

Sustainable Development for Canada's Arctic and Subarctic Communities: A Backcasting Approach to Churchill, Manitoba

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ABSTRACT. Backcasting has been used to evaluate sustainable development in several communities in Canada, Europe, and the United States, but no research has applied it to a remote northern community. This first such effort, which took place in Churchill, Manitoba, evaluated the environmental, social, and economic aspects of a small Subarctic community. As part of the backcasting approach, a community survey identified local issues and concerns, such as tundra vehicle damage, alcohol abuse, and the future economic viability of the Hudson Bay Port Company. Community residents also identified potential growth areas, including the establishment of Nunavut and increased tourism opportunities. The application of the backcasting approach in Canada's northern regions will have benefits for research and management by identifying local issues and building strategies for sustainable development.

Key words: backcasting, Churchill, Manitoba, sustainable development, Arctic and Subarctic

RÉSUMÉ. L'analyse rétrospective a été utilisée pour évaluer le développement durable dans diverses communautés du Canada, d'Europe et des États-Unis, mais aucun travail de recherche ne l'a appliquée à une communauté isolée du Grand Nord. Cette première tentative du genre, qui s'est déroulée à Churchill, au Manitoba, a évalué les facettes environnementales, sociales et économiques d'une petite collectivité subarctique. Dans le cadre de la méthode de l'analyse rétrospective, un sondage auprès de la communauté a permis d'identifier les préoccupations et enjeux locaux, tels que les dommages à la toundra causés par les véhicules, l'abus d'alcool et la future viabilité économique de la Compagnie du port de la baie d'Hudson. Les résidents de la communauté ont également identifié des zones de croissance potentielle, y compris l'établissement du Nunavut et des ouvertures accrues sur le plan touristique. L'application de la technique de l'analyse rétrospective dans les régions nordiques du Canada sera bénéfique pour la recherche et la gestion en identifiant les enjeux locaux et en édifant des stratégies visant le développement durable.

Mots clés: analyse rétrospective, Churchill, Manitoba, développement durable, arctique et subarctique

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INTRODUCTION

The World Commission on Environment and Development (WCED) defined sustainable development as a process, rather than a state of affairs, that refers to meeting the needs of the present generation without compromising the ability of future generations to meet their own needs (WCED, 1987). Sustainable development is a process for changing the character of society: it assumes fundamental changes in the way business is done, what is taught to children, how individuals live and conduct their lives, and how governments and public institutions address the essential problems affecting daily life (WCED, 1987).

Although the WCED's report *Our Common Future* (WCED, 1987) popularized the concept of sustainable development, it gave little guidance to Canadians trying to implement this concept at the community level. Since 1987,

however, a number of different agencies have attempted this task, among them the Department of Fisheries and Oceans (DFO), which under the *Oceans Act* (Government of Canada, 1997) is required to be the lead agency in developing Canada's Ocean Strategy (DFO, 1998). The purpose is to create a flexible strategy that can be implemented regionally by stakeholders within their areas of responsibility to manage activities occurring in or affecting marine waters (DFO, 1999). An important component of both the *Oceans Act* and the Ocean Strategy is to foster the sustainable development of Canada's marine resources: in the words of the *Oceans Act* mandate, "to ensure healthy, safe and prosperous oceans for the benefit of current and future generations" (DFO, 1998).

Fostering sustainable communities in Canada's Arctic and Subarctic poses many challenges, including isolation, high unemployment, and susceptibility to climate change

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(McTiernan, 1999). This paper describes an effort to better understand the relationship between sustainable development and characteristics specific to Canada's Arctic and Subarctic communities. Our specific objectives were to review and analyze literature concerning Churchill and sustainable development; document community perspectives on the environment, community, and economy of Churchill; evaluate community perspectives within a sustainable development framework; and draw conclusions and make recommendations regarding sustainable development for Canada's northern communities.

The Town of Churchill is located in northeastern Manitoba ($58^{\circ}47'N$, $94^{\circ}12'W$) (Fig. 1), approximately 966 km by air and 1697 km by rail from Winnipeg, the provincial capital. Surrounding the town is a region composed of a diverse mix of habitats, from arctic marine waters, to treeless tundra, to boreal forest. The town itself has a population of approximately 1000 people, of whom about 50% are Cree, Inuit, and Dene (Town of Churchill, 1999). The population of Churchill has experienced a steady decline since the 1960s, when military operations were transferred out of the community, from ca. 7000 in 1965 to 1604 in 1971, 1217 in 1986, 1143 in 1991, and 1090 in 1996 (Statistics Canada, 1996).

Churchill has experienced a wide range of developments over the last 70 years, including shipping, military outposts, tourism, rocket research, and hydro development. A major focus of economic development in the last 45 years has been shipping through what today is called the Hudson Bay Port. This port is the only inland, deep-sea port in Canada. Owned and operated by OmniTRAX International, it has the capacity to clean and store grain in a 140000 tonne grain elevator in preparation for the shipping season. While ocean-going vessels arrive primarily to take grain and other commodities to Europe, South America, and Africa, the port also has the capacity and potential to import a variety of products from offshore. Resupply of fuel and groceries to the communities along the Hudson Bay coast by the Northern Transportation Company Limited (NTCL) has become another important function of the port (OmniTRAX, 1998).

