Demographics as a Driver of the Future Canadian Forest

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The global population has doubled in the last 50 years and is expected to continue increasing until at least the 2030s, with growth concentrated in Africa and Asia. The population of Canada has also grown in recent decades but future growth will be lower than in most other countries. Growth will be increasingly dependent on immigration rather than on births within the Canadian population. Most immigrant settlement, and thus most growth, will occur in urban areas. Since immigration is fully determined by policy, future population growth can potentially be managed. Population distribution among urban, near-urban and rural areas, however, is not closely linked to policy but is critical to the future forest in terms of labour force and support for community infrastructure. Rural depopulation is a long-term trend which is likely to continue but migration from cities into near-urban rural areas may be an important reverse trend. Future scenarios based on combinations of growth (low vs high) and distribution (more urbanized vs less urbanized) likely capture the plausible range of demographic conditions relevant to the future of the Canadian forest.

1. Introduction

We see and hear the words every week – words like 'baby boom', 'brain drain', 'generation X' …or Y or Z, 'suburban sprawl', 'population explosion', 'unemployment rate', 'refugee'. And we have an understanding of what they mean and how they can affect our lives. Whether or not we are demographers, we are steeped in the language and reality of demographics. We understand well that the growth and migration of human populations, where they live and what they do there have an important influence on the world in which we live. These same drivers will be important in determining the future of Canada's forests.

The purpose of this paper is to explore demographic conditions that will influence how the forests of Canada will develop over the next 40 years. Much can be learned from the patterns of demographic change in the past. However, projections of the future remain uncertain because fertility, mortality and migration may also change in the future. The idea of projecting the future is well developed in demography and thus data on various scenarios are readily available at the global and country level, and in many cases at regional and local levels. This paper summarizes many of these projections to provide a foundation on which to build scenarios for Canada's future forests.

The paper will focus on two key demographic features: population size and population distribution. Population *size*, and the growth, fertility and death rates that influence it, are described for the globe as a whole and for countries and regions around the world, focusing on Canada. Population *distribution* is determined by population growth in a particular location but also by movements of people to and away from that location. This is relevant to Canada as a whole as population is gained and lost through migration. It is also highly relevant within Canada as people move to or away from forested regions. Clearly, population size and distribution are related but will be treated separately here because they respond to different drivers and have different implications.

2. Population size worldwide

The human population of the globe has grown significantly in past millennia and will continue to grow at least until 2040 (Figure 1). Population projections differ based on assumptions of fertility and death rates built into the scenario calculations. A continuation of current conditions ('constant fertility' in Figure 1) will lead to a world of over 10 million people by 2050. However, fertility rates have been dropping over the last few decades (more on fertility rates below), and in some areas mortality has been increasing, so that lower projections may be more likely.

Figure 1: World population trends 1950-2050, according to different projection scenarios for the period 2010-2050 (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2007)
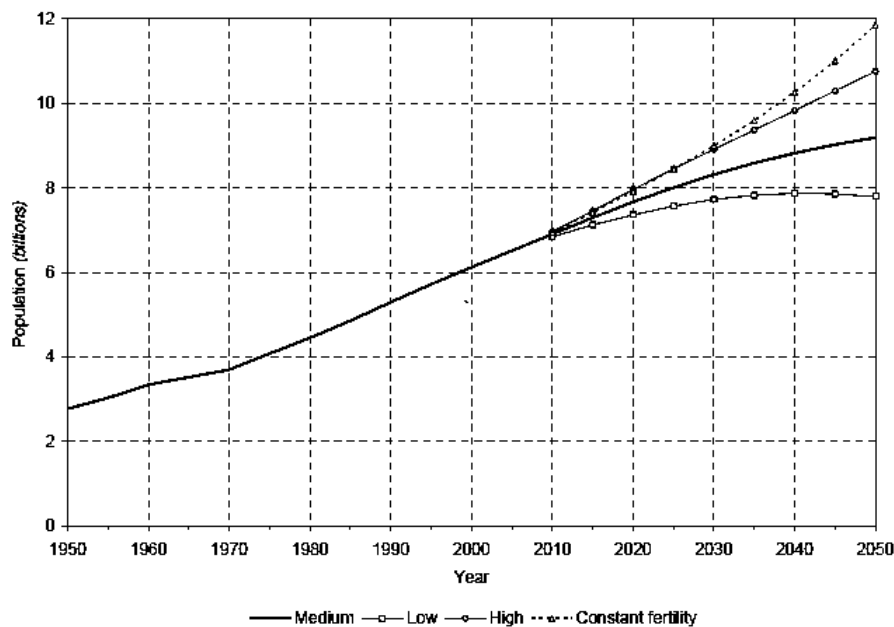
The global population projections capture only part of the picture because growth is not evenly distributed among regions or countries. While overall world population increase will continue over the next half-century, the growth will be concentrated in developing countries (Figure 2). By 2050, the population of the more-developed world will represent just over 10% of the global total.

