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KEYNOTE: MONITORING AND OBSERVING SYSTEMS

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Arctic Monitoring Systems

The Arctic Human Development Report (AHDR), ACIA, the International Conference on Arctic Research Planning (ICARP II), projects of the IPY, and others, have documented in detail the changes occurring in the Arctic and the need for monitoring to assess the impact of change. Arctic societies and cultures are faced with multiple stressors and challenges related to the ongoing and combined effects of environmental processes, industrial development, cultural development, and economic changes. The Arctic Human Development Report (AHDR, 2004) presented the first overview of human development in the Arctic. The goal of the AHDR was to identify and synthesize existing knowledge in the interests of presenting an integrated picture of human development in the Arctic. The report details the challenges faced by Arctic societies, and shows that Arctic peoples are susceptible to changing environmental conditions. It concludes that Arctic societies have a "well-deserved reputation for resilience" in the face of change. But today they are facing an unprecedented combination of rapid and stressful changes.

The ICARP II process also identified critical research needs and outlined practical steps and organization to be considered. One such proposal was the establishment of coordinated and integrated Arctic observation systems that focus on social, biophysical, and ecological dimensions and include local- to global scale monitoring; and the build up of a meta-database of case studies on socio-ecological change and with it, a standardized format and common set of key variables. Indeed, ICARP-II, ACIA, IPY projects – in particular SAON (Sustaining Arctic Observing Networks) - and many others, have pointed to the need for close and long-term monitoring of Arctic change, including observations and data management. Improved monitoring of the Arctic is needed to gain full understanding of these processes and their impacts.

The IPY project on Community Adaptation and Vulnerability in Arctic Regions (CAVIAR) is a programme of interdisciplinary research to identify insights essential for the development of adaptive responses to changing conditions in the Arctic (CAVIAR,

2008). The purpose of CAVIAR is to better understand how Arctic communities are affected by environmental changes in order to contribute to the development of adaptive strategies and policies. Data collection or monitoring of change is part of the CAVIAR programme. The programme seeks to characterize vulnerabilities or risks, to document the processes and forces that facilitate adaptation or management of risks, and to identify and evaluate means to improve the capacity of communities to adapt to changing conditions. This involves interdisciplinary integration and collaboration with Arctic community partners (CAVIAR pp. 2-3).

Among the gaps in knowledge and action with respect to the challenge climate change poses for Arctic sustainable development are the lack of Arctic monitoring systems, coordination of Arctic observing, timely and reliable data, and long-term commitment to funding of observing networks. The amount of research on climate change and its impacts is growing, but significant gaps in knowledge concerning the nature of global change risks and ways to deal with them persist. Environmental and societal changes and other processes occurring at a rapid pace, combined with limited observational infrastructure, and a lack of timely, appropriate and reliable data and information networks, present Arctic stakeholders, government and the research community with new challenges. In social science research, new demands are placed on access to data for the study and modeling of these processes, and for understanding, measuring and predicting the impacts of change on social systems at various scales, and understanding the links with the rest of the world and their feedback mechanisms. The integration of knowledge across disciplinary boundaries adds to data and information requirements. We lack access to relevant, reliable, accurate and timely data and information, and data which is appropriate and relevant to the Arctic context. Much data is currently based on southern or national data protocols, where models are often designed and legitimated in institutional contexts outside the Arctic. There is a lack of more complete data sets that enable more comprehensive and accurate research and analysis at various scales, across disciplines and across the circumpolar Arctic, and that can facilitate comparisons and contrasts, modeling, evaluation, assessment and monitoring of changes and their impacts. As well, there is a need for timely and more conclusive data and information from the natural sciences, e.g. for studies of the socio-economic impacts of climate change. A more complete understanding of the current and future environment requires access to year-round data, including improved and disaggregated data series.

The Sustaining Arctic Observing Networks (SAON - www.arcticobserving.org) – the collective effort of 350 Arctic researchers - is one of the most recent developments in Arctic observing and monitoring. An IPY and Arctic Council project, SAON's work on monitoring and observing across interdisciplinary boundaries has contributed significantly to moving us closer to a pan-Arctic observing system. As stated in the SAON report (2008), SAON is a process to further multinational engagement in developing sustained and coordinated pan-Arctic observing and data sharing systems. The goal of such a system is to serve societal needs, particularly related to environmental, social, economic and cultural issues (SAON, 2008). In its 2006 Salekhard Declaration, the Arctic Council agreed to “urge all member countries to maintain and extend long term monitoring of change in all parts of the Arctic, and request the AMAP to cooperate with the Arctic Council Working Groups, IASC and other partners in efforts to create a coordinated Arctic observing network, that meets identified societal needs”. “The foundations of SAON are the existing networks and programs that already provide high quality Arctic observations” (SAON, 2008).

Better coordination within and among existing networks is needed. There are currently several observing systems, observatory networks, evaluation/assessment

programmes, monitoring programmes, indicator projects, and Arctic data bases. A range of problems and limitations related to data and observing sites were identified during the SAON process: Arctic observing sites do not adequately cover the Arctic region, observing data are fragmentary and not easily available, and only a part of the Arctic observing is funded on a long-term basis (SAON, 2009). The work of SAON is an important new development in the effort to achieve better coordination within and among existing observing networks and the broad range of existing programmes.

A key SAON recommendation is to create the Arctic Observing Forum (AOF).

