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**The Key to Kyoto:  
Social Dimensions of Climate Change**

by

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## *Introduction*

I would like to thank the organizers of the National Forum on Climate Change for inviting me to speak about the social implications of climate change. Social dimensions have been identified as one of three building blocks in the environmental, economic and social foundation that comprises the concept of sustainable development.

The social aspects of this concept barely have begun to be explored in terms of their meaning and contribution to sustainable development and climate change more specifically. Yet it is probably through the social dimensions – the actions of individuals, households, neighbourhoods and communities – that significant steps can be taken toward meeting the spirit and targets of the recent international agreement on climate change. Under the agreement signed in Kyoto, Japan, Canada committed itself to reducing greenhouse gas emissions by six percent by the years 2008-2012.<sup>1</sup> The social domain may hold the key to Kyoto.

In this paper, the social dimensions of climate change are presented within a framework that identifies and classifies a range of possible actions. The framework is based on two major categories – the *substance* or specific measures that can be taken and the *process* as to how these can be achieved.

These possible actions assume that despite the scientific uncertainties and controversies about climate change, the ‘business as usual’ route is not an acceptable option. The need for action is clear from the projections of the Intergovernmental Panel on Climate Change, a United Nations-sponsored body that involves nearly 3,000 scientists from more than 100 countries.

It also is assumed that the disparate actions which comprise this framework are held together by a common glue – i.e., a *strong legislative base* that sets the stage for the activity to be carried out by individuals, organizations and governments, and by different sectors. Ideally, the legislative foundation should do the following:

- articulate the values that underlie the legislation and all other actions regarding climate change
- identify clear national goals with respect to climate change
- set out a national framework with possible roles for all stakeholders (i.e., those with a vested interest in the issue)
- provide the context for both regulatory and voluntary action
- set out the parameters for both the incentives and the compliance rules – i.e., the ‘carrots’ and ‘sticks’
- ensure financial support for actions pursuant to the national framework.

## ***The Framework***

Before discussing the social dimensions of climate change, it is important first to explain the framework used to classify the information. While this paper focusses explicitly upon social concerns, the framework also could be used to examine the environmental and economic impacts of climate change.

The framework sets out two major categories of action with respect to the social dimensions of climate change: preventive action and adaptive action. *Preventive action* refers to activities which have the direct or indirect effect of lowering greenhouse gas emissions. *Adaptive action* refers to measures intended to mitigate or compensate for the effects of global warming. Both preventive and adaptive action are discussed below.

While the substance refers to possible measures to be taken, the process refers to the means to achieve these ends. There are two major categories of process: regulatory action and voluntary action. *Regulatory action* refers to measures that by law are required, encouraged or discouraged. *Voluntary action* refers to activities undertaken voluntarily because these are deemed to be the ‘right’ thing to do – whether the motive is true commitment or image, reputation or marketing potential.

This paper first explores the substantive domains of preventive and adaptive action. It then examines regulatory and voluntary action. Finally, it combines both the substance and processes into a grid of climate-related actions in the social domain. Clearly, some of these actions cross into economic and environmental territories. But these areas are linked so intrinsically that it is often impossible – and within the context of sustainable development irrelevant – to say that a given action falls into a ‘pure’ social, economic or environmental box.

## ***The Substance***

### ***A. Preventive Action***

Preventive action involves three key steps: changing values, raising awareness and promoting sustainable communities.

#### ***i. changing values***

Preventive action is predicated upon a clear articulation of values. At the heart of any societal effort to effect environmental and broader social change lies a values base framed on the concepts of stewardship, citizenship and the ethic of care.

Stewardship has been defined by the National Round Table on the Environment and the Economy as “preserving the capacity of the biosphere to evolve by managing our social and economic activities

for the benefit of present and future generations” [National Round Table 1993]. The challenge is to translate that principle into a widely-held value that serves as a beacon to guide action related to the environment and to social well-being more generally.

Stewardship is related closely to the concept of citizenship, which links together the notions of rights and responsibilities. Discussions of citizenship typically focus upon rights and entitlements – i.e., the ‘expectations’ of citizenship. But the other half of the equation – responsibility – is equally important.

The challenge from an environmental point of view is to sustain and enhance the innate capacity of all citizens to build a caring and mutually responsible society. Strong and caring communities start with the citizen as the base. A renewed commitment to citizenship encourages all individuals to become active agents of change in their communities and to engage in public problem-solving [Torjman 1997b: 3]. But citizenship does not refer only to the responsibility of individuals. It also includes governments, business and other organizations.

The potential danger of putting forward the concept of stewardship and more active citizenship is that this message could be interpreted incorrectly to mean that governments can reduce or abrogate their responsibility for environmental, economic and social well-being. This implication is wrong. *In fact, the opposite actually is required.*

Government has a crucial role to play by providing moral leadership, building a common values base, setting the framework for action, establishing the parameters for incentives and compliance, investing in community services, and supporting public involvement and local decision-making. *A call for greater citizen responsibility and involvement does not equate with reduced government; it means a more strategic and clearly-defined role for the public sector.*

Related intrinsically to the notion of citizenship is the ethic of care. The theme of care was used as a key organizing concept for the work of the international Independent Commission on Population and Quality of Life, co-Chaired by Monique Bégin, former Minister of National Health and Welfare. The Independent Commission argued that the ethic of care is a core value that lies at the heart of all action to effect environmental change and to improve social well-being and the quality of life.

The challenge of promoting care as part of an underlying values framework is daunting in a society which places value primarily on items it can measure and monetize – and which considers as most valuable the concrete goods and services deemed to add value to the GDP (Gross Domestic Product).

