What is ‘Human Dimensions’ Research?

The complex suite of biophysical changes taking place in arctic ice, oceans, land, and atmosphere is driven by an interwoven system of human activities and natural processes. Research on the Human Dimensions (HD) of arctic change addresses this coupled human-natural system and investigates how individuals and societal groups
- contribute to,
- are influenced by, and
- mitigate and respond to
the changes that take place on a local, regional and global level. Human dimensions science therefore draws together many disciplines within the natural
and social sciences and uses a wide range of methods and approaches.

Understanding how social systems interact with natural systems (both physical and biological) involves quantitative studies and forms of hypothesis testing and analysis familiar to fields such as atmospheric science, terrestrial ecology, glaciology or ocean biogeochemistry. When scientists study climate-influenced and human-influenced phenomena such as ice roads, river flows, or fish catches, rigorous understanding of all the system drivers (including the role of humans) becomes critical. These are nontrivial challenges for biophysical-human dimensions research.

How HD Research Contributes to System Science

Changes that seem, at first glance, mainly physical often turn out to have human dimensions frameworks. These issues (such as livelihood vulnerabilities, institutional factors, and policy frameworks) must be studied as part of climate change research to assure that mistaken conclusions are not drawn from the data.

For example, an observed trend toward increasing river flows into the Arctic Basin might well reflect climate change. But to an unknown extent, flows vary also with trends in dam construction and reservoirs over the same period of time. Similarly, correlations between fisheries catches across widely separated regions, such as the North Atlantic and North Pacific, might reflect large-scale climatic events connected through the atmosphere. But they certainly also reflect human developments, such as new fishing technologies and markets. In each case, a physical-science analysis remains incomplete until we analyze the human dimensions as well.

Human Dimensions of the Arctic System—HARC

HARC was created in 1997 as a component of the Arctic System Science Program (ARCSS) of the National Science Foundation. Within ARCSS the aim of HARC is to better understand the role of humans in the functioning of and interactions among the various physical, biological, and social components of the arctic system and the significance of changes in the arctic system for people in the Arctic and across the globe.

HARC also provides a way to examine the policy implications of ARCSS research through stakeholder collaborations that examine decision making in light of environmental change. HARC seeks to identify the needs of decision makers and to improve the ability of ARCSS researchers to communicate their findings effectively.
To understand and anticipate environmental changes taking place in the Arctic, researchers are designing an Arctic Observation Network in the context of planning for the International Polar Year (IPY) in 2007. Equally rapid and significant changes confront arctic social systems. Some of these societal changes are driven by environmental change; others result from broader cultural and socioeconomic forces, or from complex interactions between environment and society. A Human-Dimensions Arctic Observing Network (HAON) that is analogous to that planned for the physical sciences should be a component of IPY activities. Such a network is essential to understanding common patterns and local variations in the flow of arctic social change, testing hypotheses and developing models about their causes, and developing credible, evidence-based future scenarios and policies useful for supporting decision making under conditions of escalating environmental and social change.

The analogy with a physical network of weather stations or ocean buoys is not an exact one: a HAON need not necessarily take physical form, but could instead consist of a network of social scientists, citizens and other observers to help make available and accessible arctic HD data already being collected in a common data structure of circumpolar scope. This network could also function to identify data gaps and to collect data as appropriate to fill those gaps. Existing and new data might include:

- The size, composition, well-being and livelihoods of arctic communities. Wide variations can occur between neighboring communities and regions. Detecting, understanding and anticipating such variation is important, as people cope with accelerating change.
- Health and economic statistics. These statistics provide key indicators of human and societal well-being; they can be important for highlighting successes to be emulated, or problems needing to be addressed.
- Data on industrial development, infrastructure, and resource extraction. Changes in sea-ice, permafrost and storm frequency are three environmental factors affecting human activity. HD researchers and natural scientists need to work together to define data sets needed to answer socially relevant questions.
- Global economic and institutional trends. These data provide important information about the larger contexts that affect the nature and range of choices arctic residents may have for coping with environmental change.
- Qualitative data. Data such as historical accounts, interviews or individual life histories are essential for meaning and interpretation. Such data allow triangulation between local knowledge and history, events, and conditions identified through biophysical research. The time-indexed framework of quantitative data provides a way to organize and reference qualitative accounts.

A key role for the human-dimensions observing network would be to perform the kinds of analyses needed to disseminate the data in formats that are accessible, usable, relevant, and timely to the needs of researchers, policy makers, and the public. Delivery would be through a single web portal with multiple links.

Climate Assessment for the Southwest (CLIMAS)
Like the Arctic, the US Southwest constitutes an extreme environment where climatic variability and change have strong impacts on biophysical and social systems. CLIMAS, funded by NOAA’s Office of Global Programs under its Regional Science and Assessment (RISA) program, is widely known for its success in integrating human dimensions and biophysical research into a coherent program to assess climate impacts on the region’s natural and human systems and to provide climate information useful for coping with impacts in contexts of multiple stresses. CLIMAS human dimensions researchers include scholars in resource economics, human geography, and anthropology; research activities range from in-depth vulnerability analyses to economic decision making, policy analysis, and institutional analysis. See http://www.ispe.arizona.edu/climas