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SYNTHESIS FOR ARCTIC LEADERS

Navigating Arctic Change

The Arctic is changing, ever faster and with widening scope. Decisive action is needed to effectively navigate emerging conditions, and to avoid potentially negative social and ecological changes that may already be on their way. Responses will be most effective if they build on a well-integrated, evidence-based interdisciplinary understanding of Arctic social-ecological systems and their relationship with global processes, draw on Indigenous Knowledge, and are well-grounded in practical experience. To be successful, responses need to be applied across regions of the Arctic, coordinated across different levels of policy and take both long and short time-frames into account.

This *Synthesis for Arctic Leaders* integrates key findings of the *Arctic Resilience Report*. It identifies critical policy-relevant insights, and points to activities already underway that have demonstrated potential for building resilience. The Synthesis is aimed at policymakers and other leaders who are concerned with strengthening people's capacity to effectively navigate rapid, substantial, and potentially disruptive changes in the Arctic, and to harness change that supports the well-being of northern peoples. It is aimed at the Arctic Council, in its role in identifying common goals and coordinating efforts across the Arctic. It is aimed at national and regional leaders, in their role as stewards of the Arctic – and of their citizens' well-being and initiators of wide-ranging actions. It is aimed at local leaders, whose active engagement is so central to building resilience.

Resilience was an important theme in the three major international agreements struck during 2015: the Paris Climate Agreement, the Sendai Framework for Disaster Risk Reduction, and the 2030 Agenda for Sustainable Development. Although the emphases of the agreements vary, each recognizes that social and ecological systems are inseparable. Successfully managing change is dependent on both social and environmental factors, as people are interconnected with the biophysical environments upon which they depend. This social-ecological relationship is perhaps nowhere more clear than in the Arctic.

While there is only one Arctic, different groups define their interests and goals related to the Arctic in diverse and sometimes conflicting ways. For its residents, the region is primarily a home, but it is seen by many others as a source of marketable resources. And it plays a key role in supporting unique living systems while also regulating the Earth's climate. This diversity of perspectives on the Arctic presents a significant challenge for policymaking, and for developing cross-sectoral and cross-scale perspectives on security, tourism, extractive industries, well-being, and the specific interests of Indigenous Peoples. While such diverse areas have generally been analyzed separately, it is increasingly recognized that the many perspectives on the Arctic need to be integrated in order to respond effectively to change and nurture resilience.

The Executive Summary of the Arctic Resilience Report serves as a companion document to this Synthesis and provides both key findings and a section-by-section overview. This Synthesis consolidates those findings into insights and recommendations of areas where action could be taken to build resilience. These actions have subsequently been integrated into a draft Arctic Resilience Action Framework, described later in this document.

Box: Background: The Arctic Resilience Report

In their report to the 2011 Nuuk Ministers' meeting, the Senior Arctic Officials' identified the need for "an integrated assessment of multiple drivers of Arctic Change as a tool for Indigenous Peoples, Arctic residents, governments and industry to prepare for the future". In response, the 2011 Nuuk Ministerial Declaration thus "notes with concern the accelerated change in major components of the cryosphere and the profound local, regional and global effects of observed and expected changes, emphasizes the need for forward looking Arctic cooperation with a view to increase Arctic resilience and to enhance Arctic Council leadership to minimize the human and environmental impact of climate change..."

Two Arctic Council projects emerged directly from the Nuuk Declaration and the needs identified by the Senior Arctic Officials: Adaptation Actions for a Changing Arctic (AACA), now under AMAP, and the Arctic Resilience Report (ARR), initiated as a project of the Swedish Arctic Council Chairmanship (2011-2013) and now co-chaired by Sweden and the United States.