The most recent statistics on employment in Churchill indicate that the Hudson Bay Port Company, Regional Health Authority, Town of Churchill, Churchill Airport, Northern Transportation Company Limited, and Northwest Territories Transient Centre employ approximately 400 individuals, the majority of the working population. This includes full- and part-time employees. The tourism industry employs an estimated 130 community members directly and 50 indirectly (Town of Churchill, 1999). Unemployment levels in Churchill are fairly high (21%) in comparison to the rest of Manitoba (8%), in part because much of the employment is seasonal (Statistics Canada, 1997).

Tourism is important to the community of Churchill, accounting for at least 40% of the local economy (Town of Churchill, 1999). The area has become a popular destination for national and international tourists primarily be-

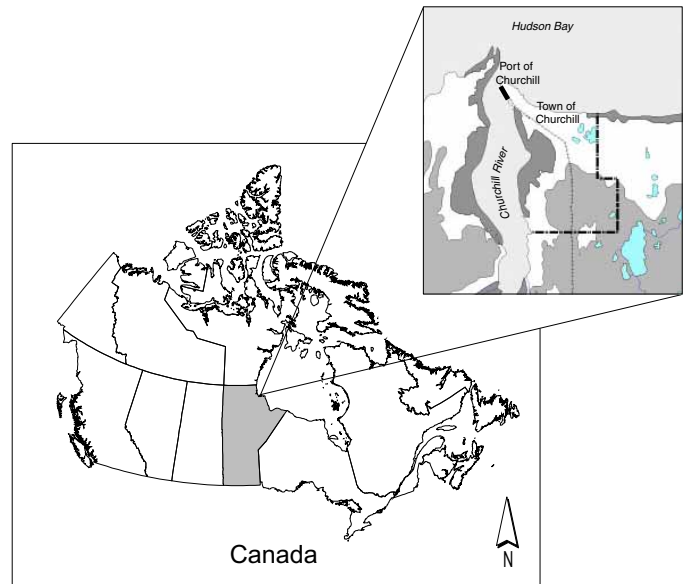


FIG. 1. Site map of Churchill, Manitoba.

cause of its polar bears, beluga whales, and major bird populations. Churchill is known as the "Polar Bear Capital of the World" because it boasts one of the world's largest denning areas (MacKay, 1997). Although fall is the best time to view the bears, they have been spotted in Churchill in every month of the year. In June, thousands of beluga whales arrive at the estuaries of Hudson Bay to feed on capelin, mate, calve, and moult. Close to 200 species of birds have been observed around the town. The marine coastline is extremely important to bird habitat and migration, and Ross's gulls, snow geese, Canada geese, ducks, and ptarmigan are abundant. Raptors such as peregrine falcon, rough-legged hawk, and snowy owl can also be found throughout the town (Local Government District of Churchill, 1996).

Although the tourism sector has grown, most other development projects have been short-lived and unpredictable, and some have had negative economic, social, and environmental impact on the community. During the 1950s and 1960s, the Cold War brought the American military with its Distant Early Warning (DEW) line facilities to Churchill, increasing the local population to approximately 7000 people and generating economic growth and development. After the Cold War ended, personnel and equipment were moved out of Churchill, but several military buildings still exist today, including the Army's rocket range facilities, located on the eastern outskirts of the town (Pelesh, 1988).

In the past few years, a number of positive growth areas have emerged. Establishment of the Nunavut Settlement Region in Canada's eastern and central Arctic in 1999 may increase Hudson Bay Port shipments through new ties between the governments of Manitoba and Nunavut. Possible extension of the tourism seasons may also help to diversify tourism and provide more employment in the community.

METHODS

An important consideration in building sustainable communities is to have a clear vision for the future. The development of scenarios through backcasting is one tool that a community can use to predict future patterns and develop strategies to achieve its goals (IISD, 1999). Backcasting has historically been used in the fields of ecology and climatology to monitor population trends and climate patterns. Recently, backcasting has successfully been adapted to measure sustainable development in a number of Canadian, European, and American communities (Holmberg, 1998; IISD, 1999). Backcasting differs considerably from traditional forecasting (Dreborg and Robinson, 1996). While forecasting extrapolates observed trends (i.e., past and present) to determine the direction of future cycles, backcasting starts by describing a particular goal and then works backwards to find strategies that will accomplish that goal.

This study represents the first use of a backcasting approach to evaluate sustainable development in a northern region. Three steps were involved in implementing the backcasting approach in Churchill. The first step, to define and discuss the criteria for a future sustainable community, was accomplished by reviewing relevant literature and consulting with the International Institute of Sustainable Development in Winnipeg, Manitoba.

