Final Report

Understanding the Dynamics and Resilience of Arctic Social-Ecological Systems to Foster Sustainable Futures

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1. Executive Summary

The focus of RPT 3 is: "Understanding the dynamics and resilience of Arctic social-ecological systems (SESs) to foster sustainable futures". The RPT addresses research priorities and their implementation around topics such as: sustainable and equitable Arctic economy; adaptive management and Indigenous nature-based solutions (actions/ adaptations/measures); healthy Arctic and healthy Peoples (multi-stressor effects, contaminants and climate interactions, One Health, Planetary Health); energy systems and sustainable energy production; reliable, accessible, and cost-effective energy that meets community needs (avoiding greenwashing and harm); reliability; resilience; food systems; sustainable production; water security; sanitary health; infrastructure; and migration. These focus areas exist at a nexus of supporting Arctic societies: their well-being, food access, energy supply, knowledge, infrastructure development, and economies. Fundamentally, this RPT sought to discover and present the research priorities that involve and impact the people of the Arctic. By choosing these focus areas, selected research priorities will foster sustainable communities, economic opportunities, effective policies and more. These are centered in community needs, avoiding harm to humans and the natural world, and involving Indigenous- and community-led-research as well as ethical and reciprocal participatory research processes with those from outside the communities.

These focus areas also demonstrate a move from multidisciplinary, through interdisciplinary to transdisciplinary research. What does this mean? This is about examining how to carry-out and mobilize research with a diversity of disciplines, integrating those inputs and methodologies, combined with insights from a variety of partners, for actionable outcomes and impacts with and for Arctic communities, governments and organizations. With a similarly broad audience for the ICARP IV document, and the research priorities from this RPT, this transdisciplinary collaboration is essential.

In addition to engagement across and among disciplines, this priority centers communities, including sovereign Indigenous Nations with their own scholarly practices and research methodologies informed by Indigenous Knowledges and Indigenous Sciences. Arctic communities are also home to long time local knowledge holders (non-Indigenous societies with long histories of interaction with their natural surroundings). Thus, although we do not state this in every priority we identify, our RPT discussed the inclusion of multiple epistemologies (ways of knowing), ontologies (ways of being), and axiologies (values and ethics) to be included in research, a recognition of heterogeneity, pluralism, and multiplicity across the Arctic. We support a strong

look at RPT 5 and the cross cutting nature of RPT 5 with RPT 3, promoting Indigenous-led research as well as participatory and co-productive research practices where community identified priorities determine the questions external researchers partner with locals to support exploring.

A key aspect informing the focus areas of this RPT were pulled from and built upon all of the other RPTs: priority research areas identified in RPTs 1 and 2 may inform community infrastructure resilience in the face of climate change; global cooperation, co-production, and Indigenous methodologies (RPTs 4 and 5) are essential for scalable innovation, reconciliation, and leveraging significant national research investments; knowledge about the Arctic (RPT6) should be inclusively developed, inform its Arctic populations and enable its people to lead Arctic research, building an Arctic population-led research economy; and research infrastructure (RPT 7) in the Arctic cannot be put in place without the consideration of its impacts and benefits in local and regional contexts. For further details on these intersections, see section 8.2.

In addition, the team discussed on a number of occasions not what was left out of the discussion, but who might be left out. With global documents/efforts such as ICARP being centered in academic spaces, there is a high risk that the contributing voices are only those who have access, time and funds for participation. This can severely bias inputs and chosen priority research areas. As such, there was an effort for how to equitably and inclusively reach diverse audiences, not only an academic one, and incorporate their input. See Section 8.1 for further information on this approach.

It is important to note that the original title of RPT 3 was "Understanding the Vulnerability and Resilience of Arctic Environments and Societies and Supporting Sustainable Development." This legacy title from the ICARP III report (https://iasc.info/images/news/2016/ICARPIII_Final_Report.pdf) was discussed at the initial RPT3 planning meeting at Arctic Science Summit Week (ASSW) 2024. While the intent of the previous ICARP III priority area remains relevant, participants agreed that the focus of this research priority team should take a strengths-based lens, not the deficit-lens implied by the previous title. Doing so would mean focusing upon balance, stressing a forward- looking approach, and highlighting the intersections between environment and community for resilient Arctic societies through scalable research.

The approach taken to establish our five research priorities was inclusive and consensus- based and reflected our commitment to equity and diversity. We utilized a suite of methods including an iterative two part survey, document review process, and expert analysis. The inclusion of Arctic Peoples is key when discussing research needs in Arctic regions to ensure that research funds can be prioritized to produce tangible benefits to those who inhabit and care for the region. Intentional effort was made to translate the survey document into other Arctic and Arctic Indigenous languages to share it with community organizations and groups across the Arctic. Financial resources did not allow for translation into other languages.

Results from the iterative survey and literature analysis were combined using constant comparison analysis. Importantly, the level of consensus that each research need obtained (when looking across survey responses) was recorded and fully considered in our selections of research priorities. For example, if there was little to no consensus on a suggested research priority that priority was excluded from the list of top five suggestions but

was still included in our full list of options. This approach ensured that the top 5 research priorities reflected that of the larger community and not just a few individuals. Although our approach was potentially more labour and time intensive, it has resulted in a transparent and fair process that is reflective of the equity centred values that the group is committed to. The responses of participants and level of consensus were then used to calculate the overall most highly rated priorities, combining the mean ratings (excluding "Prefer not to respond" ratings) for the level of priority, feasibility, and actionability.

RPT3 research priorities emerging as the highest ranking included the following thematic categories:

1. Climate and environmental change – implications for social and economic systems (CC),
2. Sustainable technology, infrastructure, economy, transportation, and energy, (ST)
3. Social systems resilience, health, well-being, education, knowledge and culture (SS)
4. Arctic cooperation, policy, law, sovereignty, diplomacy, geopolitics and security (AC).

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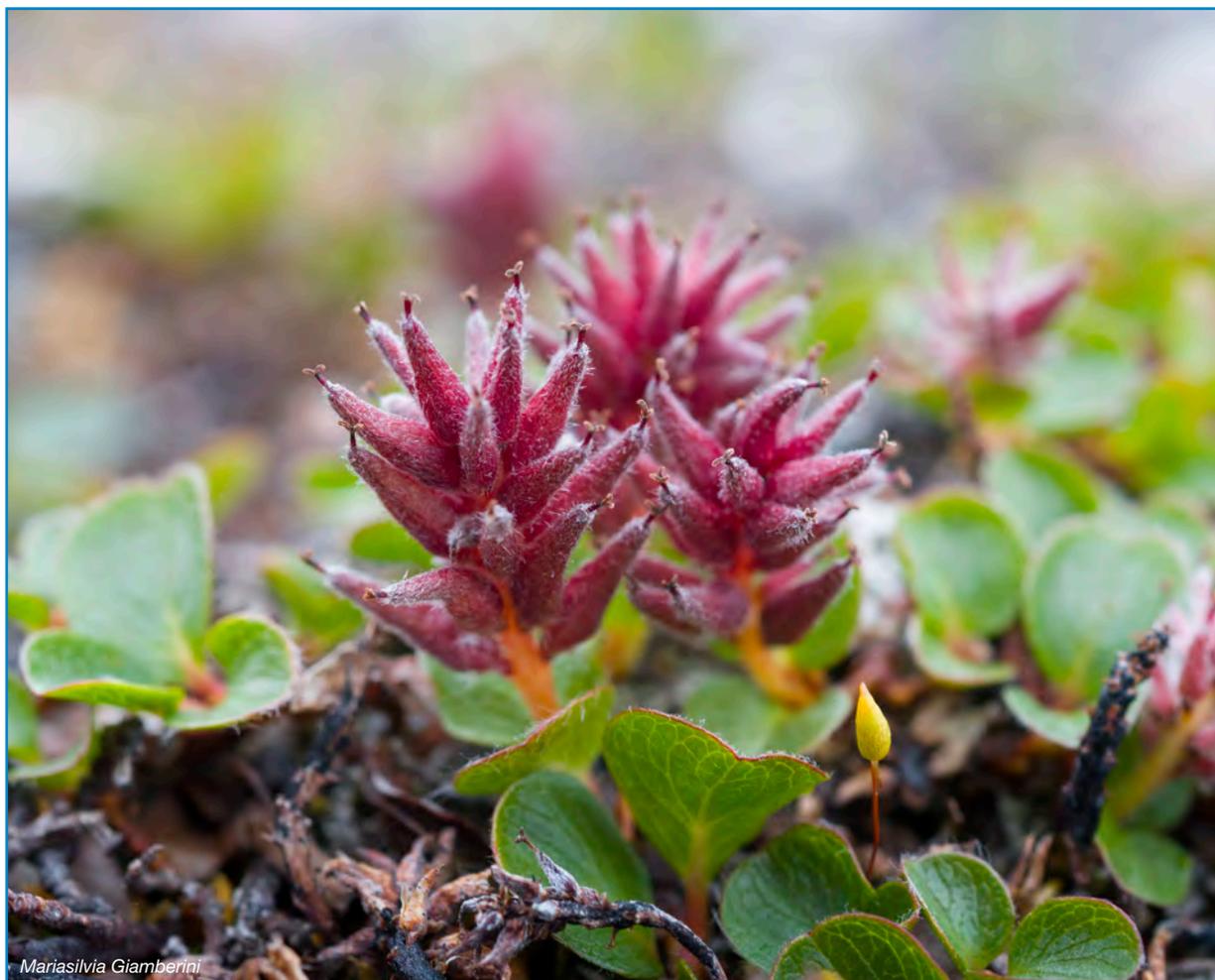
2. Definition of the Focus of RPT 3

The focus of RPT 3: is "Understanding the dynamics and resilience of Arctic SESs to foster sustainable futures." The RPT addresses research priorities and their implementation around topics such as: sustainable and equitable Arctic economy; adaptive management and nature-based solutions (actions/ adaptations/measures); healthy Arctic and healthy Peoples (multi-stressor effects, contaminants and climate interactions, One Health, Planetary Health); energy systems; sustainable energy production; reliable, accessible, and cost-effective energy that meets community needs; reliability; resilience and disaster risk reduction; food systems; sustainable production; water systems and drinking water; sanitary health; infrastructure and migration. As can be seen, this is a broad area of "focus". These focus areas exist at a nexus of supporting Arctic societies: their well-being, food access, energy supply, public safety; knowledge, infrastructure development, and economies. Fundamentally, this RPT sought to discover and present the research priorities that involve and impact the people of the Arctic (without harming humans or the natural world). By choosing these focus areas, selected research priorities aim to foster sustainable and thriving communities, economic opportunities, effective policies and more.

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3. Priorities and Needs in Arctic Research for the Next Decade

3.1. Needs and Priorities specific to the RPT 3 topic area

3.1.1. Research Needs (Gaps) for the RPT 3 topic area

Research need	Description of the research need	Rationale why included in this report
1. Funding to support community-based and community-led research and monitoring	Funding to support community-based and community- led research and monitoring in the Arctic is aimed at building and strengthening capacity for communities to design, implement, and sustain research that addresses community-concerns.	The need for community-based and community-led monitoring and research programs was repeatedly listed among the data, and funding needs to implement the top research priorities presented by this group. RP #1 specifically requires funding to create community-based programs which includes activities such as program development, training, and capacity building. This requires long-term, flexible funding that is specific to this need and can sustain the needed time frame required to establish such programs. RP #2 also requires funding for community-based research and leadership which assumes costs for honoraria, workshops, salaries, and more. Flexibility is an important component of this need as funding and reporting deadlines should be flexible according to the pace at which respective communities work. Furthermore, flexibility must apply to which types of organizations are able to receive and hold funds, as described in RP #3 needs. This specific funding is also needed to increase the number and quality of relationships between local, regional, and national Indigenous organizations.
2. Northern-based research facilities and infrastructure	Northern-based research facilities and infrastructure are needed to provide physical, technical and organizational support in Northern communities. Northern research infrastructure inclusive of and built upon Indigenous and local cultures would facilitate community-based, community-led research and monitoring and allow for research advancement and innovation in the Arctic.	The need for Northern-based research facilities and infrastructure is explicitly stated in two (RP #3 and RP #4) of the top research priorities identified by RPT3. Additionally, RP #1 identified monitoring systems and geospatial tools as an infrastructure need, emphasizing the need for Northern research infrastructure. Similarly, monitoring equipment and other technologies are frequently listed among the data and infrastructure needs in many of the RPs. Northern research infrastructure supports capacity development and training of community members to take lead in place-based, longitudinal research. It also should rely on fair and equitable partnerships with Arctic communities, needs which are also prevalent across all the research priorities listed in this report. These capabilities necessitate parallel investment in increased access to reliable, sustainable, cost-effective energy - which has mutual benefit to meet community needs and energy plans. Moreover, it also addresses the research need described above. Therefore, this research need emerged as it was common among all the research priorities and supports the other research needs listed in this table.
3. Cross/Inter-disciplinary/ transdisciplinary and cross-sectorial or convergent approaches to research	Approaches to research that i) consider multiple knowledge systems, ii) integrate multidisciplinary and multimedia methods, iii) involve actors and participatory action across sectors, such as academia, industry, non-profit, government, and iv) often rely on co-creation, co-production and co-interpretation of knowledge	This research need emerged due to the context of this RPT group and the complex nature of the research priorities put forward. Arctic SESs are in themselves interdisciplinary and require such approaches to be addressed. RP #1 lists climate change risks to humans, food security, ecosystems and the economy and requires collaboration among experts in each of these respective fields, as do RPs #2-#5. Additionally, the need for approaches to research that consider Indigenous Knowledges and Sciences and local knowledge with western scientific methods is recurrent across all the RPs. Moreover, working across sectors to address and implement these RPs is also identified in all the RPs from this report. A goal of these collaborations should be to produce meaningful research products and tools that meet community-identified needs and the needs of the Arctic ecosystem. Thus, it is clear that comprehensive, innovative approaches are required across the next decade of Arctic research to action the priorities emerging from this report.

