and collaboration for Arctic and Greenlandic environmental and societal science, as ECOTIP participated together with key collaborators in disseminating results and gained knowledge.

This report presents gained knowledge identified at two events during the Greenland Science Week on the 7th of November 2023 in Nuuk, Greenland: 1) the 1st Biennial Greenland Marine Research Seminar and 2) the workshop on Status and Development for East Greenland Waters. Both events had a forward-looking focus, to gain insight and knowledge from stakeholders and other parties, to be implemented in future research. The marine research seminar also served as a follow-up on earlier ECOTIP and Face-It stakeholder involvement in Greenland and was an opportunity to share project results and recommendations for decision-makers.

This report is divided into three parts, representing firstly the Greenland Marine Research Seminar, secondly insights from a survey distributed at the seminar, and thirdly the workshop on Status and Development of East Greenland Waters. The aim of this report is to present gained knowledge from the three parts as it has been discussed and presented by participants, stakeholders, and other parties.

SUMMARY

1ST BIENNIAL GREENLAND MARINE RESEARCH SEMINAR

The Greenlandic Institute of Natural Resources (GINR) took the lead as the organizer and key collaborator for the 1st Biennial Greenland Marine Research Seminar. The seminar provided a unique platform for international researchers to converge and share their insights, with a specific focus on Arctic marine dynamics within the Greenlandic context. Three research projects, the EU-funded research projects ECOTIP and FACE-IT, and the Davis Strait Observing System (DSOS), disseminated results from the research projects while GINR lead a joint discussion with participants to the seminar.

Summary of findings

The discussion highlighted challenges in communities and stressed the need for strategic communication in research. Key themes included a preference for visual data, effective communication channels, and shared concerns about the Arctic's environmental impact. Collaboration, expertise exchange, and addressing funding challenges were common perspectives.

In marine research discussions, the strategic goal of "localizing" research results was emphasized. Strategies like tailoring messages, translating content into Greenlandic languages, and using visuals aim to make scientific knowledge accessible. Initiatives like the Arctic Hub and engaging with local populations seek to promote clarity and collaboration in addressing circumpolar changes.

The discussion provided a nuanced perspective on climate change predictions in Greenland, highlighting the roles of human activities and natural processes. It emphasized the urgency of addressing climate-related changes and the scientists' responsibility in providing realistic scenarios. The delicate balance between local community expectations and scientific challenges in studying ecosystems and marine research in Greenland was acknowledged, stressing the importance of recognizing uncertainty and understanding the diversity of conditions within Greenland's waters.

WORKSHOP ON STATUS AND DEVELOPMENT OF EAST GREENLAND WATERS

Key stakeholders deeply embedded in the marine and coastal environment of East Greenland were participants in a workshop designed to discuss insights and priorities for these waters. This workshop served as a platform for deliberations on ecosystem status, with a focus on ensuring sustainable development in the region. The collaborative workshop was facilitated by the Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS), an international, interdisciplinary marine research working group with a dedicated focus on East Greenland, operating under the umbrella of the International Council for the Exploration of the Sea (ICES).

Summary of findings

Discussions on marine resources and key areas in East Greenland highlight the intertwined nature of marine resource management, tourism, and economic development. The need for revised management practices, acknowledgment of conflicts, and cross-regional knowledge exchange signifies a forward-thinking approach. The complex interplay between climate-driven changes and their effects on the environment and human activities is emphasized. The findings underscore challenges and opportunities in East Greenland, emphasizing the importance of tailored approaches for sustainable development. Furthermore, there's a need for a holistic approach addressing infrastructure, employment, political will, education, and fostering dialogue among stakeholders. Additionally, advocating for clearer regulations in the fishing and tourism industries reflects a demand for precision and adaptability to navigate industry dynamics and ecological intricacies. Integrating local knowledge is crucial for sustainable management practices.

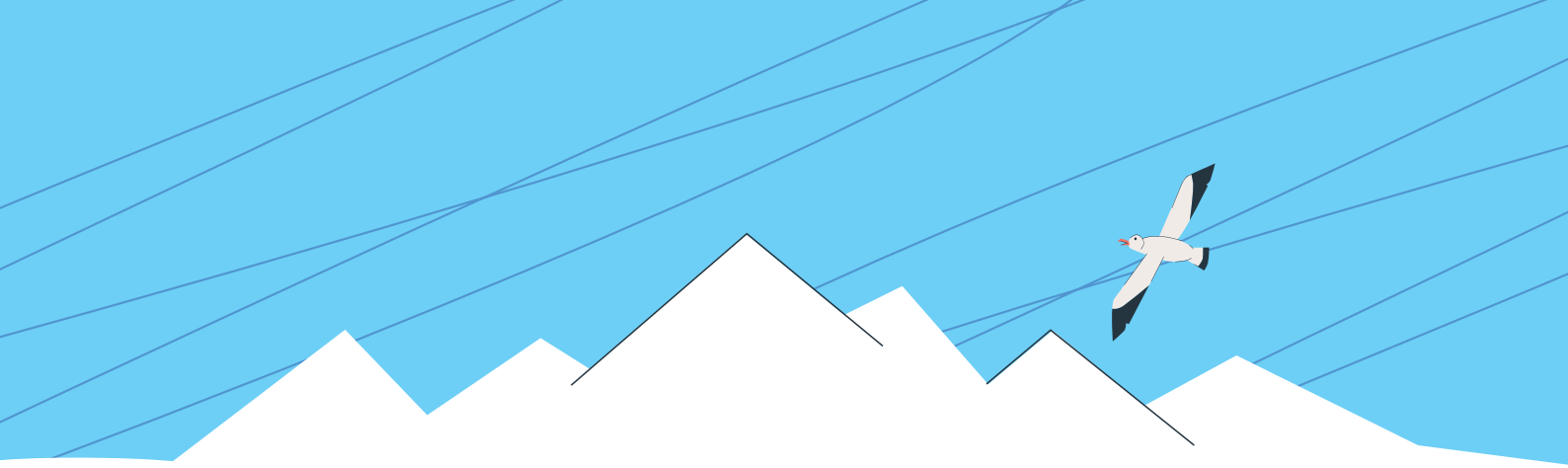
PART 1

1ST BIENNIAL GREENLAND MARINE RESEARCH SEMINAR

This chapter presents discussions from the 1st Biennial Greenland Marine Research Seminar during Greenland Science Week in Nuuk on the 7th of November 2023.

During the Greenland Science Week, the Greenlandic Institute of Natural Resources (GINR) functioned as the organizer and key collaborator of the 1st Biennial Greenland Marine Research Seminar. This seminar presented an opportunity to explore research conducted by three co-collaborators, two EU-funded research projects: ECOTIP and FACE-IT, and the Davis Strait Observing System (DSOS) - A sustained observational network for Davis Strait. The Seminar served as a collaborative platform for international researchers to disseminate their research, gain enriching understandings and insights from stakeholders, fostering perspectives on Arctic dynamics, and where collective efforts strive to preserve the delicate balance of the Arctic environment.

GINR, ECOTIP, FACE-IT and DSOS invited stakeholders and interested parties with the objective to disseminate their ongoing research and for participants to actively engage and share their own insights during the seminar. Revolving around three central themes: Learning from Local and Indigenous Knowledge, The Future Perspective and Societal Impact of Fjord Changes and Environmental Change at Davis Strait, each offering a unique perspective on the challenges and changes unfolding in the region, ECOTIP, FACE-IT and DSOS shared their research and findings from each research project.



ECOTIP, FACE-IT and DSOS shared research on the following themes:

ECOTIP: Learning from Local and Indigenous Knowledge: A fundamental objective is to tap into the wealth of local and indigenous knowledge, unraveling the impacts of climate and biodiversity change on fisheries and discerning the policy needs associated with them. The integration of scientific practices with local and indigenous knowledge seeks to provide a comprehensive understanding, paving the way for sustainable practices and policies. ECOTIP also distributed policy recommendations on 2 themes: local knowledge on biodiversity change and adaptation capacity: Link. And optimized biodiversity monitoring in the Arctic: Link. Both of these in English, Danish and Kalaallisut.

FACE-IT: The Future Perspective and Societal Impact of Fjord Changes: Glacier fronts and sea ice systems serve as focal points for biodiversity, acting as crucial hubs for various species. The diminishing presence of these features may give rise to challenges for the functionality of Arctic coastal ecosystems, ultimately impacting local livelihoods. The Arctic stands as a precursor, illustrating the repercussions of diverse global and regional environmental changes on both ecosystems and the means of sustenance for communities.