The mandate of the ARR was specified by the Arctic Council at its meeting in Luleå, Sweden, on 8–9 November 2011: it was tasked with identifying potential for shocks and large shifts in ecosystem services that affect human well-being in the Arctic; analyzing how different drivers of change interact in ways that affect the ability of ecosystems and human populations to withstand shocks, adapt and transform; and evaluating strategies for adaptation and transformation in the face of rapid change. The project has been led by the Stockholm Environment Institute and the Stockholm Resilience Centre in collaboration with the University of Alaska Fairbanks and the Resilience Alliance. The project has built on collaboration between the Arctic States and with Indigenous Peoples in the region, as well as with several Arctic scientific organizations. In keeping with Arctic Council procedures, a Project Steering Committee (PSC), chaired by Sweden and the United States, was established that included participants from Arctic States and Permanent Participants, as well as from the Arctic Council Working Groups, collaborating organizations and Arctic Council Observers. The scientific work of the ARR has been subject to a scientific peer review process (organized by IASC), and selected portions of the final report were submitted for additional review through AMAP.

An Interim Report from the ARR was delivered to the Kiruna Ministerial Meeting in 2013 at the conclusion of the Swedish Arctic Council Chairmanship. The final scientific report from the project, the Arctic Resilience Report, was submitted to Senior Arctic Officials at their October 2016 meeting in Portland, Maine, and formally launched at the Swedish Ministry of Environment and Energy in November 2016. This Synthesis for Arctic Leaders is derived from the Arctic Resilience Report and the Interim Report.

Due to similarities and complementarities between the two projects, the ARR has coordinated with the AACA. The projects share similar goals, but employ different methodologies; whereas the AACA informs and examines adaptation opportunities based on scenarios of future change with a sub-regional focus and assessments of on-going adaptation activities, the ARR draws on a diverse set of recent case studies where major thresholds have been already reached or could be reached in the foreseeable future, together with analyses of the policy landscape at the circumpolar scale. The ARR and AACA both provide knowledge on how to avoid and/or respond to the impacts of a rapidly changing Arctic.

The AMAP Working Group of the Arctic Council has reviewed this Synthesis for Arctic Leaders to ensure that its content is consistent with AMAP's published work on Arctic climate change at the time of the release of the ARR. The views expressed in the ARR and this Synthesis for Arctic Leaders are the responsibility of the lead authors of the ARR and do not necessarily reflect the views of the Arctic Council, its members or its observers. This Synthesis is intended for Arctic leaders at all scales, from the Arctic Council to the local level. It contains recommendations of specific areas where additional action can contribute to resilience and provides a selection of examples of current activities.

Part II. The Arctic Resilience Report: Key Insights

The key insights below are based on findings of the Arctic Resilience Report 2016 as well as the Arctic Resilience Interim Report (2013).

Overarching messages:

- *The people of the Arctic are on the forefront of global change, yet they are not its primary cause. Building resilience of the Arctic will primarily require actions to be undertaken within the Arctic.*
- *The fate of the Arctic will be decided by actions taken largely outside the Arctic. Changes in the Arctic can have significant global repercussions, influencing global-scale societal and biophysical systems. Slowing the pace of global and Arctic change requires actions primarily outside the Arctic.*
- The social and environmental systems of the Arctic can accommodate very diverse activities, but to do so while maintaining the systems' core functions and important values for human well-being requires an integrated understanding of the interactions between people, ecosystems, and the physical environment in the Arctic.
- While the dominant drivers of change in the Arctic are linked to climate change, Arctic change is often experienced through interlinked social and environmental factors. These factors play out differently in different locations, through land and sea use, and cultural, social and economic change.
- There are already many efforts underway in the Arctic that build resilience. These activities can be modified to address limiting factors. Their impact can be magnified by sharing ideas, replicating and adapting promising efforts, by scaling up, and by coordinating among different decision arenas.
- The ARR concludes that non-linear change with potentially irreversible shifts is a real risk in the Arctic. The scientific assessment in the ARR identifies 19 instances in the Arctic, where multiple drivers, in particular climate change, can trigger abrupt and potentially irreversible change, with far reaching social-environmental implications for Arctic communities and beyond.

Part III. Actions to Enhance Arctic Resilience

These key insights from the Arctic Resilience Report point to clear challenges for decision-making. Causes and consequences are separated geographically and in time. Complex causal linkages underlie important policy problems. Diverse actors pursue different and sometimes conflicting goals, and change is leading into uncharted territory. Such turbulent conditions call for new approaches to planning, policy, and practice.