The next step was a community survey to identify local information about sustainable development in Churchill. Respondents were selected using the snowball sampling technique (Babbie, 1998), identifying individuals through recommendations from contacts made during an initial site visit. These initial contacts identified other key individuals with knowledge of environmental, social, and economic concerns. The interviews continued until there was a consensus of information and redundancy in responses. The total number of respondents was 54, 18 females and 36 males. Nineteen respondents were of aboriginal background. The first section of the survey elicited community concerns about Churchill's environment, community, and economy by asking respondents to identify their main concern. The second section focused on building a sustainable vision for Churchill in the future, asking respondents to give their view of a sustainable future and identify strategies to accomplish that goal. These last results are summarized in the Discussion section.

The final step involved comparing the current state of the environment, community, and economy with the sustainable vision. An important outcome of this step was the identification of areas of priority for sustainable development.

RESULTS

The community survey asked interviewees to identify concerns and perspectives regarding their environment, community, and economy, and to name the single concern

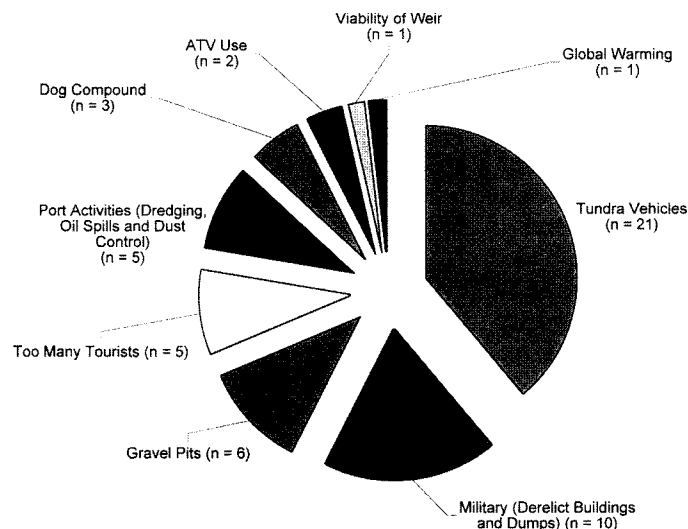


FIG. 2. Main environmental concerns expressed in survey of Churchill residents.

they considered most important in each area. Figure 2 shows the community respondents' main environmental concerns. The highest number ($n = 21$) of the respondents identified tundra vehicle damage as their main environmental concern in Churchill. Tundra vehicles are large, tractor-like machines developed by a local entrepreneur, which allow tourists to travel on the tundra and view polar bears in their natural habitat from a safe location. However, the weight and heavy use of these vehicles on permafrost can crush vegetation and alter soil drainage (M. Macri, pers. comm. 1999). Northern regions are particularly sensitive to such damage because of their low biological productivity and permafrost-bearing soil (Webb, 1985). Changes to soil configuration and vegetative communities resulting from tundra vehicles have been noted in the Churchill Wildlife Management Area (WWF, 1999). Pre-existing roads and trails are intended to absorb the bulk of tundra vehicle traffic, yet many of the vehicles venture away from these areas.

The second greatest concern in the community, identified by 10 respondents, is the presence of derelict buildings and dumps left by the military in the 1950s and 1960s. One respondent called the military contaminants and unsightly buildings "an eyesore and potential pollutant" (E. Depatie, pers. comm. 1999). Asbestos was used in many of these structures, and polychlorinated biphenyls have been found in some abandoned dumps (Dredge, 1992). The community is concerned not only that the unsightly buildings will discourage tourists, but also that pollutants may contaminate the surrounding wildlife. The federal government sponsored an initial cleanup of some of the sites; however, many dumps and buildings still remain (C. Young, pers. comm. 1999).

Gravel pits along the Hudson Bay coast were the third main environmental concern ($n = 6$). Many such pits were created in the 1950s and 1960s to supply military installations with gravel for construction and then abandoned when their usefulness was exhausted (Pelesh, 1988). New

gravel pits have been excavated along the Hudson Bay coast to supply material for road and runway construction. These gravel pits may cause erosion and loss of wildlife habitat along Churchill's coast through sedimentation and disturbance. One problem facing the community is that reclamation of these pits is very expensive and labour-intensive (Dredge, 1992).

Five respondents identified "too many tourists" as their main environmental concern. This concern relates to the carrying capacity of the local environment. During October and November 1999, approximately 10 000 tourists visited Churchill to view the polar bears (C. Young, pers. comm. 1999). Community members are concerned that this number of visitors over a short time may compromise both the environmental integrity and the infrastructure of the town. The same number of respondents ($n = 5$) identified port activities, particularly dust control, dredging, and oil spills, as their main environmental concern. Dust has been a problem within the community in the past; however, OmniTRAX's new dust control facility is supposed to eliminate this problem (OmniTRAX, 1999). Dredging is a concern because it alters the marine ecosystem, which may have negative impacts on the beluga whales in the Churchill River estuary. One oil spill associated with port activities has occurred, and Churchill residents are concerned about the potential for another (WWF, 1999).

