ARCTIC

Contributions to Social Science and Public Policy

Committee on Arctic Social Sciences

Polar Research Board

Commission on Geosciences, Environment, and Resources

National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C. 1993

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Cover: Eskimo elders Kate and Tom Brower (now deceased), Barrow, Alaska. This photo appeared in the Winter 1992 issue of UIÑIQ magazine. (Courtesy of Bill Hess, Running Dog Publications, Wassilla, Alaska.)

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Preface

The Committee on Arctic Social Sciences was established in 1987 to undertake a study to provide direction for social science research on arctic topics. The committee was charged with reviewing existing research, identifying research needs, and recommending future directions for the social sciences in the Arctic.

The committee held two public meetings in Washington, D.C. in November 1987 and July 1988, and a workshop at the American Association for the Advancement of Science's Arctic Science Conference in Fairbanks, Alaska, in October 1988. In addition, numerous scientists from federal and state of Alaska agencies, private organizations, and universities were contacted. By involving a range of social scientists in its study, the committee hoped to encourage broad participation in the further development of arctic social science research and policy. These individuals also provided information on relevant topics and literature in the arctic social sciences that helped in the production of this volume.

In 1989 the committee produced its study report, *Arctic Social Science: An Agenda for Action.* That report discusses priority research needs for arctic social science and the infrastructure requirements to meet those needs. The report was intended to serve as a major document for the 1989 revision of the U.S. Arctic Research Plan, mandated by the Arctic Research and Policy Act (ARPA) of 1984. In addition, the agencies represented on the Interagency Arctic Research Policy Committee (established under ARPA)

provided intraagency reviews and analyses of how to implement the report's recommendations.

At its November 1989 meeting, the committee determined that a multidisciplinary summary of significant findings of arctic social science research was needed. In response to a request from the Polar Research Board, the committee began an assessment in late 1989 of potential contributions from the arctic social sciences to the social science disciplines, building on the literature review undertaken to prepare the 1989 study report. The present report expands on the 1989 report and devotes particular attention to the potential contributions of arctic social sciences to the theoretical and practical concerns of mainstream social sciences. This study was supported by grants to the Polar Research Board from the National Science Foundation and the National Oceanic and Atmospheric Administration.

In the course of preparing this report, the intended audience has changed. The report was originally prepared as a journal article, but it was later decided that it would be released as a committee document. Because of the difficulty in providing the breadth of the supporting arguments that would normally accompany chapters in a committee report, as well as the need to draw parallels between each topic presented in the present report and the recommendations in the committee's 1989 study report, *Arctic Social Science: An Agenda for Action* is included here as an appendix.

The Polar Research Board appreciates the dedication and patience of Mim Dixon and Oran Young, cochairs of the Committee on Arctic Social Sciences, and the efforts of the committee members in the conduct of the study and the preparation of this report.

Robert H. Rutford, *Chair*
Polar Research Board

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Introduction

Over the past several years a consensus has emerged on the national need for more and better social science research on the Arctic. This need is well documented. The Arctic Research and Policy Act of 1984 (P.L. 98-373) was enacted "to establish national policy, priorities, and goals and to provide a federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological, and health sciences, and social and behavioral science." The act stresses the importance of research to "enhance the lives of arctic residents, increase opportunities for international cooperation among Arctic-rim countries, and facilitate the formulation of national policy for the Arctic." While the national need for more and better social science research on the Arctic was clear, so too were the obstacles to meeting that need. For example, there was no lead agency at the federal level to advocate and support social science research on arctic topics. Also, there was no organization to bring social scientists together to reach consensus on arctic research priorities and to facilitate the development of an effective communications network. Finally, inadequate funding prevented the participation of social scientists in meetings where arctic research policy was discussed and formulated.

To help overcome the obstacles and provide a focus for arctic social science research, the Polar Research Board established the Committee on Arctic Social Sciences in 1987 and charged it with reviewing existing research, identifying research needs, and recommending future directions for

social sciences in the Arctic. In 1989 the committee produced its study report, *Arctic Social Science: An Agenda for Action.* Since then, the National Science Foundation has been designated as the lead agency for social science research in the Arctic and has appointed a program director, apportioned funding for the program, and established, through the Interagency Arctic Research Policy Committee, a task force on arctic social science. In addition, the International Arctic Social Sciences Association and the International Arctic Science Committee have been established to assist, in part, with scientific coordination and cooperation internationally. All these infrastructure needs correspond to recommendations in the committee's 1989 report.

The 1989 report identified three substantive themes that should be given highest priority in developing new coordinated programs of multidisciplinary social science research on the Arctic: human/environmental relationships, community viability, and rapid social change (Table 1). Each of these themes is discussed in some detail, including background, justification for the research initiative, and representative types of research questions to be incorporated into applied and basic research programs, as well as opportunities for international cooperation. The present report builds on those themes by identifying ways in which research in the Arctic has contributed to evaluating social science theories. In the past, “exceptionalism”—the notion that such research was outside the mainstream—pervaded the arctic social sciences. In fact, arctic social scientists themselves tended to treat the Arctic as an exception to the tenets of social science research. In the course of its deliberations, the committee found that this is no longer the case and that research in the Arctic has indeed contributed, and continues to contribute, to mainstream social science theory. Consequently, the committee undertook a more comprehensive review of the arctic literature to identify theoretical linkages broadly covering the three priority areas in its 1989 study report. The present report intends, therefore, to identify areas where arctic research is relevant to theory and to problem solving, particularly in the organization of production, protecting the environment, and cultural diversity. This report does not presume that arctic research necessarily solves all theories or problems of concern to the social sciences.

TABLE 1 Summary of Key Elements for Multidisciplinary Plan for Arctic Social Science Research

Theme	Research Problems
HUMAN/ENVIRONMENT RELATIONSHIPS	
Applied	
	• methods for allocating natural resources
	• avoidance and resolution of conflicts over use of natural resources
Basic	
	• control of human activities that threaten to disrupt natural systems
	• human response to habitat change
	• human dimensions of global change
COMMUNITY VIABILITY	
Applied	
	• economic diversification and viability of coastal and riverine communities
	• motivation and psychosocial adjustments of the Northern work force
	• obstacles to community survival
Basic	
	• relationship between community survival and cultural survival
RAPID SOCIAL CHANGE	
Applied	
	• patterns of social interaction
	• trends in expectations and aspirations
	• relationship between social change and physical and mental health
Basic	
	• consequences of social specialization and increased interdependence
	• education for participation in a rapidly changing multicultural world
	• cognitive and emotional limits of peoples' ability to cope with rapid change

SOURCE: Modified from NRC (1989).

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Arctic Social Science and Public Policy

Policymakers and citizens alike look to the social sciences to explain social phenomena, to draw lessons from history about the resultant problems, and to develop policy options to come to terms with them. Social scientists in turn look to regions, such as the Arctic, as testing grounds for theories and as natural laboratories in which to evaluate innovative programs and policy responses. Thus, the Arctic may contribute to our understanding of such contemporary global issues as the collapse of the centrally planned economies of the former Soviet Union and Eastern Europe, the progressive degradation of ecosystems around the world, and the persistence of racism in many societies.

Three examples illustrate the links among current affairs, social science theory, and arctic research. Dramatic changes in the former Soviet Union and Eastern Europe have led social scientists to test and revise theories about the organization of production. Effective environmental management often requires evaluation of theories and policies concerning the control of human uses of nature and natural resources in such forms as fishing, hunting, and mining. Combating racism requires an understanding of the sources and value of cultural diversity.

The Arctic can play a special role in the development of these and other social science theories. Hunting and gathering peoples—called Eskimos in the outside world but known to themselves as Inuit, Inupiat, Yupik, and other names—have survived in the Arctic for centuries. Their isolated communities have experienced cultural change, but there is sufficient cul

tural continuity to test hypotheses about the relationships between human behavior and the environment, the organization of production, the maintenance of cultural diversity, and other topics. Government management of the land and water of the circumpolar North provides a laboratory in which to test theories about public policies pertaining to natural resources and the environment.

THE ORGANIZATION OF PRODUCTION

Throughout the twentieth century the production and distribution of goods and services have been dominated by debates over the relative merits of capitalism and socialism. There are, however, systems of economic action that are neither socialist nor capitalist and that may have something to teach us about the organization of production.

The Arctic offers a rich array of economic arrangements that social scientists can use to test theories about outcomes arising from different structures of property rights. For example, indigenous economies feature systems of common property in which the use of natural resources on the part of individuals is subject to culturally defined rules. These rules govern the circumstances under which resources are available for use by individuals, the appropriate means of harvesting or making use of resources, and distribution of the proceeds of hunting and gathering (Usher and Bankes, 1986).

Not only does the Arctic provide opportunities to look at foraging systems undergirded by common property arrangements in a relatively "pure" form, it offers instructive examples of mixed economies in which individuals can make choices among wage employment, subsistence activities, or some combination of the two.

The term "subsistence" is shorthand for the work people do in hunting and gathering societies. Subsistence is a social practice that has cultural as well as economic significance and that has been viewed as a mode of production, a mode of consumption, and a mode of living (Sharif, 1986). Complex exchange relationships, which may or may not include an element of commercial trade, are common to all subsistence systems. Just as traditional Native societies are evolving to more closely resemble Western society, so too are the definitions and practices of subsistence activities in the everchanging legal and political contexts in which they occur.

One of the impacts of Western contact with indigenous societies is the introduction of a cash economy, featuring wage employment and goods and services of the types produced in industrialized societies. Throughout the world, when the opportunity is presented, people exhibit an intense desire for goods and services produced by industrial processes. Mixed subsistence-based economies offer some combination of wage employment or

other access to a cash economy and subsistence activities (Berger, 1977; Quigley and McBride, 1987; Wolfe and Walker, 1987).

Until recently, social scientists regarded mixed economies as a transitional stage on the road from subsistence to a market economy. They assumed that social evolution would ultimately lead to an industrialized society characterized by private property and a market economy (Applebaum, 1984; Usher, 1981). However, studies of the Inupiat living on Alaska's North Slope and other northern aboriginal groups have demonstrated that indigenous peoples who are most acculturated to Western society, as measured by education and employment in a wage economy, are at the same time more active than others who are participants in a subsistence economy (Kruse, 1982; Kruse et al., 1982). This has resulted in increasing doubts about a number of conventional ideas concerning the outcomes of economic development.

Issues of productivity and motivation, central to the changes occurring in Eastern Europe and the former Soviet Union, have also become prominent in the United States, where there is concern about U.S. competitiveness in world markets. Choice between subsistence and wage employment in a mixed economy provides a natural laboratory to test theories about motivations underlying choices of employment and leisure activities. These theories, developed in Western social settings, emphasize the distinction between direct production benefits (such as wages) and “process” benefits (such as social interaction) derived from participation in economic activities (Crandall, 1980; Driver and Burch, 1986; Herbert, 1987; Ingham, 1986; Juster and Courant, 1986; Pollnac and Poggie, 1988; Vroom, 1964).

Subsistence research suggests that the distinction between production benefits and process benefits may not always be useful or relevant. Studies conducted in Alaska indicate that process benefits associated with subsistence activities make them more attractive to many individuals than available forms of wage employment. Process benefits that account for the attractiveness of subsistence activities, especially to Inupiat men include social interaction, personal challenge, opportunities for individual achievement, time spent away from village living, and reinforcement of cultural and religious values. Thus, subsistence studies in the Arctic suggest that there are situations in which it is useful to refrain from dichotomizing work and leisure. Instead, it may be more useful to measure the various production and process benefits derived from different activities to determine why an individual faced with several alternatives might be attracted to one activity over another.

These are but a few examples of the role of the Arctic as a natural laboratory for testing theories about the organization of production. The Arctic may also contribute more specifically to an understanding of the dynamics of foraging societies located elsewhere in the world. While an

estimated 4,000 publications have documented ethnographic details of arctic societies, the Arctic is just beginning to fulfill its potential in the international literature on foraging societies. Studies of the Arctic may enhance understanding of a variety of topics related to hunting and gathering, including social boundaries, the effect of climate change on the demography and social organization of foragers, population control, the relationship between social organization and population structure, band organization, the causes and effects of migration, social control, and intersocietal relations.

PROTECTING THE ENVIRONMENT

Concern is growing throughout the world about environmental disruptions arising from ozone depletion, global warming, acid rain, radioactive contaminants, solid waste disposal, depletion of renewable and nonrenewable resources, and destruction of habitats.

During the 1970s, a metaphor known as the “tragedy of the commons” acquired a central role in efforts to devise solutions to these problems (Hardin, 1968). This metaphor suggests, in essence, that rational individuals will consistently overuse common property resources (like fish stocks, watersheds, or the atmosphere) because they expect the full benefits of their activities to accrue to themselves while assuming that many of the costs arising from these activities will be borne by others. Self-interested users of the commons, on this account, are also unlikely to save resources for future use because they have no way of preventing others from exploiting them in the meantime. This line of reasoning typically concludes that the tragedy of the commons can be avoided only by privatizing the resources or by introducing some system of government regulation to control uses of common property resources.

Yet this paradigm has long been attacked from several directions. Privatization often gives rise to destructive side effects or externalities. Government regulation frequently benefits special-interest groups or contributes to the growth of stultifying bureaucracies. Neither constitutes a trouble-free response to the tragedy of the commons. Also, research on aboriginal societies has made it clear not only that common property arrangements do not necessarily lead to the destructive outcomes envisioned in the tragedy of the commons metaphor but also that preindustrial modes of economic organization can, under certain conditions, afford protection against destructive misallocation or overexploitation of subsistence resources. This has stimulated a renewal of interest in culturally defined rules and informal norms as mechanisms for controlling the behavior of individual users of common property resources (Berkes, 1989; McCay and Acheson, 1987; NRC, 1986; Ostrom, 1990).

The Arctic offers a unique laboratory to study the alternative of gover

nance without government and other solutions to the problem of managing the commons. Among the many distinct indigenous cultures in the circumpolar North, ethnographic studies indicate that aboriginal peoples have succeeded under some circumstances but failed under others in efforts to devise and maintain systems that promote sustainable uses of natural resources while at the same time ensuring that the proceeds of their efforts are distributed to the members of the community in a socially desirable manner (Berkes, 1977, 1982, 1986; Burch, 1980; Feit, 1973; Fienup-Riordan, 1983; Nelson, 1969, 1973; Tanner, 1979). Accordingly, the Arctic provides opportunities to pinpoint conditions governing success or failure with respect to sustainable human uses of renewable resources.

In modern times all the indigenous cultures of the Arctic have been impacted to a greater or lesser degree by Western social practices. This creates a range of opportunities to study the consequences of external impacts on aboriginal systems for protecting the environment together with the responses of indigenous peoples to these impacts. Studies of arctic and subarctic communities have figured prominently, for example, in the debate over the extent to which contact with Europeans may have subverted a culturally defined relationship between humans and animals that is thought by some scholars to have played an important role in controlling the environmental impacts of hunting and gathering in precontact indigenous systems (Feit, 1986; Krech, 1984; Martin, 1978).

The Arctic is also the scene of a longstanding debate about the relative merits of two divergent systems of managing wildlife and other natural resources: the “state system,” with its emphasis on Western scientific knowledge and regulatory control mechanisms, and the “indigenous system,” with its reliance on aboriginal knowledge and informal or culturally defined rules (Usher, 1987). In the Arctic there is evidence both for and against the claims made on behalf of each system. Equally important for the purposes of this discussion is that neither system has triumphed over the other in the circumpolar North. Government officials ordinarily possess the legal authority to manage resources, but they seldom have the resources needed to implement the state system in the absence of voluntary compliance on the part of users. The users, by contrast, have a close relationship with the resources in question, which provides them with a good deal of observational or experiential knowledge, but they lack the authority to manage the resources on their own. Recently, this situation has led to a growing interest in “comanagement” regimes (e.g., for bowhead whales, polar bears, migratory birds, various caribou herds) intended to expand opportunities for government officials and users to work together to manage wildlife and other resources cooperatively (Osherenko, 1988; Pinkerton, 1989). While it is premature to speak of success or failure, this movement does offer oppor

tunities for research on an important aspect of human/environmental relationships.

More generally, governments have shown a growing interest in devising systems of restricted common property to control the human use of natural resources as an alternative to privatization or conventional command-and-control regulatory arrangements. Here, too, studies of arctic practices have contributed significantly to our understanding of the potential of restricted common property as contrasted with private ownership or public ownership of natural resources. Cases include analyses of limited-entry systems governing access to the marine fisheries (Adasiak, 1978; Koslow, 1986; Langdon, 1980; Morehouse and Rogers, 1982; Young, 1983), leasing systems establishing rights to develop offshore oil and gas deposits (Dryzek, 1983), and systems of preferential rights to consumptive uses of marine mammals (Langdon, 1989).

Additionally, innovative responses to similar concerns arising at the international level in the Arctic have attracted the attention of students of international relations (Young, 1977). The international regime for the northern fur seal, originally formed in 1911, is regarded by many analysts as the first international arrangement to conserve wildlife (Bean, 1983). The more recent international arrangement for the protection of polar bears marked an important step in the transition from efforts to protect single species to the articulation of an ecosystem perspective. Analyses of restricted common property arrangements and imaginative mechanisms for management in the Arctic are now contributing to a broader understanding of the determinants of the formation of international regimes and the factors governing the effectiveness of such arrangements once they are put in place (Young and Osherenko, 1993).

CULTURAL DIVERSITY

Racism is a pervasive human phenomenon. One of the most significant contributions of anthropology is its role in combating racism through accurate information about physical and cultural differences among peoples and an understanding of the adaptations of different cultures to their distinctive environments. Since Franz Boas's ethnography of the Eskimos of central Canada, the Arctic has played an important part in demonstrating and documenting the relationships among culture, language, and environment (Boas, 1888).

While the environmental movement has heightened our concern for the protection of biological diversity, society has devoted relatively little attention to the significance of protecting cultural diversity. From time to time, many countries, including the United States, have practiced policies of as

similation, denying minorities use of their languages, customs, and even religions.

An understanding of the structure of different cultures may not only serve to combat racism but also add to the repertoire of human experience that can be brought to bear in efforts to solve a wide range of common problems. Aboriginal cultures of the circumpolar North survived for thousands of years in harsh environments subject to sharp and often unforeseen fluctuations in the availability of essential resources. The experiences of the peoples of the Arctic may offer insights of value to those responsible for solving contemporary problems, such as the need to achieve sustainable development in an era increasingly subject to competition for limited resources.