The problem is that GDP is, at best, an incomplete measure of the health of an economy and society. Worse still, it is a blunt and misleading barometer that counts as positive some very negative events, such as spending to clean up oil spills and other environmental disasters. It fails to account for degradation of the environment and natural systems [Intergovernmental Panel 1995: 5].

GDP is an equally inaccurate predictor of economic health. In the past two years, for example, poverty has continued to rise despite economic growth reflected in a higher GDP. The expression 'jobless recovery' embodies the contradiction. These problems have led to the exploration of other measures, such as the Genuine Progress Indicator (GPI), which attempt to reflect more accurately the true health of a society.

The Independent Commission on Population and Quality of Life argues that the domination of the market-based economy has occurred at the expense of the ethic of care. The growth of output has taken priority over all other considerations. The notion of caring for ourselves, for each other and for the environment is the foundation upon which the sustainable improvement of the quality of life must be built [Independent Commission 1996: 116].

The Commission believes that care must be made visible; it needs to operate publicly as well as privately. "Ending poverty, curbing the waste of resources, promoting the quality of life of others: These are the essence of care. And caring for the environment is central to the quality of life and of survival, for other species as well as our own" [Independent Commission 1996: 177].

In short, the ethic of care is the central value that lies at the heart of protecting the environment and all species, including human beings. We need to balance the obsession with GDP growth by an equally important matter: caring for the environment and for people. Environmental and social concerns share a common values base and are linked by a highly complementary agenda.

Governments can play a crucial role with respect to promoting a shift in societal values. They can provide the moral leadership that puts forward and reinforces the concepts of stewardship, responsible citizenship and the associated notion of care.

The federal government, in particular, can provide moral leadership through promoting the themes of stewardship, citizenship and care. All policies, speeches, budgets and documents of the Government of Canada can make reference to these values and can state clearly that responsible citizenship and care comprise the foundation of all its initiatives. Ottawa can set the tone and thinking that create, in effect, a national project to which all citizens are committed as a common goal.

Of course, moral leadership requires that actions be consistent with rhetoric. The concepts of citizenship and care imply far more than lip service. Recent massive cuts to social programs have raised serious doubts about Ottawa's authority to provide moral leadership, especially when it comes to the ethic of care. Hopefully, the era of soon-to-be mounting fiscal surpluses will help rebuild the social infrastructure and demonstrate the importance of citizenship and care.

Neither has the federal government spent a considerable amount on climate change in particular. The 1998 federal Budget investment of an extra \$50 million annually over the next three years for energy efficiency and renewable energy was seen by environmental groups as a paltry sum.<sup>3</sup> Leadership must be tied to strong, long-term financial commitment.

Governments also can provide moral leadership through exemplary practices. They can introduce, for example, policies on ‘green procurement’ which would change internal practices as well as put pressure on outside suppliers to modify their production and transportation methods if they want to receive public contracts.

*ii. raising awareness*

A clear foundation of values that embraces the twin notions of citizenship and care sets the stage for the next preventive action – i.e., raising awareness about environmental issues and about climate change more specifically. Information is a prerequisite to behavioural shifts.

The problem with climate change, in particular, is that there is conflicting information as to its impact and the appropriate preventive and adaptive actions. Much of the impact information is speculative. There are many projections as to what *could* happen. But we know very little about what actually *will* happen. It is difficult to be prescriptive with an uncertain information base. It is also difficult to convince a confused and skeptical public that preventive measures are essential.

But despite controversies about the urgency of climate change, we do know that greenhouse gas concentrations due to human activity are rising rapidly. There are secondary benefits – or environmental ‘double dividends’ – to greenhouse gas reduction that are equally important. For example, the reduction of greenhouse gases is a desirable goal not only because of climate change but also because of reduced acid rain; lower ground-level ozone, leading to cleaner air in urban areas and fewer respiratory problems; fewer particulates in the atmosphere which harm health; and less habitat destruction from oil exploration. Reducing the use of fossil fuels also may encourage the development of renewable resources and minimize reliance on nonrenewable resources – an important principle of sustainability [Benyus 1997: 265].

Both the federal and provincial governments can play a central role in raising awareness about climate change. They can prepare and disseminate clear, prescriptive information about the steps individuals and households can take to change their consumption patterns and lifestyles to have a positive impact on the environment and on climate change in particular. In line with the theme of responsible citizenship, the messages should emphasize that every small action taken by individuals adds up to a very significant and substantial whole. (The role of business and other organizational ‘citizens’ is discussed below.)

Environment Canada already has begun to develop and distribute such material. It should consider broader coverage, such as media reports, to ensure even wider dissemination of this information. Natural Resources Canada also provides public information – e.g., its Energy Efficiency Home Page sets out clear steps to increase the energy efficiency of homes, vehicles, businesses, institutions and governments. Provinces and schools have an equally important educational role.

But raising awareness involves not only a statement of desirable and undesirable behaviours. Targeted information also is needed to promote informed choice. ‘Just-in-time’ facts are required at key decision points – e.g., when consumers purchase a vehicle or when companies consider various modes of transport for their products.

In order to promote informed consumer choice, manufacturers and producers could be obliged, for example, to label very clearly the emissions associated with a given product and its most energy-efficient uses. This requirement would be part of a regulatory regime (i.e, product labelling) that supports voluntary action (i.e., informed consumer choice).