Fewer respondents ($n = 3$) mentioned the dog compound as their main environmental concern. The dog compound is an area along Churchill's coast where sled dogs are kept and fed. One respondent commented that the interaction of the polar bears with the sled dogs might cause habituation and safety concerns for both dogs and bears (M. Macri, pers. comm. 1999). Even fewer respondents felt that all-terrain-vehicle (ATV) use ($n = 2$), the questionable viability of a new weir on the Churchill River ($n = 1$), and global warming ($n = 1$) were main environmental concerns.

The community survey also revealed many issues and concerns about the health of the community. Some residents have faced obstacles in retaining their culture and livelihood (Dredge, 1992). For example, in 1956, federal government officials, concerned about a decline in caribou herds, blamed the Sayisi Dene First Nation for overhunting and decided to move them from their traditional land along the northern border of Manitoba to Churchill (Dredge, 1992). Denied their traditional way of life, unable to speak English, and left without jobs or support, the Sayisi Dene turned to alcohol and became stuck in a destructive cycle of sexual abuse, domestic violence, and suicide. As outsiders in Churchill, they were shunned by the aboriginal people already in the area (Dredge, 1992). It wasn't until 1973 that the survivors were finally moved to Tadoule Lake, a Manitoba settlement located southwest of Churchill.

Figure 3 illustrates the main community concerns of the respondents in Churchill. The largest number of respondents ($n = 18$) felt that alcohol abuse was their main social concern. According to B. Wohlgenuth (pers. comm. 1999)

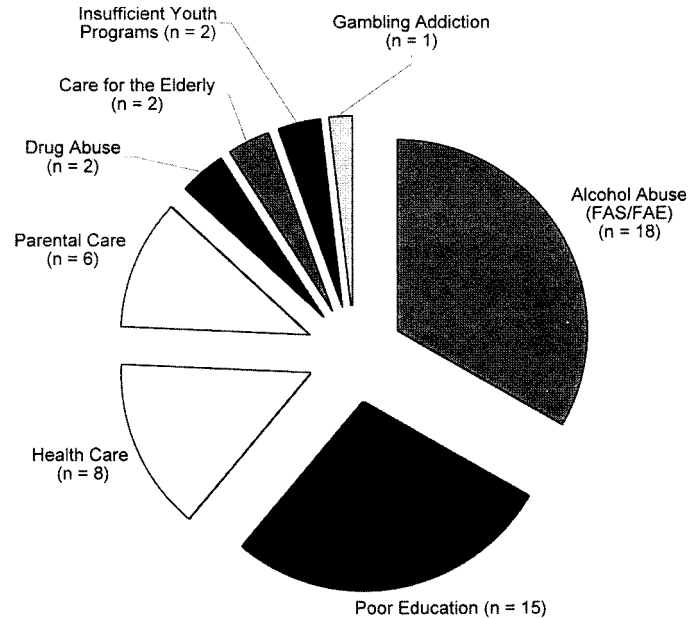


FIG. 3. Main social concerns expressed in survey of Churchill residents.

of Churchill's Regional Health Authority, one of the problems associated with alcohol abuse is the high incidence of Fetal Alcohol Syndrome (FAS) and Fetal Alcohol Effect (FAE), which occur when expectant mothers consume alcohol during pregnancy.

Poor education ranked second as the respondents' main social concern ($n = 15$). While Churchill's education facilities are comparable to their southern counterparts, many students are not performing at a level that is acceptable for administrators, teachers, or parents. In 1998, only three students graduated from grade 12, out of a possible 16 (Regional Health Authority Inc., 1999).

The quality of health care was the third main social concern ($n = 8$). One respondent commented, "Even though Churchill's Regional Health Authority is well-serviced and equipped, many of the community members don't feel that it adequately serves their needs" (E. Depatie, pers. comm. 1999). Doctors and nurses usually stay in the community for only a two-year term, so there is little time for residents to build a rapport with their providers or develop confidence in their health care system (Regional Health Authority Inc., 1999).

Six respondents cited inadequate parental care as their main social concern. A study performed in Churchill in 1997 found that lack of parental care at home correlates with poor educational performance and peer interaction (Regional Health Authority Inc., 1999). Two felt that drug abuse, care for the elderly, and insufficient youth programs were their main social concerns. One respondent was concerned about gambling addictions because of video lottery terminals (VLTs) in the community (B. Wohlgenuth, pers. comm. 1999).

The community survey also highlighted issues and concerns about the viability of the local economy, which is based on the Regional Health Authority, tourism, port

facility, and transportation services. Figure 4 illustrates the main economic issues and concerns in Churchill. Tourism was the greatest concern: 14 respondents felt that developing “shoulder seasons” for tourism was key to economic development. Providing services over a longer portion of the year would allow the industry to expand existing tourism activities and create new ones (WWF, 1999).

