

***Adaptation Actions for a Changing Arctic (AACA):
The Transition from Science Assessments To a Science-Decision Making Process
Founded Upon Sustained Observations and Sound Science***

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The Goal

The goal of the AACA is to “*inform Adaptation Actions in a Changing Arctic*”. The goal of this paper is to place the AACA Regional and pan-Arctic science assessments into the overall context of the AACA science-decision making enterprise so that AACA may indeed effectively inform actions and decisions.

Introduction

For years, AMAP, the Arctic Council, and many different national and international efforts have relied largely on the development of discreet scientific synthesis and assessment products in order to evaluate past, present and most importantly, potential future states of one or more aspects of the Earth system. These linear studies- broadly classified as assessments- have been valuable in helping different scientific communities develop broad frameworks for describing specific scientific questions, related gaps in our scientific understanding of the issues the questions were addressing, and ultimately, some level of prediction of the future state with an identified level of uncertainty. These assessments grew from a scientific tradition of “literature reviews” where a small team of experts summarized what was known about a particular topic to form a foundation for subsequent scientific research. Over time, these studies, initially intended for the scientific community, have evolved to include derivative summaries (Summaries for Policy Makers, or SPMs) aimed at communities that may utilize the science in order to inform decisions. These decisions typically include policies and management actions affiliated with the impacts and effects (past, present and future) on specific or general aspects of the physical, chemical, biological, social, economic and even behavioral systems. And while these SPMs have been a significant achievement in moving science-based information into a greater role of direct societal relevance, their immediate value in providing specific decision-support has been limited. This has primarily been a result of the assessments and the derivative SPMs being developed at levels too technical and scales too coarse for most types and specific examples of actual decision-making; a dilemma typically faced by the science community since the forces driving Arctic changes are global in origin, yet the resulting impacts and effects and related policy and decision-making span scales from local to global.

Adding to this dilemma, in many instances the assessment studies were conducted without significant up-front (i.e. pre-assessment) end-user (i.e. decision maker)

collaborative consultations. This resulted in conclusions or recommendations that were meaningful to the scientists who developed the reports but not necessarily directly applicable to decision-makers. In fact, this collaborative-consultative process is a prerequisite for ensuring that the science community is actually aware of the specific issues directly relevant to decision-makers and that the decision-makers, in turn, effectively understand what information can be provided by the science community in order to effectively support the decision-making community's needs.

The Science-Decision Making Process

Over the past several years, through many significant collaborative studies, the science and decision-making communities have begun to work together in a more collaborative manner, albeit in limited cases. And in doing so, have begun to develop methods for effective and iterative consultation and decision support product development and the much-needed evolution of the assessment products themselves. Now, scientists and decision-makers of all types are taking additional and significant steps in forming collaborative consultations that are leading to the establishment of issue-based frameworks that identify the science needs of future assessment reports subsequent derivative products, including SPMs and specific decision support and communication/outreach tools and services. In those examples where such consultations have happened, the outcomes have been positive with a clear understanding of what is needed, what is known and where the uncertainties lie.

It is important to understand that the evolution of the science assessment process goes much further than just shaping the way that we conduct the assessments themselves. The evolution of the process is a metamorphosis of the entire engagement process between scientists and decision-makers, and includes changes in the timing and methods to which both parties engage and interact in identifying the issues relevant to decision-makers, the structure and content of the scientific assessments, the science needed to develop the assessments (including prioritization of areas of continued scientific uncertainty) and the nature and types of decision support and outreach tools and services that are provided (Figure 1). Furthermore, the overall framework of the collaborative-consultative process for engagement must be sustainable so that effective decision-making, with products co-designed to address, inform and support decisions around key issues and questions can occur. It must be highly responsive to complex decision-making issues. Thus, it must include an adaptive management loop; a mechanism that allows for iterative engagement between scientists and decision makers that focuses on evaluating the performance of decisions already made and subsequent recommendations by decision makers that helps scientists prioritize areas of continued scientific uncertainty that will require additional research investments (Figure 1).

Bridging the Chasm Between Science and Decision-Making: The Collaborative Science-Based Decision-Making Enterprise

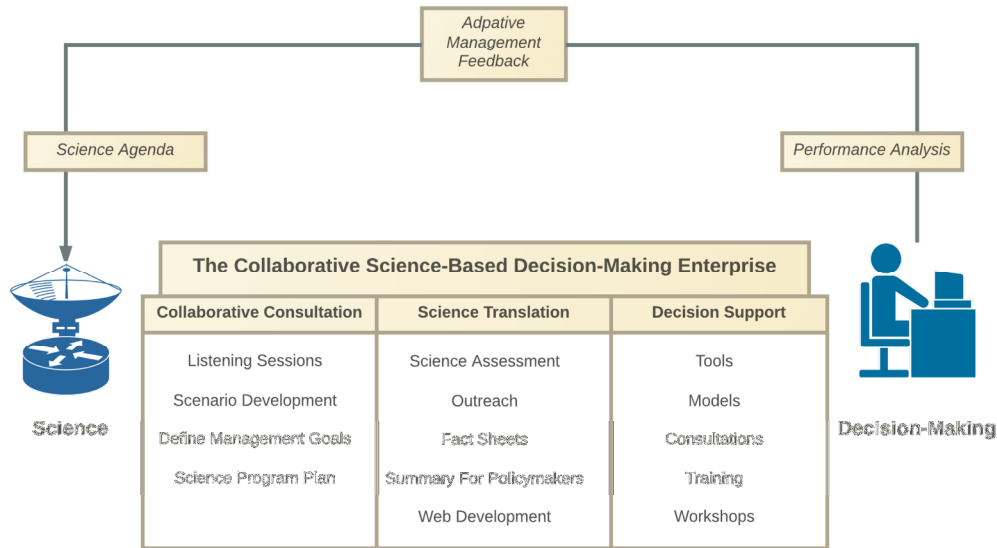


Figure 1. Science-Decision-making Schematic

Sustained Observations: A Foundational Element for the Science–Decisionmaking Process

And at the center of this feedback exists the need for a co-designed ***Sustained Observations Network***- An integrated enterprise consisting of all relevant observing networks across the Arctic that have the potential to provide observational information that serves a dual role:

1. Providing key observational information that supports continued scientific research, and;
2. Supporting the decision performance of all stakeholders (ie decision-makers) by providing critical observational information on how science-informed decisions are performing, verifying system responses to adaptation actions, and ultimately, providing direction and guidance for adaptive management feedback to the science community in order to improve the next phase of scientific investigation and thus subsequent decision performance.