Davis Strait Observing System (DSOS): A sustained observational network for Davis Strait: Positioned as a vital gateway between the Arctic and the subpolar North Atlantic, Davis Strait holds key insights into environmental dynamics. The Davis Strait Observing System, focusing on this area, aims to meticulously document measurements of physical, chemical, and biological variability at one of the primary gateways that connect the Arctic and subpolar oceans. By unraveling the complexities of this critical juncture, researchers aspire to contribute valuable insights into the broader Arctic ecosystem.

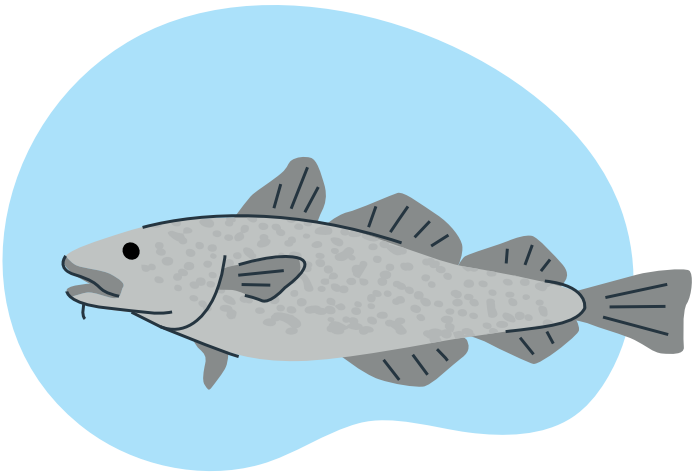
SEMINAR PROGRESS

The Seminar was conducted in a traditional conference style, firstly with the co-collaborating research projects disseminating their research as mentioned above, followed by a collective discussion, divided into four topics, guided by one question per topic for the audience to discuss and give insights to, by raising their hands.

The four seminar topics:

- What is the most effective way to convey and have a dialogue about research results?
- What are your sources when you get information on the (marine) environment and what information is of greatest value to you?
- What marine research and knowledge about the marine environment could be useful to you and improve your work?
- What do you expect the state of the ocean around Greenland to be like in 20 years?

The Language spoken was English with interpretation to West Greenlandic. The seminar was recorded on audiotapes, for notetaking. The subsequent chapters will explore deeper into each of the four seminar topics.



WHAT IS THE MOST EFFECTIVE WAY TO CONVEY AND HAVE A DIALOG ABOUT RESEARCH RESULTS?

The insights provided and discussed from this first question, about what the participants would like to see in the future regarding dissemination of research, the findings, consequences and gained knowledge on practices, gives us a glimpse into the perspectives of individuals involved in the local communities in especially east Greenland, and from scientist that produce the research.

"Overwhelmed and difficulty in following" seemed to be an overarching title of the perspectives shared from the participants. Feeling overloaded with what is going on in research about Greenlandic environmental and societal issues, expressing that it's "too much to handle for them." Statements like "sometimes I can't follow" suggests that the affected society or people wanting or needing the information from the science community, might be struggling to keep up with certain aspects of the work or information produced by scientific projects. Additionally, it is suggested that incorporating more dialogue with the local fishermen's chairmen could provide valuable insights and possibly solutions to address the shared concerns. There was, however, a general satisfaction that locals were involved in regional research. It leaves a sense of satisfaction when research takes place with the involvement of the locals, rather than research revolving around specific areas without the local population being involved or informed of the work taking place.

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As a response to this issue of "too much" and the inability to follow, the topic of "shaping research for society at an earlier stage" is brought to the table. This indicates an even stronger and more proactive approach to research vs community-relationship in the future, suggesting a desire from the scientific community to make the research more relevant and impactful for the broader community. By involving stakeholders and considering societal needs from the outset, the research can be better aligned with real-world challenges. This perspective highlights the importance of collaboration and engagement with various stakeholders to ensure that research outcomes are practical and beneficial for society.

Together with a different perspective of a "multi-pronged communication strategy", the need for a diverse communication strategy is emphasized. Instead of relying on a single approach, it is suggested that a multi-pronged strategy is implemented in the earlier stages of research projects that affect communities. This means finding various entry points or channels where people are interested in the research or where the research has a direct or indirect impact on communities. The idea is to adapt the communication methods to meet the specific needs of different audiences. One of the points from the discussion was that the previously mentioned communication can and must take place through Greenlandic and local media, to a higher extend that what is seen now. This may indicate that there is a need for the communication to go more directly to the communities, rather than people increasingly having to navigate the media and the various channels themselves. It should thus involve tailoring messages for different groups or using a mix of traditional and modern communication platforms. This approach is strategic and aims to ensure that the research reaches and engages a wider audience when considered necessary.

SUMMARY

These insights reveal a mix of community challenges, strategic communication considerations, and a proactive approach to shaping research for societal impact. Balancing and diversifying communication strategies and involving stakeholders early in the research process appear to be key areas of focus. It also revealed that the Seminar should employ fit-for-purpose meeting style, fostering dialogue.

WHAT ARE YOUR SOURCES WHEN YOU GET INFORMATION ON THE (MARINE) ENVIRONMENT AND WHAT INFORMATION IS OF GREATEST VALUE TO YOU?

During this discussion, a diverse perspective on the needs of individuals engaged in research, environmental advocacy, the fishing community, and tourism in the Arctic region came to light.

Emphasis on visual data and local relevance highlighted an importance of visual data over textual articles, suggesting a preference for easily interpretable information, possibly to aid the scientific community in communicating with locals. This aligns with the idea of making information more relatable and accessible to a wider audience as mentioned during topic 1. The point on visual data was followed by suggestions of short webinars as well as podcasts as an effective means of communication, as these forms of channels are easily accessible and flexible for most people to use when and if needed, as people would naturally seek out those that relate to their work. Webinars should be no more than 30 min long, with time for questions, stressing that there should be a focus on tailoring these communication efforts to the people that need them. It's highlighted that people in the industry rarely have more than an hour to set aside for information gathering, as their everyday work does not leave much time to take part in longer webinars if these are in real-time. Pre-recorded webinars or "information-videos" could be a way forward additionally.

Some of the research topics that were requested were: changes in temperature, salinity, and mud. Also, the specific need for visual information about hydrology for South Greenland's fishing industry, underlining the need to develop practical applications suitable for the industry. These insights draw attention to a specific interest in environmental parameters, crucial for understanding the region's dynamics. The incorporation of visuals would translate into a further reinforcement for the commitment to accessibility. Visual communication, such as infographics, charts, and other visual aids, is believed to enhance the understanding of complex scientific concepts, while also having the potential to transcend language barriers and cater to different learning styles, making the information more digestible and engaging for a broader audience.

Another important perspective on information sharing and value of information, is shown in a discussion about networks. The interest and acknowledgement in Arctic Hub's effective communication and work,

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suggests a recognition of the value of their content, while highlighting a reliance on a network that provides such information. This reinforces the importance of collaboration and knowledge-sharing among organizations in the region. However, it is also pointed out, the challenges and need for long-term monitoring, indicating the importance of sustained data collection for meaningful analysis, and that funding for such is a common challenge faced by many research initiatives.

SUMMARY

It was revealed that there is a collective interest in visual and practical data, a recognition of effective communication channels (such as webinars, podcasts, and videos), and a shared concern for the environmental impact of various activities in the Arctic region. The need for collaboration, the exchange of expertise, and addressing funding challenges for long-term monitoring emerge as common themes in these diverse perspectives.

WHAT MARINE RESEARCH AND KNOWLEDGE ABOUT THE MARINE ENVIRONMENT COULD BE USEFUL TO YOU AND IMPROVE YOUR WORK?

The discussion about usable marine research information emphasizes the importance of adopting a circumpolar perspective in scientific monitoring to better inform decision-makers about changes in the region.

During the discussion, the primary goal revealed to be to present scientific information in a format that is accessible and comprehensible to various stakeholders, including decision-makers, industry professionals, and the local population. This approach involves transitioning from local observations to regional assessments and ultimately framing the findings within a circumpolar and international context.

But on the other hand, one key aspect highlighted is the need for collaboration and communication between scientists and the local population. The information underscores the value of incorporating indigenous knowledge, recognizing it as a crucial source of information that enhances the understanding of circumpolar changes. The collaboration of experts and locals is pivotal, as it plays a key role in responding to changes, making the information relevant and understandable for different user groups, especially those in the marine industry. One participant shared in the written survey, that they would have like to see more participation of local fishers and hunters to this specific seminar, as the information shared and discussed is highly relevant to them, and likewise it's highly relevant to have them share their knowledge. This insight reveals that the organizers in the future should make sure to combine participation from relevant groups to a greater extent.