In addition to ‘just-in-time’ information, car manufacturers in particular should be encouraged to change their advertising from the heavy promotion of sport utility vehicles and minivans to more fuel-efficient vehicles. In fact, European advertising emphasizes efficiency and economy. At a recent car show in Tokyo, Japanese car manufacturers focussed upon the fuel efficiency of their vehicles as the key selling point; US manufacturers, by contrast, promoted lifestyle and image. “Throughout the show, the themes of Japanese carmakers were of technological substance: fuel economy, near-zero tailpipe emissions. The Americans were pushing sizzle and style” [Kageyama 1997].

### *iii. promoting sustainable communities*

The third major preventive action is the development of sustainable communities which are intended to promote environmental, economic and social well-being. Sustainable communities seek to create local jobs and wealth, are designed to be ecologically sustainable, and set up structures and processes that allow greater community control of decision-making and resources [Nozick 1992: 141].

The need to design sustainable communities has arisen primarily from the decline of many urban areas and the environment more generally through urban sprawl, the associated smog and the appropriation of natural habitats. The conventional wisdom underlying the traditional design of urban areas often lacks real wisdom; urban development that has created sparsely-populated neighbourhoods and that separates out the various functions of living has led to a wide range of environmental, economic and social problems.

Jane Jacobs, one of the foremost critics of conventional urban planning and design, has proposed a different set of principles to shape modern city planning and rebuilding. In contrast to the accepted practice of urban development, Jacobs views the concept of density in urban development as a good thing, not as something to be avoided. Urban design should be shaped by the principle of ‘mixed use’ in which communities combine housing, workplaces, shopping, education, recreation, leisure, culture and green space. Mixed-use, dense communities are more economically alive, make for safer urban areas (there are more ‘eyes on the street’) and encroach less upon natural habitats [Jacobs 1961].

The intensification of neighbourhoods – particularly residential suburbs – also helps contain urban sprawl and the associated need for automobile use. With housing, work, education, recreation, shopping and banking in close proximity to each other, the self-reliant neighbourhood reduces the use of cars [Nozick 1992: 44]. Neighbourhoods can be designed to be more self-sufficient by making work, health and social services, and cultural activities within walking or cycling distance to most residents.

Sustainable communities encourage local planning and decision-making. Local solutions to climate change, in particular, will require the engagement of all sectors in identifying possible actions to reduce greenhouse gas emissions. Municipalities could appoint citizens' councils to develop local ecological plans.

These plans might include, for example, public awareness sessions, the intensification of community functions, mixed-use design for new sub-developments, supports for at-home work, solid waste reduction in order to lower methane emission from landfill sites, better insulation for commercial properties and private residences, and community projects such as tree planting. Other actions might involve restrictions on the times or areas of private automobile usage, lower bus emissions, improvements to and integration of public transportation, carpooling requirements and shifts in traffic patterns.

Local ecological plans also could incorporate a blueprint for alternative energy sources – e.g., wind, solar or biomass energy – in order to reduce and eventually replace fossil fuels. The selection of alternatives must be made on the basis of a Life Cycle Analysis to ensure that the processes involved in the capture and production of these alternatives do not rely excessively on fossil fuels. Another option is to treat existing greenhouse gases or recapture them for productive use – e.g., methane provides a profit when recovered from landfills and is used to generate electricity or heat.

Clearly, the research for such technologies requires substantial investment (government and private) that goes well beyond the capacity of local communities. But the commercial application of alternative resources, in some cases, would be local. Wind energy, for example, is becoming less expensive to produce. While it is still too costly to operate on a widespread basis, on a smaller scale, the harnessing of wind energy is both technologically and financially feasible.

These smaller energy stations could complement – and in some communities eventually replace – much of the power provided through large monopolistic utilities. The smaller the production load and the shorter the 'commute,' the less likely it is that problems or massive breakdowns will occur [Benyus 1997: 269]. The pressure to meet the Kyoto commitment may act as a positive impetus to the commercial development of locally-generated forms of energy production scaled to operate on a regional rather than provincial basis.

Environmental remedies and substitute technologies could create many new jobs, thereby helping to address one of Canada's key problems – our chronically high rate of unemployment. Retrofitting and upgrading the energy efficiency of homes and buildings also could generate substantial work. The development and production of local energy supplies could be a boon to local employment. Groups

concerned with promoting job creation through community economic development likely could find a range of opportunities in the environmental field. Organized labour can play an important role by directing venture capital funds towards businesses that lower or replace the production of fossil fuels.

In fact, environmental technologies now represent one of Canada's top five industries. And American Vice-President, Al Gore, has estimated the value of the global market for environmental goods and services at approximately \$300 billion; it will grow to between \$400 and \$500 billion by the beginning of the next century [Benyus 1997: 247]. (It should be noted that such estimates are always subject to challenge with respect to the definition of 'environmental industry.')

Ideally, local ecological plans also would take into account social issues. For example, community gardens are a source of low-cost nutritious food, represent an environmentally positive use of land and help reduce the 'food miles' associated with imports. The educational value of community gardens is also important; gardens help children learn about the environment as they take a direct role in planting and harvesting the produce [Torjman 1997a: 2].

In short, there are clear complementary agendas and great potential for integrating environmental issues with local economic and social needs. There are also striking parallels with the approaches required for community-based poverty reduction [Torjman 1998].

But community-based development can go only so far. Unemployment must be addressed primarily through appropriate fiscal and monetary policies [Caledon Institute 1997]. Governments also can combat unemployment through public sector job creation.

