

The Role of Community Dynamics in Assessing Vulnerabilities to Climate Change in the Western Arctic

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1) CONTEXT



Canada's western Arctic is anticipated to experience some of the earliest and most pronounced changes associated with global warming. While environmental observations are being increasingly documented at the community level, the understanding of how impacts will create vulnerabilities for northern lifestyles and physical infrastructure is difficult to predict.



A community's vulnerability to environmental change can be expressed as a function of its exposure to stress and its adaptive capacity (Smit and Ford, 2004). Duerden (2004) suggests there are fundamental dynamic aspects of community life which need to be described and understood to develop a balanced view of the stresses a community experiences, its reaction to such stress and the way in which changes may be transmitted in a community. These dynamics encompass the demography, population change and the transactional linkages that exist within each community.



This poster presents one approach for studying impacts of climate change in the Inuvialut Settlement Region (ISR), using the hamlet of Holman as an example to describe community dynamics and their role in the assessment of vulnerability.

4) TRANSACTIONAL DYNAMICS

The economies of remote Arctic communities are characterized by a web of transactions between the wage economy, the harvest sector, and various forms of transfer income. Understanding how these economies are structured and what linkages exist between sectors is important for identifying possible vulnerabilities.

WAGE ECONOMY: The Holman economy is largely dependent on wage income and transfer payments, with harvesting activities providing an important in-kind contribution to household income. Residents find work in government services [Hamlet (33), Community Corp. (5), Power Corp. (2), School (27), Daycare (5), RCMP (2)], retailing [Northern store (10), Co-op (22)]. A smaller portion earn wages through sale of local crafts and resources. Holman also has a tourism industry which involves sport hunting (polar bear, muskoxen) and fishing (arctic char). This creates demand for hotel, restaurant, guide, equipment rental, and other goods/services.

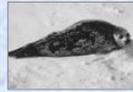
Implication: With the exception of tourism activities and sale of local resources, it would not appear that wage vocations are sensitive to impacts of environmental change. However, the impacts on other non-wage activities (such as harvesting) will likely affect the sufficiency of current incomes to meet household needs.

HARVEST SECTOR: Because of its dependency on the physical environment, the harvesting sector is most directly exposed to potential impacts of a changing climate influencing the availability, quality and reliability of land/sea based resources.

It is difficult to calculate an economic value for these resources because of their intrinsic importance for cultural and nutritional health, though estimates exist for the region. In 2002, Usher used an imputed value of \$10/kg for the replacement cost of country food, providing a non-cash benefit in the amount of about \$1,150 per capita (or per Inuvialut in the ISR) (Usher, 2002).

Given that Holman is considered to be more traditional than other communities – with 76% of residents participating in hunting and fishing activities and 66% of households consuming more than half their diet from country food sources (Statistics Canada, 2004) – it can be assumed that the imputed value is somewhat conservative. The average household of four people would, therefore, bring in over \$4,600 worth of harvested foods in one year, with the community (399 Inuvialut) generating a total replacement value of more than \$460,000.

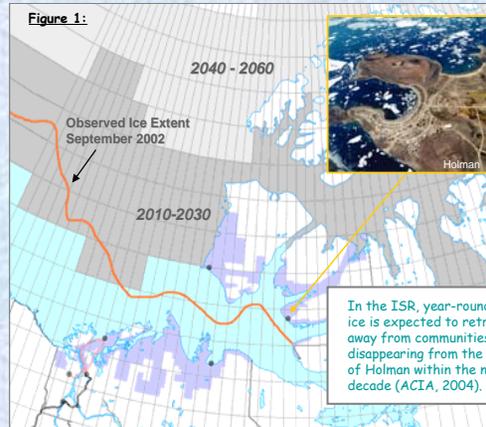
Implication: The in-kind contribution of land/sea activities to household income is significant, offsetting the need to buy store bought foods which are expensive in remote communities (price index for Yellowknife: 100, Holman: 188). Changes in the cultural reliance on harvested resources and environmental alterations to their quality and availability will likely increment household expenditures and create the need for supplementary increases in cash income.



2) REGIONAL SETTING

HOLMAN (Ulukhaktok): The hamlet of Holman (pop. 420) is located on the western coast of Victoria Island and developed as a permanent settlement with the establishment of a Hudson Bay Company post in 1923. Despite the introduction of wage employment, Holman remains one of the most traditional settlements in the ISR with a high involvement in land/sea based activities.