Figure 2. Historical and projected global population (medium scenario) in more- and less-developed regions, 1950-2050. Source: Population Reference Bureau ; http://www.prb.org/Publications/GraphicsBank.aspx
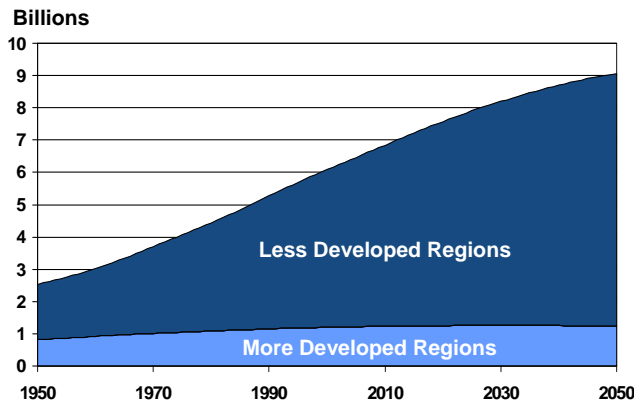
More detail on the projected country-level distribution of population growth (Figure 3) positions Canada relative to other nations of the world. The Canadian population is expected to grow slightly (<25%) as are populations in several other regions including western Europe, South Africa. China will also grow modestly, due to its 'one child' policy. The United States is expected to grow faster than Canada as are Mexico, latin and South America and most of Asia. Populations of Eastern Europe and Russia are expected to decline. Most of Africa and the Middle East will double in population. Despite their relatively modest growth rates in China and India, world population will continue to be dominated by these countries, which together will represent almost 35% of global population by 2050. Half of the world's population will live in Asia in 2050.

Figure 3. Projected population change by country 2005-2050. Source: Population Reference Bureau
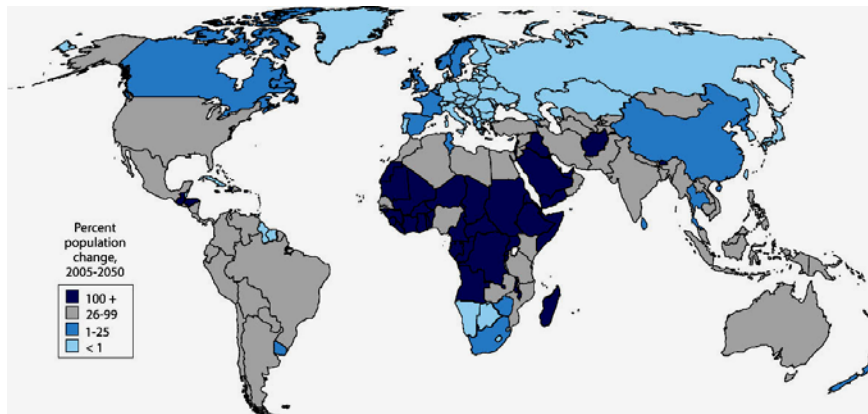
3. Population Size in Canada

The Canadian population has almost doubled over the last 50 years, from 17 million in 1957 to 33 million in 2007 (Figure 4). The increase, representing the balance between births and immigration versus deaths and emigration, has been relatively uniform over time, despite variation in all its components.