The ARR has reviewed and engaged with a variety of initiatives that make important contributions to people's capacity to navigate into an unpredictable future. Many of these initiatives have been

carried out under the auspices of the Arctic Council. Others have been initiated at the regional and local levels. The ARR enumerates well-tested principles to help guide resilience-building policy and activities and points to the importance of assessing different characteristics that contribute to resilience. The ARR also identifies a range of activities that contribute to building resilience. Recommendations for these resilience-building activities can be organized into three categories for action:

- 1. Integrate social and ecological monitoring using a systems perspective**
- 2. Strengthen knowledge integration**
- 3. Increase the capacity of Arctic people to engage with, respond to, and shape change**

Activities that build and strengthen resilience are already underway in these three areas, and Arctic leaders have an opportunity to make significant improvements. For example, innovation within those activities and wider sharing of approaches supports transfer of knowledge and coordination of activities. Resilience can be strengthened through replicating those current activities in additional locations, adapting them to local contexts as needed. It can be strengthened by scaling up and increasing the reach of some activities that can be effectively implemented in different regions and, on larger scales or higher governance levels. And where there are gaps, new, complementary activities can be added.

1. Integrate social and ecological monitoring using a systems perspective

The interactions between social and ecological components - including feedbacks - provide both early indications of system change and possible disruptions, and opportunities for intervention to help navigate and harness change. Monitoring typically focuses on either social, biological or geophysical systems, but seldom on the dynamics of social-ecological systems as a whole. Integrated monitoring to strengthen these abilities for decision-making requires data gathering, synthesis, and assessment strategies that integrate human and biophysical dynamics. While some forms of monitoring are not easily amenable to encompassing social-ecological systems, promising steps have been made in this direction.

Box 1: Example-Extend community-based monitoring of social-ecological systems

Community-based monitoring (CBM) programs that make use of local expertise offer a promising way to strengthen the knowledge base on social-ecological interactions. Already, these efforts benefit from Arctic inhabitants' time spent in close contact with nature, "drawing on personal experience, information shared with others, and knowledge handed down through generations." With additional training, planning, and incentives, such "citizen science"¹ monitoring efforts can further build relevant, shared knowledge. Numerous examples from around the world demonstrate how hunters, fishers, urban residents, and other users of ecosystems have collaborated to produce knowledge. Such efforts have been documented to provide other benefits as well, particularly local learning, network building, and increased capacity for engagement and involvement in local decisionmaking.²

Integrating monitoring efforts to encompass the dynamics of social-ecological systems would entail extending CBM to include observations pertaining to direct and indirect impacts of ecosystems change on people – a potential envisioned in early Arctic Council initiatives to develop CBM.³ Such observations are already being recorded to some extent, for example, where observations are made regarding species that are food sources, or snow cover or ice extent observations that also impact transport or hunting. These observations could be further developed to include the social activities connected with those developments, for example, how social networks shape hunting and food sharing practices. As with the application of scientific methods for conducting "citizen science" in the observation of ecosystem phenomena, ongoing training and follow-up is important in ensuring the development application of criteria for scientific quality. The effectiveness of these local efforts also can be enhanced by linking with observation systems at greater scales.

Recommended next steps: engage with CBM projects to identify and develop observations to provide knowledge on social-ecological interactions and social consequences of ecosystems change.

Local leaders: engage in workshops for developing and testing criteria for social-ecological observations.

National and regional leaders: provide support for workshops, including funding and technical support

Arctic Council: facilitate use of systems perspective in CBM by promoting collaboration between relevant working groups, encouraging Arctic states to identify relevant goals in the Arctic Resilience Action Framework (ARAF).