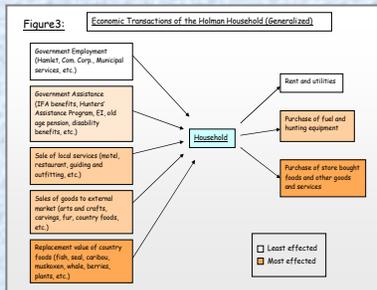
In recent studies, residents have reported observations associated with climate change. These include: warmer temperatures (in summer and winter months), higher sea levels, increased ground settlement, changes to wildlife (migration of key species as well as health and general availability), changes in wind directions (broken sea ice drifting back towards the community), increased frequency of extreme storms and changes in sea ice conditions. (Global Climate Change, 2000; Chauhan, 2002; Pearce in prog.)



5) TRANSACTIONAL DYNAMICS CONTINUED....

ECONOMIC LINKAGES: Tracking possible economic vulnerabilities to climate change extends beyond identifying individuals who are immediately affected (those who interact directly with the physical environment, such as hunters, outfitters, etc.). It is also important to study financial linkages and raise such questions as:

What are the secondary impacts? How will they be transmitted? Where will they occur? What consequences exist for other activities in the community?



Based on Quigley and McBride's model of the Sanikiluaq economy (1987), Figure 3 generalizes the economic linkages of income and expenditures for households in Holman.

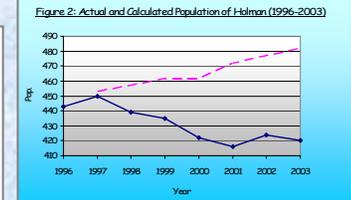
The orange gradient distinguishes between different levels of vulnerability, with those directly linked to the environment being most sensitive.

3) POPULATION DYNAMICS

TRENDS: Population trends can be indicative of community well being and have implications for a community's sense of place and attitudes towards change. Populations in decline suggest that pre-existing stressors may be present, influencing household decisions to stay in or leave a community. While lack of education and employment opportunities are recognized as sources of stress, it is still unclear how environmental change will influence migration decisions amongst northern settlements.

Over the past decade, Statistics Canada records show that fertility rates in the ISR have been on the increase, but because of out-migration, this trend has not been translated into similar population growth. Figure 2 illustrates population trends in Holman from 1996 to 2003.

- indicates the recorded population for each year
- indicates what the population would have been with no in or out-migration (based on vital statistics).



TURN OVER: Population turn over has important implications for a community's ability to make informed decisions in times of change. In Holman, residents can generally be categorized as "permanent" or "temporary"; permanent residents generally being local people who remain in constant or declining numbers, while temporary residents are characteristically skilled professionals who fulfill contractual work in government, administration, education, healthcare, RCMP and other key positions. Because they are a constant proportion of the population (continually being replaced), this indicates that it is the Inuvialut population which is migrating out of the region.

Implications:

- 1) Populations re-locate because of stress or perceptions that better opportunities exist elsewhere. The maintained decline of Holman's population suggests that there are long term stressors influencing the decision to move out; stressors that may be further exacerbated by environmental change.
- 2) Population turn-over affects commitment to place and the responsibility people feel towards caring for current and future generations in their community. Residents who do not spend extensive amounts of time in one place may be less likely to notice environmental changes and also less inclined to be concerned about future events.
- 3) Relative population decline and rapid turn-over have implications for institutional memory. The turnover of key decision making personnel are significant dynamics given their influence on the way a community responds to stress.

6) DISCUSSION

The conclusions that can be drawn through analysis of community structure and linkages are largely speculative given the uncertainties associated with climate change. For Holman, environmental change is occurring in a community that is already stressed and in relative decline, gradually losing its indigenous population. This shift indicates that younger, more resourceful segments of the population leave while older, more vulnerable populations remain. In a region where loss of inter-generational transmission of knowledge is already a key concern, this trend is likely to compromise the value of community memory as a means for assessment of and planning for environmental change. There may also be implications for household decisions concerning migration within the ISR and to other regions.

Exposure of community economy to environmental stress varies by sector, though none are completely insulated given the linkages which cause change to be transmitted from one sector to the next. Harvesting of country food is the activity most exposed, making ecosystem shift or changing ice conditions of significant concern. The manner in which residents will respond to this change is debatable, but decrease in local food harvests will likely result in further reliance on store-bought food, altering household spending habits and placing increased importance on wage income and transfer payments.