The second largest economic concern in Churchill is the proposed hospital in Rankin Inlet, Nunavut ($n = 12$). For several years, the community of Rankin Inlet has been trying to generate enough funding to build its own hospital. At present, residents of Rankin Inlet and surrounding communities use the Churchill Regional Health Authority (RHA) for their health needs (Regional Health Authority Inc., 1999). According to one respondent, a hospital in Rankin Inlet would dramatically reduce the number of patients and economic activity in Churchill’s RHA (B. Wohlgenuth, pers. comm. 1999).

The high level of seasonal employment in the community was the third main economic concern expressed ($n = 9$). Residents are forced to rely on government subsidies during the months when they are not employed (Regional Health Authority Inc., 1999).

A perceived lack of customer service and the feeling that tourists were not spending enough money in Churchill ranked fourth ($n = 6$) and fifth ($n = 4$) as the respondents’ main economic concerns. The community concern about a lack of customer service was not reflected in an exit survey of tourists in 1997, which found 72% of tourists very satisfied with their visit to Churchill (MacKay, 1997). It seems that while tourists are generally pleased with service in Churchill, community respondents feel that if further improvements were made, tourists would be willing to spend more money. A 1998 survey found that tourists were leaving the community with an average of \$400–\$500 of unspent travel money (Travel Manitoba, 1999).

A few respondents felt that the potential failure of OmniTRAX ($n = 2$), an insufficient tax base ($n = 1$), global warming ($n = 1$) and the current housing status ($n = 1$) were main economic concerns.

DISCUSSION

The Sustainable Vision of Churchill

The vision of a sustainable future for Churchill is based on recommendations gathered through the community survey. This vision describes a town in which residents are able to maintain and enjoy a quality of life that meets their particular needs and expectations.

Roseland (1992) defines the environmental, social, and economic principles that characterize a sustainable community. A sustainable environment is one that recognizes that growth occurs within limits and is restricted by the carrying capacity of the environment; minimizes harm to the natural environment; and uses materials in continuous

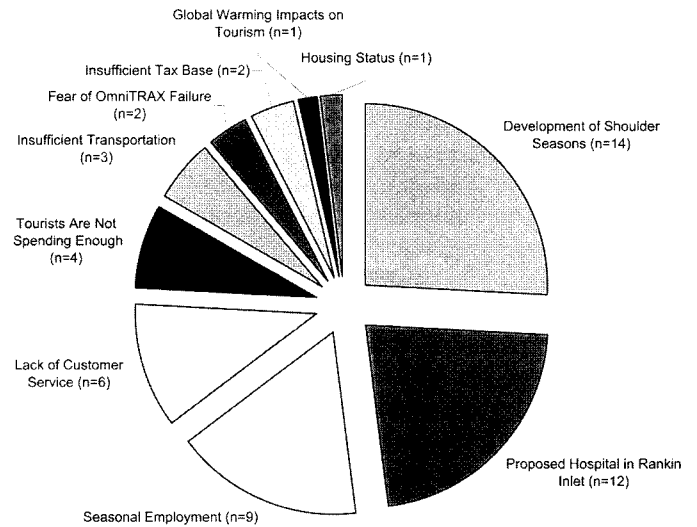


FIG. 4. Main economic concerns expressed in survey of Churchill residents.

cycles. A sustainable community values cultural diversity; makes decisions and plans in a balanced, open, and flexible manner that includes the perspectives of the community; and encourages fair distribution of benefits among all members, including the disadvantaged. Finally, a sustainable economy involves a local economy that is stable and diversified, relies on local strengths and resources, encourages local initiatives, and provides year-round employment for local residents.

This community-based vision for Churchill anticipates evolution and improvement, which transform local communities and residents. It accommodates large-scale export-oriented development via the Hudson Bay Port Company, of benefit to all Manitobans and Canadians, provided that such developments do not threaten the viability of resource use by the community. The vision for Churchill also focuses on small-scale, local initiatives to maintain and enhance the quality of life for Churchill residents. It recognizes a need to foster decision-making processes that build consensus and cooperation among all the stakeholders in Churchill.

Components of a Sustainable Churchill in 25 Years

This section outlines the specific components of a sustainable Churchill in 25 years, as they relate to the sustainable community principles mentioned above. Community respondents identified transportation, tourism, and community development as the three pillars of their sustainable vision.

Transportation: Transportation will continue to be a key sector of the local economy 25 years from now. A sustainable transportation sector will require an active port and a coordinated effort by the rail and airline sectors. The following sections describe how a sustainable transportation system could be achieved.

If the Hudson Bay Port Company is to be sustainable in the future, it must increase its shipping tonnage. The

break-even tonnage for the port is approximately 600 000 tonnes for operating expenses and 1 million tonnes for total costs each year (A. Johnson, pers. comm. 1999). OmniTRAX, as the new owner of the rail and port facilities, is the marketer and must provide the catalyst to stimulate port expansion. The transfer of the port from public to private interests in 1997 involved bringing the port facilities up to environmental standards (OmniTRAX, 1998). The majority of these tasks have been completed, including dust control and the remediation of contaminated soils surrounding the marine tank farm. OmniTRAX has also stated that it now plans to operate the port in an environmentally friendly manner. The implementation of OmniTRAX's environmental guidelines is a requirement for the sustainable development of the transportation sector (OmniTRAX, 1998).