Figure 4. Population of Canada since 1957. Data from Statistics Canada 2007b.
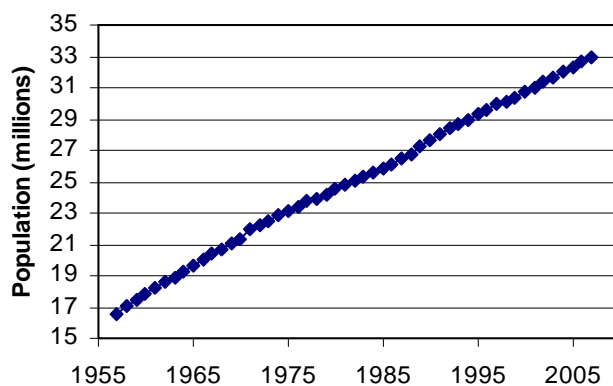
Statistics Canada (2005) projections suggest that the Canadian population will increase over the next few decades and likely will continue to increase beyond 2050 (Figure 5). One scenario, with the lowest levels of fertility, longevity and immigration, projects a stable population by the 2030s. The medium scenario projects an increase of about 10 million people (about 30%) between 2005 and 2050 to a total of 42 million, whereas the high scenario projects 50 million.

Figure 5. Canadian population observed (1981-2005) and projected (2006-2056) for the low, medium and high ranges covered by six scenarios; scenarios 2 -5 differ only in interporvincial migration. (Source: Statistics Canada 2005)

In thousands
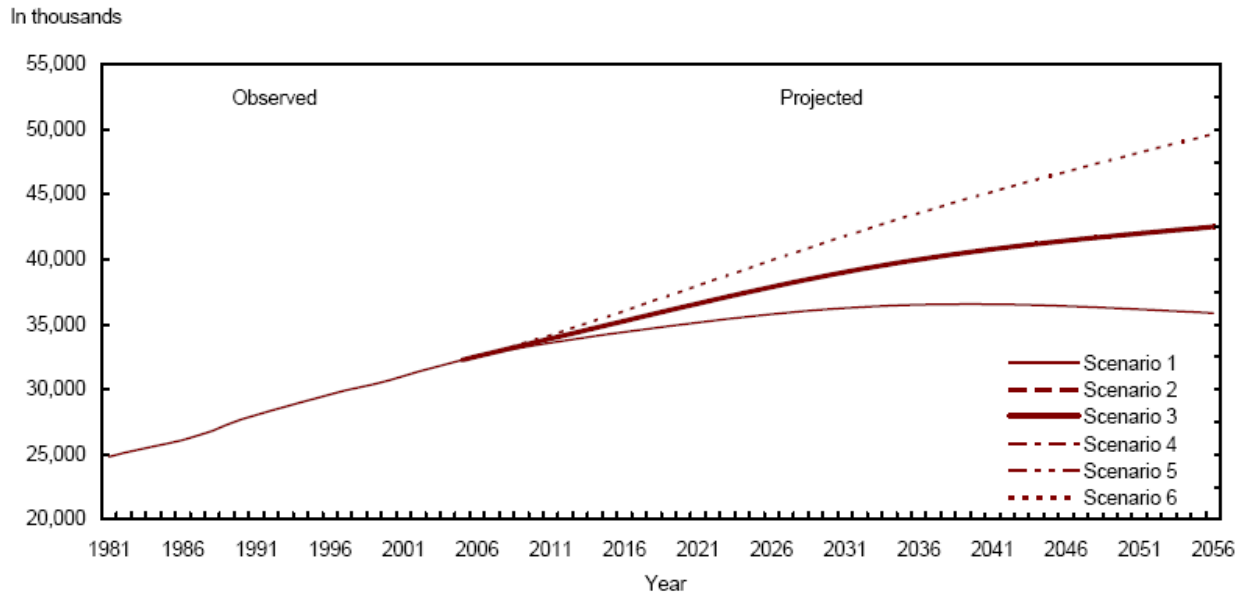
Population Growth Components

Population growth projections are based on accounting of the balance between several components that contribute to growth, including additions to the population from fertility (natural increase) and immigration versus loses from population due to mortality and emigration. In Canada, fertility and immigration have received considerable attention as their rates of change have been more dramatic than those of emigration and mortality.

Fertility has been a concern because current rates are insufficient to maintain the Canadian population. For a population to be stable due to inherent fertility, a total fertility rate of about 2.1 children per woman is required. Currently fertility in the Canadian population as a whole is about 1.6, having dropped from 2.3 in 1970 and 3.5 – 4 during the 1950's baby boom. This rate is consistent with the fertility rates in many developed countries around the world and is insufficient to support an increasing population.