The call from locals for information stresses the importance of community engagement and the inclusion of observations from people living in the circumpolar region. This not only enriches the scientific understanding of changes but also encourages a collaborative approach to monitoring and decision-making. It emphasizes a bottom-up approach, where information flows from the local level to the regional, circumpolar, and international levels. However, one participant shares an important perspective in this discussion; "I always hear researchers/departments/ institutes talk about how important it is to include 'local indigenous knowledge', in their projects. Yet I feel that this is not the case. Sometimes it feels like statements like these are made by researchers/departments/ institutes because it's the politically correct thing to do or looks good in their reports. But inclusion with the real Inuit is rare in my experience". This insight reveals that, the reality and the wished practices seems yet to be reaching its full potential.

During the seminar, the Greenland Institute of Natural Resources encouraged people to generally share information and ask questions, which reflected a proactive and inclusive approach to research. By encouraging the community to actively participate, the Institute aims to break down barriers between scientists and the population. The enthusiasm expressed by researchers when individuals contribute observations of plants, animals, and other elements indicates a desire for a more collaborative and mutually beneficial relationship between the scientific community and the public.

During the seminar, a question about formal or informal pathways for information sharing, sparks a discussion about the need for knowledge on formal pathways for information sharing within the community and between the community representative and the Greenland Institute of Natural Resources. The focus is on whether there is a centralized pathway for communication, as opposed to relying solely on individual connections. The response indicates that the Arctic Hub serves as the intended centralized meeting point for researchers and society. The concept of the Arctic Hub suggests a structured and organized platform designed to facilitate the exchange of information between researchers and the broader community. The used term "meeting point" implies a space where community individuals with diverse perspectives and expertise, both local, industry and scientific, can come together to share insights and knowledge. This centralized approach is thought of as potentially streamlining communication, enhancing collaboration, and ensuring that information reaches a wider and relevant audience in the community.

Additionally, the information highlights a set of questions concerning the nature of Local Ecological Knowledge (LEK). There is an acknowledgment that discussions often revolve around LEK, and there is an expressed interest in defining what is meant by this term in different contexts. This recognition of the need for clarity in defining LEK reflects a commitment to

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precision in communication and an understanding that interpretations may vary. By clarifying the meaning of LEK, stakeholders can develop a shared understanding, ensuring that the knowledge and observations from local communities are appropriately integrated into scientific research and decision-making processes. This effort contributes to the overarching theme of ensuring that information is not only shared but also understood across different industries, communities and by decision-makers.

This also connects to the above discussion about the significance of tailoring communication strategies for conveying research results effectively. The key points include the importance of specializing messages derived from various research findings, translating these messages into Greenlandic, and utilizing visual means to enhance accessibility. This approach is underlined as crucial to ensuring that the users who stand to benefit from the scientific information can comprehend and utilize it. During the seminar it is thus discussed that specializing the message involves crafting communications that are targeted and relevant to specific audiences. This recognition aligns with the understanding that diverse stakeholders, ranging from policymakers to local communities, may have different needs and levels of familiarity with scientific terminology. By tailoring messages, the information becomes more accessible and applicable to a wider range of users. The emphasis on translating messages into the Greenlandic languages, reflects a commitment to linguistic inclusivity. This approach recognizes that communicating scientific information in the local language is essential for reaching and engaging with the broader community effectively. Language thus plays a vital role in ensuring that the information is not a barrier, and it aligns with the broader goal of making science more accessible and relevant to diverse audiences.

SUMMARY

During the discussion of marine research and information sharing, the role of "localizing" research results within the circumpolar context was highlighted as an important strategic goal. Tailoring messages, translating content into the Greenlandic languages, and incorporating visual elements are identified as key strategies to ensure that scientific knowledge is accessible to diverse stakeholders. This approach aligns with the broader goal of fostering understanding and collaboration between the scientific community and various user groups, ultimately facilitating the effective application of research findings in real-world contexts. Whether through formal pathways like the Arctic Hub, the clarification of terms like Local Ecological Knowledge, or the active engagement with the local population, the overarching aim is to break down barriers, promote clarity, and encourage a collaborative approach to addressing circumpolar changes.

WHAT DO YOU EXPECT THE STATE OF THE OCEAN AROUND GREENLAND TO BE LIKE IN 20 YEARS?

The discussion about the state of the ocean in 20 years, provided insights into the nuanced perspective regarding the interaction between local communities and scientists, specifically in the context of questions about ecosystems and marine research in Greenland.

The locals express a desire for specific questions to be answered by scientists, indicating a reliance on scientific expertise to provide insights into their environment. Conversely, scientists acknowledge the complexity and uncertainty inherent in addressing questions related to ecosystems and marine research, especially when asking about regional or local contexts.

The scientists' acknowledgment of uncertainty is a key aspect of the discussions during the seminar. They emphasize the challenges in obtaining a realistic understanding of how and why things happen in ecosystems and marine environments. The statement that there is "much uncertainty" in addressing these questions suggests a great challenge in the face of the dynamic nature of natural systems. The caution expressed by scientists seemed to stem from the recognition that their understanding of the system is not always complete or accurate. The distinction between what scientists think they know and what might be speculative or uncertain is crucial. Even the presence of "signs", such as warming of the ocean and an increased influx of fresh water, is complex and accentuates the difficulty of predicting future changes. The caution in generalizing about the entire Greenlandic environment is also notable. The acknowledgment that different things are happening in

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ECOTIP's exhibit 'Tipping Points' was displayed on the walls of the seminar and workshop rooms for participants to view and interact with. There were also printouts of these in Western Greenlandic language. Link to the exhibit: Tipping Points: Arctic Seas in a time of rapid change (https://zenodo.org/records/7781450#.ZCQ0AbLP1hk)

various waters and that changes can manifest in multiple directions reflects a commitment to precision and a recognition of the diversity within the extremely large region that Greenland constitutes. This cautious approach is expressed as essential in ensuring that scientific observations and analyses accurately represent the complex reality of Greenland's ecosystems.

During the seminar, more specific environmental topics occurred, addressing scientific predictions related to climate change, particularly the anticipated decrease in sea ice. The insights revealed challenges with predicting future environmental conditions, particularly in the context of the Greenlandic Arctic environment.

Scientists attending the seminar discussed a reduction in sea ice, which aligns with broader climate change projections. However, the emphasis on human influence was a critical aspect of their input to the discussion. It underlines the recognition that anthropogenic activities, particularly the release of carbon, contribute significantly to environmental changes. This reflects an awareness of the need for collective efforts to mitigate the impact of human activities on the environment.

During the discussion, the mentioning of a 20-year timescale introduces a sense of urgency and emphasizes that the effects are not distant but rather imminent. A statement about glacial retreat and fewer marine glaciers potentially affecting productivity of coastal ecosystems in Greenland within this time frame highlights the tangible consequences of climate change in the region. The call for more information specifically about Greenlandic fjords indicates the importance of localized and detailed knowledge for effective decision-making and communication with the population. During the discussion it was mentioned that the fishing industry will most likely have adapted to the predicted changes in 20 years, suggesting an expectation of resilience and adaptability within the sector. The identification of adaptation within the industry, seen in the light of the potential extensive impacts of natural changes on ecosystems, emphasizes the complex and dynamic nature of human-environment interactions.

The discussion concerning science not being able to provide a 100% certain prediction for the future, accentuates the inherent uncertainties in climate modeling and environmental forecasting. However, the importance of providing realistic scenarios for policymakers is highlighted. This recognition aligns with the practical role of science in informing decision-making and policy formulation, even in the face of uncertainties. A statement regarding that scientists cannot continuously claim "we don't know" every time they are asked a question, they do not for sure know the answer to, emphasizes the need for proactive engagement with the challenges posed by climate change.

During the seminar, the scientists are urged to provide scenarios that, while not certain, offer valuable insights for policymakers to make informed decisions. This perspective reflects the responsibility of the scientific community to contribute to the development of strategies and policies that address the impacts of climate change.

SUMMARY

In summary, the discussion provided information that reveals a multifaceted perspective on climate change predictions in Greenland. It emphasizes the dual roles of human activities and natural processes in shaping the future, the urgency of addressing climate-related changes, and the responsibility of scientists to provide realistic scenarios for effective policy making despite inherent uncertainties. It also became evident that there is a delicate balance between the expectations of local communities and the challenges faced by scientists in addressing questions about ecosystems and marine research in Greenland. The acknowledgment of uncertainty, caution in making predictions, and a commitment to recognizing the diversity of conditions within Greenland's waters are key aspects that contribute to a more comprehensive understanding of the complexities involved in studying and responding to environmental changes.