The protection of cultural diversity requires a sophisticated understanding of the complexities of cultural continuity and change. It must not be thought of simply as a matter of reconstructing cultures of the past to remain unchanged as living museums. Rather, the remarkable ability of arctic cultures to adapt to changing circumstances must be understood and acknowledged. Further research may improve appreciation of the dynamics of living cultures in which individuals can alter their social practices in response to environmental changes without undermining their sense of belonging to an ongoing cultural community whose essential features remain intact. The modern history of the Arctic's indigenous cultures offers many opportunities to study the circumstances determining the degree of success this adaptation meets.

As a result of the accelerated pace of social change in the Arctic, some traditional cultures of indigenous peoples are threatened with eradication by the regulations, technologies, and social practices of the now dominant Western culture. The intensity and pace of social change are factors affecting the disruption of traditional cultures. In some areas of the world where social change has occurred more slowly, indigenous cultures have more easily adapted to and blended with new social practices. Much of the social stress and maladaptation among arctic people may result from not incorporating traditional cultures into new Western ways. Conversely, lower levels of stress and maladaptive behavior are seen in areas where elements of the traditional culture have been retained and incorporated into newer institutions. Few matters are more central to the protection of cultural diversity than an improved understanding of the determinants of this unique blend of continuity and change that marks living cultures.

Research on the effects of rapid social change on the health of indigenous peoples of the North may provide insights into similar effects on other indigenous peoples (Foggin and Aurillon, 1989; Thouez et al., 1989). Studies of northern peoples have found associations between higher educational achievement in Western institutions and psychosocial maladjustment (Phil

lips and Inui, 1986). Suicide rates are higher where education raises expectations that cannot be fulfilled within a limited economy (Travis, 1984). To better evaluate mental health impacts and provide more effective services, research is needed on traditional indigenous interpretations of the signs and symptoms of emotional disturbance (O'Nell, 1989).

Social, economic, and cultural changes happen as a result of new technologies being introduced into daily life. For example, television was introduced relatively recently in the Arctic. This has given researchers an opportunity to test hypotheses about the effects of television on cognitive abilities, attitudes, and aspirations (Coldevin and Wilson, 1985; Lonner et al., 1985).

Discrete events, such as the construction of military bases, mines, oil production facilities, pipelines, and railroads, can also change communities. Because these events are often controlled by public policies and public finances, they afford an opportunity to make deliberate decisions that affect outcomes. One important method that has arisen to meet this challenge is social impact assessment (SIA). Although SIA, like environmental impact assessment (EIA), is primarily an applied science intended to help policymakers choose among alternatives with some foresight regarding their probable consequences for people and their communities, it is properly understood as a process of hypothesis testing and, therefore, as a procedure that can contribute to the theoretical understanding of social change. Although SIA has developed in the Arctic and sub-Arctic in response to concerns about the impacts of industrial development in the form of discrete projects, it can also be used (subject to the usual trade-offs between scale and precision) to predict the human consequences of large changes in the natural environment or in the content of public policies, such as the effects of climate change or fundamental changes in policies governing access to or allocation of natural resources (Craig and Tester, 1982).

In the cross-cultural setting of the North, SIA has advanced well beyond its origins in cost-benefit analysis, economic assessment, and social indicators research. Like EIA, however, it remains characterized by a lack of consensus about its content and methods and by uncertainty with respect to the understanding of cause-and-effect relationships needed as a basis for prediction. This is partly a problem of paradigm selection (Lang and Armour, 1981), which depends in turn on improved understanding and modeling of social phenomena, such as the dynamics of social change and cultural continuity (Usher and Weinstein, 1991). In part, improving the ability of SIA to verify its predictions will require enhanced postproject monitoring and evaluation. Because there are normally fewer extraneous factors, small arctic communities offer attractive opportunities for studies of this type.

3

The Future of Arctic Social Science

Perceptions of the Arctic as an extreme environment with a unique history, coupled with limited research funding, have produced a tendency toward exceptionalism in arctic social science or, in other words, a propensity to focus on unique cases rather than generic processes. Moreover, at first glance, issues such as the failure of the centrally planned economies of the former Soviet Union and Eastern Europe, environmental degradation, and persistent racism seem far afield from the Arctic. But as the preceding chapter demonstrates, arctic studies have already contributed significantly to our understanding of mainstream social science issues, and the potential for additional contributions is great.

The U.S. Congress recognized this potential by including the behavioral and social sciences in its call for basic and applied research on arctic issues to address national interests relating to security, weather and climate, natural resources, transportation, communications, environmental protection, health, culture, and socioeconomic issues (U.S. Congress, 1984). Science policymakers at the National Science Foundation (NSB, 1987) and the Interagency Arctic Research Policy Committee (IARPC, 1989) also have noted the opportunities and needs for arctic research in the social and behavioral sciences to advance our national interests.

In 1990 representatives of national scientific organizations from the eight arctic countries signed founding articles establishing the International Arctic Science Committee (IASC, 1990). The founding meeting identified

issues relating to humans in the arctic region as one of four priority areas in which the committee should endeavor to take the lead.

The National Science Foundation has assumed the role of lead federal agency for U.S. social science research on arctic issues and has created the position of social science coordinator in the Division of Polar Programs with a mandate to establish and develop the Arctic Social Science Program. This program received an initial $1 million in funding for fiscal year 1991 to be used in support of competitive research projects. The new program has, in turn, adopted program guidelines based on recommendations set forth in the National Research Council report *Arctic Social Science: An Agenda for Action* (NRC, 1989). The 1989 report, which is attached as an appendix to this report, recommends that priority be given to funding research related to three interdisciplinary themes: human/environmental relationships, community viability, and rapid social change.

Today, arctic social science is in a position to make important contributions to the intellectual concerns of mainstream social science disciplines. While we have chosen examples related to the organization of production, environmental protection, and the preservation of cultural diversity, similar opportunities exist in many other areas. The fact that analogous issues arise not only in the North American Arctic but also in Fennoscandia and Russia opens up numerous avenues for international collaboration in the interest of conducting comparative studies based on common research designs. Research in this field can also help with the search for appropriate responses to urgent applied issues, such as continued comparative interdisciplinary research on how arctic communities and other Third World communities cope with a variety of problems, including declining financial resources for social services, cultural survival of communities, and a complex pattern of intergovernmental relations, regulations, and conflicting expectations. The time has come for arctic social science to be viewed as having come in from the cold and to begin to make sustained contributions to broader understanding of human affairs.

References

Adasiak, A. 1978. The Alaskan Experience with Limited Entry. In: Limited Entry as a Fishery Management Tool. Washington Sea Grant Program, Seattle.

Applebaum, H. 1984. Work in Non-market and Transitional Societies. State University of New York Press, Albany.

Bean, M. J. 1983. The Evolution of National Wildlife Law. Praeger Publishers, New York.

Berger, T. R. 1977. Northern Frontier, Northern Homeland: The Report of the Mackenzie Valley Pipeline Inquiry . Department of Supply and Services, Ottawa.

Berkes, F. 1977. Fishery Resource Use in a Subarctic Indian Community. Human Ecology, 5:289-307 .

Berkes, F. 1982. Waterfowl Management and Northern Native Peoples with Reference to Cree Hunters of James Bay. Musk Ox, 30:23-35 .

Berkes, F. 1986. Common Property Resources and Hunting Territories. Anthropologica, 28:145-162.

Berkes, F. (ed.). 1989. Common Property Resources: Ecology and Community-Based Sustainable Development. Belhaven Press, London.

Boas, F. 1888. The Central Eskimo. In: Sixth Annual Report of the Bureau of American Ethnology for 1884-1885. Bureau of American Ethnology, Washington, D.C., pp. 399-699 .

Burch, E. S., Jr. 1980. Traditional Eskimo Societies in Northwest Alaska. Senri Ethnological Studies, 4:253-304 .

Coldevin, G. C., and T. C. Wilson. 1985. Effects of a Decade of Satellite Television in the Canadian Arctic: Euro-Canadian and Inuit Adolescents Compared. Journal of Cross Cultural Psychology, 16(3):329-354 .

Craig, F. E., and F. J. Tester. 1982. Indigenous Peoples: Reassessing Directions for SIA. In: Indian SIA: The Social Impact Assessment of Rapid Resource Development on Native Peoples. C. C. Geisler, R. Green, D. Usner, and P. C. West (eds.). University of Michigan, Ann Arbor, pp. 16-40 .

Crandall, R. 1980. Motivations for Leisure. Journal of Leisure Research, 12:45-54 .

Driver, B. L., and W. Burch. 1986. Probable Personal Benefits of Outdoor Recreation. In: A Literature Review: The President's Commission on Americans Outdoors. U.S. Government Printing Office, Washington, D.C., pp. 63-67 .

Dryzek, J. S. 1983. Conflict and Choice in Resource Management: The Case of Alaska. Westview Press, Boulder, Colorado.

Feit, H. 1973. The Ethno-Ecology of the Waswinipi Cree or How Hunters Can Manage Their Resources. In: Cultural Ecology. B. Cox (ed.). McClelland and Stewart, Toronto, pp. 115-125.

Feit, H. 1986. James Bay Cree Indian Management and Moral Considerations of Fur-bearers. In: Native People and Resource Management. Alberta Society of Professional Zoologists, Edmonton.

Fienup-Riordan, A. 1983. The Nelson Island Eskimo. Alaska Pacific University Press, Anchorage.

Foggin, P. M., and N. Aurillon. 1989. Respiratory Health Indicators and Acculturation Among the Inuit and Cree of Northern Quebec: A Regional Approach Using Geographic Seriation Analysis. Social Science and Medicine, 29(5):617-626 .

Hardin, G. 1968. The Tragedy of the Commons. Science, 162:1243-1248 .

Herbert, D. T. 1987. Exploring the Work-Leisure Relationship: An Empirical Study in South Wales. Leisure Studies, 6(2):147-165 .

Ingham, R. 1986. Psychological Contributions to the Study of Leisure—Part One. Leisure Studies, 5 (3):255-279 .

Interagency Arctic Research Policy Committee. 1989. United States Arctic Research Plan. National Science Foundation, Washington, D.C.

International Arctic Science Committee. 1990. Brief Report from Founding Meeting, Resolute Bay, Northwest Territories, Canada .

Juster, T. F., and P. N. Courant. 1986. Integrating Stocks and Flows in Quality of Life Research. In: Research on the Quality of Life. F. M. Andrews (ed.). University of Michigan, Institute for Social Research, Ann Arbor.

Koslow, J. A. 1986. Limited Entry Policy and Impacts on Bristol Bay Fishermen. In: Contemporary Alaskan Native Economies. S. J. Langdon (ed.). University Press of America, Lanham, Md., pp. 47-62.

Krech, S. , II (ed.). 1984. The Subarctic Fur Trade: Native Economic and Social Adaptations. University of British Columbia Press, Vancouver.

Kruse, J. A. 1982. Subsistence and the North Slope Inupiat: The Effects of Culturally Adapted Jobs. Arctic Anthropology, 20(1):1-21 .

Kruse, J. A., J. Kleinfeld, and R. Travis. 1982. Energy Development on Alaska's North Slope: Effects on the Inupiat Population. Human Organization, 41(2):97-106 .

Lang, R., and A. Armour. 1981. The Assessment and Review of Social Impacts. Federal Environmental Review Office, Ottawa.

Langdon, S. J. 1980. Transfer Patterns in Alaskan Limited Entry Fisheries. Final Report for the Limited Entry Study Group of the Alaska Legislature, Juneau .

Langdon, S. J. 1989. Prospects for Co-management of Marine Animals in Alaska. In: Cooperative Management of Local Fisheries. E. Pinkerton (ed.). University of British Columbia Press, Vancouver, pp. 154-169 .

Lonner, W. J., R. M. Thorndike, N. E. Forbes, and C. Ashworth. 1985. The Influence of Television on Measured Cognitive Abilities: A Study with Native Alaskan Children. Journal of Cross Cultural Psychology, 16(3):355-380.

Martin, C. 1978. Keepers of the Game: Indian-Animal Relationships and the Fur Trade. University of California Press, Berkeley.

McCay, B., and J. Acheson (eds.). 1987. The Question of the Commons: The Culture and Ecology of Communal Resources. University of Arizona Press, Tucson.

Morehouse, T. A. and G. W. Rogers. 1982. Limited Entry in the Alaska and British Columbia Salmon Fisheries. Institute of Social and Economic Research, Anchorage.

National Research Council. 1986. Proceedings of the Conference on Common Property Resource Management. National Academy Press, Washington, D.C.

National Research Council. 1989. Arctic Social Science: An Agenda for Action. Prepared by the Committee on Arctic Social Sciences, Polar Research Board. National Academy Press, Washington, D.C.

National Science Board. 1987. The Role of the National Science Foundation in Polar Regions, A Report to the National Science Board. National Science Foundation, Washington, D.C.

Nelson, R. K. 1969. Hunters of the Northern Ice. University of Chicago Press, Chicago.

Nelson, R. K. 1973. Hunters of the Northern Forest: Designs for Survival Among the Alaskan Kutchin. University of Chicago Press, Chicago.

O'Nell, T. D. 1989. Psychiatric Investigations Among American Indians and Alaska Natives: A Critical Review. Culture, Medicine and Psychiatry, 13(1):51-87 .

Osherenko, G. 1988. Can Comanagement Save Arctic Wildlife? Environment, 30(6):6-13, 29-34 .

Ostrom, E. 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press, Cambridge.

Phillips, M., and T. Inui. 1986. The Interaction of Mental Illness, Criminal Behavior and Culture: Native Alaskan Mentally Ill Criminal Offenders. Culture, Medicine and Psychiatry, 10:123-149 .

Pinkerton, E. (ed.). 1989. Cooperative Management of Local Fisheries. University of British Columbia Press, Vancouver.

Pollnac, R. B. V., and J. J. Poggie, Jr. 1988. The Structure of Job Satisfaction Among New England Fishermen and Its Application to Fisheries Management Policy. American Anthropologist, 90(4):888-901 .

Quigley, N. C., and N. J. McBride. 1987. The Structure of an Arctic Microeconomy: The Traditional Sector in Community Economic Development. Arctic, 40(3):204-210.

Sharif, M. 1986. The Concept and Measurement of Subsistence: A Survey of the Literature. World Development, 14(5):555-577 .

Tanner, A. 1979. Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters. Memorial University of Newfoundland, St. Johns.

Thouez, J. P., A. Rannou, and P. Foggin. 1989. The Other Face of Development: Native Populations, Health Status, and Indicators of Malnutrition—The Case of the Cree and Inuit of Northern Quebec. Social Science and Medicine, 29(8):965-974 .

Travis, R. 1984. Suicide and Economic Development Among Inupiat Eskimo. White Cloud Journal, 3(3):14-21 .

U.S. Congress. 1984. Arctic Research and Policy Act of 1984. P.L. 98-373, 15 USC 1301, et. seq.

Usher, P. J. 1981. Sustenance or Recreation? The Future of Native Wildlife Harvesting in Northern Canada. In: Proceedings of the First International Symposium on Renewable Resources and the Economy of the North. M. M. R. Freeman (ed.). Association of Canadian Universities for Northern Studies, pp. 56-71 .

Usher, P. J. 1987. Indigenous Management Systems and the Conservation of Wildlife in the Canadian North. Alternatives, 14(1):309 .

Usher, P. J., and N. D. Bankes. 1986. Property, The Basis of Inuit Hunting Rights—A New Approach. Inuit Committee on National Issues, Ottawa.

Usher, P. J., and M. S. Weinstein. 1991. Towards Assessing the Effects of Lake Winnipeg Regulation and Churchill River Diversion on Resource Harvesting in Native Communi

ties in Northern Manitoba. Canadian Technical Report #1794 of Fisheries and Aquatic Sciences. Department of Fisheries and Oceans, Winnipeg.

Vroom, V. H. 1964. Work and Motivation. John Wiley & Sons, New York.

Wolfe, R. J., and R. J. Walker. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. Arctic Anthropology, 24(2):56-81 .

Young, O. R. 1977. Resource Management at the InternSational Level: The Case of the North Pacific. Pinter and Nichols, London and New York.

Young, O. R. 1983. Fishing by Permit: Restricted Common Property in Practice. Ocean Development and International Law, 13:121-170 .

Young, O. R., and G. Osherenko (eds.). 1993. Polar Politics: Creating International Environmental Regimes. Cornell University Press, Ithaca, N.Y.

Appendix

Arctic Social Science: An Agenda for Action

Committee on Arctic Social Sciences
Polar Research Board
Commission on Physical Sciences, Mathematics, and Resources
National Research Council

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Foreword

The Arctic Research and Policy Act of 1984 calls for the formulation of a coherent Arctic research policy by the federal government and mandates the development of an Arctic Research Plan, to be updated at two year intervals. In preparation of the first Arctic Research Plan, the Interagency Arctic Research Policy Committee (IARPC) asked the Polar Research Board (PRB) to prepare a document assessing national needs and problems regarding the Arctic; in 1985 PRB published the document *National Issues and Research Priorities in the Arctic.*

When preparing the Social and Cultural Research chapter of the *Nation al Issues* report, the Board realized that a separate, longer-range study was needed for the Arctic social sciences. In addition, when reviewing drafts of the Arctic Research Plan, the Board again recognized the lack of a widereaching study to provide further direction for social science research on Arctic topics.

The Committee on Arctic Social Sciences was established by the PRB to undertake such a study as part of the Board's ongoing "Polar Research— A Strategy" series. The committee was charged with reviewing existing research, identifying research needs, and recommending future directions for the social sciences in the North. In addition, the final report was to be available for examination by the Interagency Arctic Research Policy Committee prior to the 1989 revision of the U.S. Arctic Research Plan.

The committee held two public sessions in Washington, DC, and a workshop at the AAAS Arctic Science Conference in Fairbanks, Alaska, in

October 1988. In addition, numerous federal and state agency, private organization, and university scientists were contacted. By involving a range of social scientists in their study, the committee hopes to have encouraged their participation in the further development of Arctic social science research and policy.

This study was supported by grants from the National Science Foundation, the State of Alaska, the Smithsonian Institution, and the Bureau of Land Management, Department of the Interior.

The Polar Research Board appreciates the time and efforts of Mim Dixon and Oran Young, co-chairs for the Committee on Arctic Social Sciences, and of the members of the committee in the conduct of the study and preparation of this report.

Gunter Weller, *Chairman*
Polar Research Board

Contents

Executive Summary

Both Congress and the federal agencies have found that there is a national need for a broad-gauged program of social science research on Arctic topics. The Arctic Research and Policy Act of 1984 explicitly includes the social and behavioral sciences. The *U.S. Arctic Research Plan,* developed by the Interagency Arctic Research Policy Committee to fulfill the requirements of the Arctic Research and Policy Act, devotes one of its three substantive chapters entirely to recommendations for research on people. But the plan provides little direction in establishing research priorities and formulating a focused program for Arctic social science.

