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Arctic study finds resilience of social, ecological systems pushed to limits

An international project, the Arctic Resilience Report, finds that rapid – even abrupt – changes are occurring on multiple fronts across the Arctic, raising the risk of crossing thresholds that would cause irreversible changes to ecosystems, environmental processes, and societies.

The Arctic is in the spotlight like never before. Scientists and environmentalists watch it as a bellwether of global climate change, while nations and corporations seek to exploit the region's oil, gas and mineral reserves, and new shipping routes. Yet most discussions of the Arctic fail to consider how changes in climate, ecosystems, economics, and society interact.

The Arctic Resilience Report (ARR), led by the Stockholm Environment Institute (SEI) and the Stockholm Resilience Centre at Stockholm University (SRC), set out to fill that gap. What it found is that the combination of multiple, dramatic changes is pushing social-ecological systems to their limits.

“The Arctic is changing so fast and in so many interacting ways that it affects the very fabric of ecosystems and societies,” says Annika E. Nilsson, Ph.D., senior research fellow at SEI and scientific coordinator of the first phase of the ARR. “We have to be prepared for surprises, and we need to increase the capacity to adapt and to grapple with conflicting priorities.”

Launched in 2011 as a priority of the Swedish Chairmanship of the Arctic Council, the ARR is a collaboration between experts in the Nordic countries, Russia, Canada, and the U.S. representing a range of knowledge traditions including indigenous perspectives. Today at the Arctic Council Ministerial Meeting in Kiruna, Sweden, a 120-page report is being released that lays out the ARR's initial findings. It includes a preliminary assessment of critical thresholds in the Arctic, an analysis of societies' adaptive capacity, and four pilot case studies. The ARR final report will be released in May 2015.

“Change in the Arctic is taking place with striking breadth and diversity,” says Johan Rockström, executive director of SRC and chair of the ARR Steering Committee. “We need robust options for policy and management, and the first step is to get a more integrated picture of the challenges in the Arctic.”

To achieve this, the ARR team applied what they call a “resilience lens”: an approach that explores how social and ecological systems are interconnected, identifies the shocks and stresses they may face, and gauges their ability to recover and, if needed, to adapt or transform.

Viewed through this lens, the Arctic is a web of social and ecological systems that, together, are rapidly changing in multiple ways. The combined effect of those changes increases the risk of crossing thresholds that could abruptly and irreversibly transform Arctic ecosystems, environmental processes, and societies.

“When people talk about global change, they often assume that it will happen fairly steadily, and that people and ecosystems will be able to make step-by-step adjustments over time, but we document a growing body of research that shows this is far from always the case,” says Sarah Cornell, Ph.D., lead author of the ARR's thresholds analysis and coordinator of the Planetary Boundaries research initiative at SRC.

“Sometimes very large steps will need to be taken to keep up. And sometimes, changes will be radical,” Cornell adds. “Arctic sea ice is melting faster than global models predict. Ice-free summers could be the case within a few decades. Human interventions are also increasingly changing the landscape. Change this rapid is unprecedented, so we don't fully know what to expect, but the climatic and ecological results will be profound. Not only ecosystems, but communities and industrial infrastructure could be seriously affected.”

Building on strengths and making wise choices

A key message of the ARR is that policy and development choices matter a lot. Past decisions shape today's options for adaptation and transformation, and today's choices will shape our future options. The authors also stress that many changes in the Arctic are driven by global trends, and at the same time, changes in the Arctic could have environmental, economic and social impacts around the globe.

“Responding to these challenges involves grappling with different and sometimes competing priorities,” says Nilsson. “The resilience approach can help us understand the interplay of those priorities, and participatory processes can ensure all voices are heard.”

A major section of the ARR discusses sources of resilience and adaptive capacity in the Arctic, highlighting ways to build on them that would facilitate more flexible and collaborative approaches to Arctic governance that can quickly adjust to new conditions.

“The Arctic is going to keep surprising us, and we need to set up systems that can respond and adapt to slow and fast changes alike,” says Nilsson. “Solutions will also need to be appropriate for different sets of circumstances, and incorporate insights from different knowledge traditions – social and natural sciences as well as traditional knowledge.”

To learn more about the Arctic Resilience Report or download the Interim Report or a four-page Summary for Policy-makers, go to www.arctic-council.org/arr. The report is also available on the SEI and SRC websites.

Note to editors: Annika E. Nilsson is in Kiruna on 14–15 May; please contact Ylva Rylander for interviews. Sarah Cornell is available for interviews in Stockholm or by telephone; please contact Sturle Hauge Simonsen. Several other ARR authors, in Alaska, Canada and Europe, are also available, through any of the contacts below. All media contacts can also provide high-resolution photographs and graphics.

For more information, please contact:

Ylva Rylander – Director of Communications, SEI (European media)
ylva.rylander@sei-international.org +46 73 150 3384

Sturle Hauge Simonsen – Head of Communications, SRC (European media)
sturle.hauge.simonsen@stockholmresilience.su.se +46 8 674 7428

Marion Davis – Communications Manager, SEI-US (Americas, Asia and all others)
marion.davis@sei-international.org +1 617 245 0895

The Stockholm Environment Institute (SEI)

The Stockholm Environment Institute is an independent international research institute. The Institute has established a reputation for rigorous and objective scientific analysis in the field of environment and development. SEI aims to bring about change for sustainable development by bridging science and policy.
www.sei-international.org

The Stockholm Resilience Centre (SRC)

The Stockholm Resilience Centre at Stockholm University advances transdisciplinary research for governance of social-ecological systems with a special emphasis on resilience – the ability to deal with change and continue to develop. www.stockholmresilience.su.se