LIST OF REGISTERED PARTICIPANTS FOR THE GREENLAND MARINE RESEARCH SEMINAR

Aalborg University (AAU)
Aarhus University (AU)
Arctic Education Alliance (AEA)
Arctic Eider Society
Circumpolar Biodiversity Monitoring Programme (CBMP)
Conservation of Arctic Flora and Fauna (CAFF)
Demokraatit
Fisheries and Oceans Canada (DFO)
Fishermen and Hunters Association (KNAPK)
Greenland Business Association (GE)
Greenland Climate Research Centre (GCRC)
Greenland Fisheries License Control Authority (GLFK)
Greenland Institute of Natural Resources (GINR)
Greenland Maritime Center
Greenland Research Council (NIS)
Grid-Arendal Norway
International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT)
Kodiak Regional Aquaculture Association
Ministry of Agriculture, Self-Sufficiency, Energy and Environment
Ministry of Fisheries and Hunting
National Oceanic and Atmospheric Administration (NOAA)
National Oceanography Centre (NOC)
Nunavut Arctic College
Oceans North - Kalaallit Nunaat
Oregon State University
Polar Seafood A/S
Qalerualinniat aalisagarniallu Kattuffiat (QAK)
Royal Greenland A/S
Scripps Institution of Oceanography
Sea Grant Alaska
Sigguk A/S
Sustainable Fisheries Greenland
Sustaining Arctic Observing Networks (SAON)
Technical University of Denmark (DTU)
The Indigenous Knowledge Social Network (SIKU)
University of Alberta
University of Bremen
University of Colorado Boulder
University of Oldenburg
University of Southern Denmark (SDU)
University of Washington
U.S. Department of State
U.S. National Science Foundation (NSF)
Visit Greenland A/S
World Wildlife Fund (WWF) - Kalaallit Nunaanni

SURVEY FROM THE GREENLAND MARINE RESEARCH SEMINAR

During the seminar, a survey was distributed to gather feedback on the seminar's effectiveness and areas for improvement, and questions of interest to GINR and the co-collaborating projects. The survey asked the following questions:

1. Is your voice heard and taken into consideration in the management of nature? What voices and knowledge are missing in the management?
2. Is the current management flexible and/or sufficiently adaptive to meet the rate and magnitude of the current (climate) changes?
3. How would you define Tipping Points in Greenlandic terms? And what do you consider a Tipping Point, and have you experienced sudden changes to the environment?
4. What new knowledge did you gain during the seminar? And what would you like or see, hear, and discuss more in future Marine Research Seminars?
5. How do you rate this seminar? 1= Not Good and 5=excellent.
6. Other suggestions, or critics regarding this seminar?

As expressed in the above chapters, many points on communication and collaborations were made, but as the following will reveal, the collaborations between the research community and the locals are not the only valid point for further development. These subsequent insights shed light on a critical aspect of environmental management and societal adaptation to climate change. The central theme revolves around the challenges faced by communities dealing with the impacts of climate change and how the existing regulatory frameworks may not be sufficiently responsive or adaptive.

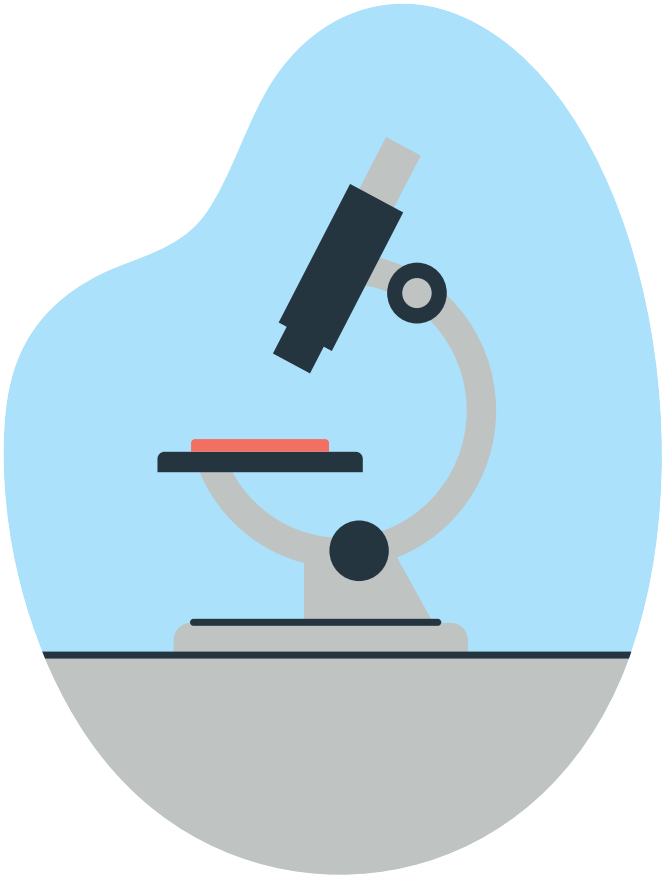
The perspective of the population ending up being caught between management of climatic changes and the ability to handle these changes, even though they make an effort to understand the research, and also experience rapid changes to the environment, is a focal point of attention for the following. In the written survey one participant shared that current management is not always flexible or sufficiently able to adapt to climate changes. They argued that;

"legislation tends to be conservative and slow in many contexts. One hunter that I collaborated with in Avanersuaq once said, that they as hunters are better at adopting to climate change than the regulation".

While the notable point, raised earlier in the report, about the collaboration between the research community and local populations acknowledged as an important aspect, the above insights delve deeper into the struggles faced by Greenlandic communities dealing with rapid environmental changes. It is presented that management, particularly legislative frameworks, tends to be conservative and slow to adapt. This is exemplified by the assertion that fishers/hunters, who are directly impacted by climate change, might be more adept at adapting than the regulations imposed upon them. Another participant follows this argument and shares that;

"there are elements of flexibility in the management of fisheries, less so in hunting. Typically, the administration is flexible when the 'need' for increases, but there are no alternatives for employment for citizens who depend on natural resources when the availability of these changes. Climate change is faster than management adaptation. There is a lack of political voices to make the necessary decisions that can create a sustainable future for society, economy, and nature."

The distinction between the flexibility in the management of fisheries compared to hunting is highlighted. The participants argue that while the administration may become flexible when the need for



it arises, the lack of alternative employment options for those reliant on natural resources makes it difficult for citizens to cope with the changes. The pace of climate change is depicted as surpassing the adaptability of management strategies, indicating a potential gap between the evolving reality and legislative responses. A participant shares a very relevant point about adaptive climate legislation;

"the legislation often does not mention climate change and does not necessarily have built-in adaptive management mechanisms with regular checks on whether the legislation fits reality, and in the future".

This statement also connects to the lack of connection between climate knowledge and practices;

"we are heard in the management of fisheries, I don't think we lack a voice, but the factual climate indicators are not being used in the advice. I do not believe that the new climate knowledge is linked to fisheries management, nor to fisheries advises".

The concern about the lack of political 'readiness' addressing the need for sustainable decisions is another significant point. Participants emphasize the necessity of decisions that consider not only economic factors but also societal and environmental aspects. The observation that climate change is not adequately reflected in legislation, and there is a lack of adaptive management mechanisms, underscores a potential disconnect between policy and the evolving environmental scenario. The passage also highlights the

disconnect between climate knowledge and practical applications in fisheries management.

It was also discussed, that even though there is a procedure for consultation that makes room for involvement, different votes are weighted differently. To this it is noted that;

"there is a great deal of personal cooperation, for example, some departments in the administration are open to discussions, while other departments are closed in advance to requests/discussions. There is a lack of insights from 'young' people".

Despite the existence of consultation procedures, the varying weights given to different voices and the lack of representation from the younger generation indicate potential shortcomings in the participatory processes. This brings attention to the need for more inclusive decision-making, especially considering the long-term implications of climate change on future generations.