To solve this problem, the Polar Research Board formed an ad hoc committee on Arctic social sciences and charged this committee with the task of developing a strategy to meet the national need for social science research on Arctic topics; this report presents such a strategy. Through its deliberations, the committee has identified three substantive themes that merit priority attention for a U.S. Arctic social science research plan. These themes are as follows:

1. *Human/environment relationships.* Top priority is given to studies of the complex relationships between human communities and the biological and physical systems that make up the natural environment of the Arctic. Such studies will advance our understanding of global change processes, identify creative ways to address resource management problems, and provide a stimulus to the development of productive linkages between social and natural scientists.

2. *Community viability.* Arctic communities tend to be small and to have little conventional industrial basis for local taxation. Still, these communities require services like education, transportation, and law enforcement that most parts of the United States take for granted. There are cultural, social, economic, political, and technical challenges in providing necessary services to these communities. Studies are needed on a host of complex issues relating to labor, expenditures of public funds, the balance between self-sufficiency and dependence, and the importance of villages to cultural survival.
3. *Rapid social change.* Rapid and often disruptive social change has become a pervasive phenomenon throughout the world. The Arctic is unusual because social change that took centuries elsewhere was compressed into just a few generations in the Arctic. Research areas recommended include traditional patterns of social interaction; the role of changing expectations and aspirations in labor force participation, subsistence activities, and commercial consumption; and factors contributing to physical and mental health.

Each of these themes lends itself to studies of the past, present, and future. The committee has identified research needed by mission-oriented agencies as well as corresponding topics for basic research. Topics for international collaboration are highlighted for coordination with this multidisciplinary, multiagency research plan. Key elements of the recommended action plan are summarized in the table on the following page.

The Arctic today presents a unique and promising opportunity for an integrated program of applied and basic social science research. But the realization of this promise is severely limited by constant pressure to allocate limited resources, both financial and human, to applied research, and the absence of adequate mechanisms to link such applied research to the broader basic research issues. The time has come for Arctic social science research to be better integrated into the mainstream of the relevant scientific disciplines. In addition to case studies and descriptions of social phenomena that are uniquely related to the extreme Arctic environment, social science on Arctic topics must contribute to broader scientific issues.

To address these limitations and to provide proper support for the program initiatives set forth in the report, the committee recommends several changes in existing federal arrangements for social science research in the Arctic.

The highest priority is to designate the National Science Foundation (NSF) as the lead federal agency for Arctic basic social science research and to charge it with responsibility for integrating basic research with applied research in other agencies. Other top priority infrastructure needs identified by the committee concern education and training, the involve

ment of Arctic residents, data and information, and international cooperation.

Summary of Key Elements for Multidisciplinary, Multiagency Plan for Arctic Social Science Research

Theme	Research Problems	Federal Agencies
HUMAN/ENVIRONMENT RELATIONSHIPS		
Applied		NPS, USFWS, BLM, USFS, NOAA
	• Allocation methods for scarce natural resources • Conflict avoidance and resolution in the use of natural resources	
Basic		NSF
	• Control of human activities that threaten to disrupt natural systems • Human response to habitat change • Models of impacts of global warming on humans	
COMMUNITY VIABILITY		
Applied		MMS, NOAA, BIA, DOT, DOE
	• Economic diversification and viability of coastal and riverine communities • Motivation and psychosocial adjustments of the Northern work force • Obstacles to community survival	
Basic		NSF, NIMH, ADAMHA
	• Relationship between community survival and cultural survival	
RAPID SOCIAL CHANGE		
Applied		MMS, USFS, NPS, NOAA, NIH, NIMH, ADAMHA, CDC
	• Patterns of social interaction • Trends in expectations and aspirations • Relationship between social change and physical and mental health	
Basic		NIH, NIMH, ADAMHA, CDC, NSF, DOD
	• Consequences of social specialization and increased interdependence • Education for participation in a rapidly changing, multicultural world • Cognitive and emotional limits of peoples' ability to cope with rapid change	

To properly discharge its leadership role as designated lead agency and to strengthen the social science community, the NSF should have a program manager who is trained in a social science discipline and experienced in Arctic research. The role of the program manager in planning, coordinating, and providing assistance to scientists is crucial to the growth and development of Arctic social science programs to meet national needs. This is only the first step toward developing a vigorous program of social science research on the Arctic. Ultimately, the goal is for the NSF to have an established program for Arctic social science with a program manager and budget to develop the research agenda set forth in this report.

1

Introduction

Over the last several years, consensus has emerged on the proposition that there is a national need for more and better social science research on the Arctic. So far, however, little has been done to devise an effective strategy for translating this consensus into a well-organized and properly supported program of research. This report seeks to remedy this situation. Specifically, it recommends three multidisciplinary, multiagency research initiatives in the social sciences for the Arctic and addresses an array of organizational problems that must be solved to meet this national need.

The need for an expanded program of social science research on Arctic topics is well documented. The Arctic Research and Policy Act of 1984 (U.S. Congress, 1984; see appendix) was enacted "to establish national policy, priorities, and goals and to provide a federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological and health sciences, and social and behavioral sciences." The findings and purposes of the act relate to the need for economic, political, social, and cultural research to facilitate broad national goals of reducing dependence on oil and thereby improving the national balance of payments, strengthening national defense, and developing commercial fisheries and agriculture. In the act, Congress recognizes that research on the "long-range health, environmental, and social effects of development in the Arctic is necessary to mitigate the adverse consequences of that development to the land and its residents." The act stresses the importance of research to "enhance the lives of Arctic residents, increase

opportunities for international cooperation among Arctic-rim countries, and facilitate the formulation of national policy for the Arctic."

The *United States Arctic Research Plan* responds to the Arctic Research and Policy Act by devoting one of its substantive chapters entirely to the development of recommendations for research on people (IARPC, 1987). The plan observes that "no longer are Arctic peoples and resources considered unimportant to the strategic, social, and economic concerns of modern nations" and calls for a "reevaluation of the state of knowledge of social science in Arctic regions" (p. 236). Characterizing the present situation as one in which "social science research is poorly funded, has low visibility, and is poorly organized administratively," the plan concludes that "although past federal Arctic research has been directed largely at physical and biological studies, it has become evident that the objectives of U.S. Arctic research policy cannot be met without a program in the social sciences" (p. 236).

The National Science Board's recent report entitled *The Role of the National Science Foundation in Polar Regions* reviews the same evidence and reaches similar conclusions about the national need for more and better research in the social sciences on Arctic topics (NSB, 1987). The report observes that "[i]n the North, there are diverse and often urgent needs for behavioral and social science research" (p. 40). It also states that "behavioral and social sciences are obvious examples of fields in which basic research [on Arctic topics] is not sufficient" (p. 51). The National Science Board, meeting in June 1987, formally endorsed the recommendations of this report, making them governing policy for the National Science Foundation.

Nor is this recognition of the need for an expanded program of social science research on Arctic topics confined to the United States. In Canada the authoritative report entitled *Canada and Polar Science* states that "systematic studies in human and social sciences in the Arctic have on the whole lagged behind those in the natural and applied sciences, and there have been few major thrusts or programs" (Roots et al., 1987, pp. 82-83); it goes on to state that more work in these fields is essential and overdue. The report of the 1988 Stockholm meeting on International Cooperation in Arctic Science lists "man and the Arctic environment" as a major programmatic area that would benefit from the development of joint research projects among the Arctic countries (Royal Swedish Academy of Sciences, 1988). More broadly, the concern about global change, which has given rise to the International Geosphere-Biosphere Programme (IGBP) and which is widely supported by scientists concerned with Arctic issues, has led to a recognition of the need to incorporate studies of the human dimension of global change into its overall program of scientific research.

While the national need for more and better social science research on the Arctic is clear, so too are the obstacles to meeting this need:

1. There is no lead agency at the federal level to advocate and support social science research on Arctic topics; the social sciences constitute very small programs in a number of agencies. There is no effective proponent of social science research on Arctic topics within the federal government.
2. Social scientists interested in the Arctic are not a well-organized and cohesive group. There is no organization to bring social scientists together to reach consensus on Arctic research priorities and to facilitate the development of an effective communications network. Such a network must include indigenous Arctic people who are often subjects of or participants in such research.
3. Inadequate funding has prevented the participation of social scientists in meetings where Arctic research policy is discussed and formulated. Funding for social science research has been so scarce that competition is intense and often leads to divisiveness within and between disciplines. For example, in fiscal years 1985 and 1986, the NSF reported spending $0 on social science research on Arctic topics, and has predicted an estimated expenditure of $62,000 for this research in both 1987 and 1988. Predicted NSF expenditures for Arctic research in all disciplines for 1988 totaled $21,597,000 (IARPC, 1987).

The Committee on Arctic Social Sciences was established by the Polar Research Board (PRB) in 1987 to develop a strategy to overcome these problems in the interest of meeting the national need. Composed of individuals who have worked in the Arctic and who represent the major social science disciplines, the committee has taken steps to foster communication with colleagues throughout the social sciences and has held meetings with representatives of numerous federal agencies to seek their ideas regarding solutions to the problems outlined above. By reaching out to social scientists and Arctic residents through news releases sent to the major professional society newsletters and Native organizations, the committee has developed an extensive mailing list for review of its workshop discussion paper.

The committee held a workshop to provide further opportunity for participation in conjunction with the Arctic Science Conference, sponsored by the American Association for the Advancement of Science (AAAS) in Fairbanks, Alaska, October 7, 1988. Nearly 100 people attended the workshop.

This report is an action plan for future social science research on Arctic topics. The committee sees a need to present an evaluation of past contributions of Arctic social science, and hopes that this will be forthcoming.

In writing this report, the committee has deliberately transcended the geographic boundaries of the Arctic as defined in the U.S. Arctic Research

and Policy Act of 1984. The committee has considered northern regions more generically since social systems are not delimited by permafrost, the tree-line, or any other specific environmental factor. Public policy research in the Arctic involves political divisions whose geographic areas extend south to include the subarctic and in some cases even more temperate zones. In general, the political units considered in this report are those that border on the Arctic Ocean, including the United States (Alaska), Canada (Yukon Territory, Northwest Territories, northern Quebec, Labrador), Greenland, Norway, Sweden, Finland, the Soviet North, and the Soviet Far East. Use of the term "Arctic" in this report generally means the circumpolar Arctic and subarctic. While this definition varies somewhat from that articulated in the U.S. Arctic Research and Policy Act, all the recommendations outlined in this report are applicable to the Arctic as defined in that act.

Several indigenous groups reside in the Arctic. The term "Inuit" is used in this report to refer to circumpolar indigenous people who share similar languages, including Inupiaq, Central Yupik, Siberian Yupik, Inuvialuktun, Kalaallisut (Greenlandic), and Inuktitut. In the United States, these groups are generally called "Eskimo." The committee decided to use the term "Inuit" because the circumpolar political organization of indigenous people has chosen to call itself the "Inuit Circumpolar Conference." In this report, "Native people" is used to mean all indigenous people in the circumpolar Arctic, including Aleuts, Eskimos, Athapaskans, Saami, and others. By contrast, "non-Native" is used to mean people of various ethnic groups who are not indigenous to the Arctic, such as people of European, Asian, or African descent who have immigrated to the Arctic in the past 300 years or so. Taken collectively, both Natives and non-Natives living in the Arctic are called "Northerners" or "Northern people."

This report is divided into two principal sections. The first, entitled "Program Initiatives for Arctic Social Science," identifies three substantive themes that the committee believes should be given priority. These themes are human/environment relationships, community viability, and rapid social change. After a review of existing documents and agency concerns, the committee identified many topics worthy of national attention. The committee used the following criteria for developing and selecting themes for new research initiatives:

- "Life-and-death" significance of issues, including human survival;
- Timeliness and urgency of research, particularly information that may be lost forever if data are not collected soon;
- Global or circumpolar significance;
- Research in which the Arctic can serve as a unique or particularly well-suited natural laboratory;
- Spanning the continuum between applied and basic science;

- Transcending individual agency concerns;
- Drawing upon the skills and knowledge of Native people and providing them with useful information;
- Bridging the social, biological, and physical sciences; and
- Promoting comparative research among social scientists in the Arctic countries.

The committee has intentionally framed these themes in such a way as to transcend conventional disciplinary boundaries. Not only is multidisciplinary and interdisciplinary research required, but the resultant research should also encompass studies of the past, the present, and the future.

The second section, entitled "Organizational Issues," identifies a range of structural or institutional problems currently impeding the development of social science research on Arctic topics and sets forth a series of recommendations designed to alleviate these problems. Although the formulation of well-defined research priorities is clearly necessary, solving the key structural and institutional problems is equally critical. The committee believes that it is imperative to treat the two principal sections of this report as components of a single integrated strategy.

It should be noted that many of the issues discussed in this report are not limited to Arctic studies. The recent National Research Council publication *The Behavioral and Social Sciences: Achievements and Opportuni ties* (NRC, 1988a) provides an excellent overview of national issues in behavioral and social science research. Many of the recommendations of this committee parallel recommendations in that report. The trend toward decreased funding of social and behavioral sciences in the Arctic is part of a larger national trend toward decreased funding in these fields.

Why, then, focus attention on social science in the Arctic? Congress has found that the strategic importance of the Arctic to the United States merits a special research emphasis. But, there are other compelling reasons to emphasize the Arctic for social science research. First, the opportunity for action exists because there is an organizational structure to coordinate Arctic research through the National Research Council's Polar Research Board and the National Science Foundation's Division of Polar Programs, each of which has found it necessary and desirable to broaden its interdisciplinary purview to include social and behavioral sciences. These organizations for interdisciplinary coordination provide an opportunity to expand our models for interdisciplinary research in exciting and potentially useful ways.

Second, as the Arctic Research and Policy Act states, the Arctic provides a natural laboratory that is unique in all of the United States in which to conduct research on issues of national, international, and global importance. In the Arctic the environment is especially sensitive to human activ

ities, and humans are more sensitive to environmental change than in more industrialized, urbanized areas. Thus, the Arctic can provide early warning of changes that may eventually have national or even global significance. For example, scientists studying the global warming trend hypothesize that the effects of climate change will be magnified in areas above 55° north latitude; the impact of climate change on humans might surface in the Arctic first. The Arctic is an excellent natural laboratory for some types of social science research because the relevant variables can be isolated more easily than in more complex societies. With the excellent preservation conditions in the Arctic, archaeology may be able to discern the impacts on humans of past climatic fluctuations more effectively than in other areas. The Arctic is also a valuable place to study new and creative social organizations and programs.

Yet a third reason for emphasizing the Arctic in social science research is to assure that actions taken by the U.S. government and others do not foreclose, but rather safeguard, the opportunities for survival of the cultures of the Inuit and other Native Americans who have lived there successfully for thousands of years.

2

Program Initiatives for Arctic Social Science

Recent reports have touched on research needs related to Arctic social sciences. The National Research Council report *Polar Biomedical Research* (NRC, 1982) and the American Public Health Association's report *The National Arctic Health Science Policy* (American Public Health Association Task Force, 1984) discussed the relationship between behavior and health, particularly in regard to the significant problems of alcoholism, suicide, homicide, and other forms of violence in the Arctic. While the Committee on Arctic Social Sciences endorses the need for a coordinated research program in these areas, no attempt was made to duplicate the valuable work of these other committees.

In response to the mandates of the Arctic Research and Policy Act, the first *U.S. Arctic Research Plan* produced by the Interagency Arctic Research Policy Committee (IARPC) lists many feasible and potentially rewarding types of research in health and the social sciences (IARPC, 1987). Organized by discipline, the plan conveys a clear sense of the breadth of disciplines and research issues subsumed under the label “social science.” It provides a strong argument for overall increases in funding for social science research. However, the *U.S. Arctic Research Plan* provides little direction for formulating focused programs that could be implemented to foster needed research.

To assist federal agencies in responding to the need for more and better social science on the Arctic and to suggest topics that lend themselves to international cooperation and comparative studies, the Committee on Arctic

Social Sciences has identified three themes that should be given highest priority in developing new coordinated programs of multidisciplinary social science research on the Arctic. These themes are (1) human/environment relationships; (2) community viability; and (3) rapid social change. The three themes are discussed in some detail in the following subsections, each of which covers background, justification for the research initiative, and representative types of research questions to be incorporated into applied and basic research programs as well as opportunities for international cooperation. The types of research questions cited to illustrate program opportunities are not intended to be exhaustive or exclusive, and undoubtedly, further ideas will be generated by the scientific community.

HUMAN/ENVIRONMENT RELATIONSHIPS

The committee recommends that Arctic social science give top priority to studies of the complex relationships between human communities and the biological and physical systems that together make up the natural environment of the Arctic. In addition to the intrinsic importance of this type of research, studies of human/environment relationships in the Arctic will advance our understanding of global change processes and will identify creative ways to address resource management problems. While such a program of studies would encourage the use of the Arctic as a natural laboratory, it would also provide a stimulus to the development of productive linkages between social scientists and natural scientists working in the North. In the process, this research initiative would yield valuable contributions to the work of those carrying out projects emphasizing global change, like the International Geosphere-Biosphere Programme (IGBP).

Background

Social scientists interested in Northern peoples have long studied the constraints on human activities posed by the natural environment as well as the adaptations that such peoples have made to the biological and physical systems making up the natural environment. Analyses based on varying conceptions of the carrying capacity of northern ecosystems, for example, offer powerful explanations of several prominent features of traditional Native cultures. The fact that northern ecosystems are inhospitable to an agrarian or settled mode of production plays a major role in explaining the predominance of hunter/gatherer societies in the Arctic and subarctic right into the modern era. The limited productivity of northern ecosystems is a key factor in accounting for the low density of human population throughout the North. The pronounced fluctuations in absolute numbers and geographic distribution of northern animal populations (for instance, herds of caribou) gave rise to the traditional mobility of Arctic people.

Cultural practices of Native peoples have been analyzed as adaptations to the changing character of the natural environment. Sometimes the relevant changes involve only short-term or localized developments. For example, the migratory routes of caribou herds shift from time to time and the southern extent of sea ice varies on interannual and longer time scales. Flexible social arrangements capable of assuming a variety of configurations represent an adaptation to these short-term changes. The opportunism of Native communities (for example, the tendency to take large numbers of animals whenever the opportunity arises) is often attributed to the influence of such short-term changes.