Research need	Description of the research need	Rationale why included in this report
4. Coordinated, interoperable and accessible data repositories	Data repositories that are usable for various types of data and knowledge including qualitative, quantitative, physical (e.g., animal tissue biopsy) samples, local observations, Indigenous Knowledges and others. These repositories must be accessible with user-friendly platforms, clear governance frameworks and functional.	Interoperable and accessible data repositories are critical to advancing collaborative research, detailed above, and for respecting principles of equity and data sovereignty which are also essential for collaborative research and for community-led research. As discussed, multiple knowledge systems and interdisciplinary approaches to research are needed across the next decade. Ensuring data repositories, toolings and organizations can share and communicate via their data will support these needs. Further, each RP emerging from this report requires data collection (including observational data, local and Indigenous Knowledges) and each RP has an implementation action plan related to the creation of data products, repositories or accessing historical data as well as clear guidelines on respecting and application of data sovereignty principles.
		Therefore, this research need highlights not only the need for data collection but for the way in which that data is collected, stored and shared to be usable for all actors. In order to achieve this RP, specialized technical teams, aware of sensitive and non-sensitive data handling, and sustained funding for these platforms is a prerequisite.
5. Funding to support foundational research	Funding to support foundational research and activities such as those that require ongoing or long-term support, including i) relationship building with Indigenous partners, ii) long-term monitoring programs, including those rooted in Indigenous Knowledges (e.g. Indigenous Guardians) iii) training and capacity building and iv) exploratory research.	The need for foundational research and foundational research activities was frequently mentioned across the RPs. RP #1 specifically identified the importance of long-term programs to collect baseline climate data, as well as for workshops to collect Indigenous Knowledge and local knowledge, and training activities that promote the creation of long-term monitoring programs. RP #3 highlighted the need for baseline historical and contemporary environment data, physical data and mental health data for Arctic communities, which specifically requires funding for foundational research. Moreover, across all RPs the need for relationship building, training and capacity building are listed as funding, data and infrastructure needs. Funding for these specific activities which prepare or set the foundation for research to occur is essential.

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3.1.2. Priorities for Arctic Research for the RPT 3 topic area

As described in section 8 of this report, RPT3 research priorities emerged from a group of surveys sent out to a group of international Arctic SESs experts who had the opportunity to contribute their opinions as to what research priorities are needed for the next decade. In addition, a literature review was completed by RPT3 members to capture existing research priorities which were combined with the results from the surveys. Together, the results from the surveys and the literature review led to the identification of these 5 most urgent priorities, related to RPT3's theme. The priorities presented in table 3.1.2 are a summary of the highest ranking priorities according to the following thematic categories 1) Climate and environmental change – implications for social and economic systems (CC), 2) Sustainable technology, infrastructure, economy, transportation, and energy, (ST) 3) Social systems resilience, health, and well-being, education, knowledge and culture (SS) , and 4) Arctic cooperation, policy, law, sovereignty, diplomacy, geopolitics and security (AC). In table 3.1.2 we present the final research priorities (left column) and the contributing research priority statements which led to the final priority (right column).

Priorities for research	Reason why this should be an ICARP IV Priority
1. Conduct hazard mapping for key climate change risks (e.g. erosion, flood zones, wildfire areas, and new potential for other extreme events.) and their implications for human communities, food and energy security local ecosystems, climates, and cultural and economic activity while continuing investigation of impacts of increased occurrences of extreme weather events, weather hazards and climate extremes at human-animal-environmental interfaces	The priority statements contributing to priority #1; CC-2 Conduct hazard mapping for key climate change risks across the Arctic (erosion, flood zones, others) and their implications for human communities, food security, local ecosystems, climates, biodiversity, and economic activity (e.g., shipping, mining). CC-10 Investigating the impacts of increased occurrences of extreme weather events on Arctic communities, and adaptation strategies to weather hazards. CC-6 Understanding health issues emerging in the Arctic at human, animal, and environmental interfaces from increased heatwaves, flooding, and other climate extremes.
2. Advance community- and Indigenous-led approaches to sustainable economies and infrastructure, including energy, waste, sanitation, and other aspects of a functional community in remote Arctic areas by analyzing local needs and developing models that support continued long-term human thriveability in the Arctic.	The priority statements contributing to priority #2; ST1- Understanding how the energy transition and climate change mitigation and adaptation strategies are impacting Arctic Peoples and social and ecological systems. ST17- Analysis of local energy availability and needs: how to increase energy use (residential, transport, industry), avoiding local pollution effects and global climate change effects. ST19 - Study sustainable waste management technologies and infrastructure gaps and needs in remote Arctic communities. ST2 - Researching and developing models for alternative sustainable, circular and community-led infrastructure, economies, industrial ecology, and sustainable design, including Indigenous-led models and solutions. ST9- Identify economic and non-monetary trade opportunities and barriers for Indigenous-harvested and subsistence products to support Arctic communities.
3. Identifying and monitoring the social and environmental determinants of health for Arctic Peoples, including understanding: (i) impacts, gaps and opportunities for all aspects of physical security, (ii) Indigenous Peoples' well-being as it relates to self-determination and governance, and (iii) systemic causes of violence against Indigenous individuals	The priority statements contributing to priority #3; SS-11 Explore the gaps and opportunities for emergency management and response capabilities in Arctic and Northern communities. SS-1 Understanding impacts of food and housing security on Arctic communities. SS-2 Understand Indigenous self-determination and governance in the Arctic in regard to the many aspects of wellbeing (including housing, subsistence, land management, rights, input into international decisions, as well as holistic health definitions, etc.). SS-10 Understand the systemic causes of all forms of violence against Indigenous women, girls, and gender diverse populations. SS-5 Identifying and monitoring social and environmental determinants of health for Arctic communities.
4. Support broader understanding of the rights of Arctic Indigenous Peoples, especially in creating regulations, such as those related to commercial maritime activities and Arctic militarization; understanding the impacts of these activities on Arctic communities, including subsistence harvesting activities; and studying the role of Arctic Indigenous involvement in wildlife research and subsequent decision-making.	The priority statements contributing to priority #4; AC-7 Ensure Arctic Indigenous involvement in wildlife research. AC-4 Research legal regulation of Arctic activities, including maritime rights. AC-10 Investigating potential conflicts between commercial fishing, aquaculture/fish farming, leisure fishing, and subsistence harvesting. AC-1 Evaluating the societal impacts of Arctic militarization and conflicts. AC-11 Investigating the role of Indigenous governance in Arctic decision-making.
5. Support community-based observation and monitoring programs on climate change and adaptation, including research on impacts of climate change on marine and terrestrial ecosystems important for public services, subsistence and commercial activity.	The priority statements contributing to priority #5; as well as statements above that indicate a need for regular, local, data collection: CC-19 Continuing and supporting community observation and monitoring programs on climate change and adaptation, to include hazard sciences and ecosystem services. CC-9 Study effects of rising sea temperatures, increased and longer ice-free seasons on Arctic animals and fisheries important for subsistence and/or commercial activity.

3.2. Cross-Cutting Needs and Priorities

Cross-cutting needs and priorities are defined as not only relevant for one of the RPT topic areas specifically, but instead cutting across several of the seven topic areas:

- RPT 1: The Role of the Arctic in the Global Earth System
- RPT 2: Observing, Reconstructing, and Predicting Future Climate Dynamics and Ecosystem Responses
- RPT 3: Understanding the Dynamics and Resilience of Arctic Social-Ecological Systems to Foster Sustainable Futures
- RPT 4: Arctic Research Cooperation and Diplomacy
- RPT 5: Co-Production and Indigenous-led Arctic Research
- RPT 6: Education and Knowledge-Sharing In and About the Arctic: Research and Practice
- RPT 7: Technology, Infrastructure, Logistics, and Services

3.2.1. Cross-Cutting Research Needs

Research need	Rationale why included in this report
1. Observe, understand, and mitigate risks	Risks associated with climate change, infrastructural development and other transformations in Arctic SESs have become a primary concern for Arctic residents and scholars. Concerted research efforts across disciplines and regions are needed to monitor, assess, mitigate and communicate current and future impacts and risks at different scales.
2. Improve health and well-being of Arctic residents	One Health and Planetary Health concepts are highly relevant and interdisciplinary (Sudlovenick, Jenkins, and Loseto, 2024; Redvers et al., 2022). They have key importance for Arctic communities and require concerted research efforts across environmental, biological, and social sciences. They also necessitate infrastructural investment and improved understanding of effective health systems access, governance, and delivery of relevant services, as well as addressing how human behavior impacts the natural world which in turn impacts human health.
3. Facilitate just transitions (see Wang & Lo, 2021; Shapovalova, 2023)	SES in the Arctic are undergoing rapid transitions in both natural and social subsystems. Improving the knowledge about these transitions (energy, green transition, demographic, housing, nutrition, and other communal infrastructure and services, species range shifts) and these processes require transdisciplinary research and close collaboration with Arctic communities. As these processes unfold, there is an urgent need to elucidate equity and justice associated with these multiple transitions in alignment with UNDRIP (United Nations Declaration on the Rights of Indigenous Peoples).
4. Promote community and human security (Redvers et al., 2022)	Community security includes food security, energy security, personal security, economic security, and climate security, among others such as freedom from violence; overall security is an important concern in Arctic communities. There is a need to improve the capacity of Arctic communities to respond to various security threats and navigate impacts to social systems. The Arctic research community can and should invest in engineering and the design of resilient infrastructure which takes into account community needs and plans, requiring expertise from diverse fields of study and knowledge systems.
5. Ensure equity, respect, and reciprocity in research processes and data governance	Research must adhere to ethical standards and methodologies that ensure equity, respect, reciprocity, and observe data governance principles (i.e. ICC, 2022; Carroll et al., 2021; The Collaboratory for Indigenous Data Governance, n.d.)). Further decolonization of research and advancement of knowledge co-production, Indigenous-led, and community-based research are necessary to successfully meet the needs of Arctic residents and address changes in SES.

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3.2.2. Cross-Cutting Priorities for Arctic Research