FEEDBACK ON SEMINAR

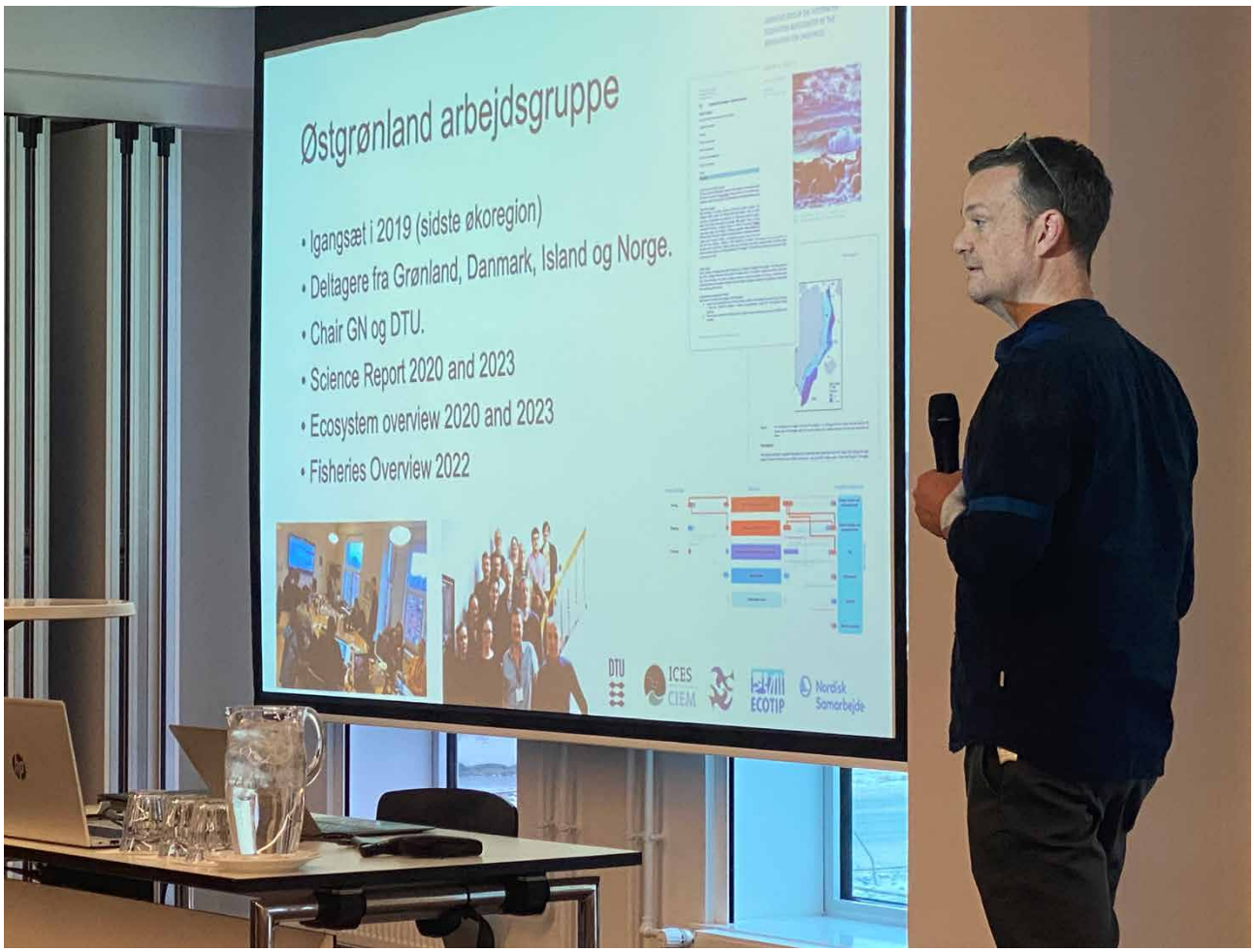
Following the seminar, the organizers gathered oral and written feedback from the participants on their satisfaction with the seminar. The participants generally expressed high satisfaction with the seminar and in the written survey an average rating of 4.08 was appointed to the question 'How do you rate this seminar', 0 being Not Good and 5 being Excellent.

Feedback concerning the format of the traditional conference style revealed that the participants would like the organizers to develop on this style. Some of the comments left in the written survey were that the Marine Research Seminar-meeting style should in the future support dialogue even more. A participant shared that "smaller break-out groups could also facilitate dialogue", and another shared that the organizers should share the topics/questions for the seminar before the seminar begins, "to support the input and discussion". This feedback connects to the statement of "make it possible to answer the evaluation digitally when you get home too, as there is no proper time on the day itself". Likewise, wishes for stakeholders to actively take part in the presentations were shared.

Since it is the organizers intention to strive for dialogue to be the driver of this meeting, the seminar style will be evaluated and develop on for the year 2025 Marine Research Seminar. Also, active involvement and oral presentations from stakeholders will to a higher degree be incorporated.

PART 2

WORKSHOP ON STATUS AND DEVELOPMENT OF EAST GREENLAND WATERS



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Scientific marine studies and local knowledge have borne witness to the profound transformations occurring within the East Greenland marine ecosystem. Over the past decade, the region has experienced significant shifts in ice cover, melting patterns, and sea temperatures, resulting in consequential changes in the distribution of fish and marine mammals. Concurrently, the area has witnessed an increased accessibility, attracting tourist sailing, shipping, and fishing activities.

Participants in the workshop represent key stakeholders, deeply intertwined with the marine and coastal environment of East Greenland. Their organizations were invited to discuss their insights and priorities for these waters. The workshop functioned as a platform for discussions on ecosystem status, aimed at ensuring sustainable development within the region.

The initial phase of this initiative involved a broad group-based discussion among relevant stakeholders, acting as a knowledge-mapping exercise to comprehend the ongoing developments. Their valuable insights gathered from these discussions are instrumental for the organizers when striving to comprehend the present status and trajectory of the marine area in East Greenland. Furthermore, this participatory process aligns with the overarching objectives of Greenland's research strategy and contributes to the aspirations of the UN for marine research and sustainable development. The second part of the workshop was a joint plenary, functioning as an open discussion based on the notes taken during the workshop.

The facilitator for the workshop is the international, interdisciplinary marine research working group, Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS), with a dedicated focus on East Greenland. Led by researchers from Greenland and Denmark, this initiative falls under the purview of the International Council for the Exploration of the Sea (ICES). Furthermore, Danish, and Greenlandic researchers, actively engaged in the EU-funded research project ECOTIP, co-organized the workshop. ECOTIP brings expertise to the forefront, emphasizing understanding of current and future adaptation measures in fisheries within the East Greenland marine ecosystem.

WORKSHOP DESIGN

The workshop on Status and Development of East Greenland Waters brought together a diverse group of participants, functioning as knowledge holders and interest parties connected to or holding interest in East Greenland waters and coasts, in particular within science, fisheries, tourism, environmental NGO's, and government.

To provide additional inspiration and guidance, the workshop started with the main facilitator presenting research results from the Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS) and objectives of the workshop.

During the workshop, the main facilitator guided the participants through a series of four questions designed to foster discussion and knowledge sharing on specific topics, pre-designed by the organizers. For the sake of this report, the four questions have been translated into English:

1. Which marine resources and areas in East Greenland are of particular importance to the people or industry?
2. How do you experience changes and how can they be measured?
3. What threatens sustainable development?
4. How can local knowledge and the industry contribute to ensuring a sustainable development of the ecosystem?

The participants were randomly divided into five groups, placed around a big conference room, in the style of round-table discussion. Each group had a pre-selected secretary, which held connections to the organizers. The secretaries were instructed in taking notes in a selected-for-the-purpose digital program called Miro, functioning as a digital copy of each group's tables, creating interactive sessions.

During the group discussions, each group would discuss one of the four questions at a time, placing notes on the digital copy. The participants were guided through the group discussion by the main facilitator, prompting reflection, allowing them to identify relevant focus points for the discussion.

The workshop concluded with a joint plenary, where the main facilitator showcased the digital platform Miro on a big screen for all participants to see what they and the others had noted on the platform. The notes around each question would serve as a conversation starter and a knowledge sharing opportunity among the groups.

The knowledge created during the workshop was subsequently analyzed with a thematic focus and will be presented in this report. This report is distributed to all participants and for other parties interested on demand.

WHICH MARINE RESOURCES AND AREAS IN EAST GREENLAND ARE OF PARTICULAR IMPORTANCE TO THE PEOPLE OR INDUSTRY?

The findings revolved around the critical assessment of marine resources and areas of high importance in East Greenland, highlighted from the perspectives of the various working groups, shed light on the importance of specific resources, the challenges posed by tourism, and the potential for knowledge exchange with neighboring regions.

Some of the marine resources identified as important marine resources included: Greenland halibut, narwhal, seal, cod, and shrimp. These are evidently vital to both the local population and the business sector in East Greenland. The emphasis on fishing and catching these species underlines their economic and cultural significance. This suggests that these resources form the backbone of the community, providing sustenance and supporting local industries.