In the future, OmniTRAX will also require an integrated rail and port approach to coordinate traffic and provide the personalized customer service needed for niche markets and smaller-volume sales. The Hudson Bay Port Company will also need to facilitate movement of inbound traffic. Integrating rail and port operations will enhance the profitability of the total system (Canada Grains Council, 1997). The future scenario will need to consider further diversification of the grain traffic to include a wider range of alternative crops, as well as adding bulk commodities such as potash. Adoption of containerized service and the development of two-way trade opportunities with Europe and Africa will also contribute to the future viability of the Hudson Bay Port Company (OmniTRAX, 1998).

The Northern Transportation Company Limited (NTCL) has served successfully as a distribution centre for the Central Arctic Region since 1975. Cargo is brought to Churchill by train and transferred by NTCL barge to the individual northern communities (NTCL, 1999). The NTCL will also continue to be a vital component of the transportation system into the coming decades (NTCL, 1999; OmniTRAX, 1999). NTCL traffic is presently 35 000 tonnes annually (9000 tonnes dry products and 26 000 tonnes fuel). As one respondent suggests, the establishment of the Territory of Nunavut and the corresponding agreement between Nunavut and Manitoba to maintain Churchill as a "Gateway to Nunavut" should result in increased shipments. Twelve respondents agreed that the establishment of Nunavut would increase resupply opportunities for NTCL.

The airport is another important consideration in the sustainable development of the transportation sector. In 1998, the airport employed 37 people directly and 82 people indirectly, contributing a total of \$14 million in direct and indirect revenues to Churchill. The new terminal/hangar built in 1999 will improve transportation in the future scenario by enabling the airport to accommodate increasing numbers of aircraft and passengers, reduce heating and other operating costs, and handle increased traffic volumes for air freight moving to more northerly locations (Calm Air, 1999).

An important environmental consideration for the transportation sector is coordinating its activities with tourism and wildlife guidelines. As the potential for port activity increases in the new millennium, conflicts may arise between shipping and whale watching. As five respondents noted, dredging of the port may affect the viability of wildlife using the Churchill River estuary. An integrated management plan incorporating a Marine Protected Area under Canada's *Oceans Act* (Government of Canada, 1997) may help to ensure the successful coexistence of shipping, tourism, and wildlife. Integrated management could provide a continuous, transparent decision-making process developed by stakeholders to plan and implement all activities and policies affecting Hudson Bay (DFO, 1999).

Maintaining and improving Churchill's transportation activities will also affect Canadian sovereignty in the future scenario. The operation of a port and rail links to Hudson Bay provides commercial shipping traffic through areas where Canadian claims to sovereignty have been contested (Caribou Ventures Ltd., 1994). These activities are a valuable supplement to the military and other government projects meant to confirm the Canadian presence in this territory, which could have implications for future gas and mineral claims (P. Watts, pers. comm. 1999).

Tourism: Tourism will continue to stimulate economic growth and will remain a major component of the economy 25 years from now, alongside the shipping and transportation sectors. Respondents suggested specific environmental, social, and economic components that could comprise a sustainable tourism industry in the future.

The tourism industry in Churchill can increase its economic viability over time with relatively low capital investment by making fuller use of existing transportation facilities (WWF, 1999). There is untapped tourism potential in the region. One respondent stated that many tourists are seeking imaginative and varied experiences and are increasingly interested in adventure travel, wilderness vacations, and aboriginal cultural events. At present, these activities are not generally made available in the town (M. Macri, pers. comm. July 1999).

Improving tourism and increasing related employment opportunities will depend upon maintaining the transportation infrastructure, expanding shoulder seasons, and providing more quality accommodations. To serve more tourists, Churchill requires not only more independent transportation services, but also integrated transport facilities that allow easy access when two or more modes of travel are involved (OmniTRAX, 1998). An example of integrated transport is the cruise ships that work with VIA Rail and Calm Air. Tourists arrive on cruise ships, spend a day or two in the community, and then have the option of taking the train or an airplane to their next destination (Calm Air, 1999). This type of client service for tourists has growth potential.

The capacity to develop shoulder seasons for tourism also has major implications for the community's future

sustainable development. With the polar bear season (October and November) almost at full capacity, future tourism growth must occur in another sector (i.e., beluga whales, northern lights) (WWF, 1999). Judging from respondents' recommendations, the residents are optimistic they will be able to diversify and expand tourism in the future.

As the demand for tourism grows in Churchill, the potential for environmental damage may also increase. Permanent tundra damage, disturbance of wildlife, and pollution of aquatic and terrestrial ecosystems have all been cited as possible negative environmental outcomes of tourism growth in Churchill (WWF, 1999). The challenge, then, is to direct tourism toward activities that improve the environmental integrity of the region and ensure a sustainable tourism industry for generations to come. The following paragraphs describe several steps the community could take to encourage a more sustainable tourism industry.