Fertility rates are not uniform across the population, however, and areas of growth exist within the country. Of particular relevance to the Canadian forest is the high fertility rate (3.5 births/female) within the Aboriginal population. Such high rates explain to a large degree the increasing population (10% in the period 2001-2006) of Nunavut in recent years, and have the potential to lead to demographic shifts in regions of high Aboriginal population.

One feature of decreasing fertility rates that is of concern to social planners is that fewer births result in a changed age structure of the Canadian population. Hence, the Canadian population is becoming older as the baby-boom generation ages and is not being replaced by new-borns. This is being documented at present (Statistics Canada 2007a) and is recognized as a potential challenge for the future as, for instance, health-care costs will rise due to the aging population without a concomitant rise in the tax-paying population and labour force.

Immigration to Canada is determined largely by federal, and, after 1976, Quebec policy. Following the Second World War, immigration policy was largely directed at filling specific

needs in the Canadian labour market (Jakobsen 1997). Until the Immigration Act of 1976, the numbers of immigrants allowed into Canada were closely tied to perceived domestic labour market needs (Figure 5), although circumstances abroad, such as the invasion of Hungary in 1956, drove some policy decisions.

Figure 5. Unemployment and immigration in Canada 1946 – 1976. (Data from Leacy 1983)
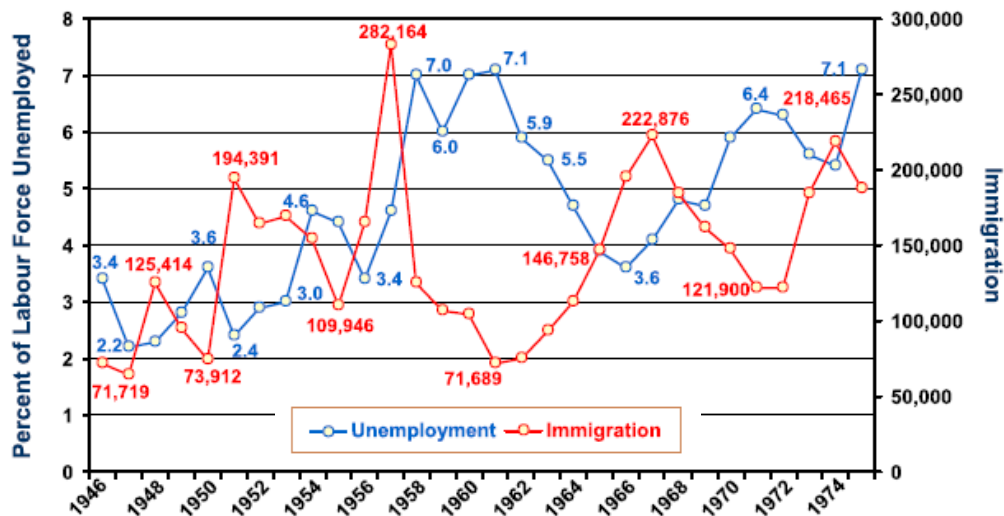

After 1976, policies were more broadly directed to attract immigrants that had skills and abilities that would be of benefit to the country in the future. Allowances were made for family members of previous immigrants and for refugees. Revisions to the Act in the 1980s further refined the classes of immigrant to include economic and business classes (Jakobsen 1997). The latter were instrumental in drawing people with significant capital to Canada, largely from Asia, in the 1980s and 1990s.

Current population growth in Canada is strongly driven by immigration. Immigrants represent over 60% of persons added to the population annually and this proportion is expected to increase significantly over time. A medium-growth scenario suggests that all growth will be fully dependent on immigration by the 2030's (Figure 6). Projections by Statistics Canada (2005) in Figure 6 determine immigration as a constant proportion of population. While this is a possible policy-driven outcome, it does not recognize the drivers that will influence immigration and is inconsistent variation in numbers over time, even in recent years.