Priorities for research	Reason why this should be an ICARP IV Priority
1. Improve understanding of multi-layered and multi-scale governance of Arctic SESs, including natural subsystems, resources, and human livelihoods	Governance is a cross-cutting theme that is relevant across multiple needs and priorities. Improving the understanding and implementation of effective governance at various scales will be instrumental in attaining resilience and sustainability of Arctic SES, addressing the most urgent community needs, and securing the long-term well-being of the Arctic's inextricably linked natural and social subsystems.
2. Advance and co-produce knowledge and solutions for community-based sustainability, resilience, and adaptation	Sustainability remains a key concept in the Arctic. Emphasizing the co-production of knowledge and Indigenous-led approaches, sustainability research in the Arctic is becoming more actionable and solutions-oriented. Critical approaches to sustainability research, including assessment of positionality (gender, intersectionality, colonialism, etc.), and connecting these to how the research is applied will further advance the utility of this interdisciplinary field. Sustainability and resilience data, and indicators, need further development to be useful and usable for Arctic community decision-making.
3. Document determinants and holistic understanding of health	Health concerns need to be addressed using community-led, Indigenous-led, comprehensive, trauma-informed, culturally-responsive, OneHealth, and Planetary Health approaches and methodologies that improve health outcomes across multiple components of SES. There are major gaps in the current documentation of holistic understandings of health for Arctic communities, and limited data on the various determinants of health.
4. Advance knowledge of infrastructure systems	Infrastructure encompasses a series of complex SESs where interactions and feedback loops are becoming increasingly complex and critical for the Arctic's future. With the advancement of technologies, modern innovations, and engineering solutions, new cultural, social, and ethical challenges need to be addressed. There is a lack of understanding of Indigenous and local infrastructure, no coherent inventory of infrastructure systems across the Arctic, limited collaboration between disciplines, and utilization of new methods of inquiry, such as AI, remote sensing. Leaders in applied energy research can be resources as we expand these lines of inquiry for broader impact.
5. Further promote knowledge co-production and transdisciplinary methodologies	Development of transdisciplinary, multimedia, and convergence methodologies with transparent and equitable inclusion of diverse ways of knowing and collaboration among natural and social sciences, engineering, arts, humanities, Indigenous Knowledge and local knowledge is crucial for a better understanding of SES.
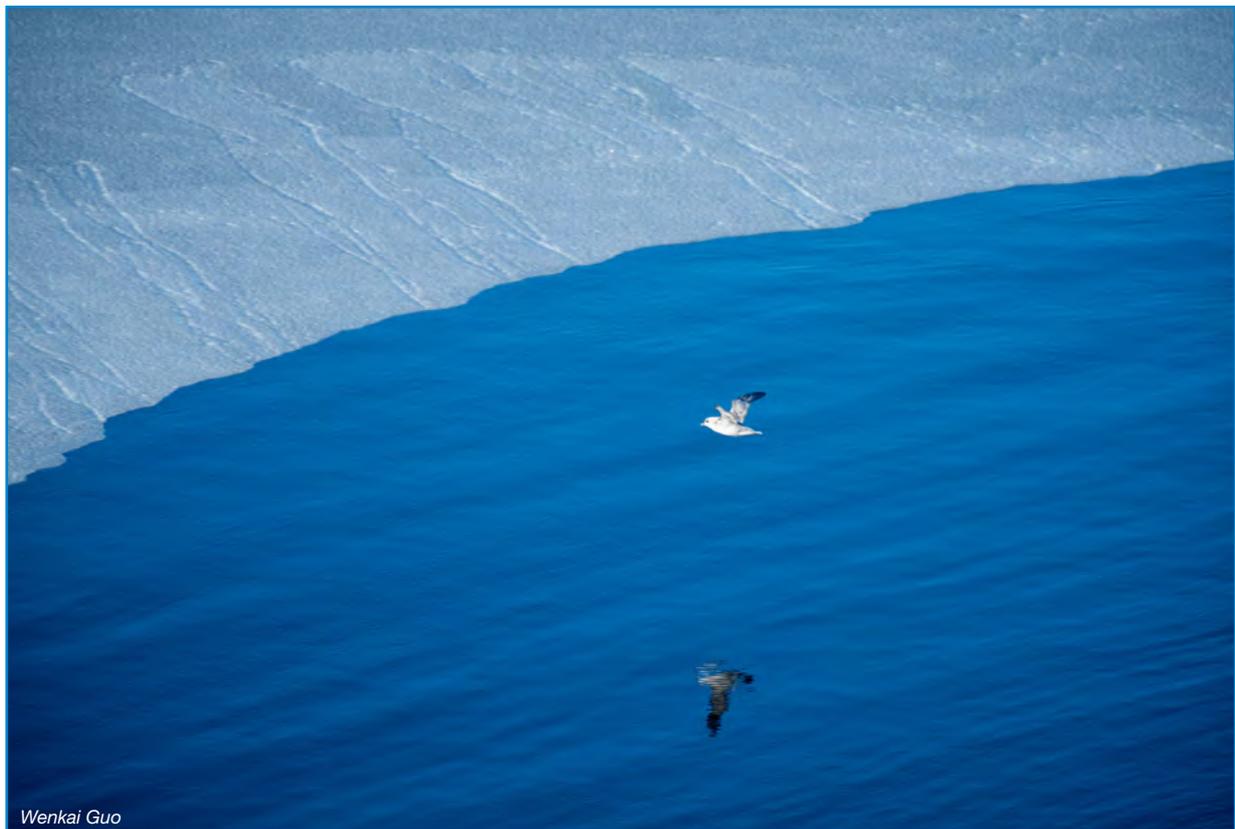
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4. Recommendations to Implement the identified Priorities for Arctic Research

4.1. Implementation of the RPT 3-specific Priorities

Priority 1:
Conduct hazard mapping for key climate change risks (e.g. erosion, flood zones, wildfire areas, and new potential for other extreme events) and their implications for human communities, food and energy security local ecosystems, climates, and cultural and economic activity while continuing investigation of impacts of increased occurrences of extreme weather events, weather hazards and climate extremes at human-animal-environmental interfaces.

Spatial scale:	Local, Regional, Pan-Arctic
Time scale:	Relevant now for next 10 years and beyond

Funding requirements and potential sources:	Requirements:
	• Long-term funding
	  • To support new and ongoing monitoring initiatives and to support adaptation.
	• Support community-based research including monitoring, observation, sampling, etc.
	  • Need to create new and support existing community-based programs, including program development, training, capacity development and connection to regional, systems-level, and pan-Arctic data sets.
	  • Honoraria, salaries for staff
	  • Flexible to accommodate the pace at which communities work and prepare for risks and rapid response to hazard events (e.g. flooding, storms, wildfire)
	• Inter- and multi-disciplinary approaches and accepting of multiple ways of knowing (including Indigenous methods for data collection, analysis, and application)
	  • Social, cultural, economic, health, environment dimensions
	  • Teams with diverse research backgrounds and expertise
	  • Allowing communities unique experiences, knowledge, circumstances and interests to be centered
	• Climate change focus
	  • Research specific to the priority area (i.e. climate change hazards, risks, extreme weather events, weather hazards, climate extremes)
	
	Potential sources:
	• Government agencies (e.g. NASA, Polar Knowledge Canada, United States Arctic Research Commission)
	• International forums (e.g. IASC, Horizon Europe, EU PolarNet)
	• Intergovernmental forums
	• Non-profits (e.g. ARF, ArcticNet)
	• Academic and research institutions (e.g. AWI, UArctic, ACEP, ISER, IARC, SNAP, CED, OneHealth)
	• Foundations (e.g. The Prince Albert II of Monaco Foundation)

Infrastructure needs and requirements:	• Weather and climate monitoring systems
	  • Near real-time monitoring with ground-based systems (research stations, field stations, mobile labs, weather stations)
	    – Ideally in- or near- communities
	  • Coordinated ocean-based systems (research vessels, AUVs)
	• Remote sending and geospatial tools
	  • Satellites, drones, GIS
	• Modelling and forecasting (climate, energy, population, socio-economic)

Data needs and requirements:	• Coordinated data repositories
	  • Interoperable datasets
	  • Standardization of long-term observation and monitoring data
	• Occurrences of extreme weather and climate events (date, location, event type)
	  • Harmonizing and integration of Indigenous Knowledge, local knowledge, and western science data
	  • Downscaled model outputs (i.e., useful at the local scale)
	• Leveraging local knowledges on climate change integrating social, cultural, economic, health, environment dimensions
	• Access to historical monitoring data (e.g., open science frameworks)

Priority 1 *continued*:
Conduct hazard mapping for key climate change risks (e.g. erosion, flood zones, wildfire areas, and new potential for other extreme events) and their implications for human communities, food and energy security local ecosystems, climates, and cultural and economic activity while continuing investigation of impacts of increased occurrences of extreme weather events, weather hazards and climate extremes at human-animal-environmental interfaces.

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Map current weather and climate monitoring programs (including community-based programs) in the Arctic to create a database of existing projects.	• Creating a working group, or multiple working groups, depending on the scale tasked with this action. Alternatively, leveraging and supporting coordination between existing Arctic working groups (e.g., SAON, Polar Observing Assets Working Group). • Identify and integrate existing observing metadata standards for the database including how long programs have been operating, in which part of the Arctic, organizations involved, etc. • Appoint a host for the database. • Comb through existing databases, e.g. NASA, Government of Canada.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health for emergency management, hazard mitigation plans and comprehensive plans • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic Council WGs (AMAP, CAFF), SAON, Polar Observing Assets WG, European Space Agency Polar WG
Organize community workshops to gather Indigenous Knowledges and local knowledges on climate risks and hazards	• Partnerships with Arctic-based organizations to deliver and facilitate community-based workshops with clear protocols to protect Indigenous data sovereignty and governance (Inuit Circumpolar Council, 2022; see The Collaboratory for Indigenous Data Governance for resources). • Participatory mapping activities for monitoring or modeling climate and environmental change. • Training activities for data literacy, stewardship, collection, and archiving. • Participatory Science, Technology, Engineering, Arts, and Math (STEAM) activities to collect knowledge on risks and hazards across community members and researchers (stories, dance, arts/crafts, music, role plays, film, etc.).	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health
Establish (e.g., via literature review) the current state of knowledge related to the effects of i) extreme weather events ii) weather hazards, and iii) climate extremes on humans, animals and the environment	• Use AI to comb existing literature for these examples. • Create a working group, hire an early career researcher, and/or local students. • Use the results from the lit review to establish the state-of-knowledge and knowledge gaps. • Openly share results with broader Arctic research community	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic Council WGs (AMAP, CAFF)
Develop an understanding of impacts of longer ice-free seasons on Arctic species and fisheries of cultural, social and economic importance	• Cross-sectoral communications, via a meeting, networking, conferences, or other communication medium to bring together experts. • Create a working group, hire a researcher and/or leverage existing working groups (e.g., SAON) to broaden awareness of the initiative. • Create a baseline understanding and establish the state-of-knowledge (e.g., via literature review) on this topic.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health
Training on technical skills for equipment use, maintenance, data stewardship, and other crucial skills for interested Arctic residents.	• Develop training opportunities (e.g., certifications, informal learning workshops) focused on the specific equipment, tools and standard operating procedures (e.g., quality assurance) needed to capture necessary skills. • Create workshops and learning materials for data stewardship, sovereignty, and literacy	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health

Priority 2:
Advance community- and Indigenous-led approaches to sustainable economies and infrastructure, including energy, waste, sanitation, and other aspects of a functional community in remote Arctic areas by analyzing local needs and developing models that support continued long term human thriveability in the Arctic.

Spatial scale:	Local, Regional
Time scale:	Relevant now and for the next 10 years

Funding requirements and potential sources:	Requirements:
	• Community-based research and leadership
	  • Honoraria, training opportunities, salaries
	  • Costs for community workshops and programs
	• Include Indigenous Knowledge Holders, practitioners, and those with local knowledge
	• Partnership and collaboration with Arctic communities
	• Arctic focus
	• Knowledge dissemination and policy impact
	
	Potential sources:
	• Industry/private sectors (most notably, the energy sector)
	• Government agencies (e.g. Polar Knowledge Canada, United States Arctic Research Commission)
	• Intergovernmental forums
	• Non-profits (e.g. ARF, ArcticNet)
	• Academic and research institutions (e.g. AWI, UArctic, ACEP, ISER)

Infrastructure needs and requirements:	• Community partnerships between local governance and researchers • Modelling software & expertise • Arctic, remote island and microgrid technical expertise • Waste management and other sanitation expertise and centres • Sustainable infrastructure examples with evaluation of sustainability on various metrics
Data needs and requirements:	• Energy use patterns in communities • Arctic waste management and sanitation practices, • Indigenous Knowledges and local knowledges on harvested and subsistence products • Arctic human demographic data, • Infrastructure mapping • Resource availability • Supply chain data (e.g., number of re-supply ships visiting communities and cargo load of ships) • Subject matter expertise in integration of renewables into remote islanded microgrids • Increased data literacy to support Arctic Indigenous data sovereignty

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Create working groups with community partners to co-create project research questions, goals and scoping, determine appropriate methodology, collect and analyze data, and compile research products.	• Outreach and engagement with Arctic communities, including Indigenous governance organizations • Compensate Arctic residents that participate, share, and contribute to science projects • Set an expectation that all data and results are communicated in scientific spaces as well as in ways that are useful to Arctic communities	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health • ASSW/AOS conveners to host sessions and working groups • IASC and UArctic develop solicitation for funding on topic
Community engagement and capacity building	• Collect, collate, and communicate with community governance the historical and local data on energy use, waste management, etc. and demographic data • Assess community-specific needs by supporting/ facilitating community energy (waste, other infrastructure, etc.) planning processes • Gather and communicate with community leaders about economic and relevant technical information relevant to each community and their infrastructure plans, including evaluations of relative sustainability/ risks and benefits of various infrastructure development options	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions such as ACEP • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health

Priority 2 *continued*:		
Advance community- and Indigenous-led approaches to sustainable economies and infrastructure, including energy, waste, sanitation, and other aspects of a functional community in remote Arctic areas by analyzing local needs and developing models that support continued long term human thriveability in the Arctic.		
Implementation: Implementation actions:	**How to implement the actions:**	**Who to address the actions:**
Model development	• Use existing and new data (perhaps also from internal research, e.g. lit review) to create models related to the energy transition, circular infrastructure, economies, etc. specific to each community and reflective of their needs. • Resource availability data • Current energy cost data and generation make-up • Interconnection and intertie data, including data on independent power producers and power purchase agreements • Subject matter experts to help with model selection and validation • MOUs, NDAs and data sharing agreements with energy partners to receive and handle critical infrastructure data • Cybersecurity for secure handling of critical infrastructure data	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health

Mariasilvia Giamberini

Priority 3: Identifying and monitoring the social and environmental determinants of health for Arctic Peoples, including understanding: (i) impacts, gaps and opportunities for all aspects of physical security, (ii) Indigenous Peoples' well-being and how it relates to self-determination and governance, and (iii) systemic causes of violence against Indigenous communities and individuals.	
Spatial scale:	Local, Regional, National
Time scale:	Has been, is currently and will remain relevant until substantial resources and efforts are allocated to these issues, as well as concerted efforts to restructuring of governance structures and decision-making processes.

