

Table 1: HARC Research Questions

	A What are the impacts of human activity on arctic and global systems?	B What are the types and sources of global change in the Arctic?	C What are the effects of global changes on human societies in the Arctic?
Highly appropriate for immediate funding	<ol style="list-style-type: none"> 1. What are the cumulative impacts of large-scale development on arctic ecosystems? (Page 30) 2. How has the spread of contaminants changed the functioning of arctic ecosystems? (Page 30) 3. How has human use altered arctic food chains and resulting ecosystem processes in terrestrial, freshwater, and marine ecosystems? (Page 31) 4. How have anthropogenic changes in the surface energy balance of arctic and subarctic regions and changes in river runoff affected the water balance and regional climate of the Arctic? (Page 32) 5. How will the effects of human disturbances on the landscape and climate change interact in areas of ice-rich permafrost? (Page 33) 	<ol style="list-style-type: none"> 1. How will the worldwide economy act as a global change agent in the Arctic? (Page 35) 2. To what extent will decreases in external government support for communities act as a global change agent? (Page 36) 	<ol style="list-style-type: none"> 1. How will global changes affect the size, distribution and condition of fish and wildlife resource populations and their use by arctic residents? (Page 39) 2. How will community resilience and vulnerability respond to global changes in the environment, the economy, and society? (Page 39) 3. How will global changes affect the possibilities for economic diversification and sustainable development? Will the changed possibilities, in turn, affect the arctic system? (Page 40) 4. How will global changes affect indigenous control of local and regional institutions and the ability of arctic peoples to influence the pattern of human activities in the Arctic? (Page 40)
Important, requiring further planning and integration	<ol style="list-style-type: none"> 6. How do economic, cultural, social, educational, and environmental factors govern the types, scale, and geographic variability of human impact within the Arctic? (Page 34) 	<ol style="list-style-type: none"> 3. What is the relative contribution of changes in mean temperature and precipitation (as opposed to their variance or the frequency of extreme weather) on resource population dynamics and other aspects of arctic life? (Page 36) 4. What is the carrying capacity of humans in the Arctic? How will the growth of human populations in the Arctic influence arctic ecosystems? (Page 37) 	<ol style="list-style-type: none"> 5. What effects will global changes have on education, training, and employment opportunities for arctic residents? (Page 41) 6. How will global changes affect health and access to health care in northern communities? (Page 41)
Important, needing further conceptual development and integration		<ol style="list-style-type: none"> 5. What is the relative importance of the various global changes to changes in the arctic environment? (Page 37) 	<ol style="list-style-type: none"> 7. What other socioeconomic changes (e.g., emigration or immigration, family formation, birth rates, social problems, cultural continuity) are likely to accompany large-scale environmental change? Do these changes create new anthropogenic influences on the arctic system? (Page 42)

	D What are the alternatives?	E What are the effects of changes in the arctic system on people living outside the Arctic?
Highly appropriate for immediate funding	<ol style="list-style-type: none"> 1. Economic: What economic alternatives are available to arctic communities, and what are the implications of such economic alternatives for the arctic system? (Page 43) 2. Social: What kinds of institutions can be designed to promote sustainability, guide sustainable use of resources, mediate resource conflicts, <i>etc.</i>? (Page 43) 3. Ideological: What are the impacts of shifting ideologies, within and outside the Arctic, on resource use and the arctic environment? (Page 44) 4. Political and legal: How effective are current political systems and policies for responding to large-scale environmental change? (Page 44) 	<ol style="list-style-type: none"> 1. How does human harvesting in the Arctic affect resource availability in the mid-latitudes? (Page 47)
Important, requiring further planning and integration	<ol style="list-style-type: none"> 5. Health: What are alternative approaches to improving the health of people in the Arctic? How might these approaches affect the development and spread of diseases and, thus, the effect of disease on arctic and global systems? (Page 45) 6. Historical: Can we identify successful sociocultural adaptations to past change that have relevance for adapting to global change, including climate change as indicated by ARCSS research? What new institutions might help communities adapt to environmental change and mediate resource conflicts? (Page 45) 7. Ecological: What factors might predict the resilience or adaptability of individuals and communities facing ecological change (and the regulatory changes that often accompany sudden ecological declines)? (Page 46) 	<ol style="list-style-type: none"> 2. How do changes in North Atlantic deep-water formation, as influenced by the hydrology of the Arctic Basin, affect climate and fisheries outside the Arctic? (Page 47) 3. Under what circumstances would changes in surface-energy budgets or in trace-gas fluxes within the Arctic be large enough to affect climate beyond the Arctic? (Page 48)
Important, needing further conceptual development and integration		<ol style="list-style-type: none"> 4. What are the impacts on people outside the Arctic of migratory birds and fish that accumulate arctic contaminants? (Page 48)

The HARC initiative provides a unique opportunity to meld ecosystem and climate studies with the social sciences. This will improve our overall understanding of arctic systems, of which humans are an integral part.



“Chuki” (Lucy) George at Umkumiut, Alaska fishcamp (© James H. Barker).