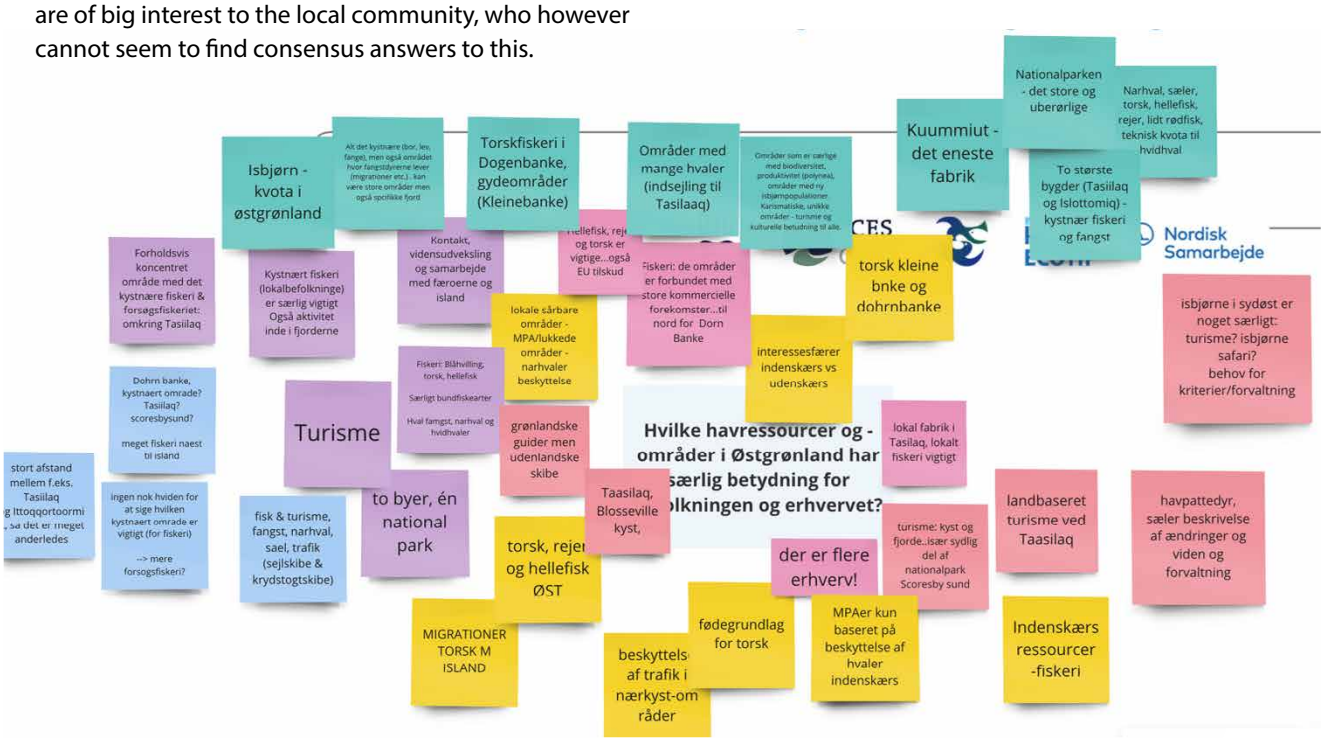
Coastal ship tourism also emerges as a prominent and multifaceted topic in the discussion. The recognition of various perspectives on tourism indicates a nuanced understanding of its impacts. The subsequent focus on cruise tourism reveals a conflict with hunting of marine mammals, particularly around Tasiilaq. The assertion that large cruise ships may scare away marine mammal life, stresses the tangible consequences of tourism on the local environment and economy, including consideration of the cultural and traditional aspects of the local community. However, there is uncertainty about whether cruise ships, hunting, ocean temperatures, or other factors have the most significant impact on the hunted and fished marine life. These questions are of big interest to the local community, who however cannot seem to find consensus answers to this.

The acknowledgment of a possible need for changed management and criteria for tourism practices, including polar bear safaris, reflects an awareness of the potential ecological and cultural impacts of tourism activities. This recognition is a crucial step towards developing sustainable practices that balance economic interests with environmental conservation. The highlighted conflict between tourism, especially large cruise ships, and hunting practices amplifies the complexity of managing East Greenland's marine resources.

The discussion regarding possible future exchange of knowledge with Iceland, the Faroe Islands, and East Greenland demonstrates a proactive approach to addressing shared challenges. The consideration of enormous distances and the unique management challenges in East Greenland suggests that insights from neighboring regions can be valuable in formulating effective strategies for both fishing and tourism development.

SUMMARY

In conclusion, the question around important marine resources and specific areas of particular importance to East Greenland fosters discussion about the intertwined nature of marine resource management, tourism, and economic development in East Greenland. The possible need for changed management practices, the acknowledgment of conflicts, and the potential for cross-regional knowledge exchange are indicative of a comprehensive and forward-thinking approach to the sustainable development of the region.



HOW DO YOU EXPERIENCE CHANGES AND HOW CAN THEY BE MEASURED?

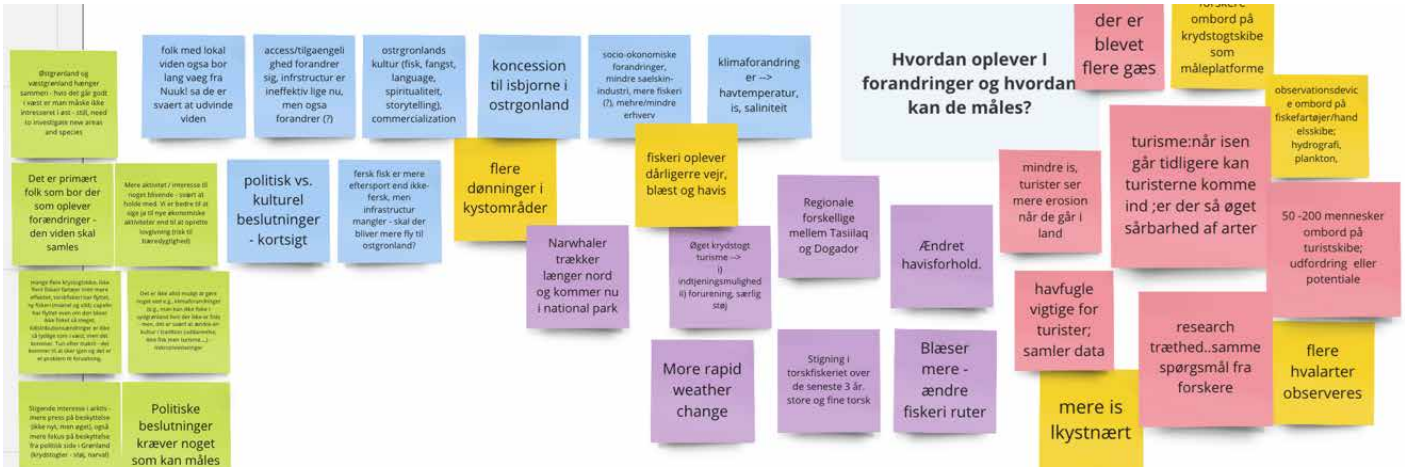
The discussion on experiencing and measuring changes in East Greenland's environment provides valuable insights into the observable shifts, particularly in nature and fishing conditions. The information highlights the multifaceted impacts of climate change and environmental transformations on both terrestrial and marine ecosystems, recognizing regional differences.

On the environmental front, notable changes include an increase in the presence of geese, whale species, and polar bears. This observation is suggested as shifts in migration patterns and habitat preferences, potentially influenced by climate-induced alterations in food availability and temperature. The increased proximity of wind to the coast and reduced sea-ice visibility is discussed to align with broader climate change trends, indicating shifts in atmospheric and oceanic conditions. The mention of more erosion is a concerning aspect for the locals, emphasizing the environmental consequences of changing weather patterns, as erosion can have detrimental effects on local ecosystems, impacting habitats for both terrestrial and marine species.

In terms of the fishing industry, the reported experiences of more swells (stronger waves) and rapid weather changes indicate challenges posed by changing climatic conditions. It is brought to the discussion that such variations in weather patterns can affect the safety and efficiency of fishing operations, impacting the livelihoods of local communities dependent on these activities. The noteworthy point that the sea-ice disappears earlier, while also being located nearer to the coast, has direct implications for the fisheries and hunting possibilities, as it is noted that fishery routes have to change, and that different marine species are impacted differently. Participants say that narwhales are seen moving north into the national park area, and that for the last 3 years, fishers have seen an increase of cod, but also an increase of whale species around east Greenland. The description of the environment as particularly unpredictable, is underlined as a future dynamic and evolving nature of East Greenland's ecosystem. The unpredictability poses challenges for both nature and fishing activities, requiring adaptive strategies and resilience in the face of ongoing changes.