Funding requirements and potential sources:	• Funding for:
	  • Programs addressing these issues
	  • Foundational research;
	  • Capacity building;
	    – Indigenous-led research institutions;
	    – Northern and culturally-sensitive educational institutions and/or opportunities.
	    – Ensuring skill-building is a funded part of "regular" research projects in a way which supports Indigenous self-determination and governance.
	  • Restructuring of current systems;
	    – Funding allocated for existing or new employees in public, private, non-governmental, and Indigenous institutions/organizations by these organizations which accounts for inevitable temporary loss of productivity when shifting to and/or incorporating Indigenous self-governance in these institutions.
	• Funding must be:
	  • Flexible:
	    – Able to adjust project and reporting deadlines to be more in-line with the pace at which communities would like to engage in this work.
	    – Able to adjust expected workflows and deliverables in case of unforeseen circumstances or obstacles limiting the analysis for which funding was originally allocated.
	  • Consistent and predictable over long-term:
	    – Much of this priority relies on or explicitly seeks to address structural and systemic problems, which are extremely costly and which take a long time to address properly and meaningfully and in the best way.
	  • Distributed according to local community priorities:
	    – Local communities and regional organizations must be involved in allocating funds to undertake this work as each community is unique in their contexts, preferences, and needs.
	• Potential sources of funding for these initiatives:
	  • Non-profit organizations
	  • Charitable contributions from organizations globally
	  • Arctic Indigenous organizations (e.g., Inuit Circumpolar Council)
	  • International human-rights organizations
	  • International Arctic research organizations
	  • Governmental and inter-governmental funding institutions with a mandate of Arctic Indigenous Peoples' well-being and how it relates to and self-determination/-governance

Infrastructure needs and requirements:	• Increased number and quality of relationships between local, regional and national Indigenous organizations and research institutions to increase community-led and community-based research on these sensitive topics. • Arctic-focused and northern-based on the land education institutions and funded research opportunities for Indigenous Arctic residents to build the required capacity in and near home communities in a culturally-meaningful way. • Culturally appropriate and sensitive Northern-educational institutions and opportunities to engage Arctic Indigenous youth in ways that support their long term inclusion in the research community (build sustainable research capacity within communities). • Northern-based research centers to support desired research, southern/northern research partnerships, and help build capacity in Arctic and subarctic communities. • Cross-disciplinary methods to allow for collaboration between natural and social sciences to research and understand social and ecological systems as inherently linked and intertwined.

Priority 3 *continued*:
Identifying and monitoring the social and environmental determinants of health for Arctic Peoples, including understanding: (i) impacts, gaps and opportunities for all aspects of physical security, (ii) Indigenous Peoples' well-being and how it relates to self-determination and governance, and (iii) systemic causes of violence against Indigenous communities and individuals.

Data needs and requirements:	
	• Requirement to leverage the Collecting Accurate and Robust Equity (CARE) and Findable, Accessible, Interoperable, Reusable (FAIR) data principles and other regional specific data best practices to ensure that sensitive and potentially harmful data is handled with the utmost care and leveraging Indigenous Data sovereignty and governance practices to their fullest extent (Carroll et al, 2021).
	• Identifying and monitoring the social and environmental determinants of health for Arctic Peoples:
	• Baseline historical and current environmental data.
	• Baseline historical and current physical and mental health data for Arctic peoples to couple with above environmental data.
	• Community-led and -based monitoring and general research programs to ensure ongoing and locally-relevant monitoring of environmental variables which are of importance to Arctic peoples while building capacity.
	• Developing a database of case studies showcasing implementation of Indigenous self-determined and self-governed systems.
	• Evaluating correlations between implementation of these models and systems and well-being of rights- and stake-holding Arctic peoples in these case studies.
	• Systemic causes of violence against Indigenous Peoples:
	• Disaggregated spatial and temporal data on instances and types of violence against Indigenous individuals.
	• Understanding and evaluating correlations between systems and histories and the number of instances of violence in areas with high and low numbers of instances.
	• Ensuring that data from this work is owned and used fully by Indigenous Rights-Holders and impacted persons (e.g., Data for Indigenous Justice project).

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Develop a database of instances of Indigenous self-determination and self-governance	• Communication of this data need with Arctic nations; • Appointing a committee to accept data and compile the database; • Providing Indigenous-led guidelines for identifying instances of Indigenous self-determination and -governance.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and governance • Non-governmental organizations with a mandate for research and governance
Develop an understanding and summary of the status and trends in the health and well-being of Indigenous Peoples in all Arctic regions	• Communication of these data needs with Arctic nations; • Develop an Indigenous advisory committee on ethics to oversee research activities and data protocols. Identify a data body and archive with appropriate ethical standards to accept data, metadata, and compile the database; • Providing guidance for metrics and variables which would likely provide data required for an accurate assessment of the health and well-being of Arctic Indigenous Peoples; • Establishing an Indigenous-led research group to undertake a spatial and temporal assessment of the health and well-being of Indigenous Peoples in different Arctic areas using compiled data; • This research group would collaborate with the environmental health research group to understand relationships and correlation between trends in the Indigenous Peoples' and local peoples' health and well-being and environmental contexts.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research, socio-cultural well-being and public health • Non-governmental organizations with a mandate for research, socio-cultural well-being and public health • Inter-governmental organisations like Arctic Council WGs (AMAP)
Develop an understanding and summary of the status and trends in the environmental context of all Arctic regions	• Communication of these data needs with Arctic nations (also including Indigenous Peoples); • Appointing an entity (person, group, organization) to accept data and compile the database; • Providing guidance for metrics and variables which would likely provide data required for an accurate assessment of the environmental health context of different Arctic regions; • Establishing a research group to undertake a spatial and temporal assessment of the environmental health context in different Arctic areas using compiled data; • This research group would collaborate with the Indigenous health and well-being research group to understand relationships and correlation between trends in the Indigenous health and well-being and environmental contexts.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic Council WGs (AMAP)

Priority 3 *continued***:**

Identifying and monitoring the social and environmental determinants of health for Arctic Peoples, including understanding: (i) impacts, gaps and opportunities for all aspects of physical security, (ii) Indigenous Peoples' well-being and how it relates to self-determination and governance, and (iii) systemic causes of violence against Indigenous communities and individuals.

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Assessing current emergency management strategies in different regions of the Arctic	• Communicating with Indigenous organizations, governments, non-governmental organizations, and other relevant actors at the local, regional and national scale, about needs and risk assessments. • Organizations in different regions and at different scales provide an overview of their risk assessments to an organization as a collaborative network to share and learn, or a team identified as the point of contact. • Summary document prepared for each region and (perhaps) at different scales to provide an overview of the current state of emergency management to then develop needs for development and implementation of solutions. Include extant networks for shared information and lessons learned.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health to include review of hazard mitigation plans per jurisdiction. • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic Council WGs (AMAP, CAFF), SAON
Assessing current and food and housing security context in different regions of the Arctic	• Communicating with Indigenous organizations, governments, non-governmental organizations, and other relevant actors at the local, regional and national scale, about data needs. • Organizations in different regions and at different scales provide an overview of studies and datasets to an organization as a collaborative network to share and learn, or a team identified as the point of contact. • Summary document prepared for each region and (perhaps) at different scales to provide an overview of the current state of food and housing security (and insecurity) to then develop needs for development and implementation of solutions. Include extant networks for shared information and lessons learned	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and social health to include review of summaries for food and housing security assessments per jurisdiction. • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic

Igor Vasilevich

Priority 4: Support broader understanding of the rights of Arctic Indigenous Peoples, especially in creating regulations, such as those related to commercial maritime activities, harvesting rights/quotes, and Arctic militarization; understanding the impacts of these activities on Arctic communities, including subsistence harvesting activities; and studying the role of Arctic Indigenous involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) and subsequent decision-making.	
Spatial scale:	Local, Regional, National, Global, Pan-Arctic
Time scale:	Building Indigenous research capacity in the Arctic takes a long time, but understanding regulatory issues, and developing alternatives may prove to be a shorter endeavour. All of the priority is currently relevant, but, excluding building capacity in Arctic communities, I would say this will be attainable in approximately 5-10 years. However, addressing (rather than studying) impacts of militarization in the Arctic may be more relevant in the next ~5 years, and will remain relevant and perhaps grow in relevance over time depending on the evolution of geopolitical conflicts.
Funding requirements and potential sources:	• Funding for: 　• Foundational research; 　• Policy and legislation analysis and development of alternatives; 　• Increased local capacity for involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) • Funding must be: 　• Provided in a manner which minimizes conflicts of interests from governments and companies heavily-engaged in maritime commercial activities (e.g., funding provided to third-party organizations with no strings-attached). 　• Substantial and consistent to ensure capacity for Arctic Indigenous involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) is built and retained. • Potential sources of funding for these initiatives: 　• Non-profit organizations 　• Charitable contributions from organizations globally (with significant scrutiny due to the conflicts of interests between, for example, commercial fishing companies and research on maritime fishing regulations) 　• Northern Indigenous organizations (e.g., Inuit Circumpolar Council) 　• International human-rights organizations 　• International Arctic research organizations 　• Governmental and inter-governmental funding institutions with a mandate of maritime law, maritime governance,
Infrastructure needs and requirements:	• Increased number and quality of relationships between local, regional and national Indigenous organizations and research institutions to increase community-led and community-based research on these sensitive topics. • Northern-based education institutions and funded research opportunities for Indigenous northerners (especially youth) to build the required capacity in and near home communities in a culturally-meaningful way. • Northern-based research centers to support desired research, southern/northern research partnerships, and help build capacity in northern communities. • Cross-disciplinary methods to allow for collaboration between natural and social sciences to research and understand social and ecological systems as inherently linked and intertwined.
Data needs and requirements:	• Support broader understanding of the rights of Arctic Indigenous Peoples, especially in creating regulations, such as those related to commercial maritime activities and Arctic militarization: 　• Dataset of examples of Indigenous self-governance of commercial maritime activities. 　• Literature review of Indigenous governance in military conflicts, especially in the Arctic and other northern regions. • Understanding the impacts of these activities on Arctic communities, including subsistence harvesting activities: 　• Dataset of environmental impacts from specific commercial maritime activities in specific regions cross-referenced with impacts in instances with Indigenous-governed maritime activities. • Studying the role of Arctic Indigenous involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) and subsequent decision-making: 　• Dataset of previous examples of Indigenous Peoples involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) and management or co-management. 　• Data on species and environmental health in circumstances where these are governed and co-governed by Arctic Indigenous Peoples.

Priority 4 *continued*:
Support broader understanding of the rights of Arctic Indigenous Peoples, especially in creating regulations, such as those related to commercial maritime activities, harvesting rights/quotes, and Arctic militarization; understanding the impacts of these activities on Arctic communities, including subsistence harvesting activities; and studying the role of Arctic Indigenous involvement in environmental research (i.e., land, marine, animals, fish, plants, etc.) and subsequent decision-making.

Implementation:

Implementation actions:	How to implement the actions:	Who to address the actions:
Develop a database of instances of Indigenous self-determination and self-governance	• Communication of these data needs with Arctic nations; • Identifying an Indigenous-based committee or organization to accept metadata, compile the database and identify where this data will be stored • Providing some guidelines (perhaps Indigenous-led) for identifying instances of Indigenous self-determination and -governance.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and governance • Non-governmental organizations with a mandate for research and governance
Develop an understanding and summary of the status and trends in the environmental context of all Arctic regions	• Communication of this data need with Arctic nations; • Appointing a single entity (person, group, organization) to accept metadata and compile the database; • Providing guidance for metrics and variables which would likely provide data required for an accurate assessment of the environmental health context of different Arctic regions; • Establishing a research group to undertake a spatial and temporal assessment of the environmental health context in different Arctic areas using compiled data; • This research group would collaborate with the Indigenous health and well-being research group to understand relationships and correlation between trends in the Indigenous health and well-being and environmental contexts.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like Arctic Council WGs (AMAP)
Develop an understanding and summary of environmental impacts from commercial activities occurring in the Arctic	• Communicating with industry, Indigenous organizations, governments, non-governmental organizations, academia, and other relevant actors at the local, regional and national scale, about need. • Organizations in different regions and at different scales provide an overview of their assessments to an organization or team identified as the point of contact. • Summary document prepared for each region and (perhaps) at different scales to provide an overview of impacts for each commercial maritime activity and how they differ in each region and under different governance regimes)	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and environmental health • Non-governmental organizations with a mandate for research and environmental health • Inter-governmental organisations like SAON

Wenkai Guo

Priority 5:
Support community-based observation and monitoring programs on climate change and adaptation, including research on impacts of climate change on marine and terrestrial environments important for public services, health, subsistence, and economic activity, etc.