Examples: Some CBM projects that could be extended are:

CLEO (Circumpolar Local Environmental Observer Network) – ACAP. LEO, based in Alaska, uses handset based technology to enable community members to record observations. CLEO expands participatory monitoring of environmental change to the circumpolar level. For further information, see: <http://www.leonetwork.org/>,

CONAS (Community Observation Network for Adaptation and Security) – CAFF. CONAS is an international community-based monitoring network with eight indigenous partner communities bordering the Bering Sea in East Russia and Alaska. See: <http://conas-ak.org>

PISUNA (Piniakkanik Sumiif nni Nalunaarsuineq - the Greenlandic name of the project) – Government of Greenland. Government of Greenland has collaborated with communities in Disko Bay and Uummannaq Fiord of NW Greenland to pilot the use of community-based natural resource monitoring as a tool for improving biodiversity conservation and sustainable resource management. See <http://www.pisuna.org>

¹ <http://www.caff.is/community-based-monitoring>

² http://publications.gc.ca/collections/collection_2014/ec/En40-883-2003-eng.pdf

³ https://oaarchive.arctic-council.org/bitstream/handle/11374/178/Community_Based_Monitoring_Discussion_Paper_Nov_2004.pdf?sequence=1&isAllowed=y

End Box 1

2. Strengthen knowledge integration

Understanding Arctic change requires an approach that integrates the dynamics of social, biological and geophysical systems. The Arctic Resilience Report points to important knowledge gaps that are partly an outcome of the structures through which knowledge is pursued and organized. Bridging the spaces between already available types of knowledge is a crucial endeavor, both within the structures of conventional science, and in efforts to find meaningful linkages with Indigenous Knowledge on equal terms.

Knowledge integration can be challenging as it requires trust, clarification of meanings and concepts, as well as negotiation regarding what knowledge is needed and to which goals it should be directed. It also requires respect that systems of knowledge production can differ. In many instances, integration also requires fitting together the puzzle pieces of already established knowledge and developing new frameworks and methods to integrate existing knowledge and gathering new data that generates new discoveries.

Box 2:

Currently, several initiatives seek to strengthen knowledge integration in the Arctic. These efforts include problem-based projects that employ interdisciplinary approaches at local and regional levels, efforts to integrate Indigenous Knowledge and local knowledge with scientific knowledge, and collaboration between Working Groups. These diverse initiatives have been pursued at different scales, and can also be distinguished based on whether knowledge integration is pursued at the front end in monitoring and data gathering, or later, in the application of knowledge for decision support and

informing action (the CBM example described above involves integration in the knowledge production phase). As the examples highlighted below illustrate, this integrated knowledge also has implications for management and decision-making.

Recommended next steps: *Initiate local projects and overarching research projects organized to incorporate knowledge from different knowledge systems and academic disciplines. Prioritize projects that actively engage with communities.*

Local: *integrate knowledge through application of diverse, relevant knowledge to practical local goals such as natural resource management or adaptation planning.*

Regional and National: *prioritize funding and technical support for problem based, interdisciplinary projects that use specific social-ecological challenges to focus knowledge integration, and that meaningfully engage with communities.*

Arctic Council: *prioritize projects that require active collaboration between two or more Working Groups*

Knowledge integration in knowledge production

Bridging knowledge traditions: integrating Indigenous Knowledge with scientific assessment (Arctic Council Working Groups). The Working Groups (WGs) of the Arctic Council have engaged in a variety of efforts to bridge knowledge traditions. As an expression of this important trend, each has engaged in efforts to integrate Indigenous Knowledge with their scientific assessments. As the remit of each WG varies considerably, the experience and lessons learned through these efforts can also be expected to vary. Important examples include CAFF's efforts integrate Indigenous Knowledge in the Arctic Biodiversity Report and in community-based monitoring, PAME's Arctic Ocean Review, as well as SDWG's Adaptation Exchange Portal (part of the earlier phase of Adaptation Actions for a Changing Arctic). Although these kinds of bridging and integration efforts are often demanding, they can be improved through experience.