The findings also offer a comprehensive view of the challenges and dynamics facing East Greenland, particularly in the context of increasing tourism, economic activities, and interactions with research ships:

- The increase in tourist numbers is acknowledged by several of the participants as a positive development, but it is also highlighted that this surge brings challenges for the local community. The discussion points towards issues related to inefficient infrastructure, suggesting that the region may not be adequately prepared for the influx of visitors. However, it is also mentioned that, generally, cruise tourism is interested in taking on more responsibility in connection with research of marine environments and offers the possibility for researchers to join cruises.
- It is discussed that major regional differences in social and economic challenges indicate that a one-size-fits-all approach might not be suitable for East Greenland. The huge distances in the region contribute to these challenges, making it difficult for the community to feel prioritized by decision-makers, both in terms of physical distance and symbolic attention.
- An increase in cod fishing is noted, indicating a growing economic activity in the region. The preference for fresh fish over non-fresh fish reflects changing consumer preferences and market demands, which is challenged by the lack of infrastructure, e.g., flight schedule does not support the export of fresh fish.



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During the workshop, it is mentioned that researchers on board research ships should contribute more to the local community. The concern raised suggests a perception that these ships may not be effectively engaging with or benefiting the local population. This point is connected to a discussion around Community Engagement and Local Knowledge. The discussion points out a perceived lack of engagement by research ships with the local community, emphasizing the need for a more inclusive approach that considers the impact of their activities on the community. However, an important note about 'research fatigue' is mentioned. During the discussions, the repetitive behavior of the research community is mentioned, circling around wanting to include the locals, but in practice end up exhausting the population with the same questions to the same people again and again. This indicates a lack of coherence, coordination, and knowledge about each other's projects, from the research community, as many researchers from different research organizations are researching the same things or things that are closer to each other. This means that the local population - when they are involved - is involved in the same topics repeatedly.

It is also noted that, in connection to Local Ecological Knowledge (LEK), coastal fishing ships could potentially contribute by bringing sensors on their ships, which thus function as data collection for research. However, the mention of a lack of measuring instruments and a method for retrieving and collating information to gather local knowledge underscores the challenge of integrating traditional and local knowledge into traditional sciences and decision-making processes. This signals a potential gap in the tools available to capture the nuanced insights of the community.

Finally, the working groups discuss sustainability concerns. A statement about short-term solutions threatening long-term sustainability, highlights the overarching theme of the importance of a sustainable approach to development in East Greenland, further stressing the need for discussions around development of the region.

SUMMARY

Overall, the discussion of these observations reveals a complex interplay between climate-driven alterations and their cascading effects on the environment and human activities in East Greenland. Likewise human activities and its effect on the ecosystem is discussed as a pivotal part of the discussion of developments in East Greenland. The need to measure and understand these changes is crucial for developing informed strategies to adapt to the evolving conditions and promote sustainability in the region. This information also underlines the importance of considering the broader impacts of climate change on vulnerable species, emphasizing the interconnectedness of ecological systems in the Arctic. In conclusion, the findings paint a nuanced picture of the challenges and opportunities in East Greenland, touching on aspects of tourism, economic activities, community engagement, and sustainability. The discussion reveals a need for more tailored approaches to address regional differences, improve infrastructure, and ensure that economic activities, including tourism and research, are conducted in a manner that is sustainable and beneficial for the local community.

WHAT THREATENS SUSTAINABLE DEVELOPMENT?

The insights from the working groups regarding threats to sustainable development in East Greenland reveal a complex interplay between economic, social, and political factors. The findings can be organized around four key themes that emerged during the discussion:

Infrastructure Limitations and Depopulation; The limitations in infrastructure are identified as a significant hurdle to sustainable development. Insufficient infrastructure is discussed to hinder economic growth, limit access to essential services, and contribute to the general depopulation of the area. The depopulation is primarily attributed to a lack of job opportunities, indicating a critical link between employment and population retention. The lack of job opportunities gives attention to the next key theme.

Knowledge Retention and Education Opportunities; The challenges in maintaining "know-how" are highlighted as a concern. This is linked to the lack of opportunities for education and training in the area, requiring individuals to travel long distances for educational purposes. The disruption caused by this migration affects the retention of local knowledge and skills, hindering the sustainable development of the community. However, it is also discussed that next to the lack of education and the general depopulation, there are simply fewer human resources in the smaller coastal communities in Greenland to take on the massive challenges that are discussed during this workshop.

Diversification of Activities - Dependency on Fishing and Hunting and Motivation; The lack of diversification in economic activities is recognized as a threat. This mono-dependency, particularly on fishing and hunting, makes the region vulnerable to external fluctuations. The discussion points to the need for spreading out fishing activities to reduce dependency on few species. This diversification is seen as essential for building resilience and adapting to changes in the economic landscape. Moreover, there's a mention of a lack of motivation to develop, which is attributed to a weak political system. The perception of a weak political system is further elucidated by a mention of a "lack of political will to make unpopular decisions." Among other things, it was discussed that the quotas on whales and fishing are a subject that is on many people's minds and that can create great discussions and even conflicts. It is also argued that, in addition to gaining knowledge both ways, the involvement of the

locals will result in higher motivation, which is said to increase the chances that a management plan will be successfully implemented.

Lack of Dialogue Between Tourism and Locals; The lack of dialogue between the tourism industry and the local community is acknowledged as a challenge. It is discussed that the challenge consists of several aspects of Greenlandic culture. Among other things, it is mentioned that the hospitality of the people is under pressure, supposedly because of the lack of involvement and having a role in the development of tourism. Also, the spirituality among the local population could be affected, and is mentioned as something worth protecting in this phase of development. Effective communication is noted as crucial for ensuring that the benefits of tourism are shared equitably, and the potential negative impacts on the local culture and environment are mitigated. This highlights the need for a more inclusive approach to tourism development.

Besides the above four key themes, several other topics were mentioned during the workshop. Among others, it was noted that East Greenland faces challenges with avoiding invasive species, sailing control issues, shipwrecks with oil and personal injuries seen in the light of East Greenland's enormous distances when help is needed, capital limitations on among other experimental fishing, and uncertainties about the impact of bottom trawling on ecosystems. Another important point to be mentioned was that human activities are difficult to manage (tourism, minerals...) - everything is shared between different departments or municipalities - and that no one has an overview of all the activities. Additionally, questions about the industry's sustainability are raised, as Greenland's economy is dependent on the fisheries -is it even sustainable to be dependent? Many uncertainties were mentioned which make sustainability difficult, especially when there is not enough knowledge on the different topics, including climate change, fish prices and tourism destinations in the future. It is pointed out that there is a risk of overexploitation when knowledge is lacking.

SUMMARY

The findings highlight a web of challenges faced by East Greenland in its pursuit of sustainable development in the long term. The interconnected nature of infrastructure, employment, political will, education, tourism, and business concentration emphasizes the need for a holistic and collaborative approach. Addressing these challenges will require not only economic diversification but also improvements in infrastructure, education, and governance structures, along with fostering open dialogue between various stakeholders in the region.

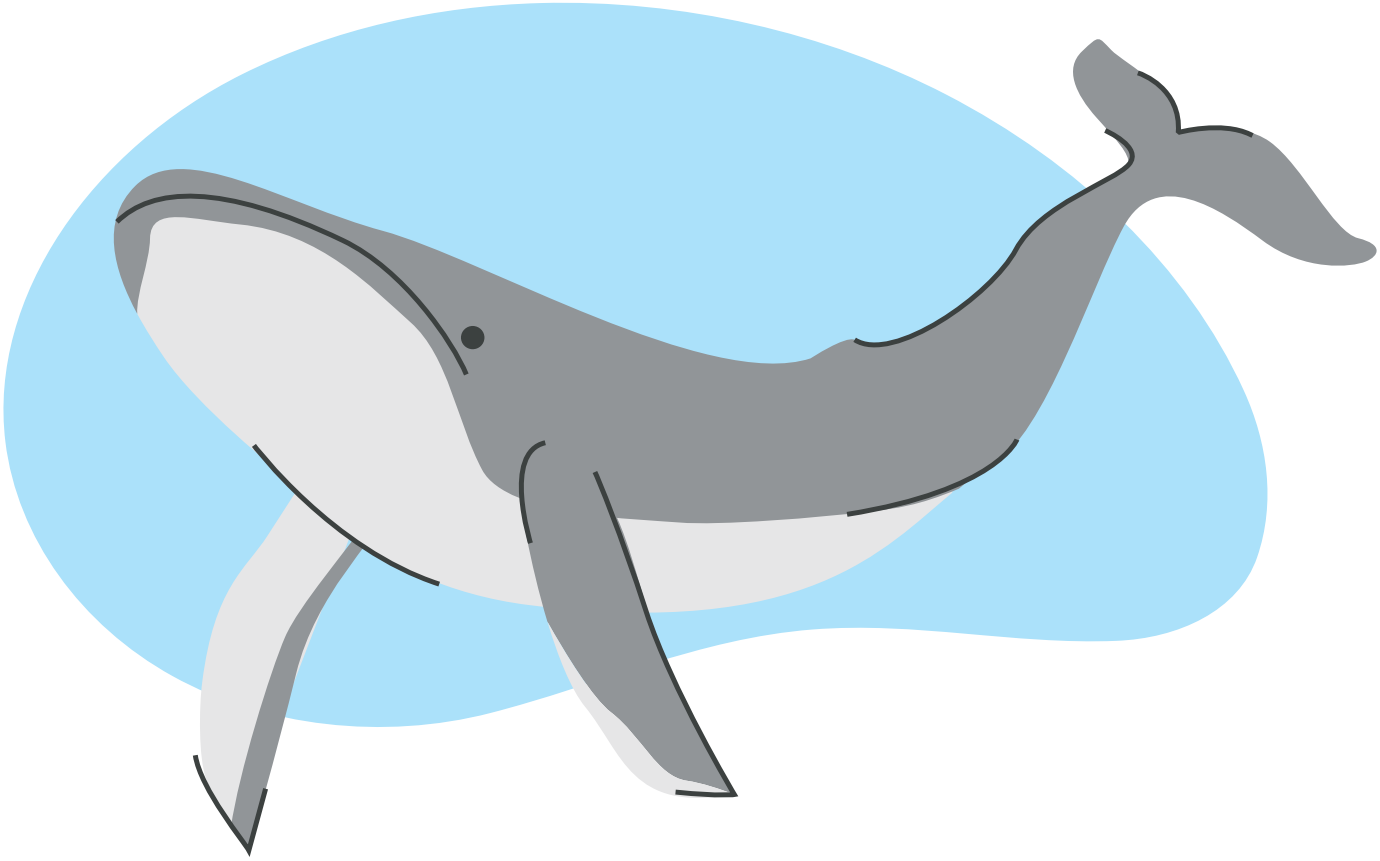
HOW CAN LOCAL KNOWLEDGE AND THE INDUSTRY CONTRIBUTE TO ENSURING A SUSTAINABLE DEVELOPMENT OF THE ECOSYSTEM?