At the same time long-term changes in the natural environment have played a predominant role in shaping the overall pattern of human activity in the Arctic. Scholars typically associate major episodes in the peopling of the New World with the periodic emergence and disappearance of the Bering Land Bridge. The movement of human populations both northward and southward in Eurasia is correlated with the succession of cold glacial episodes. The spread of Thule Eskimo culture eastward and the failure of the Norse colonies in Greenland have been explained in terms of the impact of the "Little Ice Age," fluctuations that began toward the end of the thirteenth century and culminated in the late nineteenth century.

Modern technology has enhanced the capacity of human beings to insulate themselves from environmental changes in all regions. We heat and cool our homes to cope with temperature swings; we import food from distant regions to combat fluctuations in local production, and we construct retaining walls to offset coastal erosion. Nevertheless, human communities in the Arctic are highly sensitive to changes in the natural environment. A decline in the abundance of wild animals can prove drastically disruptive to communities oriented to subsistence lifeways. Small changes in water temperatures can lead to economic bonanza or economic collapse in coastal communities dependent on commercial fishing. Other changes such as global warming can produce erosion that threatens communities and archaeological resources. And environmental pollution (such as the radioactive fallout that contaminated Saami reindeer in the wake of the 1986 Chernobyl disaster) can prove disastrous to small communities highly dependent on a single resource for their livelihood.

The Arctic may be more sensitive than other places in the world because flora and fauna are at the limit of their range and thus slight changes have noticeable impacts. Whether or not this is the case, the impact of human activity is measurable in a researchable time frame, and innovative policy options are testable. The relative simplicity of Arctic ecosystems provides greater possibility of controlling or accounting for intervening variables in developing models of human/environment relationships.

In addition to an understanding of human/environment relationships,

public policy guiding the use of natural resources depends largely on value systems and economic conditions. Alaska offers opportunities to examine three major perspectives on Arctic values: the Arctic as a homeland, the Arctic as a colony, and the Arctic as the last wilderness.

The Arctic as a homeland. The Arctic is home to Native peoples whose historical use of Arctic land, water, and natural resources forms a vital and dynamic part of their culture. Among the non-Natives who migrated to these regions in connection with the successive waves of resource exploitation and defense construction, some also chose to make their permanent homes in the Arctic. The Arctic as homeland perspective has been in conflict with the purely colonial view of the region as a storehouse of resources or the last wilderness view of the Arctic as a preserve for wilderness and wildlife.

The homeland view of the region was validated and made part of national policy with the passage of the Alaska Statehood Act of 1958. This Act was nothing short of a mandate to build a new American society or polity in Alaska. The Alaska Native Claims Settlement Act of 1971 furthered this objective. On the one hand, it recognized the hereditary claims of Alaska Native people and attempted to make restitution, but on the other, it expressly crafted the means for both preservation and compensation within the framework of the larger political economy—through such institutions as profit and nonprofit corporations and municipal governments.

The values and goals of those who view the Arctic as a homeland may differ depending upon whether they reside in cities or remote areas, how they attain their livelihood, and whether they have local governments and pay taxes. Urban dwellers employed or seeking employment in the cash economy and paying taxes for local governments tend to favor resource development to increase their personal income and expand their communities' tax bases. Some village people with subsistence life-styles and not paying taxes for local governments tend to fear resource development as a threat to the environment that provides their livelihood. The homeland perspective of Native people may differ from that of more recent settlers whose permanence is lesser, options for emigration greater, and who have more family and cultural ties to areas outside the Arctic.

The Arctic as a colony. Historically, North Americans have viewed the Arctic as a storehouse of resources waiting to be harvested for nonresident benefit as needed or when economic conditions are right." This vision of northern lands has resulted in successive waves of opportunistic and intensive use of a very few resource stocks characterized by exceptional size, local concentration, or unit value—chiefly furs, marine mammals, fisheries, gold, copper, and petroleum. Since World War II and the Cold War, the strategic importance of the Arctic has been an added development motive,

with allocations of land and resources made in the name of hemispheric defense. Approximately 2.6 million acres of Alaska's lands are in military reservations. Only in the last three decades, Alaska's statehood, together with the establishment of formal systems of resource management by federal agencies, has supplanted the patchwork that characterized the colonial period of laissez-faire exploitation for some resources governed by short-term economic objectives and nonresident interests, with the absolute and arbitrary closure of others.

The Arctic as the last wilderness. A sharply contrasting view of the Arctic was presented in the 1937 National Resources Committee's report entitled *Alaska, Its Resources and Development* (NRC, 1937). Among other things, this report recognized the value of Alaska's unique animal populations and recommended that all land use plans "give adequate recognition to wildlife production and management."

Preservation of Alaska's wildlife and wilderness became a national crusade and developed a strong constituency during the 1960s and 1970s. Congress enacted the Wilderness Act of 1964 and the Alaska National Interest Lands Conservation Act of 1980, which increased land in federal conservation systems from 9 percent of the total area of Alaska in 1958 to 42 percent currently. Over the same period, the state of Alaska reserved 8.6 million acres of its 104 million-acre statehood grant to create similar state conservation systems. The development versus conservation conflict is currently focused on the issue of opening the coastal plain of the Arctic National Wildlife Reserve to petroleum exploration and eventual development. Enforcement of land and resource management regulations frequently has come into sharp conflict with Native subsistence and harvesting. Conflicts also arise between different values toward land uses such as recreation and subsistence, or recreation and commercial use.

Each of these perspectives gives rise to a distinctive approach to human/environment relationships and leads to its own system of ethics regarding the human use of the natural environment as well as public policies guiding the behavior of groups in this realm. The history of human endeavors in the Arctic is in large part a history of conflicts that have arisen among the proponents of these differing perspectives.

Justification for Research

Today we are becoming aware of new and profoundly important linkages between human activities and the condition of the natural environment. Human behavior and social organization, in the aggregate, have emerged as critical determinants of stability and change in the biological and physical systems that together make up the natural environment. Increased human

population, enhanced human capabilities stemming from the introduction of new technologies, and rising human expectations have combined to produce environmental changes. The deleterious effects of radioactive fallout, the increase in ultraviolet radiation associated with the depletion of the stratospheric ozone layer, the high levels of pollution from midlatitudes in the Arctic atmosphere evidenced by Arctic haze, and the buildup of carbon dioxide that is producing a global warming trend are examples. There is growing evidence to suggest that these individual phenomena can interact to yield unforeseen and unintended consequences of even greater proportions.

Direct human consumption can lead to depletions in animal populations. Habitat destruction, arising from activities like nonrenewable resource development or the clearcutting of forests, further reduces the carrying capacity of the natural environment for these and other species. In combination, such stresses arising from human activities can, and often do, lead to the extinction of species. These concerns, in turn, create the need for governments to control human behavior that affects the environment. Examples of these controls include land use planning and zoning, management of hunting and fishing, and pollution controls on industrial activities. As a result, there has been a rise in social conflicts involving the management and allocation of increasingly scarce natural resources and environmental services. Conflicts occur between specific interest groups (commercial fishing versus sport fishing versus subsistence fishing, for example), between various levels of government seeking to control resource management, and between parties anticipating differing benefits and costs as a result of natural resource development. Conflict avoidance and conflict resolution have become increasingly important in the sphere of resource management and allocation.

Opportunities for Applied Research

Many federal and state agencies have responsibility for land and resource management in the U.S. Arctic and its offshore areas. Among those involved in the management of land, forests, fisheries, and wildlife are the Bureau of Land Management (BLM), National Park Service (NPS), Minerals Management Service (MMS), and U.S. Fish and Wildlife Service (USFWS) of the Department of the Interior; U.S. Forest Service (USFS) of the Department of Agriculture; National Oceanic and Atmospheric Administration (NOAA); the U.S. Marine Mammal Commission; the Alaska Department of Natural Resources (ADNR); and the Alaska Department of Fish and Game (ADFG).

In the management and allocation of resources, these agencies face difficult questions including some of the following: Should we strive to achieve maximum sustainable yield, maximum economic yield, or some

measure of optimum sustainable population in managing fish and game? When allowable catches or harvests are insufficient to meet the demands of all user groups, what are the consequences of giving priority to subsistence users and local residents, as has some legislation, versus the alternative of accommodating all interested parties on an equal basis through the establishment of a lottery or market mechanism? How can biological systems be protected from the disruptive impacts of oil and gas development without suppressing the hydrocarbon industry? When the volume of wastes or residuals threatens to exceed the capacity of the natural environment to handle them, how do we allocate this finite absorptive capacity?

All resource management agencies stand to benefit from research on allocation methods. Such research questions may include an examination of the relative merits of regulatory schemes, charges, and systems of rights in allocating environmental services among competing users while protecting the general public from the impact of unintended side effects. How satisfactory are limited entry arrangements, based on transferable permits or licenses, in handling the allocation of scarce resources (for example, total allowable catches of fish or wild animals) among competing users? More broadly, what can we learn from the emerging literature on resource regimes about managing human/environment relationships under the conditions prevailing in the Arctic?

Federal and state agencies in Alaska need to know about the cultures of people living in the areas they manage, conflict avoidance and resolution, and how to involve local users in decision making. Over the past decade, there has been increasing recognition that local users can make important contributions to decisions about resource management. This is particularly the case in the Arctic where, for example, vast distances make the enforcement of laws impossible without the cooperation of local residents. Many new institutions have been set up to facilitate such involvement, including some whose responsibilities transcend national borders as in the management of migratory species like birds, caribou, whales, and walrus (for example, the International Regime for Polar Bears and the Porcupine Caribou Management Board).

The experience gained to date needs to be analyzed and evaluated. As part of land claims settlements in northern Quebec and the Mackenzie Delta, local Native people have become involved in groups and committees concerned with environmental impacts, land use planning, and wildlife management. Similarly, land and resource managers in Alaska have involved subsistence users in planning and management. How have such arrangements functioned? What has been the impact of this involvement? What were the traditional methods of resource management in Native cultures and how can these be adapted effectively? What has been the influence of local knowledge on decisions and approaches? To what extent have such institu

tions facilitated a transfer of information between local users and science-oriented managers? Are there more effective techniques for involving local users?

A coordinated program of research on methods of resource allocation would be cost effective for all agencies. Further, in the preparation of specific management plans, agencies collect data in specific areas on subsistence use by Native peoples. These data and their collection methods should be standardized to permit comparability among data sets and to avoid unnecessary duplication.

Opportunities for Basic Research

Basic or theoretical research is needed to support the applied research on resource allocation. National basic research needs on choice and allocation are well defined in chapter 3 of the NRC report *The Behavioral and Social Sciences: Achievements and Opportunities* (NRC, 1988a). Particularly important to the Arctic are issues raised when human activities threaten to disrupt natural systems in ways that produce unacceptable social costs, necessitating the development of effective control mechanisms. To what extent can government regulatory approaches handle this problem? Are there ways to structure systems of property and use rights to induce human actors to include the social costs of disrupting the natural environment into their individual choices? Do systems of ethics that accord rights to plants, animals, and even inanimate objects offer a useful approach? The Arctic provides an ideal laboratory for studying these types of theoretical issues.

Human responses to habitat changes is a second area of basic research on human/environment relationships recommended in this initiative. A basic research problem is that time scales differ for climatic, biological, historical, archaeological, and sociological research, and methods must be developed to mesh these time scales. Multidisciplinary research on past environmental changes and fluctuations in relation to archaeological data may reveal patterns of human response. However, some of the archaeological records capable of documenting past human responses to environmental change are threatened by erosion and other site disturbances.

Modeling is required to project the impact of global warming trends on humans in the Arctic over the next 20 to 50 years. Particularly compelling is the need to estimate the economic costs of replacing roads, bridges, buildings, and other structures on permafrost should thawing occur. The geographic and timing changes in migration of species of birds, mammals, and fish should be modeled, along with the impact of those changes on subsistence use. Northern movement of people should also be considered. Recent and future changes in land use from the public to the private domain could affect subsistence opportunities as species change their patterns. In

dicator species that are especially sensitive to temperature fluctuations should be selected and monitored along with the economic, social, and cultural patterns of human use of those species.

Opportunities for International Cooperation

The biological and physical systems that together make up the natural environment of the Arctic do not conform to political boundaries. The Porcupine caribou herd moves back and forth across the Alaska-Yukon border, bowhead whales winter in Soviet waters but generally summer in Canadian or American waters, and migratory birds cover even larger areas in their annual cycles. Arctic haze and ozone depletion in the stratosphere are a result of pollutants produced by industrial facilities located, for the most part, well beyond the southern boundary of the Arctic or even the subarctic. Efforts to manage the human use of many arctic resources or to control human activities causing pollution in the Arctic must be international in scope. This suggests the importance of initiating collaborative research to allow social scientists in several countries to coordinate their efforts.

Several vehicles may be employed simultaneously to initiate and sustain collaborative research of this kind. The International Geosphere-Biosphere Program (IGBP) offers a broad-gauged opportunity to coordinate research on the Arctic with international research efforts focused on global climate change (ICSU, 1988; NRC, 1988b). The Northern Science Network, established under the auspices of the Man and the Biosphere program (MAB), directs attention to patterns of land use and the management of renewable resources throughout the circumpolar north. Several international research activities are being planned in various disciplines relating to "Beringia," the land and marine areas on either side of the Bering Strait. These activities could be expanded to include aspects of this initiative on human/environment relationships, such as studies of resource fluctuations and how people harvest the resources. A focus on prehistoric human response to environmental fluctuations in Beringia with comparative data from both the U.S. and the Soviet Union would be useful. So also would studies of cross-boundary management of resources and techniques of conflict resolution.

COMMUNITY VIABILITY

A second substantive theme for a new research initiative in the social sciences on Arctic topics centers on community viability. Communities in the Arctic tend to be small, to be located in places unconnected by road systems, and to have little conventional industrial basis for local taxation.

At the same time, these communities require services—education, transportation, communications, law enforcement, health care, clean water, waste disposal, and other services that people living in most parts of the United States take for granted. Overcoming the diseconomies of scale, the high costs of shipping freight, and the special engineering problems of erecting structures on permafrost are only a part of the challenge of providing services that enable communities to survive in the Arctic. There is also a host of complex policy issues relating to technical expertise in a small labor pool, tradeoffs in expenditures of public funds, and the balance between self-sufficiency and dependence.

Background

Native communities in the Arctic have a long history of self-sufficiency, with most of the resources required to fill their basic needs derived from the environment in which they live. Subsistence activities exist in some form in Native villages throughout the Arctic. Many village Alaskans incorporate subsistence with income-producing activities such as wage employment and commodity production. In this sense, subsistence does not simply “persist” as an archaic form, but is transformed into a thoroughly modern and contemporary activity. The significance and viability of this mixed economy is critical to an understanding of contemporary predominantly Native communities.

In addition to Native villages, several types of Western communities have developed in the Arctic. Since the mid-nineteenth century, the North American Arctic has been “opened up” by a series of rushes: for whales in the western and eastern Arctic, for gold in Sitka, Juneau, the Fortymile, the Klondike in Canada's Yukon Territory, Nome on the Seward Peninsula, and Fairbanks in the interior; for copper at Kennecott in the Wrangell Mountains; for salmon in Bristol Bay and southeastern Alaska; for coal in the Matanuska Valley and Nenana fields; for military efforts in the 1940s to utilize Alaska's strategic location; for timber resources in the Tongass National Forest in the 1950s; and finally for oil and gas on the Kenai Peninsula in the late 1950s and in 1968 at Prudhoe Bay on the North Slope.

Several distinctive types of Western communities have emerged in the Arctic:

Single-industry temporary communities have been created to exploit a strategic location for mining, petroleum development, construction of major projects (such as dams), or military intelligence and readiness. These settlements are intended to be abandoned when they are no longer needed; community infrastructure and housing are built for short-term use. Workers in these single-industry temporary communities tend to come from outside

the northern regions. Residual or ghost towns are sometimes left behind with a minimal economic base for security, recreation, or tourism.

Single-industry permanent communities are relatively small communities created to harvest a single renewable resource, such as fish or timber, or to provide a single service, such as a railroad or ferry terminal. They are established with the intention of being permanent communities with the expectation of sustained yields of renewable resources or sustained use of the services provided. These communities have both permanent residents and seasonal workers who reside in the community only during times of peak production. Such communities tend to be small, with summer population peaks. Changes in the demand for the industry on which the community is dependent can create a boom-and-bust economy. Ultimately these communities may be abandoned, even though the residents expected them to be permanent.

Diversified service centers, including major and smaller cities in the Arctic, provide services to broad regions. A diversified economy may include military bases, education, construction, mining, tourism, wholesale and retail sales, transportation, banking, and government. This diversification protects the economy from the devastating impact of a downturn in any one industry. The diversified service centers have larger, more stable populations, greater community infrastructure, and larger tax bases than other types of communities. In Alaska, over half the population of the state lives in the Anchorage metropolitan area. For permanent employment and education, people tend to migrate from predominantly Native villages and single-industry permanent communities to subregional and regional diversified service centers.

Each of these types of communities raises specific issues relating to community viability and the strength of local institutions. But they all present challenges for policy makers, managers, technicians, and residents.

In the 1970s, the sustaining basis for the Arctic economy was popularly viewed as megaprojects related to resource extraction. The changing world oil and mining economy has made this scenario increasingly unrealistic. This has implications for resource management strategies in the Arctic and for the employment prospects of young Northerners. The existence of mixed economies in small Arctic communities raises important questions for planners, particularly in planning for both subsistence uses and commercial uses of the same renewable resources.

Throughout the Arctic new political and economic organizations are emerging. The corporations established under the Alaska Native Claims Settlement Act (ANCSA) have had a mixed record of success in their business ventures. Native development corporations have also become common in the Canadian Arctic, sometimes as a result of land settlements and in

other cases as a result of the initiative of Native organizations. There is a great deal to be learned here about the viability of such models for local economic development. These organizations often have become involved in activities that are resource-related or in joint ventures with private sector companies from the South.

Across the Arctic, political developments are occurring that may have significant impacts. In Alaska, there is a strong movement toward Native self-determination. In the Canadian Arctic, regional councils made up primarily of Native residents have developed new methods of decision making. The governing body of the Northwest Territories, the Territorial Legislative Assembly, currently makes its decisions in the absence of traditional party politics and with an emphasis on consensus. The Inuit Circumpolar Conference was founded in 1977 to bring together Inuit from Alaska, Canada, Greenland, and the USSR to address common concerns.

The Arctic has witnessed a variety of approaches to education. In the last decade, Alaska has decentralized rural education and built schools in every village. Approaches to educational administration, cross-cultural education, teacher training, and educational evaluation, to name but a few areas of innovation, merit further research.