Future needs arising from climate change present many opportunities for employment. There is a backlog of public infrastructure projects, especially in the environmental and transportation areas as well as in health, social services, research and education that would generate substantial payback for future generations. One possible area is the fortification of existing infrastructure, such as dams and bridges, that will become increasingly vulnerable to the effects of climate change, such as heavy rains and associated floods. The reinforcement of these structures is an important adaptive action (discussed below) that also would create jobs.

The Winnipeg Floodway provides a striking example of the importance of reinforcing certain components of physical infrastructure. Premier Roblin was criticized severely when his government borrowed money to build the Floodway in the 1960s (the federal government contributed funds as well) [Caledon Institute 1997: 5]. But it is now abundantly clear that the return on this investment has been huge in terms of minimizing the environmental and economic damage from the 1996 Winnipeg and earlier floods.

The potential cost of measures that contribute to sustainable communities typically arises as a concern. But actions to promote sustainable communities are not always a fiscal drain; there also can be positive economic spinoffs. Toronto, Edmonton and Ottawa, for example, have been successful in

reducing greenhouse gas emissions. Far from suffering, these municipalities have achieved lower operating costs and job creation. They have cleaned the air and increased their efficiency [Leckie 1998].

Finally, it is essential in a discussion of sustainable communities not to forget Canada's international obligations. Global efforts to slow population growth and reduce poverty would help curtail pressures throughout the world to clear forested land for agricultural and industrial use and development. Canada can play a role through continued investment in foreign aid – particularly by supporting education for women. The evidence on population growth suggests that educational level and birth rate are inversely related; higher levels of education usually correspond with fewer children. Several major international reports emphasize the need to improve the status and education of women throughout the world as a primary route to poverty reduction and environmental protection [World Commission 1987; Independent Commission 1996; United Nations 1994].

### ***B. Adaptive Action***

Adaptive action represents the second stream of intervention; it involves compensating for or offsetting the impact of climate change. Adaptive action must address two key challenges: weather-related *change* (which may be moderate or substantial) and weather-related *extremes* whose immediate impact is significant even though it may be short-lived.

Despite the uncertainty regarding the precise impact of climate change, projections for possible floods, drought, ice storms, intense forest fires and other extreme events are sufficient warning for immediate action. If there is any watchword to help guide the future, it is 'planned spontaneity.' *We must plan not for the certain but for the unexpected.*

A clear lesson from the ice storm of 1997 was the fact that we were not prepared for this emergency. The Quebec government now is requiring municipalities to have in place an emergency preparedness plan in order to deal with future disasters.

#### ***i. community supports***

From a social perspective, vulnerable individuals are the primary adaptive concern. They include very young children, the elderly, the poor (who cannot afford to offset damages on their own or to check into the nearest hotel even at a 'reduced rate' of \$40 a night) and the homeless who are always susceptible to climate change. This focus is entirely consistent with the concept of sustainable development which emphasizes the need to protect vulnerable groups; the first step with respect to human settlements is to shelter the homeless [World Commission 1987].

In addition to violent or unpredictable events, there likely will be an increase in the number of injuries and deaths related to climate extremes, such as prolonged heat waves. Again, the most pressing

social need is to protect the vulnerable – very young children, seniors, the homeless and those with respiratory conditions or heart ailments. The potential threat is real: The 1995 Chicago heat wave killed an estimated 700 people.

Some American states provide air-conditioned shelters for the elderly during extreme heat waves. Other options include the distribution of vouchers to seniors and welfare recipients for the purchase of fans (or heaters in the case of prolonged cold spells or generators in the event of electricity loss) to relieve the effects of extreme climate.

The lesson from both ends of the weather spectrum – the ice storm and the heat wave – is clear. The key to coping with any weather-related extreme is to have in place a social infrastructure that can respond appropriately to the emergency. This infrastructure includes a network of temporary shelter and transitional housing; search squads to find and rescue potential victims; emergency food supplies, utilities, clothing and health care; and transportation for those unable to move on their own from an affected area. This infrastructure is essential to the fabric of all communities. It should not be a make-shift system that comes into play only in the extreme.

Unfortunately, in recent years, there has been a serious erosion of the social infrastructure throughout the country. The pursuit of deficit reduction has come at the expense of the network of health and social services. At the federal level, the erosion of social programs actually started in the late 1970s with successive federal cuts to provincial transfers for health, postsecondary education, welfare and social services [Battle and Torjman 1995]. But the real ‘bomb’ came in 1995 with the dismantling of the Canada Assistance Plan (CAP) – the legislative base under which Ottawa shared with provinces in the cost of welfare and a range of social services. The Budget replaced CAP with the Canada Health and Social Transfer (CHST).

The CHST arrived with a huge cut in federal cash payments to the provinces for human services. When it took effect in 1996-97, the CHST paid the provinces \$26.9 billion – \$2.5 billion less than the \$29.4 billion that would have been sent under the former system. In its second year, 1997-98, the CHST transferred \$25.1 billion – \$4.5 billion less than the \$29.6 billion the provinces would have received under the old regime. These reductions amount to 8.5 percent for 1996-97 and 15.2 percent for 1997-98, and total a hefty \$7.0 billion [Battle and Torjman 1995].

The social infrastructure throughout Canada has been weakened seriously through this loss of funds and the resulting provincial cuts to health and social programs. This disinvestment is bad at the best of times – but is especially problematic during emergencies, which are likely to occur more frequently. One only need visit the emergency wing of the nearest hospital (if it is still open) to see the impact. If these facilities have difficulty functioning under the best of circumstances (if any hospital emergency can be considered the ‘best of circumstances’), how will they cope with severe pressures that will be more common in future?