The discussion around the question revealed the theme of enhancing local knowledge collection for sustainable management in East Greenland together with the theme of the quest for clarity within the governance of the fishing industry.

A discussion surrounding offshore fishing in East Greenland revealed that there are many pathways to be considered when discussing how offshore vessels or fishing of the seabed can be linked to research, shedding light on the importance of utilizing local knowledge not only for fisheries management but also for a broader understanding of the region. It is mentioned that, generally there are a multitude of vessels, also cruise ships that can support data gathering on birds and marine mammals by observing programs and "releasing equipment for use in research". Here it is indicated too that there may be potential in using the industry and local population in the monitoring of ecosystems to a greater extent than now. For example, it is mentioned that the collection of data can take place while locals are out sailing.

While offshore fishing provides a valuable avenue for scientific inquiry, the working groups discussed that focus from research and management must extend beyond the technical aspects of fishing and the marine ecosystem. The dialogue emphasized that local knowledge encompasses a multifaceted understanding of the region, transcending the mere act of fishing. Considering this finding, the challenges, and necessities of collecting and organizing local knowledge in East Greenland to facilitate sustainable management becomes evident as something that reaches beyond the fisheries.

The working groups discussion on local knowledge in East Greenland showed that it surpasses the boundaries of the fishing industry and the marine environment. It encompasses a rich tapestry of insights into the environment, climate, ecosystems, and cultural nuances. It was discussed that significance lies not only in how this knowledge aids in optimizing fishing practices but also in its broader applications for sustainable resource management and community well-being. Recognizing



the comprehensive nature of local knowledge sets the stage for a more holistic and nuanced approach to data collection. A discussion about collecting local knowledge highlights that it is not solely about the 'how,' but equally about the 'what.' Beyond the technicalities of data gathering, the working groups argue, that there exists a crucial need to understand the essence of the knowledge being collected. This involves appreciating the cultural context, historical perspectives, and the interconnectedness of various aspects of local knowledge. Without a profound understanding of what is being collected, there is a supposed risk of overlooking crucial components that contribute to the sustainability of the region.

Within the theme of organizing and prioritizing knowledge, the vastness of East Greenland is also emphasized, as it's argued that it poses a significant challenge in managing the acquired knowledge effectively. The discussion emphasizes the necessity of organizing and prioritizing local knowledge to bridge existing gaps in understanding the region. It is not merely about accumulating vast amounts of information but rather discerning what information is most critical for sustainable management. It's mentioned that this requires collaborative efforts with local communities to identify key priorities and ensure that the knowledge collected aligns with long-term ecological and socio-economic sustainability goals.

During the discussion, a notable emphasis was placed on the idea that the key to effective management of the fishing industry, but not limited to this, is not necessarily the introduction of more rules but rather the necessity for clearer and well-defined regulations. This perspective is introduced as a recognition that sustainable fisheries management is hindered when existing rules lack the precision needed to navigate the complexities of the industry. This finding highlights the importance of clarity in regulations and how it addresses the challenge of managing fisheries without comprehensive knowledge.

The central argument about "more clarity, less volume" advocates for a shift in focus from increasing the volume of regulations to enhancing their clarity. The complexity of the fishing industry demands a nuanced and adaptable regulatory framework that can effectively address the multifaceted challenges within the sector. However, the assertion that more rules are not the solution, is indicated as stemming from the recognition that sustainable management requires an intricate understanding of the ecosystems. Without adequate knowledge about the ecosystem, fish populations, and the interplay of environmental factors, creating effective regulations becomes a daunting task for the local policymakers. During the discussion, it is mentioned that there is a lack of knowledge about; "if there are lots of resources in, for example, fjords, where we don't

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know about". Also, knowledge from bottom habitats and ecosystems, where participants asked; "how can this be done if it is not fished?". Knowledge about Greenland halibut was also mentioned as an important part of creating better management - "how are they doing? length, weight etc.?". It was mentioned, that "many areas (of the waters) are poorly known - lots of gaps about distribution of stocks, connection between coastal and offshore (e.g., is it the same stock in fjord and open sea?)". It was also mentioned that "we do not actually know whether cruise ships have a net positive or negative economic effect". Additionally, comments about non-native species reveal the broad interface of knowledge gaps; "you have to know what is happening and so that you can consider administrative measures".

As a response to this, integrating local knowledge is mentioned as a possible way to go forward. The working groups presented several pathways, like gathering seal stomach content, or in other words, making monitoring programs that look at new methods: "air, taste, stomach contents on seals". Clear rules, in this context, are thus discussed as a means to bridge the existing knowledge gap on ecosystems, providing a foundation for informed decision-making and adaptive management strategies in East Greenland. The argument contends that a multitude of ambiguous or conflicting rules can impede rather than facilitate sustainable practices. Clear and concise regulations empower stakeholders, including fishers, regulators, and researchers, to comprehend and implement guidelines effectively.

The dialogue recognizes that despite efforts to gather local knowledge, gaps persist in our understanding of East Greenlandic ecosystems. These gaps are discussed to hinder the formulation of comprehensive management strategies. Identifying these knowledge gaps is argued to be crucial for directing future research endeavors and refining data collection processes. It also emphasizes the importance of ongoing collaboration between scientists and local communities to continually update and enhance our understanding of the region.

SUMMARY

During the discussion, advocating for clearer regulations in the fishing industry, but also other industries connected to the East Greenland area like tourism, can be understood as a request for precision, comprehension, and adaptability. Given the inherent complexities in fisheries management, regulations must not only be comprehensive but also easily graspable and executable. By emphasizing clarity over sheer quantity, the fishing sector can establish the foundation for sustainable practices, endorsing responsible stewardship of marine resources. This approach is argued to recognize the need to navigate the intricate web of industry dynamics and ecological intricacies. The working groups also highlighted the intricate nature and wider scope of local knowledge in East Greenland and its pivotal role in monitoring and sustainable management. Recognizing the challenges involved in collecting, comprehending, and organizing this knowledge is essential for addressing gaps in our understanding of the region. In maneuvering through the complexities of East Greenland's vast ecosystem, a collaborative effort to prioritize and integrate local knowledge into scientific initiatives becomes crucial for achieving sustainable management practices.

LIST OF WORKSHOP PARTICIPANTS ON STATUS AND DEVELOPMENT OF EAST GREENLAND WATERS

Ministry of Fisheries, Hunting and Agriculture
Ministry for Agriculture, Self-Sufficiency, Energy and Environment
Polar seafood
Royal Greenland
Arctic Prime fisheries
Sustainable Fisheries Greenland
Visit Greenland
Arctic hub
Ocean North
CAFF
WWF
Arctic command
AECO, Association of Arctic Expedition Cruise Operators
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