In all Northern communities, there is the issue of physical infrastructure—housing, electricity, water and sewer systems, airports, docks, roads, erosion control systems, transportation, and communications. Physical infrastructure in Arctic communities is a matter of engineering research and applications as well as economics and government policies relating to subsidies and regulations. In Native villages, there is the added dimension of cultural acceptability and the consequences of rapid social change discussed in the next section of this report.

For large projects with many specialized kinds of jobs, the Native population does not have the training, expertise, or numbers to make up the workforce. Historically, high wages have attracted non-Native workers to the Arctic. While Native corporations now own some 44 million acres of land in Alaska, few Native people have received the training to manage these lands, thus contributing to the influx of non-Native workers.

The Arctic has a diverse and multicultural population. Throughout the Arctic, the number of Natives is steadily increasing. In Alaska they make up 17 to 20 percent of the total population. The dominant non-Native majority in the American Arctic and subarctic, as in other parts of the far North, is ethnically and culturally diverse. Caucasians constitute the largest group. Yet there are sizable populations of Blacks, Latin Americans of varying cultural backgrounds, Asian Americans (among them Chinese, Japanese, Koreans, Filipinos, and Southeast Asians), and a variety of other smaller groups. A small but growing number of non-Native Alaskans are native in the sense of having been born in the state. The large majority,

however, are immigrants who have made a conscious decision to move to and settle in the North, or sojourners who are temporary inhabitants whose presence is tied to a specific time-limited task or contract (such as military service or a construction project).

Immigrants to a novel and extreme environment would seem to form a highly self-selected group. Even so, the sociopsychological factors that determine a decision to immigrate to the North and affect successful or unsuccessful adaptation remain poorly understood. In a like manner, factors determining the decision to leave (a frequent decision in the North) are also little known. Sojourners, because of their less than voluntary status and marginal commitment to the area, might be thought to be facing a more difficult process of adaptation. The psychology of the sojourner in a novel environment and its implications for success or failure in the relevant task is of importance not only for the American Arctic but also for federal activities generally in view of the increasingly international character of government and development.

Throughout the circumpolar Arctic, the non-Native population, like the Native population, experiences the impact of a constellation of stresses. As with the Native population, patterns of successful adaptation exist side by side with failure and maladaptation as evidenced by the incidence of various individual and social pathologies. The newcomer to the Arctic and subarctic must adapt to unfamiliar patterns of light and darkness and of heat and cold as well as an unfamiliar environment with which he or she may feel inadequate to cope. Cold or accidental injury and physical illnesses are common. The Northern economic cycle, in which periods of intense employment at high wages are often interspersed with periods of unemployment and no income, is a phenomenon that many individuals find stressful. The average immigrant or sojourner tends to be young, often at the beginning of his or her working life or professional career. Traditional norms, values, and guidelines for behavior are apt to be difficult to maintain in a young, anonymous, highly mobile population of fellow strangers. Feelings of loneliness and isolation are consequently widespread.

Special difficulties are created for certain young families by patterns of employment that require the male fisherman, construction or oil worker, or professional to be absent from home for weeks or months with interspersed short periods of reunion with the family. Some researchers have suggested that this cycle of separation/reunion results in family conflict, ambivalence, and confusion related to a constantly shifting family structure insofar as male and female dominance and control are concerned. As with Native families, fractured in a different pattern and for different reasons, the long-term effects of this repetitive cycle of separation and loss on child development are unknown.

Of significance also is the status of women in Northern society. Both

the role and the status of women in society at large are undergoing steady change. This pattern may well be accentuated in the North, not only because of the changing family structure and dynamics mentioned above, but also because women have tended to take advantage of the greater freedom and opportunity in Northern society to play active and dominant roles in a variety of settings.

Patterns of mortality and morbidity due to violence among non-Natives in the North exceed comparable rates for the U.S. population at large. Alcoholism is a problem throughout the circumpolar North. From an historical standpoint, alcoholism among Natives must be conceptualized in terms of its impact upon migratory hunting and fishing societies that had no history of alcohol use. Among non-Natives, by contrast, alcohol is significant not only for its addictive properties but also as a means for the economic exploitation and domination of Native cultures in an Arctic tradition going back to fur traders in the eighteenth century. Today Native villages throughout Alaska are seeking to empower themselves—individually and collectively, spiritually and politically—to deal effectively with the alcohol problems. “Bootleggers” and drug dealers are regarded not only as a law-enforcement problem, but also as a threat to survival of the younger generations and the communities in which they live.

Justification for Research

The survival of indigenous peoples throughout the world has become a global concern. For the most part, these hunting and gathering groups are so small that their cultural extinction is a possibility. The extinction of these cultures results not only from disease, starvation, warfare, and genocide but also from the destruction of environments in which such cultures can survive. When tribal people move to cities, intermarry, and become absorbed in the dominant culture, their language soon falls into disuse, traditions are no longer practiced, and cultural knowledge is not passed from generation to generation.

The Arctic offers a setting in which to study these issues because all the relevant dynamics are taking place concurrently. Natives and non-Natives are not evenly distributed among Arctic towns and villages. In Alaska in 1980, for example, non-Natives made up 95 percent of the population of Anchorage and 94 percent of that of Fairbanks, while Natives predominated in most of the 200 or so small coastal and riverine villages.

These percentages obscure the fact that, in absolute numbers, Natives located in Anchorage and Fairbanks constitute one-fifth of Alaska's Native population. Many Natives who come to Anchorage from village Alaska confront traumatic problems of culture shock, unemployment, housing, health, and alcohol abuse. Another problem arises from the rapid turnover of urban

populations. It is estimated that some 50 percent of Anchorage's population is replaced every 5 years by newcomers, both Native and non-Native. Alaska provides an ideal setting in which to study the cultural, historical, social, political, and economic aspects of Native people moving between predominantly Native villages and predominantly non-Native urban areas.

Indigenous societies and their institutions put our commitment to a pluralistic society, and the development of the complex institutions necessary to live in one to the test. The question is not only how indigenous people can adapt to mainstream society, but also what mainstream society can learn from them. Planning for a multicultural society requires the cooperation and participation from all cultural groups.

Village survival in the Arctic is closely related to issues of land ownership and resource management. There is a strong link between community viability (and especially population maintenance) on the one hand, and the continued abundance and accessibility of the local renewable resource base on the other. In other words, the continued ability to obtain the necessary inputs to the domestic sphere of the economy by means of access to all or most of the traditional harvesting territory seems to be a necessary (although not necessarily a sufficient) condition of continued community viability. The balance between subsistence activities and the cash economy is often precarious. Successful examples in the Arctic may be instructive for many cultural groups worldwide that seek to find a workable combination between economic development and the continuation of culturally significant subsistence practices.

From time to time, the United States has articulated specific policies directed towards the Arctic. Most recently, in the Arctic Research and Policy Act of 1984, Congress declared that Arctic energy resources should be developed to reduce the nation's dependence on foreign oil and to improve the national balance of payments; that the Arctic is critical to national defense; and that Arctic fisheries represent one of the nation's greatest commercial assets. The pursuit of these goals requires a work force in the Arctic, and this work force must be organized into various types of communities. Important challenges include the adaptation, training, and retention of work forces in the Arctic.

The federal government's trust responsibility for Native Americans has led to a variety of programs relating to health, education, self governance, and economic and community development. The Bureau of Indian Affairs and the Indian Health Service are the primary sources of funding and oversight for these programs. Under the Indian Self-Determination Act (PL 93-638), many programs are being contracted to tribes who are developing innovative model programs. While the federal government audits and reviews these programs, these reviews are more for compliance to the law rather than an evaluation of the effectiveness of the programs. The commit

tee suggests that federal expenditures can be more effective if research is done on the traditional and more innovative programs, both in the past and present.

Opportunities for Applied Research

For the U.S. government to fulfill its statutory obligations and achieve its objectives relating to energy, defense, and fisheries development in the Arctic, research is needed on community viability. Research needed to meet the requirements of the National Environmental Policy Act (NEPA) includes both research on the impact of large projects on nearby villages, and research on the best ways to organize, develop, and dismantle or recycle single-industry temporary communities, such as Prudhoe Bay. It is expected that responsible agencies will do the necessary research on a project-by-project basis; however, all agencies could benefit from coordinating research plans.

Some research could benefit several agencies without duplicating efforts. Three types of coordinated, jointly funded and sponsored applied research programs are recommended:

1. *Economic diversification and viability of coastal and riverine com munities.* Since the passage of the Fishery Conservation and Management Act of 1976, domestic harvests of fish have increased dramatically. Yet U.S.-based processing facilities and onshore infrastructure in Alaska remain underdeveloped. There is a need for additional studies on the feasibility of developing this capacity in the seafood industry, either in the form of onshore processing or domestic "joint ventures." How can communities develop the infrastructure required to participate more fully in both harvesting and processing? Are there small-scale, low-capital economic development opportunities aimed at local or state markets that will return benefits to the community members and lead to sustainable development? We need research on the social and cultural impacts of economic diversification in coastal and riverine communities. How can (and should) single industry permanent communities respond if their resource base is eliminated or replaced?
2. *Motivation and psychosocial adjustments of the Northern work force.* This is a subject that has drawn interest from most countries in the circumpolar North and that provides opportunities for international cooperation and comparative studies. The applied research needs are for methods to recruit, select, motivate, educate, and sustain a skilled work force. There are separate and distinct issues for Natives and non-Natives, each of which may be relocated to novel, remote, and extreme environments. In addition, the non-Native work force in the Arctic needs to learn to respect the cul

tures of permanent Native groups, which may be different from their own. Findings from this research might also be of relevance to Antarctic work forces and space travelers, as well as American workers in a variety of environments around the world.

3. *Obstacles to community survival.* Under conditions of rapid change, the economic and cultural viability of small communities is challenged. Economic problems arise when subsistence opportunities are reduced by dwindling resources and government regulations. How do families support themselves in communities that have virtually no cash employment? How do employment opportunities and government subsidies affect out-migration decisions? What are the basic services required for people to remain in small villages (for example, health care, education, postal service, transportation, and communications); at what point is the population too small to justify providing these services? What is the best way of providing local services in the absence of a local tax base? How does the dominant society decide which services to provide to villages that are not self-sufficient? What happens when community expectations exceed the capability to support local infrastructure, such as electricity introduced into a village by the state purchasing a generator when people are unable to pay the electric bills to operate and maintain the system?

From a cultural perspective, how does a distinct cultural group identify those elements of their culture that are necessary to sustain them as a cohesive community in the midst of rapid social change? What are the quality of life trade-offs between culturally sensitive local institutions and the limited capacity of those institutions (for example, the trade-off between small local high schools without chemistry laboratories and regional high schools with these)?

Answers to these and other questions would assist all agencies involved in resource management, economic development, and the provision of services in the Arctic. Particularly in an era of federal and state budget cutting, it is important for program managers and policymakers to identify thresholds where further reductions in services can compromise the life of a community and to examine the costs and benefits of outmigration and abandonment.

Opportunities for Basic Research

The importance of community survival needs better definition both from the perspective of Native people and from the perspective of the dominant culture. Basic research is needed on the relationship between community survival and cultural survival for Native people. This includes research on language, art, religion, and other aspects of culture and its relationship to

the environment. In what ways are Native villages used as a source of cultural continuity for indigenous people residing in larger communities? What aspects of Native culture are uniquely tied to Native villages in the sense that they cannot be transported to other settings? What elements of Native culture and identity can be transferred from villages to people living in cities? How much contact with village life is required to maintain cultural identity? Why is the cultural survival of Native peoples important to the dominant society? How does cultural viability play a role in the adjustment of Native people to the dominant society? What components of a particular culture are necessary to ensure cultural viability? These lines of inquiry relating to the survival of indigenous cultures and remote communities are relevant throughout the world and are particularly salient in the Arctic.

Opportunities for International Cooperation

Not since Diamond Jenness published his series of studies of Eskimo administration in Alaska, Canada, and Greenland in the 1960s (Jenness, 1962-1968) have there been international comparative studies of the institutions developed in the Arctic to provide services to Native people. Particularly in the fields of education, health, resource management, and local governance, there is a recognition in all circumpolar nations that historical and comparative research would be beneficial. This research would contribute to our understanding of sustainable development under the natural and social conditions prevailing in the Arctic.

Contemporary and historical studies of costs and organization of services in remote Arctic areas, and incentives for new and sustained settlements could prove useful to planners and policy makers. Perhaps even more important is looking at the impact of government policies on cultural survival. For example, a comparison of national policies on Native languages and their effects on cultural identity would help all nations understand the impact of their language policies on indigenous people.

The International Union for Circumpolar Health, the Inuit Circumpolar Conference, and other groups are providing opportunities for international communication on Arctic research and increased opportunities for international collaborative relationships. The World Health Organization convened a committee to look at recruitment and retention of workers in polar areas. Several international groups, including the United Nations, are concerned with the survival of indigenous people throughout the world.

RAPID SOCIAL CHANGE

Rapid social change in the Arctic constitutes the third research initiative the committee recommends for sustained support. Rapid and often

disruptive change has become a pervasive phenomenon throughout the world over the last 200 years. This fact makes studies of rapid social change in the Arctic and in other parts of the world directly relevant to one another.

What is unusual about the Arctic in these terms is that these developments began later in the Arctic than in most other regions. Social change that took centuries in other parts of the world were compressed into just a few generations in the Arctic.

Arctic cultures have never been static. For thousands of years they have changed as people attempted to improve their relations with one another and with their environment. These earlier developments were very gradual and they were entirely indigenous in character. Recent change in the Arctic was largely initiated by forces outside the region, and the rate of change has far exceeded anything that occurred previously.

Background

Prior to contact with Europeans, Native peoples of the North lived in small-scale societies based entirely on hunting and gathering economies. An example is the Inuit, who occupied the northern margin of North America, Greenland, and the shores of easternmost Asia.

Most of the major resources on which the Inuit depended consisted of migratory species of land mammals, sea mammals, and fish. In order to maximize their access to these species at times of year when they could be most effectively harvested and utilized, the Inuit developed a sophisticated technology and a carefully worked out series of seasonal movements of their own.

Inuit settlements were a compromise between the advantages gained from concentration, which facilitated communal hunting, security, and interpersonal relationships, and the disadvantages of concentration, such as the risk of depleting scarce resources. Houses were usually occupied by extended families, and village plans reflected links between the different families. Arrangements were flexible enough to permit both the dispersal and reassembly of families in their attempt to deal with seasonal variations in resource supply.

Contact with Europeans brought new weapons, greatly expanded markets for hides and furs, different role models, epidemic diseases, and the depletion of major resources (Table 1). The traditional social order broke down, and a series of new ones rapidly replaced it. Today villages are laid out on a rectangular grid pattern of roads and property lines. They are permanent in nature and less able to respond effectively to changing social and environmental conditions. New frame houses generally feature separate bedrooms and living rooms. Conjugal family households are standard, and apartment houses have been introduced. The separation of Inuit fami

lies into different houses has reduced the traditional social cohesion of the extended kinship networks. Perhaps most important, villages have become much larger and more permanent because people want to be near schools, churches, stores, and medical facilities.

TABLE 1 Brief History of Change in the American Arctic

1800 - 1880	Initial introduction to radically different ideas and modes of behavior; goods brought by explorers, fur traders, whalers; outside diseases and alcohol introduced; and Russian settlement followed by sale to United States (1867) and military administration.
1880 - 1910	Breakdown of traditional societies through a combination of population reduction and dispersal brought about by resource depletion (caribou, whales, walrus) and disease; changes introduced by miners, fishermen, trappers, traders, missionaries, and teachers; beginning of loss of traditional self-sufficiency; and beginning of dependence on outside world.
1910 - 1945	Interlude characterized by a relatively stable balance between traditional-like activities (reindeer herding and trapping) and modern sorts of activities (schooling, intermittent wage employment).
1945 - 1965	Introduction of national health programs, social service programs, and public assistance programs designed primarily for an urban industrial society. Increasing awareness of threats to traditional ways of life posed by mega-projects.
1965 - 1975	Pipeline construction and land claims (great acceleration of involvement in national economy); increasing involvement in state and national political processes; Alaska Native Claims Settlement Act (ANCSA) and the formation of regional corporations; increasing involvement of federal and state governments in village affairs; and electrification of villages and introduction of television and telephones in villages.
1975 - present	Development of modern structures of local and regional government; rapid local expansion of and personal involvement in modern economy.

Other major changes include a shift from highly self-sufficient family units to families whose daily existence is linked to the operation of regional and even national institutions. The broadly generalized roles of traditional times, where virtually everyone of the same age and gender performed the same activities, have given way to specialized roles in which there is considerable differentiation of activities. Whereas all adult men used to be hunters, they are now heavy equipment operators, janitors, businessmen, politicians … and hunters. Whereas all women used to be processors of raw materials and makers of clothing, they are now teachers, health aides, managers, cooks … and processors of raw materials and makers of clothing. The cash economy is pervasive. The separation of work roles and relation

ships from family roles and relationships is beginning to approach the levels found in non-Native society. Social stratification is increasingly based on occupation rather than on family.

Rapid social change in the Arctic is often instigated and controlled by institutions with primary constituencies located outside the Arctic and regarding the Arctic as a colony. These institutions commonly have organizational structures and methods of decision making that conflict with those of traditional Native institutions. They routinely ignore Native institutions. One strategy of Native response to the actions of external institutions has been to form comparable local institutions. The expansion of local institutions and the formalization of relationships demanded by the new local institutions may decrease the influence of traditional leaders and spawn new types of local leadership. A decreased sense of local control makes it difficult to recognize points of local consensus.

Motivation processes have changed. Many traditional goals were lost; for many, new ones either have not been acquired at all or else have been very difficult to achieve if acquired. There has been a change from face-to-face to less direct means of communication; an introduction of newspapers, books and magazines, television, and formal schooling; and a transition from the Native language to English. Children can no longer communicate with their grandparents. The confusion between traditional and new concepts of status coupled with unmet expectations for change may produce ambivalent aspirations and a focus on immediate gratification.

After Western contact there was considerable increase in fertility among Arctic peoples, accompanied by a high infant death rate. Later, a dramatic drop in the infant death rate led to a huge increase in conjugal family size. More recently there has been some decline in the birth rate, but the number of elderly is now beginning to increase. Rising expectations have fostered increased out-migration, both from the region and from smaller communities. Migration within a region may tend to be toward regional employment and service centers or toward smaller villages that have expanding employment opportunities and services but fewer social problems.

The availability of processed foods and beverages may result in a diet change that reduces general health levels. Increased incomes may be used in part to purchase drugs and alcohol, thereby placing added strains on health systems.