And it is not only formal institutional care that has suffered. The dismantling of CAP created another serious problem. The federal government no longer shares half the cost of provincial human services, including supports for frail and elderly people who live at home. Community services – especially home care – are stretched to the limit. They operate on a shoestring even now; they barely were able to cope during the recent ice storm.

The withdrawal of CAP also has meant the loss of funds for emergency and transitional shelter. Cutbacks in the mental health system have left many former patients on the streets. The retraction of funds from social housing has reduced the supply of affordable accommodation.

Most communities have a fragile social infrastructure: Could they cope with a Chicago-like heat wave or a Florida-style set of tornadoes? Could we put in place the system of alternative shelter and monitoring that would be required? Could we sustain this activity if weather extremes become more frequent and intense? The ice storm refugees on the south shore of Montreal who had to live for several weeks in makeshift shelters were susceptible to exhaustion, illness and extreme stress. The incidence of domestic violence and assaults during the crisis rose dramatically.

A fragile social infrastructure makes more vulnerable the already weak. This conclusion does not necessarily imply that special investment is needed solely for weather extremes. Rather, communities require a strong social infrastructure – emergency and chronic health care; transitional and emergency shelter; and supports for the elderly such as home care, hot meals and visiting programs – that meets the health and social needs of the population. This infrastructure then would be in a position to address any extreme event or emergency as required.

Water shortage and the associated potential for conflict is another looming social issue. Some scientists argue that conflict over water may become *the* central problem related to climate change as fresh water becomes an increasingly scarce resource throughout the world.<sup>4</sup> At the national and international levels, dispute resolution panels will be required to address the problem. At the regional and local levels, it is more appropriate to think in terms of community-based conflict resolution programs.

These programs are in place right now in only a limited number of communities and tend to deal with racial tension, domestic violence and conflict related to commercial interests (e.g., protection of fishing areas in northern communities from overuse by sport fishers). Conflict resolution programs are important because they seek nonviolent solutions to economic and social problems. By trying to avoid violent confrontation, these initiatives help reduce police costs, court appearances and imprisonment.

As in the case of health and social services, if a network of programs were in place to deal with a range of conflicts, it could address tensions arising from critical water shortages. Naturally, community-based solutions cannot prevent or resolve international conflicts around this resource – although the principle of peaceful dispute mediation is highly relevant.

*ii. financial impact*

The question as to who should pay for weather-related damage is an important aspect of adaptive action. Two major types of payment are relevant here: compensation for individuals who have suffered as a result of extreme weather and compensation of entire sectors and communities that have been affected adversely by a weather emergency or climate change more generally. The second dimension is discussed below under economic impact.

For the most part, the insurance industry claims that it is not responsible for compensating for extreme weather events. The industry potentially could further restrict insurance coverage as the frequency and/or severity of natural catastrophes increase(s). Insurance companies generally adapt to losses by raising premiums and/or deductibles, reducing or withdrawing coverage altogether or making the underwriting or risk conditional on certain actions being taken by the policy holder [Environment Canada 1997a: iii].

Again, the ice storm was instructive: We cannot rely on private insurers to provide adequate or comprehensive coverage in the event of climate extremes. The federal and provincial governments paid some damage compensation in respect of the Saguenay and Winnipeg floods and the ice storm in Eastern Canada. But many victims claim that the amounts typically came nowhere near the estimated damage. (The current government formula for compensation calls for the province to pay the first dollar per capita. The federal government then pays on an escalating basis beyond the first dollar per capita payment.)

All three events saw extraordinary acts of generosity from individuals, community groups, small businesses and corporations. For many victims, these charitable efforts were the only assistance they received. Moreover, the generous ice storm contributions apparently came at the expense of existing agencies, many of which experienced a drop in donations.

One option for adaptive action is to strike a national fund for emergency compensation. It is of interest that the 1998 Budget announced an earthquake premium reserve to ensure that insurance companies have sufficient compensation capacity if required. This measure could be seen as a precedent for protection from other natural disasters, including weather extremes.

A contributory plan for individual compensation is another possibility. The latter raises interesting parallels with other aspects of social policy – notably social insurance programs, such as the Canada Pension Plan (CPP) and the parallel Quebec Pension Plan (QPP). The CPP/QPP protects workers and their families from long-term or permanent interruption of earnings as a result of retirement, severe and prolonged physical or mental disability, or death.

The CPP/QPP disability benefit provides insurance protection to all Canadians in the event of work interruption as a result of disability. Typically, private insurers exclude applicants with previously-

existing health conditions or charge higher premiums which make coverage unaffordable for some. Conditions that may appear to be covered on paper are not in practice.

These compensation options are important not just for current victims but also for the next generation which undoubtedly will suffer even more the consequences of severe weather. Individual compensation also could be linked to some form of regional or sectoral assistance.

### *iii. economic impact*

Climate change is expected to have an impact on the economy as certain industries and sectors are favoured and others are discouraged or damaged. As earlier noted, there are substantial job opportunities in the development of new energy sources, energy efficiency and the retrofit of existing infrastructure. New technologies include the replacement of certain industries as well as the reorientation of current capacity towards cleaner technologies and products.

In the meantime, throughout the conversion process, there likely will be job losses in designated sectors – primarily coal, oil, gas, forestry, transportation and fishing although manufacturing and many service industries would be affected as well [Cohen-Rosenthal 1997: 6]. (It should be noted that while this study includes the gas industry, some would argue that there actually will be an *increase* in employment in this sector in the shift from oil to natural gas.) In recognition of the time required for industrial adaptation, there may be a need for transitional assistance – for both compensation and retraining – to help workers who will be hit hardest by economic shifts related to climate change.