Spatial scale:	Local, Regional
Time scale:	Relevant now and for the next 10 years

Funding requirements and potential sources:

Requirements:
- Long-term funding
  - To support new and ongoing monitoring initiatives and to support adaptation.
- Support community-based research including monitoring, observation, sampling, etc.
  - Need to create new and support existing community-based programs, including program development, training, capacity development and connection to regional, systems-level, and pan-Arctic data sets.
  - Indigenous governance and co-management body advising on monitoring needs across regions and ecosystems, especially but not limited to, species important for subsistence food and cultural systems
  - Honoraria, salaries for staff
  - Paying Northerners, community members to operate equipment, collect data, etc.
  - Ensure funding opportunities require ethical data management from the outset, including respect for Indigenous Data Sovereignty
- Emphasis on climate change and adaptation
  - Solutions based research

Potential sources:
- Commercial fisheries and other aquaculture/mariculture industry
- Government agencies (e.g. Polar Knowledge Canada, United States Arctic Research Commission)
- Intergovernmental forums
- Non-profits (e.g. ARF, ArcticNet)
- Academic and research institutions (e.g. AWI, UArctic)

Infrastructure needs and requirements:

- Research stations in communities or mobile research labs (scalable and/or flexible lab space that may be used for coordinated and multidisciplinary projects; may be associated with academic or other institutions present in Northern communities)
- Research vessels
  - Coordinated vessel time on large, expensive, research-specific vessels to include community-led observation goals
  - Smaller, scalable vessel access (including partnerships with boats used for subsistence, other fisheries) for community-led observation and monitoring
  - Remote aquatic vehicles
- Monitoring equipment
- Ocean buoys, sensors, camera traps, acoustic tags, GPS collars, animal tags, biological sample collection, storage, and processing/shipping tools, among other equipment.
- Internet access which is stable, affordable, consistent and redundant

Data needs and requirements:

- GIS and mapping tools
- Community based data platforms and databases
  - Using existing standards for observational data and metadata to produce community-specific logs on weather, risks, hazards, and ice conditions
- Historical climate data
- Key subsistence and commercially important species data
  - Commercial fisheries data (Market values, species shifts, impacts of fishing on other species, regulatory schemes, monetary and other risks of benefits of living resource extraction)
  - Aquaculture/mariculture data
  - Subsistence data (from a western science perspective; distinct from Indigenous Knowledges and local knowledges on subsistence ecosystems)
- Indigenous Knowledges and local knowledges on species
  - Traditional use, migratory routes, seasonal timing, animal and fisheries health monitoring data, among other information
- Interoperable datasets

Priority 5 *continued*:
Support community-based observation and monitoring programs on climate change and adaptation, including research on impacts of climate change on marine and terrestrial environments important for public services, health, subsistence, and economic activity, etc.

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Create a database of community-led climate change monitoring programs	Charge a working group or researcher with this task to create a database or a summary document containing existing programs and areas where climate change monitoring is lacking	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and governance • Non-governmental organizations with a mandate for climate change research
Conduct outreach with the private and local harvesting sectors (i.e., industry, sport, subsistence fishers, hunters, gatherers, community members) to collect information (e.g., fish, stocks, prices, limits, quotas, etc.) on important species and distributions	Communication and outreach with the private and local harvesting sectors (i.e., industry, sport, subsistence fishers, hunters, gatherers, community members) to collect information on multiple species' stocks, prices, limits, quotas, etc.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and governance • Non-governmental organizations with a mandate for climate change research
Outreach with commercial fisherman to collect information on important fish species and distributions	Communication and outreach with the private fisheries sector and local fisherman to collect information about fish, stocks, prices, etc.	• Indigenous organization (whether governmental, non-governmental or inter-governmental) • Academic institutions • Government departments with a mandate for research and governance • Non-governmental organizations with a mandate for climate change research

4.2. Implementation of the Cross-Cutting Priorities

Priority 1:
Improve understanding of multi-layered and multi-scale governance of Arctic SESs, including natural subsystems, resources, and human livelihoods

Spatial scale:	All
Time scale:	5 years
Funding requirements and potential sources:	IPY, National funding agencies, private foundations
Infrastructure needs and requirements:	Research infrastructure, ethical standards
Data needs and requirements:	FAIR, CARE principles, co-produced data, data sovereignty best practices

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Reimagine governance structures and regimes in the Arctic	Undertake a concerted effort to improve the understanding of the changing governance in the Arctic given current and future climate and geopolitical transformations	Individual researchers, research institutions, funding agencies
Focus on adaptive governance and management	Develop adaptive governance approaches to addressing critical challenges in the Arctic	Individual researchers, community leaders, research institutions, funding agencies
Assess governance aspects of nature-based solutions, climate interventions and other adaptation strategies	Institutionalize assessment frameworks and commission studies within international and national organizations Provide adequate funding and support prior to any decisions	Individual researchers, community leaders, research institutions, funding agencies Private sector
Foster effective science governance	Examine science governance and the Arctic to improve its effectiveness, interoperability and focus Investigate pathways to Indigenize Arctic science governance	Individual researchers, research institutions, funding agencies
Invest in Indigenous governance research	Elevate the importance and funding of research on Indigenous rights, sovereignty and self-determination in the Arctic	Individual researchers, research institutions, funding agencies
Advance understanding and create further foundations of maritime governance	International collaborative research on maritime issues engaging diverse knowledge systems Engage international organizations and appropriate institutions to further develop principles and mechanisms of maritime governance in changing conditions	Multilateral collaboration among funders Governments, funding agencies, private sector

Priority 2:
Advance and co-produce knowledge of and solutions for community-based sustainability, resilience, and adaptation

Spatial scale:	Local, regional
Time scale:	5-10 years
Funding requirements and potential sources:	National, regional and municipal agencies, stakeholders, Indigenous corporations, local funders, public-private partnerships, innovation incubators
Infrastructure needs and requirements:	• Research infrastructure, local capacity building, steady investment/funding • Improved institutional infrastructures to interface diverse stake-, rights- and knowledge holders, decision-makers and public policy entities.
Data needs and requirements:	• Harmonization and integration of Indigenous Knowledges and co-produced knowledge to support decision-making. • Solution-oriended, actionable research to address current and potential future issues and challenges.

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Maintain focus on community-based sustainability, resilience, and adaptation	Capacity building and the regional and local levels, investment in community research and decision-making infrastructures, development of community-to-community and research-community partnerships established and funded in an equitable manner	Research institutions, local and regional governments, funding agencies
Advance methodologies of knowledge co-production and co-creation	Meaningfully invest in co-production methodologies, including relationship-building, community visioning and culturally appropriate ways of knowledge sharing as a part of research process	Individual researchers, community leaders, research institutions, funding agencies
Elevate community-driven solutions	Ensure close community engagement and diverse knowledge flows in developing sustainability and adaptation strategies	Local, regional and national governments, funding agencies
Facilitate Indigenous-led research, Indigenize and decolonize sustainability research	Refocus resources to enable and support Indigenous-led research Undertake critical and reflexive assessment of sustainability theory and practice Develop novel approaches to design and delivery of appropriate training in for Indigenous and non-Indigenous scholars and practitioners working on the Arctic	Research institutions, funding agencies
Foster synergy between critical and practical approaches to sustainability and resilience	Engage with critical approaches to sustainability, including assessment (gender, intersectionality, colonialism, etc.) and connect them to practice.	Individual researchers, research institutions, funding agencies
Develop ethical, legal and methodological foundations for data co-production	Update and develop data protocols that specifically deal with co-produced data	Individual researchers, community leaders, research institutions, funding agencies
Improve knowledge of economic aspects of sustainability and resilience to foster community well-being and prosperity	Examine economic factors, processes, tools and solutions that support sustainability and community resilience to climate change and economic transitions Reassess indicators of well-being, prosperity and human development in the Arctic Understand inequalities and inequities that are interlinked with economic, food and community security	Individual researchers, community leaders, research institutions, funding agencies, private sector

Priority 3: Document determinants and holistic understanding of health		
Spatial scale:	Local, regional, pan-Arctic	
Time scale:	10 years	
Funding requirements and potential sources:	Funding of health (care) systems and health research. National agencies, Indigenous health organizations	
Infrastructure needs and requirements:	Major infrastructure investment needed, OneHealth and Planetary Health education programming (Baena-Morales & Fröberg, 2023).	
Data needs and requirements:	Harmonization and integration of Indigenous Knowledges and co-produced knowledge to support decision-making.	
Implementation: **Implementation actions:**	**How to implement the actions:**	**Who to address the actions:**
Operationalizing One Health and Planetary Health Approaches	Investment in long-term monitoring programs Integration of Traditional Knowledges, Indigenous Sciences/Knowledges, and local knowledges with new, innovative technologies such as remote sensing Appoint a coordinator to bring together relevant parties (e.g. animal, human, and environmental health groups) to take a coordinated One Health and Planetary Health approach.	Requires joint action among communities, academia, and human, natural and environmental health authorities working across mandates and jurisdictions.

Priority 4: Advance knowledge of Infrastructure systems		
Spatial scale:	Local, regional	
Time scale:	5- 10 years	
Funding requirements and potential sources:	Major government and private funders	
Infrastructure needs and requirements:	• Local capacity building, Management of local energy resources, especially in isolated communities, or optimized import of external energy flows. • Management of local mobility systems, such as transportation, energy, and communication infrastructure (de-fossilization, using local energy resources and best available technologies) and inter-territorial , such as regional, national, international, and transcontinental mobility structures (by ground, water and air)	
Data needs and requirements:	Time profiles of energy consumption (power, heat, fuels) in residential, tertiary, industry, transportation areas. Profiles of locally available sustainable energy sources (sun, wind, tidal, biomass) and of imported fuels. Data must be standardized and include robust metadata and documentation to ensure interoperability, see the Alaska Energy Data Gateway as an example.	
Implementation: **Implementation Actions:**	**How to implement the actions:**	**Who to address the actions:**
Collect data on energy consumption and on resource availability and generation of local energy resources	Universities committed in study of energy systems in Arctic communities, supported by local authorities (for data gathering)	Local authorities propose the activity to interested universities.
Collect data on mobility needs (e.g., routes, transportation types) and identify gaps in infrastructure (e.g., roads, tracks, accessible facilities)	Universities committed in study of energy and transportation needs of Arctic communities supported by local authorities (for data gathering)	Local authorities propose the activity to interested universities
Complete Pan-Arctic infrastructure inventory across different jurisdictions	Coordinating between infrastructure experts across countries, disciplines, and knowledge systems	Funding agencies, regional and local governments, businesses
Indigenous and informal infrastructures	Continuous research on Indigenous, informal, and nature-based infrastructures: documenting, (counter) mapping, understanding historical, current and future uses, preservation, governance issues.	Individual researchers, Indigenous organizations, community leaders, research institutions, funding agencies
Continue research on climate change impact on infrastructure	Cost and benefit analysis of changing transportation accessibility Invest in climate-resilient technologies and solutions Understanding accessibility issues for diverse stakeholders Support Indigenous and local observations networks	Private sector, research institutions, funding agencies

Priority 4 *continued*: Advance knowledge of Infrastructure systems		
Implementation: Implementation actions:	**How to implement the actions:**	**Who to address the actions:**
Abandoned infrastructures and their short- and longer-term environmental implications	Studies of pollution, subsidence and wildlife impact from abandoned mines, landfills, roads etc. on	Private sector, research institutions, funding agencies
Impacts of emerging infrastructures (green, blue, nature-based, geoengineering, etc.) on Arctic environments, resources and societies	Collaboration across knowledge systems, social and natural sciences and engineering to understand opportunities, challenges, and develop new technologies and solutions to address local, regional, national, and global needs	Private sector, research institutions, funding agencies, community leaders, multilateral collaboration