Figure 6. Numbers of persons added to the Canadian population by migration (immigration minus emigration) and natural increase (births minus deaths) observed since 1981 and projected to 2031. Statistics Canada 2007a.
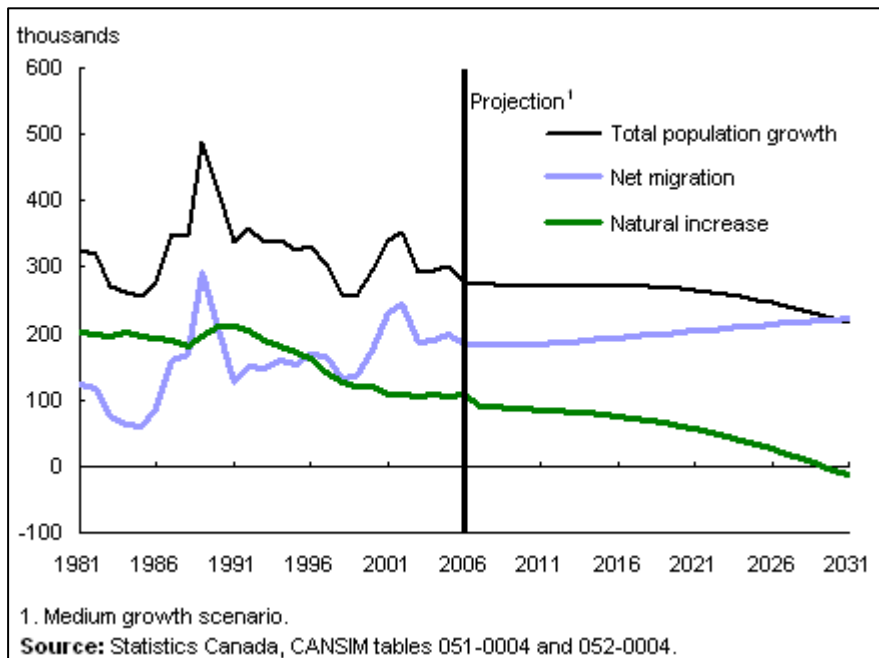

A critical dimension of immigration is that people from other parts of the world and other cultures bring their values and expectations to Canada. A growing proportion of the population from abroad will be reflected in many facets of Canadian society including demand for products and services from forested lands. Political representation that reflects the changed demographic may shift forest policy and thus influence land-use and management decision-making.

4. Location, location, location – Where do, and will, Canadians live?

The demographic history of Canada has shown a clear shift of population from rural to urban regions over time (Figure 7). Currently 80% of Canadians live in cities, 45% in the six largest urban centres: Toronto, Montreal, Vancouver, Ottawa-Gatineau, Calgary and Edmonton. Linear projection since 1974 suggests that 90% of Canadians will live in urban areas by 2050.

Figure 7. Canadian population living in urban centres, 1901 – 2006.
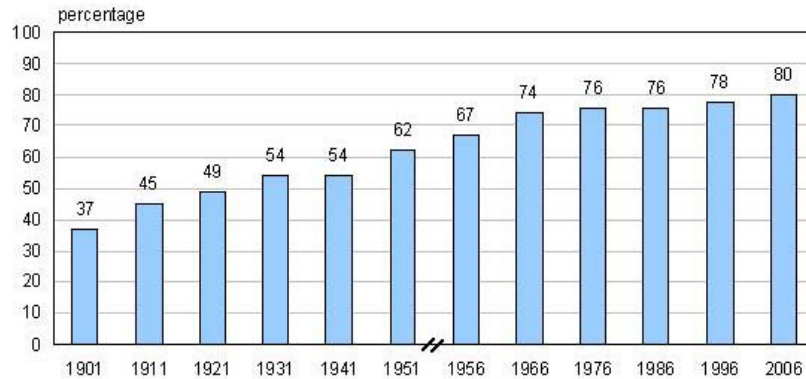
The trend toward urbanization will be enhanced by the dependency of population growth on immigration. Immigrants tend to settle in urban areas (Dolin and Young 2004). Almost 50% of immigrants settle in Toronto while 30% settle in Montréal or Vancouver. In the future, immigration will increase in importance as a component of growth. The tendency for immigrants to settle in urban areas, coupled with low rates of natural increase in most of the non-immigrant population, suggests that the majority of future growth will occur in urban centres.