How have individuals in the Arctic coped with the radical changes they have experienced? Some have achieved notable success in business, politics, and other fields that are of both crucial importance in modernized societies and highly valued by members of such societies. Others have continued to hunt, fish, trap, and generally act in a manner broadly reminiscent of the way of life of their ancestors. Still others appear to be successful in both worlds, pursuing Western political and business objectives while continuing to actively harvest subsistence resources. Unfortunately, many

others have committed suicide; committed crimes; abused their children, spouses, or elders; become chronic substance abusers; or engaged in other behaviors that are suggestive of extreme maladaptation. The rates at which such maladaptive acts occur in the American Arctic are much higher than in the general population, and these rates appear to be rising (May, 1988).

Justification for Research

A host of variables and relationships among these variables are important as determinants of both the timing and the trajectory of rapid social change in the Arctic. Some of these relationships are relatively well understood as a result of research sponsored by, among others, the Minerals Management Service (MMS) of the Department of the Interior and the National Science Foundation (NSF). Three major sets of relationships, however, remain to be studied systematically. These involve (1) patterns of social interaction, (2) trends in expectations and aspirations, and (3) developments in mental and physical health.

There is much to be learned about the dynamics of change in traditional patterns of social interaction in the Arctic. Social interaction among the Inuit, for example, traditionally occurred primarily within the extended family. Many relationships involved the transfer of goods and services among extended family members and cooperative labor units in subsistence activities. Matters of broader community concern were settled by consensus, with certain prominent individuals (for example, whaling captains in northern Alaska) carrying relatively more weight in the consensus-building process.

Several forces for change are operating on traditional forms of social interaction. A substantial increase in the non-Native population residing in Arctic communities has increased the rate of intercultural marriages. It is unknown to what extent this trend has changed traditional patterns of social interaction. Pervasive forces for change (for example, the substitution of new technology for certain subsistence skills and the emergence of new employment patterns) have also been operating on traditional practices regarding the transfer of wealth within extended family groupings or communities. At the same time, the accessibility of housing has increased, resulting in smaller household units and less active relationships among family members because they no longer live in the same household unit. Traditional social interactions have been altered by the widespread use of new communications technology such as television, telephones, and VCRs; however, long-term effects require further study. Finally, traditional social interactions at the community level have been complicated by the proliferation of formal organizations. How these and other forces for change have influenced traditional patterns of social interaction is unknown but subject to empirical research.

The second major area for research centers on the role of changing expectations and aspirations in labor force participation, subsistence harvests, and commercial consumption. Aspirations refer to the difference between a current situation and a desired future situation. Aspirations provide a key motivation for people to act and a context in which they respond to changing circumstances. Little is known about how Arctic peoples form their aspirations and how these change.

The third area for research encompasses factors contributing to physical and mental health. A constellation of changes has created stresses that impinge on the Native cultures and on individuals in a differential manner. Stress phenomena and related pathologies are often associated with processes of rapid social change. But this is by no means uniform or inevitable. An important research area should be the investigation of successful adaptation and successful resolution of conflict among Native individuals and groups.

A series of interrelated problems is worth noting. The long-term effect on Native children of disruption of the family incident to the separation and loss associated with the high death rate, foster care, parental neglect due to alcoholism, and going away to school is a continuing source of concern. Several studies over the past two decades have documented elevated rates of psychological and social pathology (May, 1988). Among these are high levels of suicide, homicide, and accidental death. The syndrome of violent death as defined by these categories is the leading cause of mortality in Alaskan populations, and the entire phenomenon of violent death exhibits a high correlation with alcohol and drug abuse.

Opportunities for Applied Research

Most of the federal agencies in Alaska with land and resource management missions are now required to conduct socioeconomic studies in connection with the environmental impact statements they are obligated to produce under the National Environmental Policy Act (NEPA) and other legislation. These studies generally provide baseline measures and attempt to predict the consequences of various proposed federal actions on communities likely to be affected.

The most vigorous applied research programs in Alaska have been conducted by the Department of the Interior's Minerals Management Service (MMS) and before that by the Bureau of Land Management's Outer Continental Shelf Environmental Assessment Program (OCSEAP). These agencies spent $22 million on socioeconomic and historical studies from 1976 through 1987, with more than $15 million or 70 percent in Alaska. The USFS, NPS, and NOAA also fund some social, economic, cultural, historical, and archaeological research to assist in planning and policy development.

These agencies probably will continue to carry out baseline monitoring and community-specific data collection, but the validity of their projections can be improved by development of a broad model of social change. Additionally, these agencies have a need for a deeper understanding of patterns of social interaction, trends in expectations and aspirations, and problems of mental and physical health.

Agencies responsible for the provision of health and social services to Native Americans, such as the Indian Health Service, the Bureau of Indian Affairs, and many of the nonprofit Native corporations, could also participate in the planning and funding of this research program. Additionally, research on factors contributing to physical and mental health should be of special interest to the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), the National Institute for Mental Health (NIMH), the National Institutes of Health (NIH), the Centers for Disease Control (CDC), and a variety of other public and private agencies and foundations. In addition to contributing to predictive models of social change, these agencies could sponsor applied research involving the development and evaluation of demonstration projects to prevent and treat alcoholism and drug abuse among different cultural groups in the Arctic.

Opportunities for Basic Research

Rapid social change is a global phenomenon. What is more, the rate of social change has accelerated over the last generation as a result of the explosion of scientific knowledge and its application in the form of a wide range of new technologies. These developments have given rise to a number of fundamental, long-term issues that are of central importance to basic and applied research in the social sciences worldwide.

Because social change in the North has proceeded in an unusually rapid and disruptive fashion, the Arctic provides an opportunity for the analysis of three of the most fundamental and generic concerns associated with rapid social change throughout the world:

1. The more specialized social units become, the more interdependent they become. Greater interdependence increases the need for effective coordination and control of activities within units and between units. The greater the need for coordination and control, the more “brittle” social systems become. As social systems change through the modernization process, are there ways to meet needs for coordination and control while still meeting the personal and social needs of individuals?
2. When children reach adulthood in rapidly changing societies, the world is a different place than it was when they were born, and very different than it was when their parents were born. How can parents provide

children with the cognitive and emotional tools they need to cope with a world that the adults themselves have never known?

3. Are there cognitive and/or emotional limits to people's ability to cope with the extremely rapid changes they experience during the course of their own lifetimes? Why? How can these limits be identified and measured?

Opportunities for International Cooperation

Since rapid social change is a worldwide phenomenon, the research initiative recommended here lends itself to inclusion in a more comprehensive program of comparative research. Insights derived from studies conducted in a wide range of specific settings could assist social scientists in formulating more powerful generalizations and evaluating the efficacy of alternative responses to rapid social change. This has important implications for the organization of research and the dissemination of scientific findings in this field of study. Thus, it is essential to encourage the fullest possible exchange of ideas among those studying rapid social change in the Arctic and in other social settings not only by ensuring that these scientists have easy access to one another's work, but also by making arrangements to allow students of rapid social change to interact with one another directly. One approach that merits consideration is fieldwork by multinational teams.

Cross-national studies of social stress, alcoholism, and mental health may facilitate research designs with greater validity owing to larger samples and control of variables. These issues are important to Native people who have already taken the initiative to look across national boundaries for effective programs to prevent and treat social pathologies.

The forces giving rise to rapid social change have increased the impacts of activities occurring in individual societies on events unfolding in other societies. Nowhere is this more apparent than in the Arctic. The Inuit residing in Greenland, Canada, and Alaska, for example, have become highly aware of one another's struggles to come to terms with the buffeting of rapid social change, an awareness that has given rise to transnational Native organizations like the Inuit Circumpolar Conference, recognized by the United Nations as a non-governmental organization (NGO).

At the same time, the internationalization of rapid social change makes it impossible for Arctic communities to escape the impact of social phenomena originating elsewhere. To take a single example, the advent of satellite broadcasting and inexpensive video equipment guarantees that American and European popular culture will rapidly affect the behavior of young people in the formerly remote communities of the Arctic. It follows that efforts to control or cope with the more disruptive consequences of rapid social change cannot succeed in the absence of effective international cooperation.

3

Organizational Issues

The lean and isolated climate of Arctic research has produced a number of creative social scientists capable of doing a lot with meager resources despite the comparatively high cost of conducting research in the North. But this is not sufficient to meet the well-documented and growing national need for social science research on which to base effective Arctic policies. Improved funding and training are surely necessary to meet this need. But there are also numerous organizational issues that should be addressed in the effort to promote better social science research on the Arctic and to bring that research into the mainstream of social science disciplines.

LIMITATIONS OF CURRENT RESEARCH

In the past decade or two, most Arctic social science has taken the form of applied research funded by mission-oriented federal and state of Alaska agencies. Without doubt, the Minerals Management Service (MMS) has played a leading role in this realm. The Alaska Department of Fish and Game (ADFG) Subsistence Division has made major contributions also. Other mission-oriented agencies with responsibilities in the Arctic share a need for applied social science research. These include the Bureau of Land Management (BLM), which regularly funds salvage archaeology; the National Park Service (NPS) and the U.S. Fish and Wildlife Service (FWS), which interact extensively with the permanent residents of the Arctic in the management of Alaskan lands; the National Sea Grant College Program and

the National Marine Fisheries Service in the National Oceanic and Atmospheric Administration (NOAA), which have a continuing interest in the social and economic viability of coastal communities in the Arctic; and the Bureau of Indian Affairs (BIA), which serves some of the needs of Alaskan Natives under the federal trust responsibility.

The applied social science research produced by these agencies is impressive in some respects. The MMS, for example, has produced more than 130 technical reports in its Alaskan Social and Economic Studies Program.

The committee nevertheless has identified serious limitations in Arctic social science research:

1. Research mandates are heavily weighted toward projections of potential impacts. Agencies are willing to pay for the projections themselves, but they are generally unwilling to fund the analysis of underlying relationships so crucial to making these projections. Mission-oriented agencies seldom are willing to pay for the monitoring work necessary to refine our understanding of these relationships.
2. Applied research suffers from a crisis orientation in which all research is directed toward immediate management requirements (for example, compliance and impact studies). This does not allow adequate time frames for longer-term analyses and for linking applied research to the larger concerns of basic research.
3. Much of the applied social science research in the Arctic has focused on case studies of individual communities in potential development areas. While case studies constitute a valuable social science research tool, it is often difficult to apply their findings to broader social phenomena. The point is that social scientists are not taking advantage of opportunities to study issues of national or even global significance while, at the same time, fulfilling legal mandates.
4. In many cases relevant information is not extracted from existing databases prior to the initiation of new field research. As a result, new case studies are conducted in the absence of an adequate synthesis of the information already in hand.
5. Analysts pressed for time are not sufficiently rigorous in their adherence to methodological canons pertaining to case studies and survey research. This problem extends to both data collection and data analysis.
6. For the most part research carried out in response to legislative and regulatory mandates has failed to reach the academic community either in the form of published reports or in the form of data sets for further analysis. This results in a growing “gray literature” rarely subjected to peer review or scrutiny by the scientific community.

Given the mission-oriented agencies' tendency toward applied research,

basic social science research in and on the Arctic has fallen to the academic community. This research typically has been done by individuals or small parties whose home institutions do not have significant ongoing Arctic research programs. Their work has proceeded in isolation both from other Arctic colleagues and from the research of social scientists concerned with other fields of study.

This environment has produced a certain provincialism in basic social science research in and on the Arctic. Most of our knowledge derives from case studies. There is much emphasis on description and on analyses of particular communities or groups of people at particular times in contrast to efforts to synthesize results over time and space or to work on general phenomena and themes. Much of the resultant research also is idiosyncratic in nature, though some disciplines have more standardized conventions than others (for example, archaeology in contrast to cultural anthropology).

Because the Arctic seems such an extreme environment with a unique history, there has been a tendency toward exceptionalism in Arctic social science, focusing on unique rather than on generic processes unfolding in the Arctic. This may have been acceptable during the earlier period of description and cataloging. But the time has come for Arctic social science research to be better integrated into the mainstream of the relevant scientific disciplines.

The intellectual integration of Arctic science into the mainstream is challenged by the fact that social scientists working in the Arctic generally recognize a moral responsibility to be responsive to the sensitivities and needs of the groups they are studying. These target groups understandably place a higher value on research with immediate benefits to themselves than on research that contributes to the larger body of knowledge regarding human behavior.

Nonetheless, isolation of Arctic social science is already beginning to break down. This should produce benefits for all social scientists since useful tests of the validity of rival paradigms arise from efforts to apply them to situations other than those in which they were devised and initially tested.

In many respects, the Arctic today offers a promising setting for an integrated program of applied and basic social science research. But the realization of this promise is severely limited by constant pressure to allocate limited resources, both financial and human, to applied research, and the absence of adequate mechanisms to link applied research to broader theoretical concerns and to make the data sets resulting from applied research readily available to those involved in basic research.

RECOMMENDATIONS FOR ACTION

To alleviate the limitations outlined in the preceding paragraphs as well as to provide proper support for the program initiatives set forth in Chapter 2 of this report, the committee believes that a number of changes should be made in existing federal arrangements for social science research in and on the Arctic. In the following pages, we provide a series of explicit recommendations relating to these changes and articulate the arguments supporting these recommendations.

Recommendation 1: Designated Lead Federal Agency

> The National Science Foundation should accept responsibility as the designated lead federal agency for Arctic social science research and undertake the tasks necessary to create and sustain an effective community of social scientists working on the Arctic.

Social scientists can learn from the experience of biologists and physical scientists who have formed an effective scientific community in the Arctic. They have developed a high degree of sophistication in designing and implementing research programs. The Polar Research Board of the National Research Council and the Division of Polar Programs of the National Science Foundation have operated for several decades as focal points for the development of a national research program directed toward natural and physical science research on the Arctic and Antarctic.

In contrast, social science planning demonstrates the current absence of an integrated Arctic social science research community. Most social scientists share the perception that funding for basic research in the Arctic is virtually nonexistent. These scientists live in widely scattered locations and lack the resources to convene to exchange ideas and coordinate research activities. Students interested in a career in the social sciences focus elsewhere as they see no concentration of Arctic scientists.

This situation can be improved. Simultaneous initiatives on several fronts can, over time, result in a vigorous Arctic social science research community. These initiatives include the following:

1. Translate the three program initiatives identified by this committee into proposal solicitations.
2. Contact institutions and individuals engaged in Arctic social science research to identify complementary expertise, training opportunities, and efficient methods for exchanging ideas and research results.
3. Encourage the participation of Arctic social scientists in national

meetings of professional societies to increase peer review of research and to attract students and scientists to Arctic research opportunities.

4. Work with mission-oriented agencies to identify research opportunities that fulfill agency mandates and contribute to the body of basic social science research.

Each of these initiatives requires repeated contacts with the emerging Arctic social science research community. These contacts are best handled by a single individual trained in the social sciences and already familiar with Arctic social science research issues. Together these initiatives constitute a full-time workload.

After reviewing the available options, the committee has concluded that the NSF is better situated than any other agency to assume the role of lead agency in the effort to promote social science research in and on the Arctic. As the U.S. Senate report on Housing and Urban Development and the Independent Agencies puts it, “NSF is the lead agency in implementing provisions of the Arctic Research and Policy Act, and has a mandate broad enough to encompass research in all the social and behavioral sciences” (U.S. Congress, 1988, p. 77). The NSF is uniquely positioned to address the problem of improving the links between basic and applied research. The committee urges the NSF to respond vigorously to the direction of the Senate Appropriations Committee “to acknowledge explicit responsibility in this area, and to develop a detailed plan for a broad-gauged program of research on Arctic topics in the social and behavioral sciences before the end of fiscal year 1989” (p. 74).

As lead agency, working with or through other relevant organizations, the NSF should create a mechanism to ensure a continuing flow of fresh ideas regarding Arctic research opportunities and priorities in the social sciences. It is not sufficient simply to respond to research proposals submitted by individual scientists. The successful fields of science have turned to mechanisms like the Polar Research Board of the National Research Council to provide leadership in the identification of interesting research frontiers, while relying on individual scientists to follow up on the ideas generated through the submissions of research proposals.

As the lead agency, the NSF should encourage the development of a more effective partnership between natural scientists and social scientists interested in the Arctic. The need for such a partnership is spelled out in some detail in our discussion of human/environment relationships. It is apparent also in the report of the March 1988 Stockholm session regarding the proposed International Arctic Science Committee as well as in the materials now emanating from the International Geosphere-Biosphere Program (IGBP). By moving in this direction, the nation's scientific policy makers

could assume a position of leadership in exploring one of the major frontiers of scientific research of our time.

Recommendation 2: Interagency Coordination

> The Interagency Arctic Research Policy Committee should establish a task force of social scientists from federal agencies with Arctic responsibilities or interests to coordinate research on topics of interest to a number of mission-oriented agencies, and to coordinate with the National Science Foundation support for research that has both an applied and a theoretical dimension.

The fact that social science research in and on the Arctic involves limited efforts on the part of many agencies rather than a major effort on the part of a single agency will not change during the foreseeable future. Undoubtedly, this helps to account for the low visibility and poor funding that has characterized federal support for research in this realm. Yet the committee believes that this fact can be made into a strength rather than a liability with proper handling.

There are striking opportunities for pooling research efforts and research support among mission-oriented agencies facing similar problems in their Arctic domains. To take a concrete example, the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the Bureau of Land Management (BLM), and the National Marine Fisheries Service (NMFS) must all deal with problems of allocating scarce natural resources and environmental services under conditions featuring several types of demands (for example, subsistence, commercial, recreational), coupled with extreme limitations on efforts to enforce rules and regulations due to the sheer size of the areas involved as well as cultural differences between the dominant society and Native user groups. It follows that advances in our understanding of mechanisms for allocating scarce natural resources and environmental services would be of great value to the Alaska regional offices of each of the agencies involved.

There are obvious links between the research needs of the mission-oriented agencies operating in Alaska (not to mention other parts of the Arctic) and broader theoretical issues arising in a number of the social sciences. As the Committee on Basic Research in the Behavioral and Social Sciences of the National Research Council has recently pointed out (NRC, 1988a), research dealing with choice and allocation constitutes a particularly promising area for basic social science research. Advances in basic research in this area would clearly be relevant to the concerns of agencies responsible for the allocation of scarce natural resources and environmental

services under Arctic conditions. Conversely, applied work in this area could stimulate new thinking of a more basic nature.

Interagency coordination could produce significant advances in our understanding of Arctic phenomena, even in the absence of increased funding for social science research in and on the Arctic. Considerations of efficiency alone, therefore, dictate that we should take steps to improve interagency coordination in this realm. Under the circumstances, the problem is to devise a workable method for achieving effective interagency coordination regarding such matters. To this end, the committee recommends the creation of a task force under the auspices of the Interagency Arctic Research Policy Committee (IARPC).