Priority 5: Further promote knowledge co-production and transdisciplinary methodologies		
Spatial scale:	Local, regional, pan-Arctic	
Time scale:	5-10 years	
Funding requirements and potential sources:	Shifts in research funding; landscape, new inter- and transdisciplinary and convergence science funding programs, international funders collaboration, funding Indigenous-led research.	
Infrastructure needs and requirements:	• Establish a network that facilitates the coordination of communications related to Arctic Indigenous research ethics, engagement, and practices; • Shifts in dominant research culture and infrastructure at all levels to engage in co-productive approaches; • Major capacity-building efforts in Arctic communities	
Data needs and requirements:	• Agreements with Indigenous Peoples on what constitutes Indigenous-led, co-productive research, and methodologies that are appropriate for researchers of various citizenship to engage in; • Research culture shifting to ask communities what they need; document and archive those priorities. • Non-Indigenous researchers must be open to learning new-to-them methodologies (at a minimum); • Collaborative space for non-Indigenous researchers to come together and help each other take steps to decolonize the research industry; Validation from Indigenous Peoples organizations; • Data sharing, data literacy and data sovereignty standards	
Implementation: Implementation Actions:	**How to implement the actions:**	**Who to address the actions:**
Establish dedicated funding streams for Indigenous-led Arctic research	Build relationships with Indigenous Peoples' organizations (Permanent Participants and Tribal or other governing bodies); Advertise existing funding opportunities to them; Invite research led by (operated or contracted) by Indigenous leaders	All funders of research
Co-develop grant criteria with Indigenous leadership	Convene a workshop series or working group with Indigenous leaders, scholars, and evaluators to develop review metrics and grant criteria. Participants should be paid an equivalent amount to that of scientists' expert participation. With varying funding structures within countries, the work would also have to support within-country co-development criteria.	IASC, or other funders, can open a funding call for this project. IASC can host a pan-Arctic knowledge sharing at ASSW Indigenous scholars to lead the project.
Ensure multi-year commitments	In recognition of the continuity required to implement any project in the north, focus investment on research that builds on relationships of trust (which take multiple seasons to establish); Allow for relationship-building grants which focus on in-region and in community time as well as but distinct from planning grants that focus investment in university infrastructure	IASC can start and advocate other research organizations do the same as a matter of modern ethical practice
Joint International funding efforts require partnership (or at least consent) with relevant Indigenous organization(s)	Similar to CINUK program (case example explained in RPT5 report)	All official IPY projects must engage with and at minimum have consent from impacted Indigenous Peoples' governance organizations (with appropriate compensation from IPY governing bodies to the Indigenous Peoples' organizations for reviewing projects)

Priority 5 *continued*: Further promote knowledge co-production and transdisciplinary methodologies		
Implementation: **Implementation actions:**	**How to implement the actions:**	**Who to address the actions:**
Include holistic goals for all topics of Arctic research, especially considering the health and wellness for Indigenous human and more than human communities	In understanding the long-term effects of colonization, including trauma, land dispossession, mental health, economic, access and other disparities, research calls should highlight the purpose of research that first does no harm and second seeks to heal from past and ongoing effects of colonization. Increase investment in land-based healing practices as a response to systemic health inequities.	Entire research industry
Promote Indigenous-led research across Arctic communities and knowledge systems	Noting that co-production methods may be employed by two or more Indigenous ways of thinking (whether or not they have a western research partner), support for collaborative and mutually beneficial research projects should be enhanced in terms of cross-Arctic learning opportunities (growing beyond the current modes of supporting Arctic/mid-latitude efforts). Establish a network that facilitates the coordination of communications related to Arctic Indigenous research ethics, engagement, and practices. Create a central Indigenous e-hub to communicate essential messages in research and the co-production of knowledge processes and research. Establish a living e-journal that is connected to the Indigenous Pavilions of ISSW/ICARP.	IASC, other research and Indigenous institutions and organizations;
Dedicated, funded work on Indigenous data storage, licensing, and sharing methodologies	Where needed, create workforce and capacity for Indigenous-led data initiatives. Expand capacity of technical teams to support Indigenous-led data efforts through intensive training. Use Indigenous methodologies to mobilize knowledge gained from these activities, popularizing and strengthening these types of activities across the Indigenous world. Sustain funding over long durations to ensure continuity and momentum.	
Shift expectation in research project funding to focus on research that meets a defined community need	All funders should be conscious of the investments they choose to make and intentional in ensuring that collective intellectual work is not wasteful. (The wasted effort in the status quo leads to duplicative work and research fatigue which would be significantly reduced with this change in practice.) This change would also empower communities to have their own priorities met, which enhances the relevance of work done on their homelands (and air, space, waters) and increases	PIs as well as funders have a responsibility to be aware of and responsive to community needs when planning research
Research/academic community regularly engages with Arctic communities and Indigenous Peoples (formal organizations) to update local and regional research priorities so external researchers are guided by known community needs	PIs and funding organizations could prioritize this immediately and into the future, which would take a commitment to acknowledging the wisdom and expertise that exist in those living in and rooted in Northern places, and then literally asking them what the community needs are instead of assuming from far away places (urban centers in the mid-latitudes primarily).	PIs and funders (government and otherwise)
Research upholding Indigenous rights (UNDRIP) as they operate on Indigenous lands	Arctic research occurs on Arctic Indigenous lands, therefore all research should 1. conform to Free, Prior, and Informed Consent 2. tangible benefit to local Indigenous communities 3. findings and data made available to local Indigenous communities 4. follow ethical protocols regarding land use and data sovereignty	All researchers Funders to implement funding requirements
Create deliverables in partnership with local Indigenous communities	Project findings should be made accessible for use by local Indigenous communities, which could include formats directed toward policy decision-making contexts such as national or international governing bodies. These could be policy briefs, maps, web tools, newsletters, films, art, and many other communication mediums.	All researchers

Priority 5 *continued*:
Further promote knowledge co-production and transdisciplinary methodologies

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Increase the direct involvement of Indigenous Peoples (governance organizations) and Indigenous researchers (individuals) in Arctic research	Invite them (and pay for their time) Develop expectations for the ratio of Indigenous scholars in programs, projects, conferences, and initiatives (like ICARP) with transparency of their involvement (or lack of involvement)	Research industry wide
Address knowledge gaps by strengthening methodologies for true co-production of knowledge, especially in the area of human health and wellbeing.	Non-Indigenous researchers trust that Indigenous Knowledge-holders have valid and legitimate contributions; this will take self-education on the Indigenous ways of knowing and doing research by non-Indigenous professionals	Research industry wide
Co-develop frameworks that bridge knowledge systems, ensuring Indigenous leadership in Arctic research moves beyond tokenistic (or box-checking) inclusion.	Build off of co-production of knowledge and other engagement frameworks to co-develop a relevant framework within project/program; Or mutually agree to adopt one or a few of the established frameworks.	All PIs engage in, funders assess/evaluate with input from Indigenous leadership to validate their findings
Expand research activities (aka funding for) Indigenous land-based monitoring, resilience practices, and climate change mitigation.	Fund Indigenous-led long-term in situ monitoring (using academically-trained and Indigenous methodologies) with a focus on supporting climate adaptation and land/resource stewardship	Government and other funders
Invest in Indigenous-led environmental governance models, including those focused on water, ice, and biodiversity protection.	Document existing models and map policy changes necessary to implement Indigenous governance models that have and could again sustain humans within the Arctic (and other environments) as part of thriving and functional ecosystems.	Research industry
Support the transmission of Arctic science knowledge and Indigenous language revitalization as a means of safeguarding Indigenous Knowledges necessary to engage in deep co-production, encompassing scientific, ecological, ethical, and cultural aspects.	Pay for translations of research projects into local languages; Support the human infrastructure of maintaining those languages and the inherently local ecological and other knowledge systems they contain; Fund projects that specifically target understanding the ways language is taught and maintained so data-driven policy choices may be made;	Research industry
Collaborate with Arctic Indigenous Peoples (governance) and address gaps in ethical research protocols that safeguard Indigenous intellectual property.	Trust is required for productive collaborations and healing from colonial-practice injuries to Indigenous communities must have time and space before Indigenous and non-Indigenous researchers can at scale engage in the co-production necessary to use research as a means to correct global harms-enacting robust data governance in respect of Indigenous data sovereignty is one tool to aid in that healing process.	Research industry, especially PIs
Create space for genuine dialogue and collaboration across cultural backgrounds, including mentorship opportunities and strengths-based growth for researchers	This encompasses changes to research project timelines (generally longer than the status quo), expectations for relationship building (more time in community for researchers to move beyond transactional which current funding calls may be inadequately structured for), and valuation of researcher time engaged in these activities (such as university tenure processes recognizing mentorship and relationship building as at least as important as the production of minimally novel publications). This also looks like credentialing Indigenous Knowledge-holders with academic equivalencies to recognize their contributions in mentoring non-Indigenous researchers towards better practices of co-production.	Industry, focus on research institutions (funders, academic centers, universities)
Promote land-based education and research practices in Indigenous and other Arctic communities	Similar to above, likely to require changes to research organizations/institutions in the ways they incentivize researcher activities Invest in research and education infrastructure to accommodate and facilitate different ways of knowledge sharing.	Industry, focus on research institutions (funders, academic centers, universities)

Priority 5 *continued*:
Further promote knowledge co-production and transdisciplinary methodologies

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Related to both above, created spaces that foster growth to increase strengths (skills) of researchers and promote land-based education, Indigenous-led teaching of Indigenous constructs for non-local research staff	Support, fund, and promote Indigenous faculty within academic settings to create and maintain curricula and coursework for local and non-local (and Indigenous and non-Indigenous) students; these classes might look like technical credentials, continuing education, certificates, minors, majors, and/or graduate level	Research orgs and universities
Decolonize education systems in the Arctic to reduce attrition of Indigenous students and increase recognition of capable research partners	Researchers could seek to understand the "leaks" in the academic "pipeline" that result in a disparity of academically credentialed Indigenous persons and seek to address those by either changing the educational environment over which they have significant influence (through documenting and creating data used by policymakers for all levels of education) and advocate directly for decolonial changes, such as their own institutions recognizing equivalencies for Indigenously educated partners.	Industry, focus on research institutions (funders, academic centers, universities)
Meaningfully involve community members in all aspects of research projects, from design to analysis, including application and archiving of data and output materials	Researchers start or continue to meaningfully involve community members in all aspects of research projects, from design to analysis, including application and archiving of data and output materials	Research professionals, especially PIs; funders could incentivize this
Emphasize transparency, accountability for researchers as white-collar professionals.	Metrics of researchers that engage in various degrees of co-production should be published and part of their promotion and tenure within academic systems; Research industry recognition of both professionals that engage in and fail to engage in ethical research practices should be the norm, as is customary with other professionals. This is another tool to build trust with community members and is necessary to engage with Indigenous Peoples who have been harmed by past unethical practices and activities conducted by the research industry.	Research professional organizations; research institutions/universities
Inclusion of diverse Indigenous perspectives	Remember, co-production of knowledge is just two or more knowledge systems. Further, each Indigenous People has a complete cosmology, epistemology, and fully functional knowledge system on which to draw, meaning that external researchers should not simply import or expect Indigenous perspectives from other places to replace engagement with local Indigenous partners (though external Indigenous perspectives may be welcome and helpful to any given project)	PIs, primarily
Recognize and respect the timelines necessary for collaboration and the approaches to timing (ways of considering time) that vary across knowledge systems	See trust-building, relationship-building, also recognizing that Indigenous Knowledge Systems may be on a significantly longer scale than most status-quo western trained researchers who are within the modern paradigm that shortchanges long term understanding with too much emphasis on the immediate.	Funders, PIs, structures of research
Develop policies that ensure Indigenous entities' control over data governance, and as a minimum standard, ensure alignment with the OCAP principles (Ownership, Control, Access, and Possession)*. *and others	This is in support of Indigenous Data Sovereignty and ethical research practices, and is a necessary step in building genuinely co-productive relationships that rely on trust to function.	Research institutes and organizations
Individual researchers are expected to have a baseline of knowledge in the history of colonization of the Arctic and its past and ongoing impacts on Indigenous nations broadly as well as local residents of any area they wish to research	Minimum education requirements for engagement in Arctic research;	Funders could require education/experience minimums before funding PIs to engage in Arctic work; Research institutions could institute continuing education requirements on their staff prior to approving their proposals to seek funding for Arctic projects.