Knowledge integration through problem-oriented application of knowledge:

Local: Knowledge integration through capacity building activities

Participatory Scenario Analysis - Community based research (two projects)

Numerous projects involve research and learning through participatory processes that engage communities, link different types of knowledge and expertise, and produce both integrated knowledge and an enhanced capacity for further activity along similar lines. Examples include the Scenarios project under the North Slope Science Initiative (NSSI - see <http://northslope.org/scenarios>) in Alaska, and a sub-project in the European Arctic "The Changing Global Context of the European Arctic," under Mistra's Arctic Sustainable Development research program (see www.mistraarctic.se; <https://www.sei-international.org/mediamanager/documents/Publications/NEW/sei-wp-2015-uncertain-futures-nilsson.pdf>). Such participatory projects are often typically grounded and executed in a way that lends itself to expansion by replication. They may also be carried out with participants whose responsibilities provide insights into potential actions at larger scales, making it applicable to a variety of settings. There is potential for such activities to be iterative and for expanding to additional locations through training participants from earlier activities.

Regional and Pan-Arctic: Project based, problem oriented knowledge integration

AACA-C (Adaptation Actions for a Changing Arctic) - AMAP: The third phase of the AACA project seeks to "produce information to assist local decision-makers and stakeholders in three pilot regions in developing adaptation tools and strategies to better deal with climate change and other pertinent environmental stressors." The different phases of the AACA project have been based within different WGs. The work of the diverse group of experts who have engaged with the AACA-C has provided valuable insight and experience. Better understanding the barriers to, and pathways for, bridging different kinds of knowledge will help guide concrete action for adaptation.

(see <http://www.amap.no/adaptation-actions-for-a-changing-arctic-part-c>)

End box 2

3. Increase the capacity of Arctic people to engage with, respond to and shape change

The capacity of people to organize themselves to respond to problems and opportunities is a core component of resilience. Strengthening people's ability to build good lives and communities in the Arctic requires supporting their capacity to engage with, respond to, and shape change. This capacity enhances people's ability to develop the knowledge needed to navigate wisely and deliberately into the future, and to engage in activities based on this knowledge.

The capacity to shape change refers to the ability of a community to substantially influence its development and fate within its own particular social-ecological context. The connectedness and diversity of the Arctic led the ARR to focus on the importance of supporting place-based partnerships and engaging the specific capabilities of actors operating at local, regional and circumpolar scales. A 'community' is therefore considered to be an integrated group of people, which can range from a village to a city, an indigenous group, a livelihood group or a constellation of these entities.

Increasing the capacity of various actors to engage with and shape change also encompasses the previous two categories for action: integrating monitoring using a systems perspective and strengthening knowledge production and integration. It also requires the collaborative development of decision support tools and decision making processes. Shaping change can take many forms, including choosing from among possible adaptive responses to inevitable changes. In some instances, shaping change may entail engaging in transformative change, with a community fundamentally changing what they do and how they are connected to ecosystems, while retaining their core identity. Examples of such transformations can be found in the case studies in the Arctic Resilience Report.

An important lesson from studies of social-ecological change in non-crisis conditions is that adaptive capacity often emerges when people work together to address concrete problems. Such efforts produce multiple benefits. The first is addressing the issue or problem. A second, less obvious benefit, is the strengthening of the capacity for self-organization and engagement in subsequent issues. Third, is a group's ability to establish links within a place as well as with actors at other levels of decision-making that facilitate learning and the spread of innovations through enabling the sharing of knowledge and experience. In addition, engagement activities in the Arctic have the potential to produce examples that are highly relevant to tackling challenges to resilience in other parts of the world.

Box 3: Engagement with change

The capacity to engage effectively and strategically with change needs to be activated, practiced, and developed to remain viable. Activities that maintain and enhance this capacity can take many forms. These include specific participatory processes such as adaptive co-management of living resources, community energy planning, and regional strategies, or forward-looking processes such as the participatory scenario planning and use of decision theaters by stakeholders described in chapter 8 of the ARR and listed under the previous two recommendations, or initiatives to negotiate around contested activities and align what were previously conflicting goals. Such processes can provide community leaders and local residents greater capacity to self-organize, experiment, learn, build the relationships that strengthen social cohesion, and in many cases take responsibility for decisions and implementation of programs.

Recommended next steps: support projects and activities that engage community members in problem solving activities using local knowledge, Indigenous Knowledge, and interdisciplinary science as tools for grappling with those problems.

Local: identify and pursue opportunities to engage community members in constructive problem solving activities, particularly where support is needed in grappling with contentious issues.