The task force should include social scientists from each of the agencies represented on the IARPC. The task force could be charged with formulating specific proposals for coordinated research on Arctic topics suitable for action by the IARPC on a regular basis. High-priority topics identified in this report are summarized in Table 2. The work of this task force should strengthen the case for budget requests to support social science research on Arctic topics in subsequent fiscal years by demonstrating a willingness to comply with the provisions of Section 110 of the Arctic Research and Policy Act of 1984, which calls for "integrated, coherent, and multiagency" requests in support of Arctic research (U.S. Congress, 1984; see appendix).

While it is important for federal agencies to coordinate with one another, they also need to coordinate with state agencies. A variety of mechanisms could be used to include appropriate Alaska state agencies in task force activities.

Recommendation 3: Education and Training

> The lead agency for Arctic social science research, acting either alone or in collaboration with other agencies, should establish a program of training grants to encourage young social scientists to work in or on the Arctic and to assist established social scientists to acquire skills needed for work in this field.

The education and training of young scholars is the key to ensuring the viability of any field of study. Yet the current situation regarding the education and training of behavioral and social scientists for work on Arctic topics leaves much to be desired. As we have noted, Arctic research is plagued not only by low visibility and poor funding but also by fragmentation in the sense that there are few clusters of scholars interested in the Arctic at American institutions of higher education. Additionally, Arctic researchers have not competed successfully for research funding with those

working on topics that are seen as more central to the various social science disciplines. Whether intentional or not, the current situation sends a signal to behavioral and social scientists that there is not much future in choosing Arctic research as a major field of scholarly interest.

TABLE 2 Summary of Key Elements for Multidisciplinary, Multiagency Plan for Arctic Social Science Research

Theme	Research Problems	Federal Agencies
HUMAN/ENVIRONMENT RELATIONSHIPS		
Applied		NPS, USFWS, BLM, USFS, NOAA
	• Allocation methods for scarce natural resources • Conflict avoidance and resolution in the use of natural resources	
Basic		NSF
	• Control of human activities that threaten to disrupt natural systems • Human response to habitat change • Models of impacts of global warming on humans	
COMMUNITY VIABILITY		
Applied		MMS, NOAA, BIA, DOT, DOE
	• Economic diversification and viability of coastal and riverine communities • Motivation and psychosocial adjustments of the Northern work force • Obstacles to community survival	
Basic		NSF, NIMH, ADAMHA
	• Relationship between community survival and cultural survival	
RAPID SOCIAL CHANGE		
Applied		MMS, USFS, NPS, NOAA, NIH, NIMH, ADAMHA, CDC
	• Patterns of social interaction • Trends in expectations and aspirations • Relationship between social change and physical and mental health	
Basic		NIH, NIMH, ADAMHA, CDC, NSF, DOD
	• Consequences of social specialization and increased interdependence • Education for participation in a rapidly changing, multicultural world • Cognitive and emotional limits of peoples' ability to cope with rapid change	

There is now "a national need to develop a group of broadly trained experts who understand Arctic military, political, socioeconomic, and cultural issues and who can provide solutions to the policy problems facing the United States in this region" (U.S. Congress 1986, p. 38). What can we do to close the resulting gap between national needs and existing capabilities? As a first step, the committee recommends the initiation of a program resembling the Northern Scientific Training Program that the government of Canada has operated for a number of years. This program, which involves the allocation to universities involved in Northern research of modest funds to support student projects, constitutes a remarkably cost effective method of recruiting new members into the community of Arctic researchers.

By providing small grants to get students into the field in the North, the program stimulates and intensifies student interest in Arctic issues, often leaving participants with a lifelong interest in the Arctic. Administered in a flexible manner, such a program of training grants could also be used to encourage Native Alaskans to become involved in Arctic research or to provide assistance to established scholars wishing to acquire skills needed for work on Northern topics. In the Canadian case, the Association of Canadian Universities for Northern Studies (ACUNS) has played a role of considerable importance in maximizing the effectiveness of the Northern Scientific Training Program. This leads the committee to suggest that consideration be given to possible roles for the newly formed Arctic Research Consortium of the United States (ARCUS) in a comparable American program of training grants for those interested in Arctic research.

The Association of Canadian Universities for Northern Studies (ACUNS) also has established a Northern Studies Trust. In contrast to the training program (which provides logistical support) the trust, derived primarily from private sources, awards a series of scholarships each year to support student research. In addition to funding Arctic research at the graduate and undergraduate levels, the trust has supported a number of innovative educational endeavors that have allowed northern Natives to acquire needed skills and knowledge at southern universities. The fact that the trust was conceived and implemented by people associated with ACUNS is a further example of the benefits of networking.

Other ACUNS-initiated activities that promote training and education include the convening of a conference for students doing research on Arctic topics and the annual presentation of the Polar Studies Undergraduate Medal for Canada for the best undergraduate thesis submitted to a national selection committee.

In addition to a program to provide funding for students, federal and state agencies should be encouraged to provide training opportunities.

Recommendation 4: Involvement of Arctic Residents

> The lead agency for Arctic social science research should establish an ongoing mechanism to allow permanent residents of the Arctic to participate effectively in all phases of the research process and, where appropriate, forge mutually beneficial partnerships with Arctic residents possessing knowledge relevant to social science research in and on the Arctic.

"The permanent residents of the Arctic have a legitimate stake in the design and conduct of Arctic research in the social and behavioral sciences, and . . . they can be expected to react vigorously to Arctic research plans they have not had a voice in formulating" (IARPC, 1987, p. 248). To this important statement the committee would now append several additional observations. There has been an unfortunate tendency among some researchers to neglect the process of reporting the findings of scientific research to interested members of the target population. Some researchers have publicized research findings outside the Arctic in a manner that engenders inappropriately negative images of Arctic residents.

Both natural and social scientists have often overlooked the important contributions that ethnoscience can make to their own research. To take an obvious example, outside scientists are typically very good at conducting analyses based on comparative observations made during a single or short time period. In the Arctic, however, they seldom have access to longitudinal or time series data. In this connection, the permanent residents of the Arctic often possess complementary knowledge. While most of them have little access to comparative data on Arctic social systems or ecosystems, many Arctic residents possess a wealth of knowledge on the evolution of Arctic social systems and ecosystems over long periods of time. Under the circumstances, there is a compelling case for outside scientists and local residents to form research alliances as equal partners. The committee wishes to emphasize that this is not merely a matter of making places for Arctic residents as research assistants collecting data under the supervision of outside scientists. What is needed, instead, are genuine research partnerships based on mutual respect for the contributions of outside scientists and local residents.

The appointment of an Alaskan Native to the Advisory Committee of the Division of Polar Programs within the NSF is a step in the right direction. What is needed also is an ongoing coordinating mechanism not only to promote harmony between outside scientists and Arctic residents but also to ensure that Arctic research is conducted in such a way as to benefit Arctic residents as well as to benefit from the knowledge possessed by Arctic residents. Such a mechanism should *not* be empowered to veto

research projects deemed worthy on scientific grounds. This would only encourage the development of an unproductive and undesirable form of research politics. Rather, the mechanism should provide a means by which research projects could be adjusted to take into account local concerns and to benefit from local knowledge regarding the subjects in question. It can also improve educational training and employment opportunities for local people.

The proper form for such a mechanism is a matter that deserves serious examination. The committee therefore suggests the initiation of discussions pertaining to this issue between officials of the NSF, as the lead federal agency, and organizations like the Alaska Federation of Natives and the Inuit Circumpolar Conference, which represent the concerns of a broad range of permanent residents of the Arctic. These discussions should be undertaken with the intention of creating an ongoing mechanism perceived as mutually beneficial to outside scientists and to permanent residents of the Arctic.

Recommendation 5: Cooperative Studies Units

> Each mission-oriented agency with Arctic responsibilities or interests should conduct a study to determine both the feasibility and the desirability of establishing cooperative studies units dedicated to social science research in and on the Arctic.

Given the limitations of funding and agency missions, one way to maximize productivity in basic and applied research is to create cooperative studies units. Typically, these arrangements collocate researchers from several agencies in a university setting and foster mutually beneficial links between the academic community and those engaged in applied research. In the natural sciences, such arrangements include Cooperative Park Studies Units, Cooperative Wildlife Research Units, Cooperative Institutes of the National Oceanic and Atmospheric Administration (NOAA), and other jointly funded and administered programs.

To take a specific example, the Alaska Cooperative Wildlife Research Unit has operated on the University of Alaska Fairbanks campus for nearly 40 years. Its activities are governed by an agreement among the U.S. Fish and Wildlife Service, the Alaska Department of Fish and Game, the University of Alaska, and the Wildlife Management Institute, a private nonprofit organization. The defining elements of the agreement are as follows:

1. the parties agree to common goals, including research, training, and public education;
2. each party provides staff and research funding for the unit;

3. agency personnel working in the unit are accorded faculty rank and privileges appropriate to their qualifications;
4. the unit is administered by a coordinating committee consisting of a designated representative from each participating organization; and
5. the coordinating committee makes decisions regarding budget and program, including the selection of research projects to be conducted.

The committee is aware of certain criticisms of cooperative studies units to the effect that they reduce healthy competition in the pursuit of research funds and that they can be used as a device for discriminating unfairly in favor of certain members of the scientific community. Nonetheless, the committee believes that cooperative studies units might well prove useful in combining funding and personnel for both basic and applied research in the social sciences. Federal and state agencies are permanently involved in research, planning, policy development, and implementation in the North.

These arrangements also may attract additional funding for each of the participating organizations. Taking advantage of university-based resources could greatly enhance these activities. Graduate training made possible by such cooperation would produce a pool of skilled individuals on which federal and state agencies could draw in the future for employees. Some of the studies produced by the units would be published in refereed journals, making them a part of the enduring scientific literature on the Arctic.

Recommendation 6: Research Ethics

> The Interagency Arctic Research Policy Committee, in consultation with the Arctic Research Commission, should develop a document concerning research ethics for *all* scientists working in the Arctic or using Arctic data.

Significant and occasionally urgent ethical issues relating to Arctic research now arise with considerable regularity. Should archaeologists remove artifacts from the locale of their discovery or should these artifacts be transferred to local authorities? Should local institutions take responsibility for the pillaging of potentially important but as yet unexcavated archaeological sites? Should those proposing to conduct social research in the Arctic be required to obtain a permit from local authorities prior to the initiation of their research? If so, what is the appropriate process for making decisions about requests for such permits? Should scientists working in the Arctic be required to disseminate the findings of their research to residents of the communities in which they work? What form should the dissemination of these findings take? In cases where the publication of research findings

may negatively portray Arctic residents or Arctic communities, should Arctic residents have some say in the publication or timing of the release of research findings? How can requirements of this sort be made compatible with the traditional value of academic freedom? With the emergence of the Arctic as an increasingly important international region in military, political, economic, and environmental terms, these and other similar questions will inevitably loom larger.

A statement on ethics not only guides scientists but also gives people and communities affected by research and their representative institutions a clear idea of what behaviors to expect from scientists in the conduct of research. The committee recommends that these concerns be addressed systematically, including enforcement mechanisms. While the examples outlined by the committee pertain to research in the social sciences, many of these as well as other ethical questions arise in connection with Arctic research in the biological and physical sciences.

This is not a new problem in scientific research. Many codes of research ethics exist that may offer useful guidance. The committee wishes to direct attention to the document entitled *Ethical Principles for Northern Research* prepared by the Committee on Relations with Northern Peoples of the Association of Canadian Universities for Northern Studies (ACUNS, 1982). This document could form the basis for a comparable statement of ethical principles governing Arctic research conducted in the United States or carried out by American scholars in other parts of the Arctic. Such a statement should be developed by the NSF in consultation with the Arctic Research Commission with significant input from the permanent residents of the Arctic, and ultimately approved and promulgated by the Interagency Arctic Research Policy Committee.

Recommendation 7: Data and Information

> The lead agency for Arctic social science research should sponsor a series of workshops and other steps that bring together producers and users of databases to maximize the usefulness of Arctic data sets for scientific research and to ensure access to these data in a timely and cost effective manner.

Having heard inconclusive and sometimes conflicting views concerning Arctic data and information, the committee has reached the conclusion that there are no simple solutions to the problems perceived by various members of the research community. The committee identified several important themes emerging from this dialogue concerning data and information. These provide the basis for an initial response to the specific request of the NSF for guidance regarding the world literature on Arctic social science.

There is a widespread sense that we must improve information about and access to the so-called "gray literature," consisting largely of documents produced by federal, state, and local governments together with a variety of Arctic organizations. The solution to this problem appears to lie in inducing agencies to make better use of existing systems, like the National Technical Information Service (NTIS) or to devise effective information systems of their own, like the Open File system operated by the U.S. Geological Survey (USGS).

Another problem is that this enormous and rapidly growing body of literature is not subject to peer review to assure adherence to accepted scientific standards. This results in a mounting barrier to the use of this literature for scientific analysis, even on the part of those who are well aware of its existence. This problem can be solved only by building into research programs (including those sponsored by private organizations as well as government agencies) both procedures and budgets for turning the best of the "gray literature" into refereed scientific literature and separating out the rest so that scientists can bypass it without fear of missing important prior work.

There is also a need to improve the quality of data sets compiled for other reasons which may be useful to social science. Given the cost and logistical complications of constructing new databases for individual research projects, most social science research in and on the Arctic will rely on data sets assembled for other purposes. One example is administrative and monitoring data routinely collected by government agencies in carrying out their statutory and regulatory mandates.

These data sets often leave much to be desired as resources for social scientists working on Arctic topics. Categories and measurement procedures are often better suited to southern, industrial settings than to the mixed, subsistence-oriented economies of the Arctic. Socioeconomic data also tend to be presented at the state or sectoral level, a practice that suppresses many important distinctions among the thinly populated settlements of the North. It is imperative that steps be taken to maximize the scientific usefulness of databases that are compiled to fulfill statutory mandates and that will continue to grow in a predictable fashion over the foreseeable future.

In the light of the increasing importance of survey research throughout the social sciences and the particular problems of conducting research of this type under Arctic conditions, the committee recommends that a concerted effort be made to establish generally accepted methodological ground rules for the collection of survey data in the North. At a minimum, this requires a standardization of survey design and application conventions so that scientists can use the resultant body of data for aggregate characterizations, comparative studies, and trend analyses. Additionally, it is important

to address the increasingly important issues of control over and access to databases resulting from survey research in the Arctic.

There is a need to structure databases to make clearer links between Arctic applications and the broader conceptual or theoretical concerns of the mainstream social science disciplines. Progress in this area would help to alleviate the tendency toward exceptionalism in Arctic social science. This must be done in a manner resulting in data and information services that are inexpensive and easy to use.

The data and information needs of social scientists working on Arctic topics cannot be met through the development of specialized Arctic databases that are responsive primarily to the needs of commercial development in the Arctic or that rely heavily on expensive technologies (for example, optical disk storage). Rather, we should encourage simple arrangements based on reciprocity in providing access to online databases and catalogs among those institutions where social scientists interested in the Arctic are located. In this regard, the committee endorses the recent initiatives of the Northern Libraries Colloquy, and of those involved in the development of the Arctic Environmental Data Workshop, held in Boulder, Colorado in March 1988 (NOAA, 1988).

The committee also recommends a series of workshops for agency personnel responsible for the collection of Arctic data and social scientists concerned with the use of these data for scientific purposes. Producers of Arctic data sets and the scientific consumers of these data should interact with one another directly in an effort to arrive at ways of making databases more accessible and more useful without violating the statutory mandates under which they are collected.

Recommendation 8: International Cooperation

> The National Science Foundation should advance international cooperation in circumpolar social science by providing travel funds, arranging for translations, fostering cooperative agreements, organizing international conferences, and other steps. Federal programs designed to foster international cooperation in multidisciplinary Arctic research should examine opportunities for inclusion of a social science component.

The basic policy governing U.S. Arctic research states that “research should be carried out in a manner which benefits from and contributes to mutually beneficial international cooperation” (IARPC, 1987). The committee notes with approval that recent initiatives aimed at promoting scientific cooperation at the international level have taken cognizance of the importance of research in the behavioral and social sciences. The statement from the March 1988 Stockholm meeting on the proposed International

Arctic Science Committee speaks explicitly of the human sciences as well as the natural sciences and lists "man and the Arctic environment" as one of five areas suitable for joint research projects (Royal Swedish Academy of Sciences, 1988).

More broadly, there is growing awareness that the International Geosphere-Biosphere Program (IGBP) cannot meet its objectives without an improved understanding of human/environment relationships or the human dimension of global change. Whether or not this leads to the incorporation of a social science component in the research activities sponsored by the IGBP, it is now generally understood that the study of human behavior is critical to our efforts to comprehend and, eventually, to exercise some control over global change.

International research needs have been identified with relation to the three themes recommended for new research initiatives in this report. There is also a need to strengthen the scientific infrastructure for circumpolar social science.

Improved relations with the Soviet Union are creating new opportunities for research cooperation. Social scientists meeting at the Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic in Leningrad in December 1988 identified numerous topics suitable for cooperative research. To take advantage of these opportunities, social scientists need to know what resources are available in archives, libraries, and museums. A natural focus would be to identify the location and content of records from the period of Russian exploration and occupation of the American Arctic. Cataloging the location and content of historical and contemporary ethnographic films and photographs is another priority. Cooperative agreements to provide access to these archives, libraries, and museum collections are essential.

Further cooperation with Soviet social scientists requires translations and translators, travel funds, and international conferences and meetings. Faculty exchanges and fieldwork by multinational teams are desirable also. These types of activities can take place on a useful scale with the assistance of an Arctic social science program manager in NSF to identify opportunities, initiate potential collaborative arrangements, and facilitate and negotiate agreements.

While the current emphasis in international cooperation in the Arctic is on US/USSR relationships, the committee believes that there may be an even greater "payoff" from developing collaborative relationships with Canadian social scientists. With the same language and similar political and social systems, it is feasible to work toward the development of consistent data sets. While there are virtually no political barriers to greater cooperation between Canadian and U.S. social scientists, the limiting factors seem to be travel funds and the lack of advocacy.

4

Conclusion

The formulation of a research agenda and the solution of the organizational problems currently affecting research are the most urgent needs in Arctic social science. In order to fulfill the mandate of the Arctic Research and Policy Act, they must be addressed simultaneously and promptly.