Priority 5 *continued*:
Further promote knowledge co-production and transdisciplinary methodologies

Implementation: Implementation actions:	How to implement the actions:	Who to address the actions:
Individual researchers engage in critical reflection of the colonial systems within which they operate and which Indigenous communities are subject to.	Support for researchers engaging in critical reflective work.	Funding support and institutional support for academically-trained researchers who engage in critical theory work.
Research institutions recognize and respect the work of critical theorists who seek to illuminate and advocate for changes to systems that create or maintain harm to Indigenous communities, especially in the Arctic.	Validate and value critical systems analysis.	Funding support and institutional support for academically-trained researchers who engage in critical theory work.
Research institutions contribute to the advocacy to policymakers on updating system approaches to reduce harm and no longer maintain disparities for Arctic communities.	Promote and enhance communication about work that is critical of harmful systems.	Funding support and institutional support for academically-trained researchers who engage in critical theory work; incentivize those who are effective at reaching policymakers and broader communities outside the Arctic.
Research activities shift towards practices of non-harm and then ethical engagement with Indigenous communities such that research is not an extractive industry.	Introduce ceremony into research activities, at least moments to set good intentions for gathering. Set meeting agreements and code of conducts. Practice being in relation that prioritizes trust, reciprocity (give without expectation of receiving), and long-term commitments.	Research and meeting conveners.
Non-Indigenous researchers analyze the systems within which they work to identify barriers to the inclusion of broad perspectives.	Critical self-reflection to identify existing challenges for those from diverse lived experiences to participate in all aspects of the research industry and/or highlights of ways that the research industry has been inclusive from an intersectional lens. This should include those with expertise being able to participate without giving up connection to full lives in relationship with their homelands.	Those with the most privilege (access, prestige) in the existing system have the most responsibility to engage in this work;
Non-Indigenous researchers analyze the systems within which they work to identify elements of policy and/or practice that exclude those from backgrounds other than the majority.	Critical self-reflection to identify existing challenges created by the research industry that drive away individuals who have experiences and values that differ from the colonial norm.	Those with the most privilege (access, prestige) in the existing system have the most responsibility to engage in this work;
Research organizations promote and incentivize the equitable representation of professionals with diverse backgrounds and perspectives (including lived experiences and educational choices) at all levels of the research industry (decisionmaking, planning, working on projects, etc.)	Conversely, leading research organizations could disincentivize research entities (from professional orgs to individual projects) that bring only narrow experience, accounting for lived and educational backgrounds.	Research industry professionals, esp. Professional organizations
Consider and weigh (count, value) the role of interdisciplinary and intergenerational knowledge transfer in research proposals for ensuring and strengthening healthy and vibrant communities.	Adjust criteria for grading and funding research proposals to include these considerations and the expertise needed to be successful in providing for the communication and stewardship of produced knowledge.	Research industry professionals, esp. Professional organizations
Develop policies that ensure equitable recognition for the contributions of all research partners, including valuing the time and expertise shared in all aspects of the research process, the risks and opportunity costs undertaken by partners, and consensual use and management of all created data and products.	Investment of time in improving the structures of research activities, such as authorship, compensation, and other methods to recognize contributors. This would protect intellectual property, enable appropriate access, and support ethical practices at all stages of the research process.	Research professionals.

5. Recommendations on how to track the Implementation of the ICARP IV Outcomes over the next decade?

Implementation action	How to track?	Who to track?	How to include in the IPY-5 planning?
Identify and compile information on existing weather and climate monitoring programs in the Arctic (including community-based programs) to create a database of ongoing projects.	• Begin data collection through approaches outlined in 4.1; • Produce draft; product by 2027 • Validate product with government organizations by 2028.	• Relevant government organizations • Registry of Polar Observing Networks (RoPON): https://polarobservingregistry.org • Revive Craig Tweedie's projects (ARMAP)	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Organize community workshops to gather Indigenous Knowledge and local knowledges on climate-related risks and hazards	• Identify a target minimum number of persons involved in community workshops for gathering Indigenous Knowledges and local knowledges on climate risks and hazards by 2027; • Workshops occur and are documented by the person responsible for tracking (e.g., through contacting relevant government, private and non-government organizations to understand what work has occurred); • By 2027, compare results with target, noting regions which have not met engagement goals and contacting relevant agencies to address the gap(s).	• Indigenous governmental or non-governmental organization	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Conduct a literature review to assess the current state of knowledge on the impacts of i) extreme weather events, ii) weather hazards, and iii) climate extremes on humans, animals and the environment	• By 2027, have literature review reports for each discipline and in each Arctic region, engaging academic, Indigenous, government, non-government and private organizations; • By 2027, assess whether submitted reports address all disciplines and regions, noting those not yet addressed and contacting relevant organizations to fill need.	• Government organizations in each Arctic region • AMAP (SICCA	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Develop an understanding of impacts of extended ice-free seasons on Arctic species and fisheries that hold cultural, social and economic significance	• By 2026, developing a list of Arctic species and fisheries of cultural, social and economic importance in each Arctic region; • By 2026, developing an interdisciplinary and multicultural team which provided a consensus- and evidence-based assessment and summary of the impacts of longer ice-free seasons on the Arctic species in each Arctic region; • By 2028, outlining species for which we are lacking understanding and developing plans to address knowledge gap(s).	• Intergovernmental organization	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls

Implementation action	How to track?	Who to track?	How to include in the IPY-5 planning?
Training on technical skills, including equipment use, maintenance, data entry, etc. for Northerners and community-members involved.	• Establishing a 2028 target for minimum number of opportunities and people partaking in relevant training (respectively), either through formal education or as part of research projects with the help of Northern and Indigenous community and governmental organizations; • Reporting on results as of 2028 for each Arctic region and discipline.	• Northern Indigenous governmental and non-governmental organizations	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Establish working groups with community partners to co-develop research questions, objectives and project scope.	• Establishing a 2028 target for minimum percentage of research projects in Arctic regions which are co-developed and/or -implemented with Arctic community partners; • By 2028, making a list of all research projects in each region, and the number of projects which were co-developed and/or implemented with Arctic community partners and comparing the proportion to the 2028 target identified.	• Academic institutions • Government organizations • Indigenous government and non-government organizations	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Develop a database documenting instances of Indigenous self-determination and self-governance in Arctic communities	• By 2026, establishing a team (or teams) responsible for defining instances of "Indigenous self-determination and self-governance" and developing a database of these instances in each Arctic region; • Establishing a 2028 target to have this database developed and shared.	• Indigenous government and non-government organizations • Academic institutions	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Develop an understanding and summary of the status and trends in the health and well-being of Indigenous Peoples across all Arctic regions	• By 2026, establishing a team (or teams) responsible for collecting data and compiling the database; • By 2027, providing guidance for metrics and variables which would likely provide data required for an accurate assessment of the health and well-being of Arctic Indigenous Peoples; • By 2027, establishing a research group to undertake a spatial and temporal assessment of the health and well-being of Indigenous Peoples in different Arctic areas using compiled data; • By 2027, this research group would collaborate with the environmental health research group to understand relationships and correlation between trends in the Indigenous health and well-being and environmental contexts; • By 2030, research groups collaborate to develop and present a comprehensive summary document for use as a baseline.	• Arctic Indigenous government and non-government organizations • AMAP Human Health Expert Group has information to share	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls

Implementation action	How to track?	Who to track?	How to include in the IPY-5 planning?
Assessing current emergency management strategies and the status of food and housing security in different regions of the Arctic	• By 2026, communicating with Indigenous organizations, governments, non-governmental organizations, and other relevant actors at the local, regional and national scale, about need; • By 2028, organizations in different regions and at different scales provide an overview of their assessments to an organization or team identified as the point of contact; • By 2030, have a summary document prepared for each region and (perhaps) at different scales to provide an overview of the current state of emergency management and food and housing security to then develop needs for development and implementation of solutions.	• Indigenous government, non-government and community organizations • Government organizations	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Evaluate current and projected future context of commercial maritime activities across Arctic regions	• By 2026, communication of this data need with Arctic nations; • From 2026 to 2028, social and political scientific research to determine local and national resource needs and available resources in Arctic regions; • By 2029, develop an understanding of likely future commercial maritime activities.	• Academic organization	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Evaluate the current and projected future context of military activities across Arctic regions	• By 2026, communication of this data need with Arctic nations; • From 2026 to 2028, political scientific research to determine susceptibility of different Arctic regions to militarization and conflicts; • From 2026 to 2028, technological research to understand future technologies (e.g., infrastructures, satellites) and methods likely to be employed as part of militarization.	• Academic political science organization	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Conduct impact assessments of commercial maritime and military activities on subsistence activities across Arctic regions based on data from above actions	• By 2030, complete environmental and social impact assessments to understand environmental and social implications of technologies and methods likely to be employed.	• Academic political science and economics organization • PAME most has information to share	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Create a database compiling community-led climate change monitoring programs across Arctic regions to highlight local initiatives, promote knowledge exchange, and strengthen collaboration between Indigenous and scientific monitoring efforts.	• By 2026, establishing a team (or teams) responsible for defining community-led climate change monitoring programs" and developing a database of such programs in each Arctic region; • By 2028, have this database developed and shared to Arctic Indigenous organizations at all scales to validate; • By 2029, finalize the database and share results.	• Indigenous or non-Indigenous government organization • Registry of Polar Observing Networks (RoPON): https://polarobservingregistry.org	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls

Implementation action	How to track?	Who to track?	How to include in the IPY-5 planning?
Conduct outreach with hunters, fisherman, harvesters and other community members engaging in and with knowledge on on subsistence harvesting	• Identify a target minimum number of persons involved in community workshops for gathering Indigenous Knowledges and local knowledges on subsistence harvesting by 2027 • Workshops occur and are documented by the person responsible for tracking (e.g., through contacting relevant government, private and non-government organizations to understand what work has occurred) • By 2027, compare results with target, noting regions which have not met engagement goals and contacting relevant agencies to address the gap(s)	• Indigenous and non-Indigenous government organizations	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls
Conduct outreach with commercial fishermen to gather information on key fish species, their distributions, and observed changes in abundance or migration patterns.	• Identify a target minimum number of persons involved in commercial fishing to gather Indigenous Knowledges and local knowledges on fish species distribution by 2027; • Workshops occur and are documented by the person responsible for tracking (e.g., through contacting relevant government, private and non-government organizations to understand what work has occurred); • By 2027, compare results with target, noting regions which have not met engagement goals and contacting relevant agencies to address the gap(s).	• Indigenous governmental and commercial fishing organization	• Identify in relevant communications • Workshop discussions • Encourage thematic funding calls

References

Baena-Morales, S., & Fröberg, A. (2023). Towards a more sustainable future: simple recommendations to integrate planetary health into education. *The Lancet Planetary Health*, 7(10), e868-e873.

Beiderbeck, D., Frevel, N., von der Gracht, H. A., Schmidt, S. L., & Schweitzer, V. M. (2021). Preparing, conducting, and analyzing Delphi surveys: Cross-disciplinary practices, new directions, and advancements. *MethodsX*, 101401.

Carroll, S. R., Herczog, E., Hudson, M., Russell, K., & Stall, S. (2021). Operationalizing the CARE and FAIR Principles for Indigenous data futures. *Scientific data*, 8(1), 108.

Fink-Hafner, D., Dagen, T., Dousak, M., Novak, M., & Hafner-Fink, M. (2019). Delphi method: strengths and weaknesses. *Advances in Methodology and Statistics, 16*(2), 1-19.

Fish, S. L. & Busby, D. M. (2005). The delphi technique. In D. H. Sprenkle and F. P. Piercy (Eds.) *Research methods in family therapy* (second edition). New York: Guilford.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32*(4), 1008-1015.

Holloway, J., Dawson, J., Holloway, N., & Frank, L. (2024). *UN Decade of Ocean Science for Sustainable Development: "A Safe Ocean" Benchmarking Report* [report]. https://doi.org/10.20381/ruor-30621

ICC (Inuit Circumpolar Council) (2022). Circumpolar Inuit Protocols for equitable and ethical engagement. ICC. Inuit Circumpolar Council) https://www.inuitcircumpolar.com/project/circumpolar-inuit-protocols-for-equitable-and-ethical-engagement/

Inuit Tapiriit Kanatami (ITK). (2018). National Inuit Strategy on Research [Report]. https://www.itk.ca/projects/national-inuit-strategy-on-research/

Pfeifer, P. (2018). From the credibility gap to capacity building: An Inuit critique of Canadian Arctic research. Northern and Public Affairs, 29-34.

Redvers, N., Celidwen, Y., Schultz, C., Horn, O., Githaiga, C., Vera, M., ... & Blondin, B. S. (2022). The determinants of planetary health: an Indigenous consensus perspective. *The Lancet Planetary Health*, 6(2), e156-e163.

Sudlovenick, E. Jenkins, L. Loseto, (2024). Comparative review of One Health and Indigenous approaches to wildlife research in Inuit Nunangat, *One Health*, 19, 100846, https://doi.org/10.1016/j.onehlt.2024.100846.

Shapovalova, D. (2023). Just Transition in the Arctic context: introduction. *The Polar Journal*, 13(2), 191-194.

The Collaboratory for Indigenous Data Governance. (n.d.). "Transforming institutional governance and ethics for Indigenous control of Indigenous data." Retrieved November 7, 2025, from https://indigenousdatalab.org/

Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research & Social Science*, 82, 102291.

Wenkai Guo

Appendix 1: About RPT 3

1.1. Approaches / Methods used to complete the RPT 3 tasks

A multi-round modified Delphi survey was employed to identify a list of research priorities and knowledge gaps stemming from the broader knowledge community related to the RPT3 theme: "Understanding the dynamics and resilience of Arctic SESs to foster sustainable futures". The Delphi survey is an iterative survey approach employed to identify consensus and on matters which can be contentious, subjective and/or difficult to evaluate (e.g., research and funding prioritization, policy priorities) (Beiderbeck et al., 2021; Fish & Busby, 2005; Hasson, Keeney & McKenna, 2000; von der Gracht, 2012).