Regional and National: prioritize scientific and other community-based projects that facilitate active engagement of community members preparing for and responding to current and future challenges.

Arctic Council: support sharing of good practices and experience of community engagement between Arctic nations, engage expertise across Working Groups

Finding common ground, aligning previously incompatible goals:

Arctic Waterways Safety Committee

The ARR highlights how multiple views of the Arctic give rise to diverse goals, some of which are mutually incompatible. Projects such as the Arctic Waterways Safety Committee (northern Alaska - <http://www.arcticwaterways.org/home.html>) offer an example of a successful effort to negotiate arrangements among interested parties that improve the conditions of co-existence.

Municipal Relocation: Kiruna, Sweden

The northern Swedish town of Kiruna is being relocated due to effects of the iron mine over which the city is built, and which provides its economic base. The need to relocate the town has been known for over a decade, and although there have been disagreements and struggles, the mining company LKAB, the municipal government and other major actors have begun what is believed will be a 20-year process of moving the town, supported by consultations, participatory processes and an expectation that the mining company must pay the costs of relocation. See: <http://www.kiruna.se/stadsomvandling/City-in-transformation/FAQ>

Energy planning initiatives at multiple scales, emphasis on clean energy

Energy access is a challenge for many Arctic communities, making energy planning a useful example of community engagement in problem solving. For example, Greenland has invested extensively in renewable energy for more than a decade, bringing the share of renewable energy in electricity production to roughly 65 percent from a starting point in 1992 of 100 percent of electricity produced from oil. The Government of Greenland co-funds development projects focused on renewable energy and energy efficiency (see <https://www.nukissiofiit.gl/> -In Danish and Greenlandic).

In another example, the Gwich'in Council is developing a local energy planning initiative that engages local residents in planning and decision making for developing and ensuring energy security. Local planning processes of this type facilitate the inclusion in energy planning of priorities such as cultural identity and values such as connection to the land, and other local needs that are typically not captured by strictly economic calculations (link to be added).

End Box 3

IV. Conclusion

The Arctic is among the fastest changing biomes on Earth. With increasing global social and environmental pressures and risks, the ARR concludes that it is of large importance that the Arctic Council integrates assessments in different areas on an ongoing basis (ecosystems, development, climate, etc.) and carries out recurrent cycles of Arctic resilience assessments with the goal of enabling Arctic leaders and communities to have state-of-the-art Arctic risk assessment and to continue identifying key priorities for social-ecological resilience building.

The ideas and examples highlighted in this Synthesis have had promising results, and that can be further developed using well-tested strategies. In many instances, greater impact can be achieved by replicating an effective model, as with community-engaged participatory methods for management and planning. In other instances, strong results can be magnified by filling in missing elements, as in the case where environmental monitoring is complemented with monitoring social factors to achieve insights about social-ecological interactions. In yet others, activities that are effective at a local scale can be adjusted to extend their reach and impact at other governance scales.

The ARR demonstrates that to most effectively build resilience in the Arctic, actions should be taken by different actors within and across scales from local to the global. As Arctic change continues at an unprecedented rate, it is important to create mechanisms for coordinating responses across all levels of governance, evaluating progress and sharing lessons learned. Such mechanisms are particularly important in working towards global and other multilateral goals, such as those outlined in the previously mentioned international agreements that emphasize resilience.

The Arctic Council, as the region's preeminent intergovernmental forum, is well-positioned to advance coordination of resilience activities and knowledge-sharing across the North. The Arctic Resilience Action Framework an initiative of the US Chairmanship of the Arctic Council, builds on the ARR's key findings and outlines priority action areas for building resilience. The ARAF provides a structure that can guide not only the Arctic Council, but a range of other Arctic stakeholders, providing a baseline for measuring additional progress and encourage the continuous sharing of information and experiences.

The ARR, AACA, and ARAF together provide a roadmap to resilience in the Arctic, but a great deal of work will be required to implement and realize this potential. By using this roadmap to maintain a focus on prosperous communities and healthy ecosystems, the Arctic Council and its institutional partners will establish a global model for building resilience in a rapidly-transforming environment.