A tourism operational organization could provide structure for and monitoring of both tourism operators and visitors. Mike Macri (pers. comm. July 1999), the owner of Sea North Tours, stated that a regulatory body comprising all the tourism outfitters is needed for the sustainable development of the town. Such an organization could facilitate communication between tourism operators and enforce restrictions on environmentally damaging practices. With the aid of departments such as the Department of Manitoba Conservation and the Department of Fisheries and Oceans, the town could also encourage sustainable tourism by implementing policies that govern wildlife viewing, for example, regulations that forbid the baiting of bears, establish beluga whale viewing guidelines, and provide structure to the birdwatching activities.

The Wapusk National Park on the outskirts of the Town of Churchill has positive implications for the future. The presence of Parks Canada in the community may help to regulate and enforce environmental legislation (E. Depatie, pers. comm. July 1999). The park is currently developing a management plan that will focus on maintaining and improving the park environment.

The tourism industry already contributes to community development by generating local income and employment. In the future scenario, it has the opportunity to expand economic growth and increase employment, as well as providing new opportunities for entrepreneurs. Better communication between groups in the tourism sector could also ensure both cultural and economic opportunities for the aboriginal population. Aboriginal residents could be supported in developing educational tourism opportunities, such as traditional hunting and fishing trips and overnight camping trips that teach the tourists about traditional lifestyles.

Building educational partnerships between industry and the community is an important step in sustainable development (Henderson, 1990). A partnership between the Department of Manitoba Conservation and the local public school could train high school youths in such areas as guiding and interpreting regional features to tourists, so

they could work with local tourism outfits during the summer. Such a program would support the needs of both the youth and local tourism businesses.

Community Development: Health care and education will form the basis for sustainable community development in 25 years. The health care system will continue to be one of the largest employment sectors, and education will be characterized by greater cultural sensitivity and community involvement. Moving toward a more sustainable community will require improved cooperation and communication between community members and social program providers.

The regionalization of the Churchill health centre in January 1996 will have implications for the future sustainable development of the community. Health services are increasingly recognized as a key component of community infrastructure that will not only provide medical care for local residents, but also attract industry, trade, and tourism to the community, with economic benefits to everyone. For example, cooperative linkages have been established with Nunavut through health services provided by the Churchill RHA to Nunavut residents (NTCL, 1999). From an economic standpoint, the RHA must make it a priority to explore the potential for establishing strategic alliances, partnerships, and sponsorships that will generate revenue and leverage for program enhancement and expansion. The availability of new money and strategic planning may result in doctors and nurses' remaining in the community for longer periods (RHA Inc., 1999).

The Regional Health Authority may also be taking a new stance toward community needs and health in the future. In 1997, the RHA conducted a Health Needs Assessment to identify community needs, assess the key factors influencing the health of residents, and identify areas of concern and opportunity within the community. Alcohol and drug abuse, parental problems, care for the elderly, and gambling addictions were identified as priority areas for Churchill (RHA Inc., 1999).

A new curriculum in the Duke of Marlborough School that incorporates town history and aboriginal heritage may also become an important element of community sustainable development. A significant number of respondents stated that Churchill students are not excited about learning because the curriculum does not suit their needs. In response to this concern, Penny Rawlings (pers. comm. July 1999) is working to implement a new curriculum that would incorporate practical learning experiences and aboriginal teachings.

The establishment of links between the RHA, the Duke of Marlborough School, and the Keewatin Community College may serve to streamline the delivery programs for health and education in the future. The ability to share financial resources and work cooperatively to cut costs is vital for the sustainable development of the community (B. Wohlgenuth, pers. comm. July 1999).

Waste disposal is another area of community development that must be addressed in a sustainable future

(Roseland, 1992). In Churchill, disposal of waste and refuse has been a problem because of poorly planned landfills and inclement temperatures, which slow down the rate of biodegradation (Dredge, 1992). The establishment of new businesses and future expansion of tourism and shipping activities may create even more waste in the community. Residents and Town Council have recognized that traditional approaches to waste disposal are no longer practical (E. Depatie pers. comm. July 1999). A recycling program aimed at cleaning up some of the waste and using more products in continuous cycles will help the community move toward sustainable development. The two traditional approaches to waste management—dumping and incineration—view waste as a liability, and not as a potential asset. Many of the waste products in Churchill can be turned into valuable resources while reducing the solid waste stream. For example, toxic wastes like paint, turpentine, and other household products can be collected and redistributed at community exchanges instead of being dumped.

BACKCASTING TO IDENTIFY AREAS OF PRIORITY FOR SUSTAINABLE DEVELOPMENT

This section highlights specific environmental, social, and economic areas of priority for sustainable community development in the future. Those components that should be maintained or enhanced can be identified by comparing the current situation with the sustainable vision of the future (Roseland, 1992).