Despite the overall shift in population from rural to urban, exploration of recent annual growth rates in different rural areas shows evidence of a different demographic change. While rural populations remote from urban areas are witnessing the decline expressed in the nation-wide statistics, rural areas close to urban centres are growing almost as fast as urban areas (Figure 7) due to out-migration. Increased wealth in recent decades and developments in technologies and transportation have made it more possible to maintain urban livelihoods in rural areas and have increase recreational use of near-urban rural areas. McCool and Kruger (2003) have documented a similar shift of urban populations to rural areas in the United States. They describe how urban migrants may differ significantly in attitudes toward forests and resource management from the local rural population, potentially generating conflict in resource decisions. This is already apparent in Canada in the Laurentide and Eastern Townships areas of Quebec, areas near Toronto, such as the Muskokas, and southern British Colombia. These areas are sufficiently accessible from urban areas for weekend and holiday recreation and to some degree for regular or periodic commuting.

Figure 7. Population in 2006 and growth rates between 2001 and 2006 in urban and rural regions of Canada. (based on Statistics Canada data).

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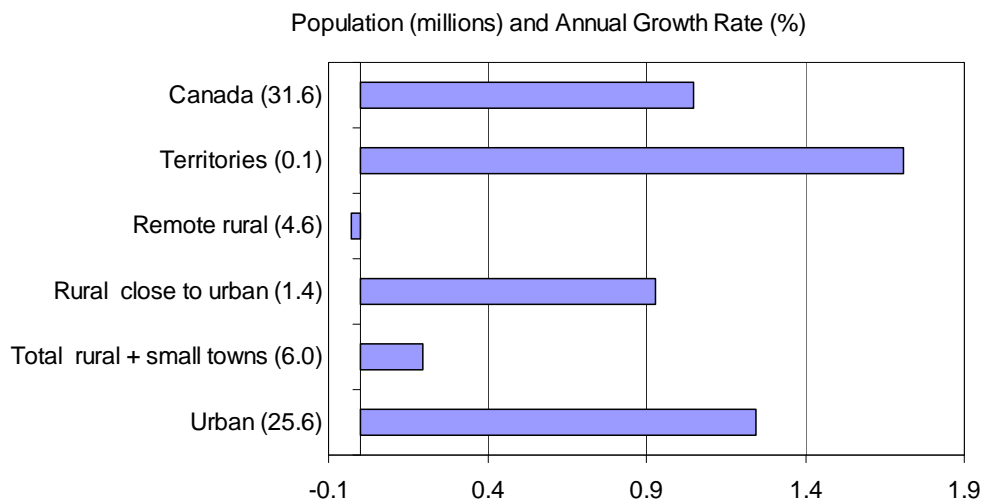
5. Interactions between demographics and other drivers of change

The role of demographic change in determining the future forests of Canada is largely indirect, expressed through effects on other drivers. Similarly, the effects of other drivers may be expressed through influences on demographics. Overall, demographics interact with many other drivers, the key among them including climate change, markets, geopolitics, technology, governance, aboriginal empowerment, forest values and industry profitability.

Increasing global population is closely linked to greenhouse gas emissions and hence is a key driver of climate change. Nevertheless, given the long turnover times of the main greenhouse gases, climate change over the next 40 years will be driven largely by past population growth and emissions, and less so by population increase during the period. Climate change could have a significant effect on demographics at global and regional scales. Climate-related disasters abroad may increase pressure to open Canadian borders to immigration to accommodate 'environmental refugees'. Within Canada, climate-related changes to the forest including increased fire and insect outbreaks, increasing the potential for insect-borne diseases and increased biting flies, may make rural areas less appealing places to live and encourage urbanization. On the other hand, some areas may become more attractive to live in as temperatures rise.

Demographic changes are key drivers of consumption and thus markets. The dimensions of this relationship are many and involve shifts in ethnic and age profiles as well as overall population growth. Clearly rapid population growth in the developing world will increase future demand for forest products irrespective of domestic markets. International development also entails increased production in some developing areas (e.g. South America), making the supply-demand balance difficult to predict.

Governance issues will both influence and respond to demographic change. Shifts of values associated with shifts in ethnic or age demography may change public perception, for instance regarding land privatization, and lead to changes in public policy. Conversely, changes in forest tenure arrangements such as privatization may contribute to driving demographic shifts in location of residence, particularly in near-urban rural areas.

Aboriginal empowerment also may drive and respond to demographic change. Resolution of Aboriginal land claims may revitalize Aboriginal communities and draw people back to the land who had previously migrated to cities. Increasing Aboriginal representation in some regions, combined with conflict over entitlements, could lead to relocation of non-Aboriginal populations. Demographic shifts in the non-Aboriginal population could influence public support for government engagement in land-claims processes.