But the need for transitional funds applies not only to industrial sectors. Certain regions also may require temporary assistance because of the likely impact of climate change [Environment Canada 1997a].

It recently was reported, for example, that the temperature in 1997 was too warm to grow ice grapes in the Niagara Region. Because of the milder climate, birds ate the grapes before these could be harvested. If the temperature remains moderate, this climate shift could affect the entire industry. It still might be possible to grow ice grapes, but they may have to be harvested in more northern regions of the country.

This ‘grapevine example’ may represent only the tip of the iceberg (so to speak); perhaps more than most industrialized nations, the Canadian economy relies upon the land. One in three Canadian workers is employed directly or indirectly in agriculture, forestry, mining, energy production, and other energy-intensive and land-based activities [Environment Canada 1997b: 5]. Serious climate change potentially could affect all land-based industries in some way.

While all Canadians face the risk of extreme weather, climate change could have an especially devastating impact upon Aboriginal Canadians whose economic and social well-being is tied to the land.

The land-based economic sector (hunting, trapping, fishing) is worth about \$15,000 per household annually in the Arctic and often comprises up to half the total local economy [Environment Canada 1997b: 15].

A recent news report noted that a group of Aboriginals in northern Manitoba was experiencing severe problems this year because of the warmer winter. The ice roads that they typically use in winter for the transport of food and other supplies were not frozen and actually were impassable. All provisions had to be flown into the area at great cost. The group is requesting financial assistance from government to help offset these costs.

Many communities throughout the country risk an unstable – or even shattered – economic base. Atlantic Canada has experienced severe economic difficulties since the collapse of the cod industry. (In fact, global climate change may prevent recovery of the cod species; cooling temperatures near Greenland likely will endanger cod reproduction.<sup>5</sup>)

In recognition of the high rate of unemployment in the Atlantic region, the federal government provides economic subsidy in the form of equalization payments and Employment Insurance. Ottawa also paid a special form of compensation to individuals who lost work in the cod industry. The purpose of The Atlantic Groundfish Strategy (TAGS) was to support retraining for new forms of work (it has done so with varying degrees of success).

Equalization payments refer to money that the federal government transfers to the poorer provinces to help equalize their fiscal capacity. The basic principle underlying this arrangement is to enable all provincial governments to provide public services at the level of the national average without having to resort to unusually high taxes of their own.

Employment Insurance is a national program that pays benefits to workers who are unemployed as a result of job loss, layoff, or temporary illness or disability. Benefits are paid over longer periods to workers in areas of disproportionately high unemployment.

While equalization and Employment Insurance are unique programs with different purposes and funding arrangements, they share a common purpose. They both recognize and compensate for regional fiscal imbalances and difficult economic circumstances. One could argue that they represent a precedent for offsetting fiscal hardship based on region.

The principle could apply to regions and communities whose economies suffer dramatically – a collapsed industry or irrevocably damaged natural resource – as a result of climate change or extreme. Transitional assistance could help pay for rebuilding, retraining or relocating physical plant and people. Transitional funds also might be considered for communities affected not directly by climate change but indirectly through shifts from oil to other energy sources.

Transitional assistance would be provided only in the event that the problem was the likely result of climate change. Because attribution clearly is a difficult problem, it may be easy to dismiss the issue on the grounds that it is hypothetical or too far down-the-road. This 'logic' would run counter to the concept of sustainable development – which *requires* long-term planning. Today's efforts should focus explicitly upon protecting the world for future generations.

***iv. health impact***

Scientific projections warn about the possible spread of insect-borne diseases – e.g., the mosquitoes which transmit malaria potentially could return to southern Canada. Concerns also have been expressed about the likely impact of climate change on respiratory disorders which are exacerbated by extreme heat and smog.

While some claims have been criticized as a 'sky-is-falling' approach, the possible impact of climate change on health should not be dismissed. Again, the watchword is to prepare as if the emergency is quite possible – and not wait until it actually happens. Representatives from the public health and medical sectors should be discussing the projections and proposing a research and/or action plan to deal with potential threats.

***The Process***

The previous section explored the social implications of climate change from the perspective of *substance*. Its purpose was to delineate possible actions that could be taken both to prevent and protect against climate change. This section considers two major types of *process* – regulatory action and voluntary action – to effect these substantive actions.

Regulatory action takes the form of legislative acts and their associated regulations that encourage, require or forbid certain behaviours. Regulatory action has two key functions. First, it can encourage certain behaviours through 'rewards,' such as tax breaks, public recognition or incentives. Second, it can discourage or even punish designated behaviours through penalties – e.g., bad publicity, fines, withdrawal of license or even imprisonment.

Voluntary action is the second stream of process. Voluntary action refers to activities undertaken voluntarily because these are deemed to be the 'right' thing to do. While the ideal would be to rely more on voluntary action to achieve environmental goals, experience has shown that it is far too early to relax the regulatory framework. For the time being at least, voluntary action is an important supplement and complement to regulatory action.

### ***A. Regulatory Action***

Many regulatory actions, both rewarding and punishing, have been proposed with respect to climate change. The following examples are illustrative and not exhaustive; they relate to the preventive and adaptive actions earlier described.

Possible regulatory action includes the improvement of vehicle efficiency by raising mileage-per-gallon standards for new cars and light trucks. Governments can regulate traffic patterns or make carpooling mandatory in certain areas or at designated times.

Regulation can require (and possibly provide financial support for) the retrofit of older homes and buildings for increased energy efficiency. Building codes can set guidelines for more energy efficient construction and insulation. They also can be upgraded to account for the fact that all construction, including public infrastructure such as bridges and dams, will have to withstand more extreme weather conditions, such as heavy rains and associated floods.