Environmental Areas of Priority

- Removal of derelict military buildings and dumps. Several of these buildings contain asbestos and PCBs, which may contaminate the wildlife and groundwater. Public Works Canada and the Town of Churchill are actively trying to remedy this situation, but many contaminated sites still remain (Town of Churchill, 1999).
- Enforcement of regulations for tundra vehicles and ATVs. Enforcement would reduce the environmental impact of vehicles that travel off designated routes and thus improve the environmental integrity of the region (Webb, 1985). The Department of Natural Resources is concerned that permanent damage to the tundra by these vehicles may destroy the future viability of the tourism industry (WWF, 1999).
- Limiting gravel excavation along the Hudson Bay coast. The presence of gravel pits can lead to coastal erosion and destruction of wildlife habitat (Dredge, 1992). Revegetation and rehabilitation of these gravel pits is very expensive and time-consuming (G. Kopek, pers. comm. June 1999).
- Continued research on how climate change affects Churchill (Stirling et al., 1999). Impacts of global warming in Churchill include an increase in the number of ice-free days and reduced nutrition in polar bears due

to a shorter feeding season (Stirling et al., 1999). If this warming trend continues, it will affect not only the environment, but also the economy of the region. For example, if polar bears have to move farther north to obtain an adequate food source, tourism in Churchill may suffer (Stirling et al., 1999).

Community Areas of Priority

- Improving the education system in Churchill. Continued improvement must address the cultural diversity and unique needs of the community. High dropout rates have been prevalent in the school over the last few years. As one respondent mentioned, the inability to develop educated children will impair the social well-being of the community (B. Wohlgemuth, pers. comm. July 1999).
- Establishing a long-term health care facility. A facility is needed to improve the level of care for the elderly. The absence of such a facility forces residents to travel south to receive proper care.
- Providing programs for alcohol and drug abusers. More resources and social welfare programs are needed to eradicate substance abuse. Current manifestations of this abuse are the high incidence of Fetal Alcohol Syndrome (FAS), crime levels, and parental neglect (RHA Inc., 1999).

Economic Areas of Priority

- Enhancing the level of community self-reliance (Roseland, 1992). The high level of seasonal employment decreases the community's self-reliance because residents are forced to depend on government and welfare subsidies for large portions of the year. The extension of tourism seasons and shipping may provide longer employment and economic stability for residents.
- Improving coordination in the transportation sectors. Churchill could move specialty crops through the port and take advantage of increased tourism dollars (A. Johnson, pers. comm. June 1999). There have been many complaints over the last few years that the port, VIA Rail, and Calm Air do not provide adequate transportation service to tourists and shipping clients (C. Young, pers. comm. July 1999).
- Increasing aboriginal involvement in Churchill's economy. This step would help future economic viability by providing a wider and more stable employment base. Currently, 50% percent of the community is aboriginal, while only about 5% of local businesses are owned and operated by aboriginal residents (Town of Churchill, 1999).
- Increasing shipping activities through the Hudson Bay Port Company. More shipping would help to improve the economic viability of the town because it would lead to an increase in employment opportunities.

CONCLUSIONS

Northern communities are distinct from their southern counterparts (Beals, 1968; Dredge, 1992). The history and lifestyle of northern communities has given them an identity that reflects the climatic, geographical, and natural conditions of their environment (Dredge, 1992). Living in these communities necessitates dealing daily with unique problems and challenges. Northern communities are generally small and remote, and usually have a predominantly aboriginal population (McTiernan, 1999).

Other northern communities share many of the problems facing Churchill. From an environmental perspective, global warming may have impacts (such as a reduction in polar ice and an increase in flooding and severe weather events) in the entire North (Stirling et al., 1999). From a community perspective, the prevalence of alcohol abuse may be a shared concern. In the case of Churchill, alcohol abuse was identified as the most serious health-related problem in the community (RHA Inc., 1999). From an economic perspective, an issue common to many northern communities is diversifying economies through expansion of tourism, which has taken the form of sport fishing, sport hunting, camping, wildlife viewing, and hiking. Northern communities are drawn to this type of economic development because it offers a relatively small-capital, non-consumptive economic approach (Boo, 1990).

Increased awareness of these issues in some northern communities has contributed to an understanding of issues concerning sustainable development. This awareness is reflected in the attention given by municipal councils and community advisory groups to waste management, water quality, and local employment opportunities (NMEDC, 1993). There is also a growing attention in the non-aboriginal northern community to the value of the traditional practices and beliefs of aboriginal elders (McTiernan, 1999).

The North is endowed with rich resources and only partially exploited possibilities. There is a clear need to identify opportunities and promote local economic, environmental, and social development to reduce poverty, improve education, and strengthen cultural identity in local northern residents. A mobilization of resources and broad co-operation among stakeholders is essential to meet the multiple challenges in the North.

The backcasting approach used here could be implemented successfully in other northern communities. The strongest feature of this approach is that it stretches the scope of a community's thinking, both about the future and about sustainable strategies. The framework allows for community involvement in creating the scenario and developing strategies for its achievement. It provides a common vocabulary and an effective basis for communicating complex conditions and development options (Mulder and Biesiot, 1998). Ultimately, the result of applying the backcasting approach is not a more accurate picture of tomorrow, but better decisions today.

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