Clearly, demographic change is a potentially important determinant of values held by society, given that different demographic groups value the forest differently (McCool and Kruger 2003). Societal values also drive demographic change to the extent that they are reflected in immigration and family policy. Canada has a long history of immigration policy based on perceptions of desirable traits of immigrants.

Industry profitability can be strongly linked to demographics since demand for skilled workers is often a main justification for increased immigration. In the same way, the demographic profile of the country will influence the availability of labour as well as markets and thus will influence profitability.

6. Scenarios for future demographic change

The main plausible scenarios for demographic change revolve first around the question of immigration as the main driver of Canadian population growth, and secondly around questions of distribution of population within the country, particularly between rural and urban areas. Extremes of immigration scenarios would be an opening of immigration to allow more people to move to Canada versus a reduction in quotas to reduce immigration. Both of these scenarios are possible given that immigration is fully determined by policy decisions and that decisions favouring both directions have been made in the past. On the question of distribution, further urbanization and rural depopulation is highly plausible whereas the reverse trend, although less likely, could be anticipated. Migration to rural areas might be expected if urban social conditions deteriorated and/or if improvements in communication technologies allowed urban livelihoods in rural areas.

The population size and distribution dimensions can be combined into four scenarios: 'urban upswing' and 'suburban stable' with both high urbanization and high and low immigration respectively, and 'rural renaissance' and 'hinterland who?' both with population actively distributed into rural areas but with high and low immigration, respectively. Each of these scenarios will present different prospects for future forests.

In 'urban upswing', high population growth will drive an increasing domestic and global demand for forest products and other goods and services from the forest. The population is concentrated in urban areas and multi-ethnic. Significant stress will be placed on near-urban rural forest areas where forest management for fibre will be much lower priority that recreation and aesthetics, but this is ameliorated to some extent because the increasingly urbanized populace feels less need to access distant wildlands. Concern for conservation in urban and peri-urban forests will, however, be high because of their proximity to the population. Demand for fibre products will drive an active forest industry in remote rural areas, supported by lower concern for biodiversity values in those areas among the urban population. The rural population will not be large but will be supported by a vigorous economy. Rural labour shortage in the forest industry may be a problem.

In 'suburban stability', the slowly growing population is well accommodated in urban and suburban housing being vacated by the disappearing baby-boom generation, resulting in a sluggish demand for wood-based products. The tendency toward urbanization is encouraged by the low economic activity on forest lands. Forest industry activity is further reduced by the lack of skilled labour in rural areas. The urban population continues to value and conserve nearby greenspace, without much concern for remote rural areas which they never see. The low rural economy and demanding urban population reduces the funding available to support transportation and other infrastructure in rural areas, creating further disincentives for the urban population to leave the cities.

The 'rural renaissance' world involves high population growth both in urban and rural areas. The viability of livelihoods in both promotes dynamic exchange between rural and urban populations. Strong domestic urban demand supports rural industry and the benefits accruing from regional producers supplying regional markets. Urban populations are aware of rural conditions and extend the concern for conservation into remote areas.

The 'hinterland who?' scenario also has weak global and domestic demand due to low population. Combined with dispersed population, this suggests a rural economy based on diverse local or regionally focused activities. Rural infrastructure would be difficult to support financially so would be in decline, and thus would not support active exchange between rural and urban areas. Dispersal of population from urban areas could be driven by lifestyle choice or economic necessity, rather than by rural vitality postulated in 'rural renaissance' above.

7. Conclusion

Demographics, in Canada and abroad, will be a potent driver of future changes in Canadian forests. Migration, a key component of population growth, is largely under the control of government policy and hence our future population is largely controllable. An increasingly multi-ethic population will bring with it an increasing diversity of values which will affect the future forest through market forces and influence on public forest policy. There are therefore many issues associated with a dynamic ethnic population profile that will make decisions on immigration difficult.

The rights of citizens to live anywhere is enshrined in the constitution and thus the distribution of population is much more dependent on economic forces and less amenable to influence by public policy. It is difficult to foresee a set of conditions that would lead to rural re-population and the tendency to urbanization is a real prospect. Whether this will lead to a population that is mentally, as well as physically, isolated from rural forests and the issues they represent remains to be seen.

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