Home energy efficiency could be upgraded through insulation, furnace tune-up, weather-stripping, lighting replacements and water-saving measures. Regulation can encourage or even require (at least in new construction) a shift from oil to gas furnaces. Electricity and heat demand in private residences and commercial buildings can be reduced through higher costs.

In considering regulation with respect to lifestyle changes, it is important to recognize that individual households will have to incur certain costs – e.g., to convert from an oil to a gas furnace or to change to more efficient lighting. Some form of subsidy or tax relief to encourage these behaviours may be appropriate, especially for low-income households for which any kind of regulatory change can represent an impossible financial burden.

At the industry level, governments can prescribe improved efficiency standards for lighting and appliances. Governments can promote investment in research and development of alternative energy sources – e.g., fuel cell batteries, solar energy, wind power – and can provide subsidies for the development of cleaner energy sources, such as natural gas. They can require the labelling of products and the provision of information in support of informed consumer choice – an important dimension of voluntary action.

Governments also can take regulatory action to encourage the development of sustainable neighbourhoods. Thirty-seven Canadian municipalities involved in a National Program on Climate Change are working to reduce greenhouse gas emissions within their own operations and within their municipal boundaries.<sup>6</sup> In fact, some local leaders have proposed that the federal government partner with municipalities to reduce emissions. Cities could be under contract to Ottawa to provide greenhouse gas emission reductions for a dollar a ton, through a 12-year, interest-free loan [Leckie 1998].

Over the long term, municipalities can promote the intensification of neighbourhoods through closer integration of housing, work, shopping, recreation and services. Municipalities also can encourage and make possible more opportunities for home-based work in order to reduce transportation pressures (although this option must be voluntary<sup>7</sup>). Zoning by-laws in many municipal areas still prohibit the start-up and operation of home-based businesses [Nares 1998].

Until recently, for example, it was illegal to edit a book or teach piano lessons from home in the City of Toronto. While this restriction did not necessarily stop book editing, it sent a clear message that the city did not support home-based enterprise. Many municipalities do not allow retail sales from home. Technically, this policy also applies to direct mail businesses which are very suitable for a home-based environment. Some municipalities forbid the use of equipment that ordinarily would not be used in the home, thereby limiting the creation of small home-based manufacturing enterprises [Nares 1998].

While some restrictions on commercial activities in residential neighbourhoods clearly are desirable, a total ban discourages and even prevents the redesign of neighbourhoods. Municipal by-laws should be reviewed to encourage certain forms of home-based work. Employers also can play a role by supporting the creation of work stations at home and in neighbourhoods. Telecommunications and sophisticated communications networks make possible this option.

Regulatory action not only involves incentives for and restrictions upon individual or organizational behaviour. It also explicitly can support voluntary action by setting up and financing certain bodies to develop environmental plans and promote preventive action. As noted, green procurement policies encourage suppliers to modify their own practices.

## ***B. Voluntary Action***

While regulation remains the centrepiece of environmental protection, its role must be complemented by a more responsive, participatory process. Individuals as well as all sectors – governments, business, labour, education, foundations and social agencies – can take voluntary measures to prevent and remediate climate change.

At the heart of voluntary action lies the decisions of individuals. It is essential to raise public awareness about climate change and to provide both general and ‘just-in-time’ information in order to promote informed consumer choice.

Voluntary action also has become an important part of the business agenda in some sectors. The Voluntary Challenge and Registry set up under the auspices of Natural Resources Canada, for example, records the efforts of private and public sector organizations in reducing greenhouse gas emissions. Participants are encouraged to submit a letter of intent confirming a commitment to limit or reduce greenhouse gases from their operations. This letter is followed by an action plan and subsequent progress reports. The Internet registry publicly documents the progress and achievements of all participants.

Again, the encouragement of responsible action needs a clear information base to guide that activity. The Canadian Standards Association (CSA) has developed a Voluntary Environmental Management System based on the international ISO 14000 protocol [CSA 1994]. The protocol is intended to encourage businesses to integrate environmental thinking into their daily operations and continually improve their techniques to minimize the adverse impact of their activities on the environment.

Ideally, environmental management should be seen as an integral part of overall management responsibility. Environmental management involves a systematic approach for identifying any significant impact arising from the organization's activities, taking corrective action and improving environmental performance.

Other sectors also can take voluntary action around climate change and the environment more generally. Municipalities, for example, can explore the use and sale of alternative energy sources. They can lower waste production through reduced usage, recycling, and refurbishing of equipment and physical plant, and can encourage local residents to do the same. Municipalities can promote tree planting and the protection of natural habitats and green spaces from development.

Municipalities also can support the development of sustainable communities through improved public transit as an alternative to private vehicles. Bike paths can be expanded; city streets and by-ways for pedestrians can be improved.

But voluntary action refers to far more than the behaviours of individuals or single sectors. Voluntary action requires multisectoral dialogue and collaborative action. Collaborative work helps transcend the narrow interests that individual sectors typically 'bring to the table' [Nozick 1992]. In fact, sustainable development is framed on the notion that solutions to complex environmental, economic and social problems are best addressed through multisectoral approaches.

Canada has substantial experience in encouraging voluntary action through multisectoral dialogue. We are "pioneers of the concept of 'Round Tables,' and moved in the late 1980s to establish these multistakeholder advisory bodies at all levels of government and in every province" [Bell 1998: 1]. Under the auspices of the Ontario Round Table on Environment and Economy, for example, a Transportation Collaborative involving 32 stakeholders developed a strategy for reducing carbon dioxide emissions that was endorsed formally by all but two members [Bell 1998: 6].