There are many strengths and limitations to the Delphi survey (Fink-Hafner et al., 2019). Of these, two strengths emerge as most notable for the purposes of the IASC RPT 3 research prioritization. The first is that the surveys can occur in an online format, ensuring ease of access and inclusivity for peoples from a variety of backgrounds and geographic regions (Fink-Hafner et al., 2019). The second is that the process is iterative, providing participants with the opportunity to anonymously review research priorities shared by other participants and rank all priorities (including those shared by the individual and the other expert participants) in a systematic manner, allowing participants the opportunity to revise their views without compromising their reputation (Fink-Hafner et al., 2019; Fish & Busby, 2005).

The inclusion of Arctic Peoples is key when discussing research needs in Arctic regions to ensure that research funds can be prioritized to produce tangible benefits to those who inhabit and care for the region (ITK, 2018; Pfeifer, 2018; Wheeler et al., 2020). The online nature of the survey ensured that Arctic Indigenous people could participate in the work and provide their key research priorities and knowledge gaps.

The online survey platform Qualtrics was used to conduct the surveys. Survey Round One was disseminated to participants through publicly available emails, social media posts, direct correspondences, and through snowball methods (i.e., participants sharing the survey with colleagues they felt would be well-suited to taking the survey). In both surveys, demographic data was collected from participants for an analysis of the responses received according to affiliations, work (e.g., professor, policymaker, hunter/fisher) and self-identification as Indigenous, among other demographics.

Survey Round One was disseminated from October 2024 to May 2025 with a total of 91 responses. Survey Round One consisted primarily of two open-ended questions, asking participants to identify (i) knowledge gaps and (ii) research priorities related to the RPT3 theme: "Understanding the dynamics and resilience of Arctic SESs to foster sustainable futures". These knowledge gaps and research priorities were categorized using constant comparison and an inductive coding approach to identify overarching categories.

A list of publicly available recent (2015-2025) Arctic research priority documents relevant to the RPT 3 theme was compiled by RPT 3 members. This included documents from different nations, organisations, institutions and (including Indigenous nations and organisations) across the globe. Literature was identified using keyword searches on search engines such as Google, and through snowball identification methods (i.e., locating a relevant report through experiences and including this in the list of documents). A total of 68 documents were reviewed from 11 countries/regions and, as well as international documents. As discussed, organizational and institutional documents (not only governmental) were included in this analysis, with representation from Indigenous organizations at a variety of scales, such as Inuit Tapiriit Kanatami, Inuit Circumpolar Council, Nunavut Wildlife Management Board, Yukon First Nations Climate Action Fellowship, and the Saami Council, among others.

In concert with Survey Round One, RPT 3 members reviewed the documents to identify explicit (i) knowledge gaps and (ii) research priorities. Many documents were reviewed and knowledge gaps and research priorities identified manually, while some documents were reviewed using the Generative Large Language Model ChatGPT (or others)). Literature review knowledge gaps and research priorities were categorized using a deductive approach with 10 categories representative of the RPT 3 theme established during RPT 3 meetings in Iceland in Fall 2024.

These 10 literature review categories and those emerging from the Survey Round One were then reduced to four common categories to reduce overlap between categories and the burden for Survey Round Two participants. Once categories were harmonized between research priority lists from the literature review and Survey Round One, the priorities from both datasets were combined in their respective categories. Employing a constant comparison approach, duplicate priority statements were identified and removed and similar priority statements combined. Microsoft Co-Pilot was employed to support identification of similar and duplicate statements which were manually removed after inspection of generated recommendations.

A subset of persons who answered Survey Round One volunteered to answer Survey Round Two and were invited to take part in the survey via email (n=82). The finalized list of 78 research priorities was then returned to participants in Survey Round Two. Participants were asked to rate each of the priority statements according to three criteria shown in a rubric: (i) the priority level, (ii) feasibility: access to necessary resources, and (iii) actionability: timeline and achievability by 2035. Each criteria had a rating from one to four and a fifth "Prefer not to respond" rating. The rubric was adapted from that outlined in Holloway et al. (2024) (see Figure 1 below for the rubric shown to participants).

Evaluation Criteria	Rating 1	Rating 2	Rating 3	Rating 4
Priority level (relevant for ensuring Arctic social-ecological resilience)	**Highest priority**: most relevant for ensuring Arctic social-ecological resilience; must be considered.	**High priority**: very relevant for ensuring Arctic social-ecological resilience; should be considered if resources permit.	**Low priority**: not very relevant for ensuring Arctic social-ecological resilience; should be considered if there is a great excess of resources.	**No priority**: not relevant for ensuring Arctic social-ecological resilience; no resources should be devoted to priority.
Feasibility: Access to necessary resources (money, people, skills)	**Required resources are readily available**: can certainly be achieved with existing fiscal realities, infrastructure and assets, and capacity (personnel and skills).	**Required resources are likely to be available**: likely achievable with existing fiscal realities, infrastructure and assets, and capacity (personnel and skills); some innovative solutions are required to meet resource needs.	**Required resources are unlikely to be available**: unlikely to be achievable with existing fiscal realities, infrastructure and assets, and capacity (personnel and skills); very innovative solutions are required to satisfy resource needs.	**Required resources will definitely not be available**: definitely unachievable with existing fiscal realities, infrastructure and assets, and capacity (personnel and skills); no possible solutions to satisfy resource needs.
Actionability: Timeline and achievability by 2035	**Definitely actionable**: no identified barriers (e.g. legal, political, institutional, social, etc.) to implementation by 2035.	**Likely actionable**: some identified barriers (e.g. legal, political, institutional, social, etc.) to implementation by 2035.	**Not likely actionable**: significant barriers (e.g. legal, political, institutional, social, etc.) to implementation by 2035.	**Definitely not actionable**: insurmountable barriers (e.g. legal, political, institutional, social, etc.) to implementation by 2035.

Figure 1: Rubric outlining evaluation criteria for use by participants adapted from Holloway et al. (2024).

The responses of participants were then used to calculate the overall most highly rated priorities, combining the mean ratings (excluding "Prefer not to respond" ratings) for the level of priority, feasibility, and actionability. Consensus was also measured using combined consensus threshold values commonly used for a 4-point Likert scale questionnaire.. The thresholds were an interquartile range (IQR) of ≤1 and a Coefficient of Variation of ≤0.5. If both thresholds were met, then the statement had "high" consensus; if only one threshold was met, then the statement had "low" consensus; if no thresholds were met, then the statement had "no" consensus. The list of the 5 most pressing research priorities (most highly ranked as identified through the mean of the level of priority and the level of implementability (implementability referring to the mean of feasibility and actionability values) were pulled for discussion and analysis of needs for integration in Chapter 3.

Mariasilvia Giamberini

1.2. Overlaps and Synergies with other RPTs

We anticipate some overlap with RPT5 considering our focus on community-based research and inclusion of Indigenous Knowledges and Indigenous research methods and science. Other synergies are likely, for example, a key aspect surrounding the focus areas of this RPT was about how this RPT in particular pulls from and builds upon all of the other RPTs: priority research areas identified in RPTs 1 and 2 may inform community infrastructure resilience in the face of climate change; global cooperation, co-production, and Indigenous

methodologies (RPTs 4 and 5) are essential for scaleable innovation, reconciliation, and leveraging significant national research investments; knowledge about the Arctic (RPT6) should be inclusively developed, inform its Arctic populations and enable its people to lead Arctic research, building an Arctic population-led research economy; and research infrastructure (RPT 7) in the Arctic cannot be put in place without the consideration of its impacts and benefits in local and regional contexts.

1.3. RPT 3 Membership

Our RPT has extensive membership across the globe, including more than 11 different countries. We are a group composed primarily of academics with a few members representing environmental and Tribal nonprofits. Our group includes a broad range of intersecting identities from nationality to race/ethnicity and gender and sexuality, which is why inclusion was so important to our group (see lessons learned in section 6.)

Our team brings together broad and interdisciplinary expertise in climate change, sustainability, and Arctic systems. We work across climate modeling, meteorology, permafrost science, hydrology, renewable energy, and air–sea–land interactions to better understand environmental change. This includes knowledge of marine and terrestrial ecosystems, including marine ecology, biodiversity, ocean food webs, nutrient transfer, and remote sensing.

Our efforts in Arctic infrastructure and public water systems support community resilience and environmental health. We also integrate social and environmental anthropology, land use conflict resolution, waste management, and ecosystem-based health strategies, applying One Health and Planetary Health frameworks to study climate-sensitive diseases, human impacts to the natural world on planetary health, and promote holistic well-being. Sustainability is a central theme throughout our work (not sustainable development), with strengths in urban systems, energy, governance, and development (avoiding harm to humans and the natural world). Many of us focus on Indigenous Knowledges, Tribal governance, and policy, working closely with communities to support culturally grounded and locally relevant solutions

Name	Affiliation	Country
Co-Chairs		
Jackie Dawson	University of Ottawa	Canada
Heather Sauyaq Jean Gordon (Iñupiaq)	Sauyaq Solutions, LLC	United States
Past Co-Chair (October 2024 to May 2025)		
Varvara Korkina Williams	Institute of Arctic Studies, Dartmouth College	United States
Research Leads		
Julia Macpherson	University of Ottawa	Canada
Nathaniel Holloway	University of Ottawa	Canada
RPT Members alphabetically by last name. Some members have been in the RPT since ASSW 2024, others joined midway, and some left the RPT prior to this report, this is recognizing all those contributing at one point or another across the RPT 3 work:		
Nicoletta Ademollo	National Research Council of Italy, Institute of Polar Sciences (CNR-ISP)	Italy
Claire Alix	University of Paris 1 Panthéon-Sorbonne	France
Anne Barker	National Research Council	Canada
Douglas Causey	University of Alaska / Harvard University	United States
Tatiana Degai (Itelmen)	University of Victoria	Canada/Russia
Seira Duncan	University of Eastern Finland (UEF)	Finland
Igor Ezau	The Arctic University of Norway (UiT)	Norway

Name	Affiliation	Country
Nadezhda Filimonova	Harvard University	United States
Jérôme Fort	CNRS	France
Anne Garland	Applied Research in Environmental Sciences Nonprofit Inc.	United States
Laura Ghigliotti	CNR-IAS	Italy
Gustavo Yunda-Guarin	Fisheries and Marine Institute, Memorial University	Canada
Taka Hirata	NPO Digital Hokkaido / Hokkaido University	Japan
Tetsuya Hiyama	Nagoya University	Japan
Yoshihiro Iijima	Department of Geography, Tokyo Metropolitan University	Japan
Kaori Ishii	Tohoku University	Japan
Emily Jenkins	University of Saskatchewan	Canada
Ilona Kater	Scott Polar Research Institute (SPRI)	United Kingdom
Brendan Kelly	Study of Environmental Arctic Change	United States
Mariel Kieval	The Arctic Institute, University of Helsinki	United States/Finland
Vera Kuklina (Buryat)	The George Washington University	United States
Stacey Kangipneq Lucason (Yup'ik)	Kawerak, Inc.	United States
Alexandra Middleton	Oulu Business School, University of Oulu	Finland
Maribeth Murray	University of Calgary	Canada
Andrey N. Petrov	ARCTICenter, University of Northern Iowa	United States
Olga Povoroznyuk	University of Vienna	Austria
Sophia Renn	University of Edinburgh	United Kingdom
Mathieu Reverberi	University Centre of the Westfjords	Denmark
Michael Reynolds	Toolik Field Station, Institute of Arctic Biology, University of Alaska Fairbanks	United States
Massimo Santarelli	Politecnico di Torino	Italy
Victoria N. Sharakhmatova (Itelmen)	ARCTICenter, University of Northern Iowa	United States/Russia
Virginie Vaté	(Centre National de la Recherche Scientifique (CNRS), Groupe 'Religions, Societies and Secularisms' (GSRL)	France
Ramey Wood	Nine One Ten	United States

Appendix 2: List of Acronyms

ACEP: Alaska Center for Energy and Power

AMAP: Arctic Monitoring and Assessment Program

AOS: Arctic Observing Summit

ARF: Arctic Research Foundation

ARMAP: Arctic Research Mapping Application

ASSW: Arctic Science Summit Week

AWI: Alfred-Wegener Institute

CAFF: Conservation of Arctic Flora and Fauna

CARE: Collective benefit, authority to control, responsibility, and ethics (data principles)

CINUK: Canada – Inuit Nunangat – United Kingdom (project)

EU: European Union

FAIR: Findable, accessible, interoperable, and reusable (data principles)

GPS: Global positioning system

IASC: International Arctic Science Committee

ICARP: International Conference on Arctic Research Planning

ICC: Inuit Circumpolar Council

IPY: International Polar Year

IQR: Inter-quartile range

ISER: Institute of Social and Economic Research (uAlaska)

ITK: Inuit Tapiriit Kanatami

NASA: National Aeronautics and Space Administration (United States)

PI: Primary investigator

RoPON: Registry of Polar Observing Networks

RP: Research priority

RPT: Research Priority Team

SAON: Sustaining Arctic Observing Networks

SES: Social-ecological system

STEAM: Science, Technology, Engineering, Art, and Math

UNDRIP: United Nations Declaration on the Rights of Indigenous Peoples

WG: Working group

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