Progress cannot occur in the absence of a clear statement of program initiatives that can provide the intellectual justification for social science research in and on the Arctic while, at the same time, establishing meaningful priorities that are consonant with national needs. But progress also requires an effective effort to solve some of the organizational problems the committee has identified.

Most of the concerns outlined in this report will require continuing action over the foreseeable future. However, if certain steps are taken first, it will increase the chances for the success of the program as a whole. These steps are as follows: (1) designation of the National Science Foundation (NSF) as lead federal agency with a mandate to establish a broadgauged program with a program manager and budget to promote the research agenda set forth in this report; and (2) the establishment of a task force composed of social scientists from all federal agencies with Arctic responsibilities or interests to act as a vehicle for the interagency coordination of Arctic social science research. Once the NSF has taken these steps, it will be possible to proceed vigorously to initiate effective response to the other recommendations made in this report.

References

American Public Health Association Task Force. 1984. The National Arctic Health Science Policy. American Public Health Association, Washington, D.C.

Association of Canadian Universities for Northern Studies (ACUNS). 1982. Ethical Principles for Northern Research. Department of Indian Affairs and Northern Development, Ottawa.

Interagency Arctic Research Policy Committee (IARPC). July 1987. U.S. Arctic Research Plan. No. NSF87-55. National Science Foundation, Washington, D.C.

International Council for Scientific Unions (ICSU). August 1988. The International Geosphere-Biosphere Programme: A Study of Global Change. A Plan for Action. Special Committee for the IGBP. Royal Swedish Academy of Sciences, Stockholm.

Jenness, Diamond. 1962-1968. Eskimo Administration. Volumes I-IV. Arctic Institute of North America, Montreal.

May, P.A. 1988. Suicide and Suicide Attempts Among American and Alaskan Natives, an Annotated Bibliography. Indian Health Service, Office of Mental Health, Programs Branch. Special Initiatives Team, Albuquerque.

National Oceanic and Atmospheric Administration (NOAA). March 1988. Report of the Arctic Environmental Data Workshop. NOAA, Washington, D.C.

National Research Council. 1982. Polar Biomedical Research: An Assessment. Prepared by the Committee on Polar Biomedical Research, Polar Research Board. National Academy Press, Washington, D.C.

National Research Council. 1988a. The Behavioral and Social Sciences: Achievements and Opportunities. Committee on Basic Research in the Behavioral and Social Sciences. National Academy Press, Washington, D.C.

National Research Council. 1988b. Toward an Understanding of Global Change. Committee on Global Change. National Academy Press, Washington, D.C.

National Resources Committee. 1938. Alaska, Its Resources and Development. Washington, D.C.: National Resources Committee.

National Science Board (NSB). 1987. The Role of the National Science Foundation in Polar Regions. Committee on the NSF Role in Polar Regions, National Science Board. National Science Board. No. 87-128, Washington, D.C.

National Science Foundation. February 1988. Draft Implementation Plan for the NSB Report, The Role of the National Science Foundation in Polar Regions. No. NSF 87-55. National Science Foundation, Washington, D.C.

Roots, E.F., W.P. Adams, P.F. Burnet, and M.R. Gordon. 1987. Canada and Polar Science. Department of Indian Affairs and Northern Development, Ottawa.

Royal Swedish Academy of Sciences. March 1988. International Cooperation in Arctic Science. Stockholm.

U.S. Arctic Research Commission. May 30, 1986. National Needs and Arctic Research: A Framework for Action. U.S. Arctic Research Commission, Los Angeles.

U.S. Congress. July 31, 1984. Arctic Research and Policy Act. Public Law 98-373. 98 Stat. 1248.

U.S. Congress. 1986. Report of the United States Senate Committee on Labor and Human Resources to accompany S. 1965, the Higher Education Amendments of 1986.

U.S. Congress. 1988. Report on Department of Housing and Urban Development—Independent Agencies Appropriations Bill, 1989. 100th Congress, 2nd Session. Report No. 100-401.

Appendix

Arctic Research and Policy Act of 1984

98 STAT. 1242
Public Law 98–373
98th Congress

An Act

July 31. 1984

[S. 373]

To provide for a comprehensive national policy dealing with national research needs and objectives in the Arctic, for a National Critical Materials Council, for development of a continuing and comprehensive national materials policy, for programs necessary to carry out that policy, including Federal programs of advanced materials research and technology, and for innovation in basic materials industries, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—ARCTIC RESEARCH AND POLICY

Arctic Research and Policy Act of 1984.

SHORT TITLE

15 USC 4101 note.

SEC. 101. This title may be cited as the "Arctic Research and Policy Act of 1984".

FINDINGS AND PURPOSES

15 USC 4101.

SEC. 102. (a) The Congress finds and declares that—

(1) the Arctic, onshore and offshore, contains vital energy resources that can reduce the Nation's dependence on foreign oil and improve the national balance of payments;

(2) as the Nation's only common border with the Soviet Union, the Arctic is critical to national defense;

(3) the renewable resources of the Arctic, specifically fish and other seafood, represent one of the Nation's greatest commercial assets;

(4) Arctic conditions directly affect global weather patterns and must be understood in order to promote better agricultural management throughout the United States;

(5) industrial pollution not originating in the Arctic region collects in the polar air mass, has the potential to disrupt global weather patterns, and must be controlled through international cooperation and consultation;

(6) the Arctic is a natural laboratory for research into human health and adaptation, physical and psychological, to climates of extreme cold and isolation and may provide information crucial for future defense needs;

(7) atmospheric conditions peculiar to the Arctic make the Arctic a unique testing ground for research into high latitude communications, which is likely to be crucial for future defense needs;

(8) Arctic marine technology is critical to cost-effective recovery and transportation of energy resources and to the national defense;

(9) the United States has important security, economic, and environmental interests in developing and maintaining a fleet of icebreaking vessels capable of operating effectively in the heavy ice regions of the Arctic;

(10) most Arctic-rim countries, particularly the Soviet Union, possess Arctic technologies far more advanced than those currently available in the United States;

(11) Federal Arctic research is fragmented and uncoordinated at the present time, leading to the neglect of certain areas of research and to unnecessary duplication of effort in other areas of research;

(12) improved logistical coordination and support for Arctic research and better dissemination of research data and information is necessary to increase the efficiency and utility of national Arctic research efforts;

(13) a comprehensive national policy and program plan to organize and fund currently neglected scientific research with respect to the Arctic is necessary to fulfill national objectives in Arctic research;

(14) the Federal Government, in cooperation with State and local governments, should focus its efforts on the collection and characterization of basic data related to biological, materials, geophysical, social, and behavioral phenomena in the Arctic;

(15) research into the long-range health, environmental, and social effects of development in the Arctic is necessary to mitigate the adverse consequences of that development to the land and its residents;

(16) Arctic research expands knowledge of the Arctic, which can enhance the lives of Arctic residents, increase opportunities for international cooperation among Arctic-rim countries, and facilitate the formulation of national policy for the Arctic; and

(17) the Alaskan Arctic provides an essential habitat for marine mammals, migratory waterfowl, and other forms of wildlife which are important to the Nation and which are essential to Arctic residents.

98 STAT. 1243

(b) The purposes of this title are—

(1) to establish national policy, priorities, and goals and to provide a Federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological and health sciences, and social and behavioral sciences;

(2) to establish an Arctic Research Commission to promote Arctic research and to recommend Arctic research policy;

(3) to designate the National Science Foundation as the lead agency responsible for implementing Arctic research policy; and

(4) to establish an Interagency Arctic Research Policy Committee to develop a national Arctic research policy and a five year plan to implement that policy.

ARCTIC RESEARCH COMMISSION

Establishment. 15 USC 4102.

SEC. 103.(a) The President shall establish an Arctic Research Commission (hereafter referred to as the "Commission").

(b)(1) The Commission shall be composed of five members appointed by the President, with the Director of the National Science Foundation serving as a nonvoting, ex officio member. The members appointed by the President shall include—

(A) three members appointed from among individuals from academic or other research institutions with expertise in areas of research relating to the Arctic, including the physical, biological, health, environmental, social, and behavioral sciences;

(B) one member appointed from among indigenous residents of the Arctic who are representative of the needs and interests of Arctic residents and who live in areas directly affected by Arctic resource development; and

(C) one member appointed from among individuals familiar with the Arctic and representative of the needs and interests of private industry undertaking resource development in the Arctic.

98 STAT. 1244

(2) The President shall designate one of the appointed members of the Commission to be chairperson of the Commission.

(c)(1) Except as provided in paragraph (2) of this subsection, the term of office of each member of the Commission appointed under subsection (b)(1) shall be four years.

(2) Of the members of the Commission originally appointed under subsection (b)(1)—

(A) one shall be appointed for a term of two years;

(B) two shall be appointed for a term of three years; and

(C) two shall be appointed for a term of four years.

(3) Any vacancy occurring in the membership of the Commission shall be filled, after notice of the vacancy is published in the Federal Register, in the manner provided by the preceding provisions of this section, for the remainder of the unexpired term.

(4) A member may serve after the expiration of the member's term of office until the President appoints a successor.

(5) A member may serve consecutive terms beyond the member's original appointment.

5 USC 8101 *et seq.* 28 USC 2671 *et seq.*

(d)(1) Members of the Commission may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code. A member of the Commission not presently employed for compensation shall be compensated at a rate equal to the daily equivalent of the rate for GS–16 of the General Schedule under section 5332 of title 5, United States Code, for each day the member is engaged in the actual performance of his duties as a member of the Commission, not to exceed 90 days of service each year. Except for the purposes of chapter 81 of title 5 (relating to compensation for work injuries) and chapter 171 of title 28 (relating to tort claims), a member of the Commission shall not be considered an employee of the United States for any purpose.

(2) The Commission shall meet at the call of its Chairman or a majority of its members.

(3) Each Federal agency referred to in section 107(b) may designate a representative to participate as an observer with the Commission. These representatives shall report to and advise the Commission on the activities relating to Arctic research of their agencies.

(4) The Commission shall conduct at least one public meeting in the State of Alaska annually.

Public meeting.

DUTIES OF COMMISSION

15 USC 4103.

SEC. 104. (a) The Commission shall—

(1) develop and recommend an integrated national Arctic research policy;

(2) in cooperation with the Interagency Arctic Research Policy Committee established under section 107, assist in establishing a national Arctic research program plan to implement the Arctic research policy;

(3) facilitate cooperation between the Federal Government and State and local governments with respect to Arctic research;
(4) review Federal research programs in the Arctic and suggest improvements in coordination among programs;
(5) recommend methods to improve logistical planning and support for Arctic research as may be appropriate and in accordance with the findings and purposes of this title;
(6) suggest methods for improving efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions;
(7) offer other recommendations and advice to the Interagency Committee established under section 107 as it may find appropriate; and
(8) cooperate with the Governor of the State of Alaska and with agencies and organizations of that State which the Governor may designate with respect to the formulation of Arctic research policy.

98 STAT. 1245

(b) Not later than January 31 of each year, the Commission shall—
(1) publish a statement of goals and objectives with respect to Arctic research to guide the Interagency Committee established under section 107 in the performance of its duties; and
(2) submit to the President and to the Congress a report describing the activities and accomplishments of the Commission during the immediately preceding fiscal year.

Report.

COOPERATION WITH THE COMMISSION

15 USC 4104.

SEC. 105. (a)(1)The Commission may acquire from the head of any Federal agency unclassified data, reports, and other nonproprietary information with respect to Arctic research in the possession of the agency which the Commission considers useful in the discharge of its duties.

(2) Each agency shall cooperate with the Commission and furnish all data, reports, and other information requested by the Commission to the extent permitted by law; except that no agency need furnish any information which it is permitted to withhold under section 552 of title 5, United States Code.

Confidentiality.

(b) With the consent of the appropriate agency head, the Commission may utilize the facilities and services of any Federal agency to the extent that the facilities and services are needed for the establishment and development of an Arctic research policy, upon reimbursement to be agreed upon by the Commission and the agency head and taking every feasible step to avoid duplication of effort.
(c) All Federal agencies shall consult with the Commission before undertaking major Federal actions relating to Arctic research.

ADMINISTRATION OF THE COMMISSION

SEC. 106. The Commission may—

15 USC 4105. 5 USC 5331.

(1) in accordance with the civil service laws and subchapter III of chapter 53 of title 5, United States Code, appoint and fix the compensation of an Executive Director and necessary additional staff personnel, but not to exceed a total of seven compensated personnel;

(2) procure temporary and intermittent services as authorized by section 3109 of title 5, United States Code;
(3) enter into contracts and procure supplies, services, and personal property; and
(4) enter into agreements with the General Services Administration for the procurement of necessary financial and administrative services, for which payment shall be made by reimbursement from funds of the Commission in amounts to be agreed upon by the Commission and the Administrator of the General Services Administration.

98 STAT. 1246

LEAD AGENCY AND INTERAGENCY ARCTIC RESEARCH POLICY COMMITTEE

15 USC 4106.

SEC. 107. (a) The National Science Foundation is designated as the lead agency responsible for implementing Arctic research policy, and the Director of the National Science Foundation shall insure that the requirements of section 108 are fulfilled.

Establishment.

(b)(1) The President shall establish an Interagency Arctic Research Policy Committee (hereinafter referred to as the "Interagency Committee").

(2) The Interagency Committee shall be composed of representatives of the following Federal agencies or offices:

(A) the National Science Foundation;
(B) the Department of Commerce;
(C) the Department of Defense;
(D) the Department of Energy;
(E) the Department of the Interior;
(F) the Department of State;
(G) the Department of Transportation;
(H) the Department of Health and Human Services;
(I) the National Aeronautics and Space Administration;
(J) the Environmental Protection Agency; and
(K) any other agency or office deemed appropriate.

(3) The representative of the National Science Foundation shall serve as the Chairperson of the Interagency Committee.

DUTIES OF THE INTERAGENCY COMMITTEE

15 USC 4107.

SEC. 108.(a) The Interagency Committee shall—

(1) survey Arctic research conducted by Federal, State, and local agencies, universities, and other public and private institutions to help determine priorities for future Arctic research, including natural resources and materials, physical and biological sciences, and social and behavioral sciences;
(2) work with the Commission to develop and establish an integrated national Arctic research policy that will guide Federal agencies in developing and implementing their research programs in the Arctic;
(3) consult with the Commission on—

(A) the development of the national Arctic research policy and the 5-year plan implementing the policy;
(B) Arctic research programs of Federal agencies;
(C) recommendations of the Commission on future Arctic research; and
(D) guidelines for Federal agencies for awarding and administering Arctic research grants;

(4) develop a 5-year plan to implement the national policy, as provided for in section 109;
(5) provide the necessary coordination, data, and assistance for the preparation of a single integrated, coherent, and multiagency budget request for Arctic research as provided for in section 110;
(6) facilitate cooperation between the Federal Government and State and local governments in Arctic research, and recommend the undertaking of neglected areas of research in accordance with the findings and purposes of this title;
(7) coordinate and promote cooperative Arctic scientific research programs with other nations, subject to the foreign policy guidance of the Secretary of State;
(8) cooperate with the Governor of the State of Alaska in fulfilling its responsibilities under this title;
(9) promote Federal interagency coordination of all Arctic research activities, including—
(A) logistical planning and coordination; and
(B) the sharing of data and information associated with Arctic research, subject to section 552 of title 5, United States Code; and
(10) provide public notice of its meetings and an opportunity for the public to participate in the development and implementation of national Arctic research policy.

98 STAT. 1247 Public information.

(b) Not later than January 31, 1986, and biennially thereafter, the Interagency Committee shall submit to the Congress through the President, a brief, concise report containing—
(1) a statement of the activities and accomplishments of the Interagency Committee since its last report; and
(2) a description of the activities of the Commission, detailing with particularity the recommendations of the Commission with respect to Federal activities in Arctic research.

Report.

5-YEAR ARCTIC RESEARCH PLAN

15 USC 4108.

SEC. 109. (a) The Interagency Committee, in consultation with the Commission, the Governor of the State of Alaska, the residents of the Arctic, the private sector, and public interest groups, shall prepare a comprehensive 5-year program plan (hereinafter referred to as the "Plan") for the overall Federal effort in Arctic research. The Plan shall be prepared and submitted to the President for transmittal to the Congress within one year after the enactment of this Act and shall be revised biennially thereafter.

(b) The Plan shall contain but need not be limited to the following elements:
(1) an assessment of national needs and problems regarding the Arctic and the research necessary to address those needs or problems;
(2) a statement of the goals and objectives of the Interagency Committee for national Arctic research:
(3) a detailed listing of all existing Federal programs relating to Arctic research, including the existing goals, funding levels for each of the 5 following fiscal years, and the funds currently being expended to conduct the programs;
(4) recommendations for necessary program changes and other proposals to meet the requirements of the policy and goals as set forth by the Commission and in the Plan as currently in effect; and

(5) a description of the actions taken by the Interagency Committee to coordinate the budget review process in order to ensure interagency coordination and cooperation in (A) carrying out Federal Arctic research programs, and (B) eliminating unnecessary duplication of effort among these programs.

98 STAT. 1248

COORDINATION AND REVIEW OF BUDGET REQUESTS

15 USC 4109.

SEC. 110.(a) The Office of Science and Technology Policy shall—

Report.

(1) review all agency and department budget requests related to the Arctic transmitted pursuant to section 108(a)(5), in accordance with the national Arctic research policy and the 5-year program under section 108(a)(2) and section 109, respectively; and

(2) consult closely with the Interagency Committee and the Commission to guide the Office of Science and Technology Policy's efforts.

(b)(1) The Office of Management and Budget shall consider all Federal agency requests for research related to the Arctic as one integrated, coherent, and multiagency request which shall be reviewed by the Office of Management and Budget prior to submission of the President's annual budget request for its adherence to the Plan. The Commission shall, after submission of the President's annual budget request, review the request and report to Congress on adherence to the Plan.

(2) The Office of Management and Budget shall seek to facilitate planning for the design, procurement, maintenance, deployment, and operations of icebreakers needed to provide a platform for Arctic research by allocating all funds necessary to support ice-breaking operations, except for recurring incremental costs associated with specific projects, to the Coast Guard.

AUTHORIZATION OF APPROPRIATIONS; NEW SPENDING AUTHORITY

15 USC 4110. 2 USC 651.

SEC. 111.(a) There are authorized to be appropriated such sums as may be necessary for carrying out this title.

(b) Any new spending authority (within the meaning of section 401 of the Congressional Budget Act of 1974) which is provided under this title shall be effective for any fiscal year only to such extent or in such amounts as may be provided in appropriation Acts.

DEFINITION

15 USC 4111.

SEC. 112. As used in this title, the term “Arctic” means all United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian chain.