While voluntary action is important, it never should be seen as a panacea or replacement for a strong public framework for action. There are clear parallels here with community-based poverty reduction. A 'bottom up' approach to poverty reduction can work only within the context of sound economic and social policies. Community-based initiatives are an important *supplement and complement* to a solid, publicly-supported social infrastructure [Torjman 1998: 5].

***Framework for Action***

The following grid combines the elements of the above discussion. Major actions fall into four major quadrants: preventive/regulatory, preventive/voluntary, adaptive/regulatory and adaptive/voluntary. The measures set out in this grid do not represent an exhaustive list; rather, they illustrate the scope of possible actions on climate change.

***Social Dimensions of Climate Change:  
Framework for Action***

	<b><i>Preventive</i></b>	<b><i>Adaptive</i></b>
<b><i>Regulatory</i></b>	<ul style="list-style-type: none"> <li>• requirements for car manufacturers to produce more fuel-efficient vehicles</li> <li>• requirements for greater energy efficiency in appliances</li> <li>• new or additional tax on designated goods (e.g., gasoline; vehicles that are energy-inefficient)</li> <li>• surtax on oil furnaces or home heating fuel</li> <li>• prohibition of private vehicles in certain areas at specified times; traffic control and carpooling requirements</li> <li>• product labelling</li> <li>• modification of zoning by-laws that discourage or prohibit home-based work</li> <li>• the intensification of neighbourhoods</li> <li>• restoration of funding for health care and social services</li> </ul>	<ul style="list-style-type: none"> <li>• requirements for local emergency plans</li> <li>• neighbourhood hostels and emergency services</li> <li>• tax credits or subsidies for purchases related to climate extremes (e.g., fans, heaters)</li> <li>• emergency compensation for individuals</li> <li>• transitional funds to support retraining and relocation for affected communities or sectors</li> <li>• monitoring the spread of climate-related diseases and plans for control/immunization</li> </ul>
<b><i>Voluntary</i></b>	<ul style="list-style-type: none"> <li>• raising awareness about environmental protection and activities that affect climate change</li> <li>• tax credits for purchase of fuel- and energy-efficient products and fossil fuel replacement products</li> <li>• improvements to public transit</li> <li>• development of model mixed-use communities</li> <li>• development of neighbourhood ecological plans</li> <li>• neighbourhood tree planting</li> <li>• further development of bikeways and walking paths</li> </ul>	<ul style="list-style-type: none"> <li>• neighbourhood emergency relief systems</li> <li>• community plans for protecting vulnerable groups from climate extremes</li> <li>• voluntary fundraising for compensating victims of climate extremes</li> <li>• community economic development which promotes the replacement of fossil fuels</li> </ul>

### ***Intergenerational Equity***

Before selecting possible actions, it is essential to examine them through the screen of intergenerational equity – a core construct of sustainable development. Intergenerational equity means that responses to current problems should not compromise the ability of future generations to meet their own needs. The concept promotes intergenerational linkages by encouraging all generations, present and future, to make the best use of their capabilities and resources [National Round Table 1993].

Adaptive action is important; there should be ways of compensating future generations for possible reductions in their well-being – e.g., helping them with costs arising from climate-related damage or dislocation. But preventive action is equally, if not more, important. Its purpose is to ensure a healthy and safe world for coming generations.

In considering the balance between investing in prevention or remediation, the screen of intergenerational equity likely would come down on the side of prevention. If we have to make difficult choices – and we will – we should favour preventive over adaptive action. Those choices may create more hardship for the current generation, but would ensure far greater protection for our children.

### **Endnotes**

1. The Kyoto agreement reached on December 10, 1997 is formally known as the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The Protocol commits Canada to reducing greenhouse gas emissions by six percent below their 1990 level by 2012 – within 15 years. But because the emission of three of the six gases covered under the Protocol – carbon dioxide, methane and nitrous oxide – already has gone up by an estimated 13 percent since 1990 (the beginning of the recession), the Kyoto target effectively requires closer to a 19-20 percent reduction to meet our international commitment. The burning of fossil fuels is primarily responsible for the production of greenhouse gases.

2. The findings of the scientists on the Intergovernmental Panel on Climate Change pass through a nine-step process of review and critique, including government policy reviews in each country [Bell 1998: 4].

3. This amount is in addition to the \$60 million that the 1997 Budget had allocated over three years beginning in 1998-99 and the \$100 million to combat climate change prior to 1997.

4. Roger Street, for example, made this argument in a presentation to the National Round Table on the Environment and the Economy on February 16, 1998 in Ottawa. Roger Street is Director of the Environmental Adaptation Research Group within the Climate and Atmospheric Research Directorate of Environment Canada.

5. This point was raised at the meeting of the National Round Table on the Environment and the Economy on February 16, 1998 in Ottawa.

6. These municipalities are part of a group called the ‘20 Percent Club.’ The Club derives its name from the 1988 Toronto Conference on the Changing Atmosphere which called for a 20 percent reduction in greenhouse gas emissions. As explained in endnote 1, the Kyoto target effectively requires closer to a 19-20 percent reduction in greenhouse gas emissions in order to meet Canada’s international commitment.

7. It should be noted that home-based work comes with its own set of social problems. For some people, home-based work is isolating, stressful and nonproductive. Employees should not be forced to work in this way but should have a choice. They may opt, for example, for a combination of work outside and within the home.

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