The AHDR (2004) identified several gaps in knowledge that has relevance for Arctic data and monitoring activities. The report recommended a series of follow-up activities including the construction of a small number of indicators to be used in monitoring changes in human development in the Arctic over time. The Arctic Social Indicators (ASI) project - a follow-up to the AHDR - is working toward filling this critical gap. The Arctic Social Indicators (ASI) project seeks to fill a critical gap in user needs in Arctic research and data information. ASI has been identified as one of the potential human dimensions' building blocks within the AOF recommended by SAON. ASI aims to devise a limited set of indicators that reflect key aspects of human development in the Arctic, that are tractable in terms of measurement, and that can be monitored over time at a reasonable cost in terms of labour and material resources. The development of indicators fall within six domains, all of which seek to address key aspects of human development that are particularly prominent in the Arctic: Fate control and or the ability to guide one's own destiny; cultural integrity or belonging to a viable local culture; contact with nature or interacting closely with the natural world; material well-being; education; and health/demography. Such a database with unique long-term series of data could be immensely useful to decision-makers, planners, and others concerned with the future of the Arctic. The work on Arctic social indicators is directed at a broad audience, including the science community, inhabitants of the Arctic, policymakers at all levels, and in particular the Arctic Council and its Sustainable Development Working Group (SDWG).

The construction of valid and useful indicators is a challenge. Indeed, several of the indicators suggested by the ASI team have weaknesses related to availability of data, affordability, and level and applicability to both indigenous and non-indigenous inhabitants of the Arctic. To be valid for tracking and monitoring an indicator should be the most accurate statistic for measuring both the level and extent of change in the social outcome of interest. It should adequately reflect what it is intended to measure, and ideally there should be wide support for the indicators chosen so they will not be changed regularly. It is critical that the chosen indicators are consistent over time and across places, as the usefulness of indicators is related directly to the ability to track trends over time and compare the well-being of regions. The chosen indicators should do well in terms of selection criteria such as data availability, ease of measurement, internal validity, affordability, robustness, applicability at various levels (household, local, regional), and applicability to indigenous as well as non-indigenous populations. To advance beyond the AHDR, ASI seeks indicators that can be compared for geographies more specific than the general Arctic regions. One obvious limitation is data availability. Statistical agencies do not provide breakdowns below certain minimum thresholds of population counts for example. Although specific thresholds vary from country to country, they sometimes preclude the release of accurate data on small Arctic communities, or make the released data a patchwork of true and artificially rounded or suppressed numbers. Communities with populations of a few hundred or a few thousand people can be of great interest to social science and policy makers, but social indicators on this scale must be interpreted with care.

At the outset of ASI, the stated intent was to identify a small set of indicators of human development relevant to the Arctic that could be monitored at reasonable cost. The ASI team hoped that “reasonable cost” could be operationally defined in terms of indicators that are based on existing information. The team also agreed on that a good indicator should have a clear meaning relevant to one or more of the six domains of Arctic human development (health and demography, material well-being, education, cultural integrity, contact with nature, and fate control); be sensitive to change over time; be available at least down to a regional level; and be applicable to, and reported separately for, indigenous and non-indigenous populations. This has proven to be a challenging task. The recommendations of the ASI deal with data issues and the need for an Arctic Social Indicator monitoring system. The Arctic Social Indicator monitoring system would meet the following objectives: data are available at a regional level; data are available separately for indigenous and non-indigenous populations; data are available on at least a five-year reporting period. Depending on the indicator and the nation one of three levels of effort are required to meet these monitoring objectives: Data are collected by a national agency and published in hard copy or electronic form; data are collected by a national agency and require special tabulations to be made available; data require primary data collection.

Creating and refining suitable indicators of human development in the Arctic will take time. It involves a step-wise process in which initial proposals are vetted empirically and refined or replaced over time as our ability to capture the essential features of human development under the specific conditions arising in the Arctic rises. Viewed in this light, the work of the ASI constitutes a significant step forward in moving us toward an ability to track trends in key elements of human development in the Arctic and, as a result, guiding discussions regarding questions of policy. A follow-up to ASI is being planned which aims to test, refine, and implement the ASI indicators, with the overall goal to help facilitate the monitoring of change in human development in the Arctic. The first phase of the ASI project developed a social indicator system, having identified a set of Arctic-specific indicators to monitor human development and quality of life in the Arctic. The next phase of ASI aims to implement the constructed indicators, by testing, validating and refining the indicators across the Arctic, and then to measure and perform analyses of select cases, with the ultimate goal of moving toward adoption by Arctic governments and the Arctic Council of the indicators for the purpose of long-term monitoring of human development.

What needs to be done to ensure a comprehensive, interdisciplinary and multi-actor approach to achieving sustainable development in the Arctic? There is no easy, straightforward and simple answer. Part of the solution lies in information and coordination, which in turn requires networks and monitoring. SAON presents one such system. A long-term and sustained approach to addressing sustainable development in the Arctic requires appropriate indicators, data, coordination and a monitoring system, to provide us with the information about the presence or absence of sustainability, or threats to sustainability in the various systems that surround us. The observed and documented threats to Arctic systems and their sustainability require attention to the point at which the rate of change begins to approach the speed with which the various systems can adequately respond.

Recommendations:

- Support the SAON recommendations for an AOF
- Encourage commitment to on-going support and funding for primary data collection